

National Institute on Alcohol Abuse and Alcoholism

# Assessing Alcohol Problems

A Guide for  
Clinicians and  
Researchers

Second Edition



**U.S. Department of Health  
and Human Services**  
Public Health Service  
National Institutes of Health

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National Institute on Alcohol Abuse and Alcoholism

# **ASSESSING ALCOHOL PROBLEMS**

**A Guide for Clinicians and Researchers  
Second Edition**

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U.S. Department of Health and Human Services  
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National Institutes of Health

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# Abbreviations and Acronyms

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AA	Alcoholics Anonymous	ASAP	Adolescent Self-Assessment Profile
AAAS	Alcoholics Anonymous Affiliation Scale	ASAT	aspartate aminotransferase
AAI	Alcoholics Anonymous Involvement [Scale]	ASB	Adaptive Skills Battery
AAIS	Adolescent Alcohol Involvement Scale	ASI	Addiction Severity Index
AAS	Addiction Admission Scale	ASMA	Assessment of Substance Misuse in Adolescents
AASE	Alcohol Abstinence Self-Efficacy [Scale]	ASMAST	Adapted Short Michigan Alcoholism Screening Test
ABS	Alcohol Beliefs Scale	ASRPT	Alcohol-Specific Role Play Test
ACQ-NOW	Alcohol Craving Questionnaire	ATI	Addiction Treatment Inventory
ADAD	Adolescent Drug Abuse Diagnosis	AUDIT	Alcohol Use Disorders Identification Test
ADCQ	Alcohol and Drug Consequences Questionnaire	AUI	Alcohol Use Inventory
ADI	Adolescent Diagnostic Interview	AWARE	Assessment of Warning-Signs of Relapse
ADIS	Adolescent Drug Involvement Scale	BAL	blood alcohol level
ADRS	Alcoholism Denial Rating Scale	B-PRPI	Brown-Peterson Recovery Progress Inventory
ADS	Alcohol Dependence Scale	CAI	Client Assessment Inventory
AEQ-S	Alcohol Effects Questionnaire-Self	CAPS-r	College Alcohol Problem Scale-Revised
AEQ	Alcohol Expectancy Questionnaire	CASI	Comprehensive Adolescent Severity Inventory
AEQ-A	Alcohol Expectancy Questionnaire Adolescent Form	CASI-A	Comprehensive Addiction Severity Index for Adolescents
ALAT	alanine aminotransferase	CBI	Coping Behaviours Inventory
A-OCDS	Adolescent Obsessive-Compulsive Drinking Scale	CBT	cognitive-behavioral therapy
AOD	alcohol and other drug	CDAP	Chemical Dependency Assessment Profile
APS	Addiction Potential Scale	CDDR	Customary Drinking and Drug Use Record
APSI	Adolescent Problem Severity Index	CDP	Comprehensive Drinker Profile
ARCQ	Adolescent Relapse Coping Questionnaire	CDT	carbohydrate-deficient transferrin
ASAM	American Society of Addiction Medicine		

CEOA	Comprehensive Effects of Alcohol [Scale]	DTCQ	Drug-Taking Confidence Questionnaire
CIDI	Composite International Diagnostic Interview	DUI	driving under the influence
CIWA-AD	Clinical Institute Withdrawal Assessment	DUSI-R	Drug Use Screening Inventory (revised)
CLA	Computerized Lifestyle Assessment	DWI	driving while intoxicated
CLDH	Cognitive Lifetime Drinking History	ECBI	Effectiveness of Coping Behaviours Inventory
CLDQ	Concordia Lifetime Drinking Questionnaire	EDA	Effects of Drinking Alcohol [Scale]
CMRS	Circumstances, Motivation, Readiness and Suitability [Scales]	EDS	Ethanol Dependence Syndrome [Scale]
COPEs	Community-Oriented Programs Environment Scale	EER	ethanol elimination rate
d	day	ELISA	enzyme-linked immunosorbent assay
DAP	Drug and Alcohol Problem [Quick Screen]	EtG	ethyl glucuronide
DAPSI	Drug and Alcohol Program Structure Inventory	FH-RDC	Family History–Research Diagnostic Criteria
DAPTI	Drug and Alcohol Program Treatment Inventory	F-SMAST	Adapted Short Michigan Alcoholism Screening Test for Fathers
DAST-A	Drug Abuse Screening Test for Adolescents	FTQ	Family Tree Questionnaire [for Assessing Family History of Alcohol Problems]
DCS	Drinking Context Scale	g	gram(s)
DEQ	Drinking Expectancy Questionnaire	GAIN	Global Appraisal of Individual Needs
DICA	Diagnostic Interview for Children and Adolescents	GF	Graduated-Frequency [Measure]
DISC	Diagnostic Interview Schedule for Children	GGT	gamma-glutamyltransferase
DIS-IV	Diagnostic Interview Schedule for DSM-IV [Alcohol Module]	HA	hemoglobin-acetaldehyde
dL	deciliter(s)	HAP	Hilson Adolescent Profile
DPI	Drinking Problems Index	5-HIAA	5-hydroxyindole-3-acetic acid
DRIE	Drinking-Related Internal-External [Locus of Control Scale]	HIV	human immunodeficiency virus
DrInC	Drinker Inventory of Consequences	5-HT	5-hydroxytryptamine
DRSEQ	Drinking Refusal Self-Efficacy Questionnaire	5-HTOL	5-hydroxytryptophol
DSM	<i>Diagnostic and Statistical Manual of Mental Disorders</i> (various editions)	ICC	intraclass correlation
DSML	Drinking Self-Monitoring Log	ICD-10	<i>International Statistical Classification of Diseases and Related Health Problems, 10th Edition</i>
		ICS	Impaired Control Scale
		IDS	Inventory of Drinking Situations
		IDTS	Inventory of Drug-Taking Situations
		IPA	Important People and Activities [Instrument]

ISS	Individualized Self-Efficacy Survey	OCDS	Obsessive Compulsive Drinking Scale
IST	Interpersonal Situations Test	ORC	Organizational Readiness for Change
IVR	interactive voice response	PACS	Penn Alcohol Craving Scale
JASAE	Juvenile Automated Substance Abuse Evaluation	PBDS	Perceived Benefit of Drinking Scale
kg	kilogram(s)	PCI	Personal Concerns Inventory
K-SADS	Schedule for Affective Disorders and Schizophrenia for School-Aged Children	PEI	Personal Experience Inventory
L	liter(s)	PEI-A	Personal Experience Inventory for Adults
LDH	Lifetime Drinking History	PESQ	Personal Experience Screening Questionnaire
LDQ	Leeds Dependence Questionnaire	pmol	picomole
Mac	MacAndrew Alcoholism Scale	POC	Processes of Change Questionnaire
MAST	Michigan Alcoholism Screening Test	POSIT	Problem Oriented Screening Instrument for Teenagers
MCMII	Millon Clinical Multiaxial Inventory	PRISM	Psychiatric Research Interview for Substance and Mental Disorders
MCV	mean corpuscular volume	PRQ	Problem Recognition Questionnaire
MDDA	Manic-Depressive and Depressive Association	PSI	Problem Situation Inventory
MET	motivational enhancement therapy	QDS	Quick Drinking Screen
mg	milligram(s)	QF	quantity-frequency
mmol	millimole	QFV	Quantity-Frequency Variability [Index]
MMPI	Minnesota Multiphasic Personality Inventory	QTAQ	Quitting Time for Alcohol Questionnaire
MSAPS	Minnesota Substance Abuse Problems Scale	RAATE	Recovery Attitude and Treatment Evaluator
M-SMAST	Adapted Short Michigan Alcoholism Screening Test for Mothers	RAATE-CE	Recovery Attitude and Treatment Evaluator Clinical Evaluation
MSQ	Motivational Structure Questionnaire	RAATE-QI	Recovery Attitude and Treatment Evaluator Questionnaire I
NA	Narcotics Anonymous	RAPI	Rutgers Alcohol Problem Index
NADH	reduced form of nicotinamide adenine dinucleotide	RAPS4	Rapid Alcohol Problems Screen
NAEQ	Negative Alcohol Expectancy Questionnaire	RESPPI	Residential Substance Abuse and Psychiatric Programs Inventory
NDATSS	National Drug Abuse Treatment System Survey	RFDQ	Reasons for Drinking Questionnaire
NDATUS	National Drug and Alcoholism Treatment Unit Survey	RIASI	Research Institute on Addictions Self Inventory
NIAAA	National Institute on Alcohol Abuse and Alcoholism	RPI	Relapse Precipitants Inventory
NIH	National Institutes of Health	RTCQ	Readiness To Change Questionnaire
nmol	nanomole		



RTCQ-TV	Readiness To Change Questionnaire Treatment Version	SMAST	Short Michigan Alcoholism Screening Test
SA	sialic acid	SMPS	Social Model Philosophy Scale
SAAST	Self-Administered Alcoholism Screening Test	SOCRATES	Stages of Change Readiness and Treatment Eagerness Scale
SADD	Short Alcohol Dependence Data	SSAGA-II	Semi-Structured Assessment for the Genetics of Alcoholism
SADQ	Severity of Alcohol Dependence Questionnaire	SUDDS-IV	Substance Use Disorders Diagnostic Schedule
SAM	Substance Abuse Module	TAS	transdermal alcohol sensor
SARA	Substance Abuse Relapse Assessment	T-ASI	Teen Addiction Severity Index
SASSI	Substance Abuse Subtle Screening Inventory	TCDT	traditional chemical dependency treatment
SASSI-A	Substance Abuse Subtle Screening Inventory for Adolescents	TICS	two-item conjoint screen
SBQ	Significant-Other Behavior Questionnaire	TLFB	[Alcohol] Timeline Followback
SCAN	Schedule for Clinical Assessment in Neuropsychiatry	TRI	Temptation and Restraint Inventory
SCID	Structured Clinical Interview for the DSM	TSF	12-step facilitation therapy
SCID-AD	Structured Clinical Interview for DSM-III-R, Alcohol/Drug Version	TSR	Treatment Services Review
SCID SUDM	Structured Clinical Interview for the DSM Substance Use Disorders Module	T-TSR	Teen Treatment Services Review
SCQ	Situational Confidence Questionnaire	UAS	Understanding of Alcoholism Scale
SCT	Situational Competency Test	URICA	University of Rhode Island Change Assessment [Scale]
SDSS	Substance Dependence Severity Scale	VA	Department of Veterans Affairs
SEEQ	Survey of Essential Elements Questionnaire	VV	Volume-Variability [Index]
		WAS	Ward Atmosphere Scale
		WBAA	whole blood-associated acetaldehyde
		WHO	World Health Organization
		wk	week
		YWP	Your Workplace

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# Introduction

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The first edition of *Assessing Alcohol Problems: A Guide for Clinicians and Researchers* has proved extremely popular and helpful for clinicians and researchers concerned with treatment of alcohol-dependent patients. This revision differs from the first edition in several ways.

Many of the instruments it presents have become available only since the publication of the first edition. Each of the chapters has been updated based on the most current research. Perhaps most noteworthy, the revision includes several new sections of chapters dealing with emerging topics, such as assessment of alcohol craving and new uses of biomarkers in treatment and research. In addition, a new chapter has been written dealing with adolescent assessment issues and instruments. Finally, the format of the *Guide* has been changed from a bound volume to a looseleaf format, which will allow users to add additional pages on new instruments, and the revised *Guide* will be accessible to users of the Internet.

We are confident that this new version of the *Guide* will also prove beneficial to the alcoholism treatment and research communities.

## INSTRUMENT SELECTION

Initial examination of potential scales for inclusion in this *Guide* yielded more than 250 candidates. Final selection of instruments entailed

careful review and extensive deliberation by the expert panel who developed this *Guide*. Decisions were based on the following criteria:

- The instrument must be specific to alcoholism treatment, with the exception of instruments to be included in the new chapters dealing with collateral addictive problems.
- The instrument must be available in English.
- The instrument must be identifiable by name, not simply by description in an article.
- The instrument must yield quantitative scores.
- Psychometric characteristics of the instrument must be described in at least one published source.
- The instrument must be appropriate for use beyond the original study for which it was developed.
- Research on or research using the instrument must have been published in 1995 or later.
- The instrument must merit broad dissemination to the treatment community.

The review panel generally adhered quite closely to these criteria. Certain exceptions were made, however. For example, in important

domains in which instrumentation remains scarce, such as adolescent assessment and alcohol craving, some measures are included that are too new to meet all criteria. Such instruments are provided to avoid leaving the clinician and researcher without evaluation options within the less developed domains of alcoholism treatment assessment.

To identify instruments appropriate for inclusion, relevant databases were searched, panel members were queried, and letters asking for additional instruments for consideration were sent to representatives of the alcoholism treatment community. Despite these efforts, some high-quality treatment assessment instruments may be missing. The editors do not presume total comprehensiveness.

## ORGANIZATION OF THE *GUIDE*

The *Guide* is designed to allow even those new to the field to understand the critical issues involved in formal evaluation of alcohol treatment and in planning treatment for individuals and to select instruments best suited to their purposes.

### Overview

The *Guide* begins with a general overview summarizing salient features of formal alcoholism assessment. Fundamental psychometric, methodological, and applied issues and suggested directions for future research are addressed. The overview is followed by a “Quick-Reference Instrument Guide” listing most of the instruments included in this *Guide*. By providing at-a-glance comparisons of instrument usage, this table may assist researchers and clinicians in identifying instruments and in comparing measures appropriate for use within each domain of treatment assessment. In that we were unable to obtain up-to-date fact sheets on some of the instruments

mentioned in the chapters of the *Guide*, readers are urged to also review the appropriate chapters when selecting instruments to meet their needs.

### Assessment Domains

The *Guide* is organized into the following assessment domains:

- *Screening*. Measures identifying individuals likely to satisfy diagnostic criteria for an alcohol use disorder and for whom further assessment seems warranted. Biochemical and self-report measures are addressed in separate chapters within this section.
- *Diagnosis*. Instruments that yield a formal alcohol-related diagnosis or that quantify symptoms central to the alcohol dependence syndrome. Also covered in this chapter are instruments designed to evaluate craving and urge to drink.
- *Assessment of Drinking Behavior*. Instruments to delineate the “topography” of drinking behavior, including quantity, frequency, intensity, and pattern of alcohol consumption.
- *Adolescent Assessment*. Because of the unique differences associated with assessment of adolescents with alcohol problems, this revision of the *Guide* includes a chapter specific to the needs of this group.
- *Treatment Planning*. Scales to assist the clinician in developing client-specific treatment plans.
- *Treatment and Process Assessment*. Measures that assist in understanding the process of treatment such as treatment atmosphere, degree of treatment structure, and the immediate goals or proximal outcomes of treatment.
- *Outcome Evaluation*. Instruments designed to assess the end results of treatment.

Each assessment domain is addressed by a chapter written by a member of the review panel, and most chapters also include tables for comparing instruments within the domain. Each chapter describes salient issues and provides a discussion of the state of research and practice within the particular stage or topic of the treatment process. It offers guidance on the clinical utility of particular instruments for assessing the domain and identifies specific issues on which additional research is especially needed. The tables contain information on instruments that have been identified as potentially appropriate for use in the relevant stage or topic of the treatment assessment process. Administrative characteristics of each instrument are noted, including populations for whom the measure might be particularly appropriate, time required for administration and scoring, and availability of computerized formats.

Because the chapter authors based their discussions of instruments on a review of the literature as well as on the actual instruments and fact sheets (as described in the next section), there may be some discrepancies in the information presented in the chapters versus the information presented in the fact sheets. Readers should contact the instrument author or source if they have questions.

## **Instruments**

The appendix includes fact sheets about the instruments listed in the “Quick-Reference Instrument Guide” and copies of the instruments, if available; they are arranged alphabetically. The fact sheets synopsise administration, scoring, and interpretation and note copyright status and how to obtain copies of the instruments. Although most details in the fact sheets were obtained directly from the instrument’s author or an expert on the measure, minor editing was done by the panel members to ensure consistency in tone and

format across scales as well as to elaborate on items not fully addressed by the instrument’s proponent. In a few instances, the reviewer independently prepared the fact sheet.

The instruments are reproduced in their entirety when possible, but length and copyright concerns prohibited full reproduction of some. In most cases, sample items are provided when the full instrument is not available in order to convey the “flavor” of the instrument’s content and format. Users are reminded to secure the permission of the authors or copyright holders before using any instrument.

The opinions expressed in the fact sheets are intended to faithfully represent views of the instrument authors. Neither the National Institute on Alcohol Abuse and Alcoholism (NIAAA) nor members of the panel certify accuracy of the data provided. Details on the fact sheets should be considered in conjunction with information obtained from original sources and the user’s particular needs to determine the suitability of an instrument for a particular task.

## **ONLINE AVAILABILITY AND UPDATES**

This *Guide* will be available online at the NIAAA Web site, [www.niaaa.nih.gov](http://www.niaaa.nih.gov), and instrument information on the Web site will be updated regularly. We also would like users’ assistance in identifying new instruments and offering suggestions to make the material more helpful. You can reach us at the following address:

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# Assessment of Alcohol Problems: An Overview

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The corpus of formal psychometric instruments, research on these measures, and conceptual frameworks on psychological assessment is extensive. A comprehensive, up-to-date description of the field is provided by G.J. Meyer and colleagues (2001), and the reader of this *Guide* is urged to study that article as background for the broader field of which alcohol assessment is a part.

As in other areas of psychotherapy, accurate patient assessment is fundamental to both treatment of and research on alcohol problems. Although each of these activities is advanced by informed use of psychometric instruments, the needs of professionals in the two endeavors differ. Most notably, the practitioner is primarily concerned with the clinical utility of the measure, particularly how well it identifies the needs of a given client and guides treatment planning. The researcher is likely to explore a broader range of variables that may quantify and explain the overall impact of an intervention (Connors et al. 1994). These variables may or may not be directly related to client care.

Psychometric properties of measures, especially validity and availability of relevant norms, are of considerable interest to the clinician. While such statistical information is not irrelevant to researchers, often it is less critical. In a formal efficacy trial, contrasts usually are between a control group and an experimental group or before versus after treatment functioning in a given group

of subjects. Since scores derived from measures with lower validity include a large component of error variance, their use may entail recruitment of larger numbers of subjects or inclusion of additional scales to in some way correct for measurement error. External norms may be a less immediate concern to the researcher.

Although for purposes of research on treatment efficacy and development of a program of treatment all subjects generally receive the same assessment battery, in clinical situations assessment procedures are usually tailored to the needs of the particular individual being served and, hence, the battery may differ somewhat from case to case (G.J. Meyer et al 2001).

Especially in the current environment of stringent controls on health care costs and service utilization, the clinician also is deeply concerned about issues such as ease of administration, scoring, and interpretation of the instrument as well as cost, time, and acceptability of the measure to clients (Allen et al. 1992). In research projects, however, subjects typically are reimbursed for their participation, and sufficient technical resources are usually available for administering measures and quantifying results.

Researchers seem to place a much higher premium on formal assessment than do many practicing clinicians, who appear to rely more heavily on interviews, review of past records

(Nirenberg and Maisto 1990), or clinical impression. While such procedures can provide helpful information, psychometric techniques offer unique and very important advantages. Their standardization permits uniformity in administration and scoring across interviewers with diverse experience, training, and treatment philosophy. The measurement properties of formal assessment procedures, including their strengths and weaknesses, are known.

The large number and variety of formal techniques also allow such measures to respond to a broad range of client management questions. To their credit as well, formal measures are economical in terms of cost, clinician time, and effort required to succinctly and clearly communicate with other clinical staff treating the client. Finally, results thus derived may well have more credibility, and thus influence, with clients than conclusions based on less formal procedures (Allen 1991).

Failure to fully appreciate and employ formal, validated assessment procedures is regrettable in the field of alcohol treatment practice. We continue to believe that “while better assessment of alcoholic patients does not ensure more specific or more effective treatment, chances for successful rehabilitation are clearly enhanced if specific patient needs can be more accurately identified and if treatment can be tailored accordingly.” (Allen 1991, p. 183)

As a greater variety of interventions are introduced into the alcoholism treatment system and as we more fully appreciate the treatment implications of differences among subtypes of alcoholics, the role of assessment in clinical practice will further expand. We hope that this *Guide* will enrich the contribution of assessment to alcoholism treatment both by apprising clinicians of the wide array of instruments available and by assisting them to make well-informed decisions about which instruments are most helpful for serving their clients.

In choosing instruments and developing the format for this text, we have tried to keep the needs of both researchers and clinicians in mind.

## **ELEMENTS IN INSTRUMENT SELECTION**

When choosing an instrument to help determine a client’s treatment needs, the primary concern is: Is the instrument appropriate for the client? Several parameters should be considered in answering this question.

### **Purpose/Clinical Utility**

In this *Guide*, instruments are assigned to chapters according to their primary role in informing sequential decisions that direct the course of treatment (i.e., screening, diagnosis, assessment of drinking behavior, treatment planning, treatment and process assessment, and outcome evaluation). Although some of these stages, such as screening and diagnosis, are narrowly defined, measures that assist in treatment planning or that assess the treatment process may answer questions very different from those resolved by other scales within the same domain.

### **Assessment Timeframe**

Measures differ according to the period of client functioning that they encompass. For example, certain measures and tests are appropriate when the concern is recent drinking patterns, whereas others reflect long-term, chronic alcohol use. Similarly, screening and diagnostic scales are designed to evaluate either lifetime or current conditions.

### **Age or Target Populations**

In choosing an instrument, it is important to consider its suitability for a given client. Most alcohol measures have been developed for adult populations. Of late, however, several useful adolescent scales have been constructed. This advance in the field is clearly welcome, since alcohol problems in adolescents often are manifested differently and lead to dissimilar consequences than in adults. Our awareness of the importance and unique nature of adolescent assessment has prompted us to include a new chapter in this volume entirely devoted to adolescent concerns. Attention of test developers has recently

focused on needs of more specific subgroups, such as pregnant women and the elderly.

### **Examples of Groups With Whom the Instrument Has Been Used**

The field of alcohol assessment has emphasized development of a wide variety of instruments, to some extent in lieu of efforts to refine existing instruments and to determine their particular applicability to subpopulations of individuals with alcohol problems. When choosing an instrument, it is helpful to consider which types of patients have been successfully evaluated with the instrument.

### **Availability of Norms**

Norms allow the test performance of a given client to be compared with that of a large, relevant group of individuals. While norms are essential to describe a single case of a sample by comparison to a larger group, they are less important, for example, in contrasting pretreatment and post-treatment behavior in an individual.

In other instances, too, norms are not of key concern. For example, screening measures are judged primarily on their ability to predict diagnosis irrespective of how an index case compares with others on the scale. In short, while some measures are interpreted *normatively*, others are interpreted *ipsatively*. In ipsative analyses, individuals are actually compared with themselves, such as their functioning before and after treatment or the relative strengths of various expectancies that the individual maintains for effects of drinking. Although normative instruments may often be interpreted in an ipsative manner, the converse is rarely true.

In determining the importance of normative information, the clinician should be concerned about whether norms are available that would assist in making clinical decisions in a particular case. Phrased differently, would the demographic characteristics of a client affect interpretation of the score and influence choice of treatment?

As with other psychological measures (Sackett and Wilk 1994), few scales in the alcohol field

have ethnic-specific norms. Separate norms for males and females, however, are available for some alcohol measures. Insofar as problem drinking and alcohol dependence are experienced somewhat differently in men and women, gender-based norming of measures for screening, alcohol use, and adverse consequences of drinking is generally desirable. It remains to be seen, however, if gender-based norming would significantly augment the utility of treatment planning measures, which are often ipsative in nature. The more challenging issue may be whether or not the fundamental dimensions differ so greatly that different measures, rather than separate norms, are needed for various subgroups. Research on this topic remains in an early stage.

### **Administrative Options**

An active area of investigation in instrument development has been alternative ways of administering the measure. These include written ("pencil and paper"), interview, computer, and collateral inquiry formats. Alternative administration procedures may decrease clinician time, more effectively engage clients in the assessment process, and heighten accuracy of responding. Although most of this research has been on screening and measuring alcohol consumption rather than on variables associated with treatment planning, in general, results from computerized assessments seem similar to those of face-to-face administration (Bernadt et al. 1989; Malcolm et al. 1990; Gavin et al. 1992; Daeppen et al. 2000).

The topic of collateral interviews for screening and measuring alcohol consumption has been reviewed by Maisto and Connors (1992). In at least one instance, alcoholism screening was successfully performed by interviewing the spouse rather than the client (Davis and Morse 1987). Several projects also suggest that spouses can provide meaningful information on whether a client has been drinking, although their judgments of specific level of consumption and frequency of drinking usually are less reliable.



## **Training Required for Administration**

While procedures for administering many scales in the *Guide* are straightforward, extensive training is required for others (e.g., the Addiction Severity Index, the Alcohol Timeline Followback, and several diagnostic scales). Beyond adequate preparation in administration, training in interpretation of results is essential. This requires at least a basic academic foundation in psychometric principles (Moreland et al. 1995) as well as familiarity with research on the specific instruments used. To help satisfy this latter need, the fact sheets included in this *Guide* provide some key references for each measure. Other citations for research may be obtained by searching computerized reference databases such as PsycINFO, ETOH, and MEDLINE.

## **Availability of Computerized Scoring or Administration**

Some of the instruments noted in the *Guide* can be administered or scored by computer, and this is noted on the fact sheets.

## **Foreign Language Availability and References**

The last decade has witnessed impressive growth in the number of instruments to assess alcohol use and treatment-related issues (L.C. Sobell et al. 1994; Allen and Columbus 1995). Unfortunately, the majority of measures are available only in English, although there are a few exceptions (e.g., Babor et al. 1994; Room et al. 1996; Üstün et al. 1997; L.C. Sobell et al. 2001). Development of cross-culturally valid instruments for assessment of mental disorders has been one of the goals of the World Health Organization/National Institutes of Health (WHO/NIH) Joint Project on Diagnosis and Classification of Mental Disorders, Alcohol- and Drug-Related Problems (Room et al. 1996; Üstün et al. 1997). Those in the WHO/NIH project have argued that reliable and valid instruments are essential for making accurate substance-related diagnosis and evaluations (Üstün et al. 1997).

The demographic composition of the United States is changing rapidly (Sleek 1998) such that by the year 2050 the exponential growth of minority groups (i.e., Black, not Hispanic; American Indian, Eskimo, and Aleut; Hispanic; Asian and Pacific Islander) is projected by the U.S. Bureau of the Census to make them a combined numerical majority (U.S. Bureau of the Census 2000). The ethical guidelines of the American Psychological Association (1993) assert that psychologists should only use assessment instruments that are culturally valid. The guidelines also require that psychologists be aware of the test's reference population and possible limitations of such instruments with other populations. For psychologists as well as for other health care professionals, test selection should be based on cross-cultural validity of content, translations should be performed on the specific cultural group being tested, and norms for that group should be available. Using assessment instruments, drinking or otherwise, that are not cross-culturally valid might result in serious errors in interpretation. Clearly, more work should be done on development and norming of alcohol-related instruments in languages besides English.

## **RELIABILITY AND VALIDITY**

Evaluation of how alternative measures fare on validity and reliability, the two primary psychometric characteristics of an assessment instrument, can assist in choosing one scale over another. Several different types of reliability and validity may be considered. They vary in importance depending on the nature of the measure and its intended application.

*Reliability* deals with generalizability of the instrument across different times, settings, scale versions, evaluators, and so forth. Reliability may be seen as a particular type of validity in which the relationship of performance on the measure with itself is evaluated. Measures low in reliability (i.e., those that cannot even predict themselves well) must of necessity also be low in other types of validity where the test is attempting to predict other performance. On the other hand, while a necessary

condition, reliability is not a sufficient cause of validity. Measures may be consistent while not accurately measuring what the author intended.

*Stability (test-retest reliability)* refers to similarity of scores for administration of the measure at two points in time. As a rule, the interval between tests needs to be long enough that similarity in responses at the repeat administration is not largely due to the client simply remembering earlier answers. One would expect high stability on measures that tap stable client characteristics, such as family history of alcoholism, age of onset of problem drinking, and general expectancies of alcohol effects. Scales for more transient client characteristics, such as craving and treatment motivation, would be expected to have lower test-retest reliability.

*Internal consistency* reliability, including *split-half reliability*, reflects agreement of content coverage within the scale itself. Internal consistency assesses how well responses on individual items correlate with those of other items of the scale. For instruments designed to measure a single phenomenon, such as severity of the alcohol dependence syndrome, these correlational coefficients should be high. The relationship between degree of internal consistency and clinical significance has been discussed by Cicchetti (1994).

*Parallel forms reliability* refers to two sets of questions that address the same issues and produce comparable results. While equivalent forms of tests are useful—for example, to allow pretreatment and posttreatment functioning to be compared without risk of the potential confounding effect of client memory—for the most part, equivalent forms for alcoholism measures have yet to be developed.

The three common types of validity are content, criterion, and construct. *Content validity* refers to the degree to which items comprehensively and appropriately sample the domain of interest. For example, a checklist of alcohol consequences should comprise the multiplicity of adverse effects of drinking rather than singling out certain negative consequences to the minimization or exclusion of others that are equally damaging. Content validity is not quantified. Rather, it must

be built into the test by careful construction and selection of test items (Nunnally 1978).

*Criterion validity* deals with how well scores on a measure relate to important, relevant nontest (real world) behaviors, such as initial motivation for treatment and long-term maintenance of sobriety. Criterion validity is a major concern in evaluating screening tests and is gauged by the extent to which individuals who score positive on them actually receive a diagnosis of alcoholism and, conversely, the extent to which those who score negative on the screen do not meet diagnostic criteria. Predictive, concurrent, and “postdictive” validity are all types of criterion validity. The distinctions among them reflect the temporal relationship between the test results and the phenomenon of interest.

Finally, *construct validity* refers to the degree to which a measure actually taps a meaningful hypothetical construct and a nondirectly observable, underlying causal or explanatory dimension of behavior. Scales purporting to measure hypothetical constructs in the alcoholism field, such as “craving,” “loss of control,” “denial,” and “high-risk drinking situation,” should yield high levels of construct validity. Scores on these measures should correlate well with other manifestations of the construct. At the same time, they should correlate only minimally or not at all with scores on scales that measure constructs distinct from them.

## BENEFITS OF ASSESSMENT

From the clinician’s perspective, the primary benefit of assessment is to accurately and efficiently determine the treatment needs of an alcoholic client. Carefully selected assessment procedures can quickly and validly evaluate severity of dependence, adverse consequences resulting from problematic drinking, contributing roles of other emotional and behavioral problems to drinking, cognitive and environmental stimuli for drinking, and so forth. These variables all have major significance in suggesting the intensity and nature of intervention needed.

Assessment, however, also yields valuable secondary clinical benefits (Allen and Mattson

1993). For example, giving clients individualized feedback based on test results may enhance their motivation for change and help them formulate personal goals for improvement. Also, research indicates that clients themselves highly value assessment (L.C. Sobell 1993) and that programs with formal assessment procedures are better able to retain clients in treatment (Institute of Medicine 1990).

If a core battery of assessment instruments is administered to all clients, the database of results can be periodically analyzed to determine, at a program level, needs for additional services, types of clients served, and so on. This information can target efforts to modify the programmatic treatment regimen to more specifically address needs of the clientele. These positive benefits of formal assessment can be fully realized only if the scales are properly administered, interpreted, and utilized by the clinician.

### **SETTING, TIMING, AND SEQUENCING OF FORMAL ASSESSMENT**

This *Guide* is largely organized according to a framework of sequencing of care for clients. The physical settings for assessment also likely reflect this sequencing. Screening is generally performed in a primary health care unit, diagnosis and triage in a general inpatient or outpatient medical facility, and specific treatment planning assessment within a facility or by a provider offering alcohol-specific services.

More research needs to be done to determine optimal timing for alcohol assessment. For the tests to be maximally useful, they need to be conducted soon enough after treatment entry that results from them can help shape the individualized treatment plan. At the same time, it should be borne in mind that following recent heavy alcohol usage, clients may be so impaired in neuropsychological and emotional functioning that they are unable to give an accurate picture of themselves (Goldman et al. 1983; Grant 1987; Nathan 1991).

Although various guidelines have been offered for time following admission necessary for valid psychological testing (e.g., Sherer et al. 1984;

Nathan 1991), insufficient research has been done on this critical issue to offer firm guidance. Time guidelines may be specific to the nature of the measure (e.g., tests requiring a high level of neuropsychological functioning may need to be delayed longer than trait-focused personality measures). Common practice and clinical judgment suggest that, to the extent practicable, most tests should be deferred at least until the client has stabilized following alcohol withdrawal.

Granted the large number of measures available to clinicians, but also considering limitations in time and resources available, the strategy of assessment must be clearly thought through.

The underlying assumption is that “more is better.” However, such a comprehensive approach may not be feasible because of the constraints often experienced within many clinical settings. Furthermore, Morganstern (1976) suggested that such an approach may not be appropriate and presents a somewhat more limited perspective: “The answer to the question ‘What do I need to know about the client?’ should be: ‘Everything that is relevant to the development of effective, efficient, and durable treatment interventions.’” (p. 52)

Finally, it is important not to regard assessment as a single activity performed at a single point in time. Assessment should be seen as ongoing because it supports clinical decisionmaking throughout the course of treatment (Donovan 1988).

### **APPROACHING THE CLIENT**

Regardless of the setting for psychometric evaluation, it is important to establish rapport with the client by adopting an empathic approach. The client should also be assured of confidentiality, and any institution-mandated limitations on confidentiality should be clearly articulated.

In introducing measures, it is important to elicit clients’ full cooperation by explaining that they will receive feedback on results and that this information will assist in developing a treatment plan maximally helpful to them. The tenor for the assessment enterprise should be characterized as collaborative, with the assessor and client jointly committed to discovering those client features that

will contribute to important decisions about future clinical management.

Also, to increase the likelihood that test results will be valid, particularly as regards level of alcohol consumption, it is important to assure that the client is not currently under the influence of alcohol (L.C. Sobell and Sobell 1990). A hand-held Breathalyzer can provide such confirmation.

## GIVING CLIENTS FEEDBACK

Research suggests that feedback on results of assessment can reinforce commitment for behavior change. Although little research has been done on how feedback process variables specifically influence its motivational impact, some general guidelines can be offered on how to give feedback (Miller and Rollnick 1991; Allen and Mattson 1993). Both rapport and objectivity should characterize the feedback process. Providing feedback should be a positive experience for both the client and the clinician. Clients are intensely interested in what tests can tell them about themselves, a topic of considerable interest to most people. As in the testing activity itself, the process of giving feedback should be seen as collaborative. The clinician is professionally and objectively sharing the findings, the client is sizing up the implications of these results, and together they will use this information to design an optimal treatment program.

Clients may be overwhelmed by test findings. Therefore, it is important that feedback be given in a clear, concrete, and organized fashion. Often, showing clients their standing on relevant dimensions by using visual displays such as plots or graphs can be informative. Review results slowly to assure that clients fully understand them. Periodically during the feedback session, clients may be asked to summarize test findings in their own words and to reflect on the meaning they ascribe to them. Asking clients to give concrete examples to illustrate the findings may also deepen their understanding of the information.

Often, test results are not totally positive. While remaining fully honest with them, help clients understand that, with abstinence and behavior change, many of the negative findings

should improve. If clients are treated for an extended time, the measures can be periodically repeated so that they can recognize positive changes in scores as well as identify areas in which further improvement is needed.

Finally, in reviewing test results with clients, it is important to show them how the findings influence development of treatment plans. Recognizing the coherence of treatment with their own personal needs should further motivate them to actively participate in treatment.

## ASSESSMENT OF OTHER PROBLEMS

The first edition of *Assessing Alcohol Problems: A Guide for Clinicians and Researchers* (Allen and Columbus 1995) and this newly revised version primarily focus on assessment instruments to evaluate alcohol use and abuse. We do recognize, however, that the literature clearly shows that individuals with alcohol problems have other co-occurring clinical problems and disorders (e.g., drug abuse, smoking, gambling, eating disorders, and other psychiatric problems). There are many compelling reasons for assessing other clinical problems; some of the more salient are as follows:

- Since 80 to 90 percent of alcohol abusers smoke cigarettes, assessment of nicotine use should be a part of the assessment and treatment planning process because it appears that continued smoking may serve as a trigger for relapse (M.B. Sobell et al. 1995) and because consumption of alcohol may interfere with smoking cessation attempts or even serve as a trigger for relapse (Fertig and Allen 1995; Stuyt 1997).
- For alcohol abusers who use or abuse other drugs, it is important to gather a profile of their psychoactive substance use and consequences, not only at assessment, but also over the course of treatment as substance use patterns may change (e.g., decreased alcohol use, increased smoking; decreased alcohol use, increased cannabis use).

- The prevalence of psychiatric disorders among alcohol abusers in treatment is high (7 to 75 percent) compared with rates in population studies (Institute of Medicine 1990; Milby et al. 1997; National Institute on Alcohol Abuse and Alcoholism 1996; Onken et al. 1997); in this regard, there are several treatment implications for alcohol abusers with a comorbid disorder compared with those with only an alcohol dependence or abuse diagnosis (e.g., the former may need more intensive or longer treatment, are more disabled and prone to suicide, have higher rates of homelessness and more legal and medical problems and longer hospital stays, and have higher rates of relapse and poorer treatment outcomes) (Rounsaville et al. 1987; R.E. Meyer and Kranzler 1988).

This *Guide* contains several instruments to assess usage of drugs other than alcohol. Readers who would like to select instruments for assessing other co-occurring clinical problems or disorders are referred to two excellent references that have carefully reviewed and evaluated instruments for their psychometric and clinical utility. The first is the *Handbook of Psychiatric Measures* by the American Psychiatric Association (2000), which includes a section discussing each instrument as well as in many cases the actual instrument in the text and on a CD-ROM. Instruments are included in over two dozen clinical domains, for both adolescents and adults. A second reference that reviews drug use instruments has been published by the National Institute on Drug Abuse (1999). Readers will also find the *Psychologists' Desk Reference* (Koocher et al. 1998) very useful; it provides advice about selecting assessment instruments for a variety of clinical problems.

Other types of psychometric measures that are not specific to alcohol and other drugs can also play a helpful role in clinical management of alcoholics. Considering the frequency of comorbidity of psychiatric problems in alcoholics in treatment (National Institute on Alcohol Abuse and Alcoholism 2000) and the implications of such

conditions for treatment of alcoholism (Litten and Allen 1995), assessment of collateral psychopathology may be useful.

General personality measures may also assist in treatment planning (Allen 1991). Traits such as impulsivity, need for social support, insight, and so forth have important implications for choosing interventions and helping the clinician relate most effectively to the client.

A variety of treatment process measures, including scales to assess client satisfaction and treatment atmosphere, may provide guidance for periodic redesign of the treatment program.

## RESEARCH NEEDS

Although substantial progress over the past decade has produced a rich array of assessment instruments to inform alcoholism treatment, several areas remain inadequately explored and warrant further research. Foremost among these is development of computerized adaptive testing algorithms. Given the variety of available instruments, a computerized assessment program tailored to the needs of the individual client would greatly facilitate and economize the assessment process. Such a program would capitalize on advances in decision tree technology.

Expert systems, such as those used in other areas of medical diagnostics, could be modified for alcoholism assessment programs. Computerized technology would offer the clear advantage of allowing easy, automated scoring and would permit comparability within and across individuals and treatment settings. Such a system could satisfy the dual needs of providing the busy clinician with information relevant to individual client treatment planning as well as providing data for subsequent program evaluation and modification. In addition, computerized testing may yield significant advantages in eliciting more accurate information from younger clients who are not threatened by the technology and might well prefer the computer to a therapist's interview (Leccese and Waldron 1994).

A critical concern for treatment providers and researchers alike is establishing appropriate timing for administration of assessment instruments.

Demands for quick turnaround to aid in triage and treatment planning compete with the clients' ability to provide accurate and reliable information after detoxification. Drastic reductions in clients' length of stay imposed by managed care decisions further complicate the dilemma. Applied research to identify the optimal times for test administration is much needed. Objective indicators that document client readiness for administration of different tests must be operationalized in terms of client functioning.

Construction of subpopulation norms for individual assessment instruments also merits further research. A related, but often ignored, issue concerns the degree to which response surfaces and underlying factor structures for tests differ for women and various subpopulations. For example, does the construct of alcohol consequences fundamentally differ in men and women? Women typically score very low on alcohol consequence inventories that include such items as violence and physical spousal abuse. Does this suggest that a scoring adjustment should be made or that a different set of items should be queried for women in evaluating the adverse effects of drinking?

While certain treatment-related issues are measured well by existing scales, other important dimensions are not. For example, assessing clients' motivation for treatment in general and specific treatment preferences has proved to be difficult for clinicians and alcoholism treatment researchers. The frequently invoked construct of craving remains elusive, despite numerous attempts to operationalize it. Various scales purporting to measure craving often elicit conflicting and unresolvable information with little reliability or face validity.

## CONCLUSION

As suggested by the sheer volume of instruments covered in this *Guide*, clinicians and researchers now have available a variety of choices to assist in planning alcoholism treatment and better understanding the nature of the problem. In order to take full advantage of this resource, clinicians and researchers must clearly understand the nature of

the questions they must answer and the strengths and weaknesses of the various psychometric instruments that can assist them. It is hoped that this overview, the excellent chapters by subject matter experts, and the fact sheets for the instruments will assist this important venture.

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## QUICK-REFERENCE INSTRUMENT GUIDE

Instrument	Target population	Screening	Diagnosis	Assessment of drinking behavior	Treatment planning	Treatment/ treatment process assessment	Outcome evaluation
Adapted Short Michigan Alcoholism Screening Test for Fathers (F-SMAST) and Mothers (M-SMAST)	Adults and adolescents	P			S		
Addiction Admission Scale (AAS)*	Adults	P					
Addiction Potential Scale (APS)*	Adults	P					
Addiction Severity Index (ASI)	Adults				P		S
Adolescent Alcohol Involvement Scale (AAIS)	Adolescents	P					
Adolescent Diagnostic Interview (ADI)	Adolescents		P		S		S
Adolescent Obsessive-Compulsive Drinking Scale (A-OCDS)	Adolescents	P					
Alcohol Abstinence Self-Efficacy Scale (AASE)	Adults				P		
Alcohol Craving Questionnaire (ACQ-NOW)	Adults		P				
Alcohol Dependence Scale (ADS)	Adults	S	P		S		

## QUICK-REFERENCE INSTRUMENT GUIDE *(continued)*

Instrument	Target population	Screening	Diagnosis	Assessment of drinking behavior	Treatment planning	Treatment/ treatment process assessment	Outcome evaluation
Alcohol Expectancy Questionnaire (AEQ)	Adults				P	S	
Alcohol Expectancy Questionnaire-Adolescent Form (AEQ-A)	Adolescents				P	S	
Alcohol Timeline Followback (TLFB)	Adults and adolescents			P			P
Alcohol Use Disorders Identification Test (AUDIT)	Adults	P					
Alcohol Use Inventory (AUI)	Adults and adolescents				P		
CAGE Questionnaire	Adults and adolescents	P					
Clinical Institute Withdrawal Assessment (CIWA-AD)	Adults		P		S		
Cognitive Lifetime Drinking History (CLDH)	Adults			P			
College Alcohol Problem Scale-Revised (CAPS-r)	Adults and adolescents		P				
Composite International Diagnostic Interview (CIDI core) Version 2.1	Adults		P				

Comprehensive Adolescent Severity Inventory (CASI)	Adolescents			P			S
Customary Drinking and Drug Use Record (CDDR)†	Adolescents		P				
Diagnostic Interview Schedule (DIS-IV) Alcohol Module	Adults		P				
Drinker Inventory of Consequences (DrInC)	Adults		S				P
Drinking Context Scale (DCS)	Adults and adolescents		P				S
Drinking Expectancy Questionnaire (DEQ)	Adults			P			S
Drinking Problems Index (DPI)	Adults		P		S		S
Drinking Refusal Self-Efficacy Questionnaire (DRSEQ)	Adults				P		
Drinking-Related Internal–External Locus of Control Scale (DRIE)	Adults				P		
Drinking Self-Monitoring Log (DSML)	Adults and adolescents			P		S	P
Drug-Taking Confidence Questionnaire (DTCQ)	Adults				P		
Drug Use Screening Inventory (revised) (DUSI-R)	Adults and adolescents	P				S	S
Ethanol Dependence Syndrome (EDS) Scale	Adults		P				

## QUICK-REFERENCE INSTRUMENT GUIDE *(continued)*

Instrument	Target population	Screening	Diagnosis	Assessment of drinking behavior	Treatment planning	Treatment/ treatment process assessment	Outcome evaluation
Family Tree Questionnaire (FTQ) for Assessing Family History of Alcohol Problems	Adults		P		S		
Five-Shot Questionnaire	Adults	P					
Form 90	Adults and adolescents			P			P
Global Appraisal of Individual Needs (GAIN)	Adults and adolescents	P					
Impaired Control Scale (ICS)	Adults		P				
Important People and Activities Instrument (IPA)	Adults and adolescents				P	S	
Inventory of Drug-Taking Situations (IDTS)	Adults				P		
Leeds Dependence Questionnaire (LDQ)	Adults and adolescents		P				
MacAndrew Alcoholism Scale (Mac)*	Adults	P					
Michigan Alcoholism Screening Test (MAST) and variants	Adults and adolescents	P					
Motivational Structure Questionnaire (MSQ)	Adults and adolescents				P		

Negative Alcohol Expectancy Questionnaire (NAEQ)	Adults			P		S
Obsessive Compulsive Drinking Scale (OCDS)	Adults			P		
Penn Alcohol Craving Scale (PACS)	Adults and adolescents			P		
Personal Concerns Inventory (PCI)	Adults and adolescents				P	
Personal Experience Inventory (PEI)	Adolescents			P	P	S
Personal Experience Inventory for Adults (PEI-A)	Adults	S			P	
Personal Experience Screening Questionnaire (PESQ)	Adolescents	P				
Problem Recognition Questionnaire (PRQ)	Adolescents	P				
Psychiatric Research Interview for Substance and Mental Disorders (PRISM)	Adults			P		
Quantity-Frequency (QF) Methods	Adults				P	P
Quitting Time for Alcohol Questionnaire (QTAQ)	Adults			P		
Rapid Alcohol Problems Screen (RAPS4)	Adults	P				

## QUICK-REFERENCE INSTRUMENT GUIDE *(continued)*

Instrument	Target population	Screening	Diagnosis	Assessment of drinking behavior	Treatment planning	Treatment/ treatment process assessment	Outcome evaluation
Readiness To Change Questionnaire Treatment Version (RTCQ-TV)	Adults and adolescents				P		
Recovery Attitude and Treatment Evaluator (RAATE) Clinical Evaluation (CE) and Questionnaire I (QI)	Adults				P		
Rutgers Alcohol Problem Index (RAPI)	Adults and adolescents	P					S
Self-Administered Alcoholism Screening Test (SAAST)	Adults	P					
Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA-II)	Adults		P				
Severity of Alcohol Dependence Questionnaire (SADQ)	Adults		P				
Short Alcohol Dependence Data (SADD)	Adults		P				
Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES)	Adults				P		
Steps Questionnaire	Adults					P	

Structured Clinical Interview for the DSM (SCID) Substance Use Disorders Module	Adolescents		P		S
Substance Abuse Module (SAM) Version 4.1	Adults and adolescents		P		S
Substance Abuse Subtle Screening Inventory (SASSI)	Adults and adolescents	P			S
Substance Dependence Severity Scale (SDSS)	Adults and adolescents		P		
Substance Use Disorders Diagnostic Schedule (SUDDS-IV)	Adults and adolescents		P		S
Surrender Scale	Adults				P
Teen Addiction Severity Index (T-ASI)	Adolescents		P	P	S
Teen Treatment Services Review (T-TSR)	Adolescents				P
Temptation and Restraint Inventory (TRI)	Adults		P		
Treatment Services Review (TSR)	Adults and adolescents				P
TWEAK	Adults	P			
University of Rhode Island Change Assessment (URICA)	Adults				P
Your Workplace (YWP)	Adults				P

Note: P = primary assessment domain usage; S = secondary assessment domain usage.  
 \* A Minnesota Multiphasic Personality Inventory scale.  
 † Primary purpose is to assess drug use.



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# Self-Report Screening for Alcohol Problems Among Adults

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Alcohol abuse and alcoholism are serious public health problems estimated to affect approximately 7 percent of the U.S. population (Grant et al. 1994), but many individuals with such problems remain undetected. Also undetected are many individuals who do not meet diagnostic criteria for alcohol abuse or alcohol dependence, but who nevertheless are experiencing negative consequences associated with their use of alcohol or are at risk for such consequences (Institute of Medicine 1990). This is unfortunate for several reasons. First, their continued drinking holds significant potential for further alcohol-related negative consequences. Second, it is not possible to refer such drinkers for appropriate services until they are detected. Particularly noteworthy in this regard would be persons experiencing mild to moderate levels of alcohol problems, who respond well to secondary prevention interventions. As such, there is a need to develop and apply techniques to screen for alcohol use disorders. Fortunately, much work has occurred in this area, and this chapter focuses on a variety of issues and measures relevant to the identification of adults with alcohol-related problems. (The topic of screening among adolescents is covered in the chapter by Winters.)

## OVERVIEW OF CHAPTER

The first section of this chapter provides a working definition of screening, identifies the goals of

screening, discusses the distinction between screening and assessment, and comments on screening in relation to the treatment process. The next section addresses issues in the evaluation of screening measures, such as sensitivity and specificity. The topic of the validity of self-report data also is addressed. An overview of self-report screening measures is presented, followed by a discussion of guidelines for the selection and use of screening measures, a summary of studies that have compared measures, and some general suggestions regarding screening. The chapter closes with a description of future directions and needs for clinical research in the area of screening.

## Definition of Screening

Definitions for the term *screening* are numerous, ranging from the narrowest to broadest breadth of focus or coverage. For purposes of this chapter, the term will be used to represent the skillful use of empirically based procedures for identifying individuals with alcohol-related problems or consequences or those who are at risk for such difficulties.

Empirically based procedures may include biological markers as well as self-report techniques. For example, elevated levels of gamma-glutamyltransferase (GGT) and mean corpuscular volume (MCV) have been used as a screen for excessive alcohol consumption (see Leigh and

Skinner 1988; Rosman and Lieber 1990; and the chapter by Allen et al. in this *Guide* for more detail on such laboratory tests). However, this chapter will focus on self-report screening procedures.

The definition of screening proposed here does not include diagnosis. Screening measures are not intended to provide a diagnosis; assessment for purposes of diagnosis occurs in subsequent stages of evaluation (see the chapter by Maisto et al. in this *Guide* for more detail on diagnostic procedures). The distinction between screening and assessment is discussed below.

### **Goals of Screening**

Having identified a working definition of screening, it makes sense to step back for a moment and specify the goals or objectives of screening. A primary objective is to detect individuals with alcohol problems. In this regard, the population of interest is persons who are not yet addressing their alcohol use disorders. A companion objective is setting the stage for subsequent assessment and, as warranted, interventions. The broader benefit to society is to minimize the human and economic costs of alcohol abuse through detection and intervention, especially early detection so that interventions can be applied as soon as possible.

### **Distinguishing Between Screening and Assessment**

Screening is designed to identify persons experiencing an alcohol use problem. An abnormal or positive screening result may thus “raise suspicion” about the presence of an alcohol use problem, while a normal or negative result should suggest a low probability of an alcohol use problem. Screening measures are not designed (if for no other reason than because of their brevity) to explicate the nature and extent of such problems. By contrast, assessment procedures *are* designed to explore fully the nature and extent of

a person’s problems with alcohol (see the chapter by Maisto et al.). Such assessment information can be used to determine whether the person meets the criteria for a particular diagnostic category, such as alcohol abuse or alcohol dependence, depending on the nomenclature system being applied.

### **Screening in Relation to the Treatment Process**

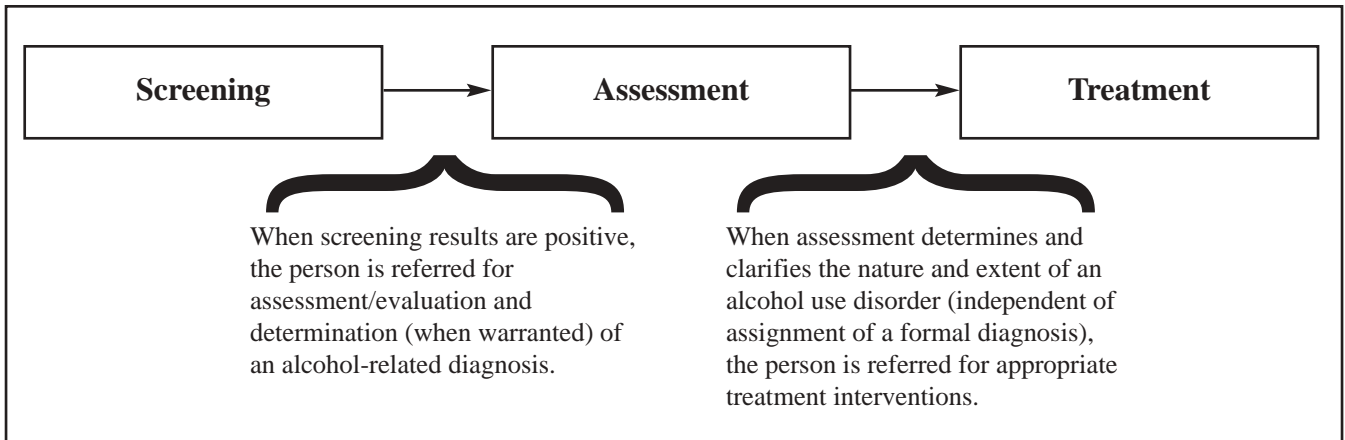
Screening ideally should occur in a manner that facilitates subsequent assessment or referral for assessment among persons identified as positive on the screening measure. For example, screening plans should include sensitive procedures for the communication of screening results in a manner that maximizes the likelihood that the individual will follow through with assessment. Further, any screening system will require procedures for the actual assessment of those identified as positive (through subsequent assessment at the same location or through a referral). The benefits of screening to the individual and society ultimately will be a function of the extent to which identified persons subsequently address their drinking problems. A staging process for these events is depicted in figure 1. Adapted from Allen (1991), the figure shows the connections between screening, assessment, and treatment.

## **ASSESSING SCREENING MEASURES**

### **Approaches to Evaluating Measures**

There are a variety of dimensions along which one can determine the strengths of a particular screening measure. Because of their relevance to evaluating measures and making determinations regarding the utility of specific measures for particular purposes, settings, or populations, it is important to identify and describe these dimensions: sensitivity, specificity, predictive value,

**FIGURE 1.—Interrelationships between stages of screening, assessment, and treatment**



likelihood ratios, and receiver operating curves. The “gold standard” by which a screening test is evaluated (called the reference test or criterion) generally is a full diagnostic evaluation.

*Sensitivity*

The sensitivity (or true positive rate) of a test concerns its ability to identify people with the disorder in question, in this case alcohol problems. Stated differently, sensitivity reflects the proportion of persons with alcohol use disorders correctly identified (“true positives”) by the test. Consistent with this definition, a sensitive test is one that provides a minimum of false negatives (i.e., persons with alcohol problems who are not detected by the screening measure).

Table 1 depicts the relationships between test results and alcohol problems. Four outcomes are possible (true positives, false positives, false negatives, and true negatives) for the crossing of the test results (negative or positive) with the disorder (present or absent). Using this grid, sensitivity would be calculated by dividing the true positive cases by the total number of persons with an alcohol use disorder ( $a/a + c$ ). Similarly, the false negative rate, or 1 minus the sensitivity of the test, would be calculated by dividing the false negative cases by the total number of persons with a disorder.

*Specificity*

The specificity (or true negative rate) of a test refers to its ability to accurately identify people who do not have an alcohol use disorder. As such, specificity reflects the proportion of non-alcohol abusers correctly identified (“true negatives”). Accordingly, a specific test provides a minimum of false positives (i.e., non-alcohol abusers identified by the screening test as alcohol abusers). Referring again to table 1, specificity would be calculated by dividing the true negative cases by the total number of non-alcohol abusers ( $d/b + d$ ). Similarly, the false positive rate, or 1 minus specificity, would be calculated by dividing the false positive cases by the total number of non-alcohol abusers ( $b/b + d$ ).

**TABLE 1.—Possible outcomes in screening for alcohol use disorders**

Result of screening measure	Alcohol use disorder	
	Present	Absent
Positive	True positives (a)	False positives (b)
Negative	False negatives (c)	True negatives (d)

As a general rule, screening tests tend to emphasize maximizing sensitivity over specificity. This logic is apparent when the purpose of screening is considered. Screening is done on unselected groups (e.g., asymptomatic primary care patients) for the purpose of identifying cases where there is a heightened suspicion of a disorder. For people screening positive, additional testing is done to determine the presence and severity of a problem. The costs of using self-report screening tests are fairly minimal compared with, for example, biochemical tests, and thus specificity becomes less of a concern. Clearly, though, specificity is an important concern as it relates to the resources used to evaluate people who screen positive but do not have an alcohol disorder.

#### *Predictive Value*

In general, good screening tests when negative should “rule out” an alcohol use disorder, and when positive should “rule in” a disorder such that assessment is warranted. A useful statistic in evaluating screening tests is called positive predictive value. This refers to the proportion of persons identified as positive on the screening test who actually have the disorder. Clinically, positive predictive value represents the probability of an alcohol use disorder given a positive test result. Referring to table 1, the likelihood that a person with a positive test result actually has an alcohol problem is calculated by dividing the true positives by the number of positives identified by the screening test ( $a/a + b$ ). It should be noted that as the prevalence of the disorder in the population being screened increases, the positive predictive value of the measure increases as well. A related concept is the “false alarm rate,” which is the probability that a person testing positive does not have an alcohol use disorder ( $b/a + b$ ).

Negative predictive value represents the probability that a person does not have an alcohol use

disorder following a negative test result (calculated as  $d/c + d$  from table 1). Yet, the more interesting clinical question is, given a negative test result, does this patient still have an alcohol use disorder? The “false reassurance rate,” or 1 minus negative predictive value, represents the probability that a patient has an alcohol use disorder given a negative test result (calculated as  $c/c + d$  from table 1). As the prevalence of the disorder in the population goes down, the false reassurance rate also goes down.

#### *Likelihood Ratios*

The method of likelihood ratios to describe the accuracy of a screening test has been touted as quicker and more powerful than the sensitivity/specificity strategy. Increasingly, studies of the characteristics of alcohol screening tests are using likelihood ratios as a summary measure. According to Sackett (1992), a likelihood ratio reflects the odds that a positive finding on a screening test would occur in a person with, as opposed to a person without, an alcohol use disorder. He described the significance of different likelihood ratios as follows:

When a finding’s likelihood ratio is above 1.0, the probability of disease goes up (because the finding is *more* likely among patients with, than without, the disorder); when the likelihood ratio is below 1.0, the probability of disease goes down (because the finding is *less* likely among patients with, than without, the disorder); finally, when the likelihood ratio is close to 1.0, the probability of disease is unchanged (because the finding is *equally* likely in patients with, and without, the disorder). (Sackett 1992, pp. 2643–2644, emphasis in original)

The calculation of the likelihood ratio for a positive test result is based on sensitivity and specificity, as follows:

$$\frac{\text{sensitivity}}{1 - \text{specificity}}$$

The likelihood ratio is thus a single number (or ratio) summarizing the characteristics of a test. Proponents of likelihood ratios have argued that they are easily remembered and provide a shorthand method for calculating posttest (posterior) probabilities (Fagan 1975). To do so, it is necessary to reexpress the prior probability as odds using the following formula:

$$\text{Prior Odds} = \text{Probability} / (1 - \text{Probability})$$

For example, a probability of 0.50 is equivalent to an odds of 1.0, interpreted as “one to one” (or 1:1). Thus, for every one patient with the disease there is one patient without the disease (and hence, the probability of disease is 0.50).

Positive predictive value (or posterior probability of a positive result) is calculated by multiplying the prior odds and likelihood ratio and reexpressing the posterior odds as a probability. The following two equations describe these calculations:

$$\text{Posterior Odds} = \text{Prior Odds} \times \text{Likelihood Ratio}$$

$$\text{Posterior Probability} = \text{Posterior Odds} / (1 + \text{Posterior Odds})$$

While likelihood ratios are often used to describe the characteristics of a test, their clinical use has been more limited. One primary limitation of likelihood ratios is the need to reexpress prior and posterior probabilities as odds in calculating predictive value (Dujardin et al. 1994). More information on likelihood ratios and their uses is provided by Feinstein (1985) and Sackett (1992).

### *Receiver Operating Curves*

Receiver operating curves are used to determine optimal cutoff scores for use with a particular screening measure, and in general to describe the overall characteristics of a measure through determining the area under the receiver operating characteristic curve. Changing the test’s cutoff, naturally, has implications for its sensitivity, specificity, and positive predictive value. For example, lowering the cutoff for a screening test generally will identify a greater number of positive test results. Such a strategy typically will result in greater sensitivity, but at the same time it will reduce the test’s specificity. An excellent example of the effect of using different cutoff points for several screening measures (e.g., CAGE, Michigan Alcoholism Screening Test [MAST], T-ACE, and TWEAK) was presented by Russell et al. (1994).

### **Self-Report Validity and Screening Tests**

Although some researchers and clinicians have argued that information from self-reports on alcohol-related variables is suspect (e.g., alcohol abusers will deny they have problems), many others believe these reports can be valid and useful in the screening as well as assessment and treatment of alcohol abusers. This controversy over self-reports has been discussed in greater detail by Babor et al. (1987), Maisto et al. (1990), and Sobell and Sobell (1990).

Clinical researchers in the alcohol field generally accept the idea that the degree of confidence in self-report data increases when information is collected in multiple modes and under circumstances shown to enhance self-reports regarding alcohol use (Babor et al. 1987). For example, the accuracy of self-reports may decrease as a function of recent alcohol consumption, concurrent psychiatric problems, physical and cognitive impairments, the absence of assurances of confidentiality, and an

ambiguous or strained relationship between the person administering the screening measure and the person taking it (see Skinner 1984). Additional considerations relevant to minimizing response bias and maximizing the validity of self-reports include providing clear instructions about the screening task, engaging the person in the process, and ensuring that screening administrators are trained and facile in the task (Babor et al. 1987). Taken together, these and other strategies, depending on the context of the screening endeavor, will yield greater confidence in the self-reports provided by those being screened for alcohol problems.

## OVERVIEW OF SCREENING MEASURES

There is no shortage of screening measures available for clinicians and researchers, and a culling of the available measures to a manageable number was performed for purposes of this chapter. Application of the inclusion criteria for this *Guide* (see Allen's "Introduction") yielded a core group of 14 screening measures. Tables 2A and 2B provide descriptive and administrative information on these measures, including examples of groups the measure has been used with, availability of normative data, format, number of items, and time needed to administer the measure. (Table 2A indicates whether norms are available generally as well as for particular subgroups.) Availability of psychometric data, including various types of reliability and validity, is indicated in table 3; see the appendix for more detail.

All of the measures listed in tables 2A and 2B are available for use with adults, and five of them were developed for use with adolescents as well. The measures range in length from very few items (such as the 4-item CAGE) to the 350-item Computerized Lifestyle Assessment (CLA). Six of the screening measures listed in the tables include 10 or fewer items (Alcohol Use Disorders Identification Test [AUDIT], CAGE, Five-Shot Questionnaire, Rapid Alcohol Problems Screen,

T-ACE, and TWEAK). Several of the measures include two or more distinct scales, should such further information be of utility in a particular screening endeavor.

The majority of measures are available for use in a pencil-and-paper self-administered format, but other options are present. Several measures (e.g., AUDIT, CAGE, and MAST) can be used in an interview format, and several measures (e.g., Addiction Potential Scale, AUDIT, CAGE, Drug Use Screening Inventory, Self-Administered Alcoholism Screening Test [SAAST], Substance Abuse Subtle Screening Inventory, and TWEAK) have been adapted for computerized assessment. Regardless of format, most measures can be completed in under 15 minutes, and six can be completed in just 1 or 2 minutes. Scoring of the majority of the measures likewise requires relatively little time.

Overall, the material presented in the tables shows that screening measures have considerable variability in length and potential applicability to particular screening contexts. The process of evaluating and selecting a particular screening measure requires consideration of a number of factors, and these are addressed in the following section.

## SELECTION OF MEASURES

It is not possible to make definitive statements on the selection of a screening measure because screening endeavors can vary dramatically along a number of dimensions, such as the population involved, the amount of time available for screening, the setting, and the goals of the screening. However, it is possible to provide guidelines and suggestions. This section provides guidelines for selecting and using a screening measure, summarizes studies that have compared screening measures, and makes some general suggestions regarding screening for alcohol problems. It is important to remember that these guidelines and

TABLE 2A.—Self-report screening measures: Descriptive information

Measure	Target population	Groups used with	Norms avail.?	Normed groups	No. items (no. subscales)
AAS	Adults		Yes	Normals; substance abusers; psychiatric patients	13
APS	Adults		Yes	Normals; alcohol/drug abusers; psychiatric patients	39
AUDIT <sup>1</sup>	Adults	Primary care, ER, surgery, psychiatric patients; DWI offenders; criminals in court, jail, and prison; enlisted men in Armed Forces; workers in EAPs and industrial settings	Yes	Heavy drinkers; alcoholics	10 (3)
CAGE	Adults and adolescents > 16 yrs.	General medical population in a primary care setting	Yes		4
CLA	Adults and adolescents		Yes		350 (20)
DUSI-R	Adults and adolescents > 16 yrs.; youth 10–16 yrs.	Known or suspected alcohol/drug users; matching specific treatments to specific problems	Yes		159 (11)
Five-Shot Questionnaire	Adults	Male early-phase heavy drinkers	Yes	Moderate/heavy drinkers; alcoholics	5
Mac	Adults	Alcoholics likely to deny problems with drinking when asked directly	Yes	Women; alcoholics with collateral drug problems	49

**TABLE 2A.—Self-report screening measures: Descriptive information** (continued)

Measure	Target population	Groups used with	Norms avail.?	Normed groups	No. items (no. subscales)
MAST <sup>2</sup>	Adults and adolescents	Alcoholics, medical patients, psychiatric patients	Yes		25
RAPS4	Adults	ER and primary care settings	No		4
SAAST	Adults	General medical patients	Yes	Gender; age	35 (2)
SASSI	Adults and adolescents	Adolescents (12–18 yrs.); inpatient and outpatient adults	Yes		Adults 93 (10); adolescents 100 (12)
T-ACE	Adults	Pregnant women	Yes	African American inner-city women attending antenatal clinic	4
TWEAK	Adults	Women	Yes	African American gravidas in inner-city clinic; M&F general population; M&F alcoholic patients; M&F outpatients	5

Note: The measures are listed in alphabetical order by full name; see the text for the full names. Information in the table is based primarily on material provided by the developers of the measures; see the appendix for more detail. DWI = driving while intoxicated; EAPs = employee assistance programs; ER = emergency room; M&F = male and female.

<sup>1</sup> Also available is a 3-item version called the AUDIT-C (see Piccinelli et al. 1997 and Gordon et al. 2001).

<sup>2</sup> Briefer versions of the MAST are available: the 10-item Brief MAST (Pokorny et al. 1972); the 13-item Short MAST (SMAST) (Selzer et al. 1975); and the 9-item modified version of the Brief MAST, called the Malmö modification (Mm-MAST) because it was first used in the city of Malmö (Kristenson and Trell 1982). Also available is a geriatric version of the MAST, called the MAST-G (Mudd et al. 1993). Magruder-Habib et al. (1982) developed a MAST variant called the VAST, designed to distinguish between lifetime and current problems with alcohol.



**TABLE 2B.—Self-report screening measures: Administrative information**

Measure	Format options <sup>1</sup>	Time to administer (minutes)	Computer scoring avail.?	Fee for use? <sup>2</sup>
AAS	P&P SA; computer SA	5	Yes	Yes
APS	P&P SA; computer SA	10	Yes	Yes
AUDIT <sup>3</sup>	P&P SA; interview; computer SA	2	No	No
CAGE	P&P SA; interview; computer SA	<1	No	No
CLA	Computer SA	20–30	Yes	Yes
DUSI-R	P&P SA; interview; computer SA	20	Yes	Yes
Five-Shot Questionnaire	P&P SA	1	No	Yes
Mac	P&P SA; computer SA	10	No	Yes
MAST <sup>4</sup>	P&P SA; interview	8	No	No
RAPS4	Interview	1	No	No
SAAST	P&P SA; computer SA	5	Yes	Unknown
SASSI	P&P SA; computer SA	10–15	Yes	Yes
T-ACE	P&P SA; interview	1	No	Unknown
TWEAK	P&P SA; interview; computer SA	<2	No	No

Note: The measures are listed in alphabetical order by full name; see the text for the full names. Information in the table is based primarily on material provided by the developers of the measures; see the appendix for more detail. P&P = pencil and paper; SA = self-administered.

<sup>1</sup> Most of the self-administered tests can be supervised and scored by office or clinic staff in relatively brief periods of time.

<sup>2</sup> Information on fees was not always clear, so potential users should confirm whether there are fees before using any of these measures.

<sup>3</sup> Also available is a 3-item version called the AUDIT-C (see Piccinelli et al. 1997 and Gordon et al. 2001).

<sup>4</sup> Briefer versions of the MAST are available: the 10-item Brief MAST (Pokorny et al. 1972); the 13-item Short MAST (SMAST) (Selzer et al. 1975); and the 9-item modified version of the Brief MAST, called the Malmö modification (Mm-MAST) because it was first used in the city of Malmö (Kristenson and Trell 1982). Also available is a geriatric version of the MAST, called the MAST-G (Mudd et al. 1993). Magruder-Habib et al. (1982) developed a MAST variant called the VAST, designed to distinguish between lifetime and current problems with alcohol.

**TABLE 3.—Availability of psychometric data on self-report screening measures**

Measure	Reliability			Validity		
	Test-Retest	Split-half	Internal consistency	Content	Criterion	Construct
AAS	•		•	•	•	
APS	•		•		•	
AUDIT	•		•	•	•	•
CAGE					•	
CLA	•		•	•	•	•
DUSI-R	•	•	•	•	•	•
Five-Shot Questionnaire					•	
Mac	•		•		•	•
MAST	•		•	•	•	
RAPS4					•	
SAAST			•		•	
SASSI	•				•	
T-ACE					•	
TWEAK					•	

Note: The measures are listed in the same order as in table 2; see the text for the full names of the instruments.

suggestions need to be evaluated carefully in the context of the particular setting and context in which the screening will occur.

### Guidelines for Selecting and Using Measures

There are four central questions that need to be addressed in selecting a screening measure:

- The goals of the screening
- The characteristics of the measure for the target population
- The time and resources available for conducting the screening
- The resources available for scoring the screening measure and providing feedback/referral for positive cases

Identifying the goals of screening in a particular situation might appear straightforward. Indeed,

all screening endeavors on some level are designed to detect alcohol problems among those tested. However, the degree of sensitivity and specificity desired will affect the selection of the measure. While one investigator may want to focus on maximizing sensitivity and thus identify as many true positives as possible, another investigator may want to key on specificity and thus maximize the likelihood that persons identified as positive are actually experiencing an alcohol problem.

The characteristics of the screening measure for use with the target population are also an important consideration in selecting a measure. Generally, a measure with high sensitivity is desirable, and ideally this has been demonstrated in screening populations similar to the target group. Measures with high likelihood ratios have the benefit of both high sensitivity and specificity, and may be effective in both ruling in and ruling out

alcohol use problems. Similar information can be gained from the area under the characteristic receiver operating curve, although this estimate is only a global measure of a measure's characteristics, and it is desirable to consider sensitivity and specificity at a given cutoff point.

The amount of time available for performing the screening should not be a major impediment to its conduct. Several screening measures can be completed in just a couple of minutes. For measures that take more time to complete, one must weigh the relative benefits or advantages of the measures against the time factor. The resources required to facilitate screening should also not be a major impediment. The majority of available measures can be administered by clinical or administrative staff with a minimal degree of training (e.g., clerical staff), and many measures can be self-administered. In addition, several measures have been developed for computer administration.

Finally, one must evaluate the resources available for scoring and interpreting the screening data collected and for acting on the results. Conveniently, a host of measures that can be scored and evaluated in just a few minutes are available. Since screening is intended to detect persons with alcohol problems, resources to provide feedback and referral for evaluation and assessment will be needed. The sensitivity versus specificity emphasis of a given measure will have implications for the amount of resources necessary for subsequent feedback and referral of positive cases.

### **Contrasts Among Screening Measures**

Another resource for selecting a screening measure is data on direct comparisons between measures. A number of such efforts, using a variety of screening measures in a range of settings, have been conducted (e.g., Russell et al. 1994; Maisto et al. 1995; Cherpitel 1997; Clements 1998; Seppa et al. 1998; Steinbauer et

al. 1998; Cherpitel and Borges 2000; Aertgeerts et al. 2001). Maisto et al. (1995), for example, reviewed research involving direct contrasts of self-report screening measures for alcohol problems in a variety of settings. Among their conclusions was that the MAST generally was more sensitive than the CAGE, although the CAGE may perform better than the MAST with elderly primary care patients, and that the CAGE and the Short MAST performed comparably. They noted that the CAGE is particularly popular in primary care settings.

Cherpitel (1997) described the relative strengths of the AUDIT, the TWEAK, the CAGE, and the Brief MAST in population subgroups. Among the conclusions were that the AUDIT and the TWEAK showed greater sensitivity than the CAGE or the Brief MAST and that the instruments were more sensitive for men than for women. However, notable subgroup patterns emerged. The AUDIT and the TWEAK were equally sensitive among African Americans, while the TWEAK was more sensitive than the AUDIT among Whites. Further, the sensitivity of the AUDIT and the TWEAK among African Americans and White men did not differ, while among women, the AUDIT was more sensitive among African Americans and the TWEAK more sensitive among Whites.

Steinbauer et al. (1998) administered the CAGE, the SAAST, and the AUDIT to patients at an adult family medicine clinic. They were particularly interested in identifying ethnic and/or gender biases in the measures. They found that the CAGE and the SAAST showed poorer performance than the AUDIT in identifying alcohol use disorders among African American men, White women, and Mexican American patients. Each measure showed good discriminability for African American women. Steinbauer et al. concluded by recommending that the AUDIT be used in primary health care settings, including those serving multi-ethnic communities. In another report comparing

measures (including the AUDIT, the CAGE, and the MAST), Clements (1998) found the AUDIT to be superior at identifying current alcohol dependence among undergraduate students.

The conclusions provided by these reports comparing screening measures may be useful in deliberations involving the choice of specific scales, particularly in terms of matching screening measures according to gender and ethnicity. However, these studies have included only a subset of the measures listed in tables 2A and 2B. Thus, their findings should not necessarily be used to choose any of the measures they surveyed over the remainder of measures listed in the tables.

Investigations also have been conducted on the use of screening measures (including several of those described in tables 2A and 2B) composed of items selected from other scales and on the use of screens including only one or two questions. The four-item T-ACE, for example, includes three items from the CAGE along with an item on tolerance, and the five-item TWEAK includes three T-ACE items and two MAST items. As another example, Cherpitel (1995) developed the Rapid Alcohol Problems Screen for use in emergency room settings. This five-item measure is composed of two questions from the TWEAK, two from the AUDIT, and one from the Brief MAST. A four-item version, called the RAPS4, has also been developed (Cherpitel 2000). Seppa and colleagues (1998) developed the Five-Shot Questionnaire, which includes two items from the AUDIT and three from the CAGE. In evaluating the questionnaire with middle-aged men attending a health screening, Seppa et al. found the Five-Shot Questionnaire to be efficient in differentiating between moderate and heavy drinkers. In an even briefer approach, Cyr and Wartman (1988) recommended two screening questions (“Have you ever had a drinking problem?” and “When was your last drink?”); Taj et al. (1998) proposed the use of a single question (“On any single occasion during the past 3 months, have you had more than 5 drinks containing alcohol?”). Williams and Vinson

(2001) also proposed a single question (“When was the last time you had more than X drinks in 1 day?” where X = 4 for women and 5 for men). Brown and colleagues (2001), in an effort to assess both alcohol and other substance abuse, have developed a two-item conjoint screen (TICS). The items are “In the past year, have you ever drunk or used drugs more than you meant to?” and “Have you felt you wanted or needed to cut down on your drinking or drug use in the last year?”

### **Suggestions**

Although, as has been emphasized throughout this chapter, it is important to consider the specific goals, setting, and other factors in selecting a screening measure, there are some general suggestions that can be made regarding screening for alcohol problems. These suggestions (see also Allen et al. 1995 and Maisto et al. 1995) have particular relevance to primary health care settings, where screening for alcohol problems is becoming more frequent.

First, there is a wide array of screening measures that can be recommended generally for use with adults. Although the choice will be dictated, of course, by the specific needs of the program, the AUDIT can be recommended for a variety of settings. It has been shown to possess a number of strengths and advantages. For settings in which a briefer approach is needed, there are several screens available that involve administration of only one or two questions.

Second, screening projects should consider the concomitant use of laboratory tests where available, particularly in health care settings where such tests are routinely performed. Positive results on biochemical tests (e.g., GGT or MCV) may enhance the credibility of self-report screening results when presented to clients. There is some evidence that biochemical markers such as carbohydrate-deficient transferrin (CDT) identify a different spectrum of alcohol use problems than self-report screening tests such as the AUDIT (Hermansson et al. 2000).

Finally, any screening endeavor requires responsive procedures regarding feedback to individuals screened and the making of appropriate referrals for further evaluation and assessment. The establishment of such procedures is a necessary component of the screening process that needs to be in place prior to the actual screening of individuals.

## FUTURE DIRECTIONS AND NEEDS

Many screening measures have been developed for use in clinical settings, including primary health care settings. There have been some interesting historical trends in this research, which should be considered as future studies are planned. First, many screening tests share common roots with the CAGE questions and the MAST. There is a fairly extensive literature on the performance of these measures. A second trend has been to develop ever briefer measures, with several single-item measures now being touted. Whether these briefer measures will lead to increased screening, allow for feedback to patients, and provide for optimal management of patients with alcohol use problems has yet to be determined. A final trend has been to emphasize consumption indicators either alone or in combination with other consequence-based or dependence indicators.

Although these advances in screening measures are important, implementation appears to be lagging behind the development and evaluation of measures. Thus, more attention should be paid to strategies and approaches for increasing the use of screening measures in a variety of settings.

There are a number of important research directions that should be considered in enhancing screening for alcohol use problems in clinical settings. Research to date has largely evaluated screening measures in highly protocol-driven, investigator-controlled studies. Research staff are often used to administer the measures, the scoring is provided through the study, and the criterion measure against which the measure is evaluated is also administered by the staff. Such studies might be seen as assessing “efficacy,” or examining the

performance of measures in ideal settings. However, we know comparatively little about how screening measures should be used in real-world clinical settings. Studies are needed to assess the “effectiveness” of screening for alcohol use problems, exploring such factors as the timing of screening, who should administer the screen, who should interpret the results for the clinician and patient, and how the results are to be incorporated with further assessment and management.

A related research concern has to do with the problem of integrating screening within other preventive health care services. For example, in the primary care setting, a routine health examination can include screening for many medical problems and health risk behaviors (e.g., various cancers, hypertension, lipid disorders, seat belt use, bicycle helmet use). Most studies on screening measures have considered a specific measure as part of the instrumentation in a research project rather than integrated within various screening tools administered as part of a routine health maintenance visit. Daepfen et al. (2000) demonstrated that the AUDIT performs well when embedded within a broader general health risk questionnaire. Research is needed to better understand how screening for alcohol use problems can become part of routine health examinations, and how screening tools might be integrated with other health risk assessments. Clearly, it is not enough to argue that screening tests should simply be added as part of the routine office visit without considering competing clinical and administrative demands put upon providers.

Research is also needed on the use of screening measures with specific populations. For example, the Research Institute on Addictions Self Inventory (RIASI) (Nochajski and Wiczorek 1998; Nochajski et al. unpublished manuscript) is a screening measure designed to briefly but accurately determine which driving under the influence (DUI) offenders need to be referred for diagnostic evaluation. The measure, which can be completed and scored in 15 minutes, is being used

to identify DUI arrestees with alcohol and/or other drug problems. The RIASI represents a careful and empirical development of a screening device for use with a particular population. Developed specifically for the New York State Drinking Driver Programs, it is now being used in several State programs for DUI offenders.

A final area for further investigation involves development of testing systems, where combinations of self-report measures, and potentially biochemical markers, are used. Again, research on screening measures has largely considered the performance of measures in isolation or in comparison with other measures. Testing algorithms might be developed where the results of one measure suggest further testing to enhance predictive value and guide assessment.

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# Biomarkers of Heavy Drinking

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In recent years significant advances have been made in biological assessment of heavy drinking. These advances include development of new laboratory tests, formulation of algorithms to combine results on multiple measures, and more extensive applications of biomarkers in alcoholism treatment and research.

Biomarkers differ from the psychometric measures discussed in other chapters of this *Guide* in at least four major ways. Most importantly, they do not rely on valid self-reporting, and, hence, are not vulnerable to problems of inaccurate recall or reluctance of individuals to give candid reports of their drinking behaviors or attitudes. They can thus add credibility to research dealing with alcohol treatment efficacy and can provide clinicians with an additional source of objective information on patients.

Second, although biomarkers are subject to many of the usual psychometric issues of validity and reliability, some, such as internal consistency and construct validity, are not relevant to their evaluation. Instead, major concerns in evaluating biomarkers deal with criterion validity, stability, test-retest consistency, and interrater reliability. These issues have a bearing particularly for new

markers for which fully automated test procedures have yet to be developed.

Third, the expertise required to ensure valid results from biomarkers is somewhat different from that needed to obtain maximally valid self-report information, where rapport, assurance of confidentiality, motivation for honesty, current state of sobriety, and testing conditions are important considerations. The accuracy of biomarker information is rarely a function of sample collection, but rather is closely related to sample handling, storage, and transmittal; quality assurance of laboratory procedures for isolation of the biomarker; and methods for quantifying and interpreting results.

Finally, although often used as screens for diagnosis of alcohol abuse or dependence, strictly speaking, biomarkers are reflections of physiological reactions to heavy drinking. Self-report screening scales, on the other hand, generally use a diagnosis of alcohol dependence as the criterion against which they are evaluated. Assessment of drinking behavior per se and severity of alcohol dependence are both important, albeit somewhat non-overlapping phenomena.

This chapter addresses the following issues: criteria for selection of biomarkers, traditional

biomarkers, emerging biomarkers, use of biomarkers in combination, use of biomarkers in alcohol treatment research and clinical practice, and research needs. Although the chapter focuses only on biomarkers, it is, of course, important to recognize that their use is in no way in competition with informed use of other psychometric measures. Rather, clinicians and researchers need to know how to maximize the information value of each class of measures.

### **SELECTING A BIOMARKER**

Selecting the proper biomarker for a particular application involves several issues. Ideally, the biological test would yield values that would directly correspond to the amount of alcohol consumed over a defined period of time. The sample for the test would be easy to obtain, readily testable, and inexpensive to quantify. Results would be quickly available. Further, the procedure would be highly acceptable to patients and therapists. No currently available biomarker has all of these features. Tests that directly or indirectly measure alcohol blood levels approach these goals but are useful only in situations of acute alcohol ingestion. They do not provide information regarding drinking status prior to acute ingestion.

Several additional considerations should guide the choice for a biological test. First, the *window of assessment* (i.e., the amount of time that the marker remains positive following drinking) needs to be understood. In emergency room settings as well as in occupational contexts, to include transportation, public safety, or delivery of medical care, level of alcohol consumption in the immediate past is often the primary concern. On the other hand, in insurance and general health care treatment screening contexts as well as in alcoholism treatment efficacy trials, the emphasis is likely to be particularly on chronic heavy drinking.

An additional concern that should guide selection of the biomarker is the *nature of the population* being assessed. Biomarkers often perform differently as a function of age, gender, ethnicity, and health status of the respondent. So, too, biomarkers are likely to perform more accurately in distinguishing extreme groups than in determining at-risk or harmful use of alcohol in a population heterogeneous with respect to drinking behavior.

Psychometric characteristics should also be considered in choosing a biomarker. Most notable of these are sensitivity and specificity. *Sensitivity* refers to the ability of a test to accurately identify those with the trait of interest. *Specificity* reflects the ability of a test to accurately detect those individuals without the trait. A test with high specificity will produce a low percentage of false-positive results. In populations with low base rates of a particular trait, a test with high specificity is generally needed to minimize the number of people erroneously labeled as having the trait. When the prevalence of the trait is high, specificity is generally not as critical as sensitivity. Statistical properties of screening tests are addressed in more detail in the chapter by Connors and Volk in this *Guide*.

### **TRADITIONAL BIOMARKERS**

Table 1 summarizes some characteristics of the traditional biomarkers discussed in this section.

#### **Gamma-Glutamyltransferase**

Gamma-glutamyltransferase (GGT) is a glycoenzyme found in endothelial cell membranes of various organs. It appears to mediate peptide transport and glutathione metabolism. Elevated serum GGT level remains the most widely used marker of alcohol abuse. Levels typically rise after heavy alcohol intake that has continued for several weeks (Allen et al. 1994). With 2–6 weeks of abstinence, levels generally decrease to within

**TABLE 1.—Characteristics of traditional markers**

Marker	Time to return to normal limits	Type of drinking characterized	Comments
Gamma-glutamyl-transferase	2–6 weeks of abstinence	~ 70 drinks/wk for several weeks	Many sources of false positives
Aspartate aminotransferase	7 days, but considerable variability in declines with abstinence	Unknown, but heavy	Many sources of false positives
Alanine aminotransferase	Unknown	Unknown, but heavy	Many sources of false positives Less sensitive than aspartate aminotransferase
Macrocytic volume	Unknown but half-life ~ 40 days	Unknown, but heavy	Slow return to normal limits even with abstinence
Carbohydrate-deficient transferrin	2–4 weeks of abstinence	60+ g/d for at least 2 weeks	Rare false positives Good indicator of relapse

the normal reference range, with the half-life of GGT being 14–26 days. Laboratory tests for evaluating GGT are inexpensive and readily available.

GGT may elevate because of increased synthesis or accelerated release from damaged or dead liver cells. It seems to primarily indicate continuous, rather than episodic, heavy drinking, although a few moderate drinkers also produce elevated levels of GGT (Gjerde et al. 1988). Excessive drinking is not the only cause of elevated GGT levels; they may also rise as a result of most hepatobiliary disorders, obesity, diabetes, hypertension, and hypertriglyceridemia (Meregalli et al. 1995; Sillanaukee 1996). There are also large numbers of false negatives for GGT. For example, Brenner et al. (1997) observed that only 22.5 percent of construction workers drinking an average of 50–99 g/d had elevated GGT values,

and even among those consuming >100 g/d, only 36.5 percent revealed high GGT levels.

### Aminotransferases

The serum aminotransferases, aspartate aminotransferase (ASAT) and alanine aminotransferase (ALAT), are also often considered as screens for heavy drinking. ASAT catalyzes the reversible transfer of an amino group from aspartate to  $\alpha$ -ketoglutarate to form glutamate and oxaloacetate. It is present in most eukaryotic cells, occurring in distinct isoenzymes in mitochondria (m-ASAT) and cytosol (c-ASAT). Both of these participate in the malate-aspartate shuttle, and in the liver the reaction transfers excess metabolic nitrogen into aspartate for disposal via the urea cycle (Nalpas et al. 1991).

Enhanced ASAT levels in alcoholics reflect liver damage, but alcohol consumption per se does not cause elevation (Salaspuro 1987). Serum ASAT does not correlate with the length of drinking (Skude and Wadstein 1977), but the highest ASAT values have been reported in alcoholics with a history of alcoholism exceeding 10 years. Other than with heavy drinking, serum ASAT also increases in a variety of liver diseases and may result from abnormal hepatocellular membrane permeability induced by ethanol (Zimmermann and West 1963).

The activity of mitochondrial ASAT can be analyzed by a rather simple immunochemical procedure (Rej 1980). The antibody against soluble ASAT is commercially available.

ALAT is found almost exclusively in the liver cytoplasm and is released to blood as a result of increased membrane permeability and breakage secondary to hepatocyte damage. ALAT appears to be the most sensitive and specific test for acute hepatocellular damage (Coodley 1971). Although in isolation ALAT is not particularly useful as a marker of chronic alcohol abuse or of chronic liver disease, the ratio ASAT/ALAT seems to provide meaningful information (Kontinen et al. 1970; Skude and Wadstein 1977; Reichling and Kaplan 1988). Usually a cutoff value of the ratio  $> 2$  is assumed to reflect an alcoholic etiology of the liver disease (Matloff et al. 1980).

### **Macrocytic Volume**

Elevated erythrocyte macrocytic volume (MCV) is common in alcoholic patients. This change results directly from the effect of alcohol on erythroblast development and persists as long as drinking continues (Buffet et al. 1975; Morgan et al. 1981; Whitehead et al. 1985).

As a stand-alone alcohol abuse indicator MCV has somewhat low sensitivity, and its slow return to reference values diminishes its potential as a relapse marker. Nevertheless, several studies have

recognized its screening value when it is considered with other markers of alcohol consumption (Mundle et al. 2000). Moreover, the testing methodology is easy and inexpensive.

### **Carbohydrate-Deficient Transferrin**

Transferrin, a negatively charged glycoprotein, is metabolized in the liver, circulates in the bloodstream, and assists in iron transport in the body. It contains two carbohydrate residues and two *N*-linked glycans (MacGillivray et al. 1983). Six sialic acid moieties may be attached. With heavy alcohol intake, these moieties can lose carbohydrate content, hence the term “carbohydrate-deficient” transferrin (CDT) (Stibler and Borg 1988). The concentrations of asialo-, monosialo-, and disialo-transferrin are increased (Martensson et al. 1997).

CDT levels appear to elevate following alcohol consumption of 60–80 g/d for 2 or 3 weeks (Stibler 1991), and they normalize with a mean half-life of 2–4 weeks of abstinence (Lesch et al. 1996). Research on possible mechanisms underlying the effect of alcohol on reducing the carbohydrate content of transferrin has been reviewed by Sillanaukee et al. (2001). False-positive CDT results can be found in patients with an inborn error of glycoprotein metabolism or a genetic D-variant of transferrin. False positives can also occur in patients with severe non-alcoholic liver diseases (e.g., primary biliary cirrhosis), those with diseases characterized by high total transferrin, and individuals who have received combined kidney and pancreas transplants (Stibler and Borg 1988; Stibler 1991; Bean and Peter 1994; Niemelä et al. 1995; Arndt et al. 1997).

Two commercial kits to isolate and quantitate CDT in serum are available. CDTECT and %CDT are both produced by Axis-Shield, ASA (Oslo, Norway). Although CDTECT shows less sensitivity for females than for males (Allen et al. 2000), there does not appear to be a gender effect with

%CDT, a procedure that determines the *percent* of transferrin that is carbohydrate deficient, rather than the *absolute amount* of CDT as does CDTect. Despite the fact that the sensitivities of GGT and CDT appear approximately equal, CDT is far more specific than GGT and other liver function tests (Litten et al. 1995).

## EMERGING BIOMARKERS

Table 2 summarizes some characteristics of the emerging markers discussed in this section.

## Hexosaminidase

Hexosaminidase (hex), also named *N*-acetyl- $\beta$ -D-glucosaminidase, occurs in several major isoforms (commonly denoted as A, B, I, and P) (Price and Dance 1972). Although hex is found in most body tissues, its concentration is especially high in kidneys (Dance et al. 1969). Increased urine hex is also an indicator of diseases associated with renal malfunction, such as upper urinary tract infections (Vigano et al. 1983), hypertension (Mansell et al. 1978), diabetes (Cohen et al. 1981), and

**TABLE 2.—Characteristics of emerging markers**

Marker	Time to return to normal limits	Type of drinking characterized	Comments
Urine hexosaminidase	4 weeks of abstinence	At least 10 days of drinking > 60g/d	
Serum hexosaminidase	7–10 days of abstinence	At least 10 days of drinking > 60g/d	Many sources of false positives
Sialic acid	Unknown	Correlates with alcohol intake	Can be measured in serum or saliva
Acetaldehyde adducts	~ 9 days of abstinence	Hemoglobin-bound acetaldehyde adducts can distinguish heavy drinkers from abstainers	Can be quantitated in blood or urine but amount to be measured is quite small
5-HTOL/ 5-HIAA	6–15 hours postdrinking	Recent consumption of even fairly low levels of alcohol	Measured in urine
Ethyl glucuronide	3–4 days (half-life 2–3 h)	Identifies even low-level consumption	Can be measured in urine or hair
Transdermal devices	Not applicable	Records alcohol consumption continuously	Technical difficulties need to be overcome

Note: 5-HTOL/5-HIAA = ratio of 5-hydroxytryptophol to 5-hydroxyindole-3-acetic acid.

preeclampsia (Goren et al. 1987a); it is also an indicator of rejection after kidney transplantation (Wellwood et al. 1973), and it is seen with the use of nephrotic drugs (Goren et al. 1987b). Moreover, children under 2 years of age and people over age 56 often have increased levels (Kunin et al. 1978).

Serum and urine activities of hex are increased in alcoholics and in healthy volunteers drinking > 60 g/d for at least 10 days (Hultberg et al. 1980; Kärkkäinen et al. 1990). Serum hex levels return to normal after 7–10 days of abstinence (Hultberg et al. 1980), whereas urine hex normalizes after 4 weeks of abstinence (Martines et al. 1989).

Other than as a result of heavy alcohol consumption, elevated levels of serum hex can occur with liver diseases (Hultberg et al. 1981; Hultberg and Isaksson 1983), hypertension (Simon and Altman 1984), diabetes mellitus (Poon et al. 1983), silicosis (Koskinen et al. 1983), myocardial infarction (Woollen and Turner 1965), thyrotoxicosis (Oberkotter et al. 1979), and pregnancy (Isaksson et al. 1984).

Kärkkäinen et al. (1990) reported sensitivities of 69 percent and 81 percent for serum and urine hex, respectively, in detecting heavy drinking among alcoholic subjects at admission to an inpatient detoxification program. Values for specificity were 96 percent for both markers. As an indicator of treatment progress, the urinary form demonstrated sensitivity of 72 percent in distinguishing heavy drinkers after 7 days of abstinence. This value exceeded the sensitivity of GGT, ALAT, or ASAT. Stowell et al. (1997b) also found that serum hex performed better than GGT, ASAT, ALAT, or MCV in identifying drinking in a group of alcoholics. The sensitivity of serum hex was 94 percent, and its specificity was 91 percent. In this study, serum hex also proved slightly more accurate than CDT.

## **Sialic Acid**

Sialic acid (SA) refers to a group of *N*-acyl derivatives of neuraminic acid in biological fluids and in cell membranes as nonreducing terminal residues of glycoproteins and glycolipids. The range of normal serum values of SA is 1.58–2.22 mmol/L. In alcoholic subjects, however, higher SA values have been found both in serum and in saliva (Pönniö et al. 1999; Sillanaukee et al. 1999b).

Sillanaukee et al. (1999a) reported a positive relationship between alcohol intake and SA levels in serum. To date, neither the dose of alcohol needed to increase it nor the mechanism underlying its increase has been defined. Neither has the half-life time of SA been reported. However, it has been observed that concentrations in serum decrease after abstinence from alcohol (Pönniö et al. 1999). Clinical studies show that SA is elevated in alcoholic subjects as compared with social drinkers, demonstrating sensitivity and specificity values, respectively, of 58 percent and 96 percent for women and 48 percent and 81 percent for men (Sillanaukee et al. 1999b). In a similar study, SA produced an overall accuracy of 77 percent for females and 64 percent for males in distinguishing alcoholics from social drinkers. SA in saliva also performed quite well—72 percent and 53 percent for males and females, respectively (Pönniö et al. 1999).

SA levels also rise in conditions other than heavy drinking. Total SA and/or lipid-associated SA levels are elevated in patients suffering from tumors, inflammatory conditions, diabetes, and cardiovascular diseases (Sillanaukee et al. 1999a). Increase of SA also seems to correlate with level of tumor metastasis (Kokoglu et al. 1992; Reintgen et al. 1992; Vivas et al. 1992), and its levels appear to normalize after successful treatment of cancer (Polivkova et al. 1992; Patel et al. 1994).

## Acetaldehyde Adducts

Acetaldehyde is the first degradation product of ethanol. This highly reactive metabolite is rapidly converted to acetate by aldehyde dehydrogenase. With chronic ethanol exposure, and in a non-enzymatic reaction, acetaldehyde can form stable adducts with a number of compounds, including proteins such as albumin and hemoglobin (Collins 1988; Goldberg and Kapur 1994; Niemelä 1999). Hemoglobin-acetaldehyde (HA) adducts have received more attention.

Adduct levels in blood or in urine indicate drinking behavior and have been proposed as potential markers of alcohol abuse (Tsukamoto et al. 1998). Early experiments in mice showed that both whole blood- and urinary-associated acetaldehyde levels were increased in ethanol-fed mice 24 hours after cessation of ethanol feeding (C.M. Peterson and Scott 1989; Pantoja et al. 1991). After 9 days of abstinence, levels of whole blood-associated acetaldehyde (WBAA) declined to control levels (C.M. Peterson and Scott 1989).

These observations have now been confirmed in humans. Moreover, the increase of WBAA following ethanol exposure suggests marked gender differences. Heavy-drinking male college students produced higher absolute values than their heavy-drinking female counterparts, although 74 percent of the women versus 44 percent of the men had levels above the 99th percentile for abstainers (K.P. Peterson et al. 1998).

Measurement of acetaldehyde adducts in blood is difficult. Initially, chromatography isoelectric focusing gel and affinity purifications were used. However, these methods failed to distinguish alcoholics from control subjects (Homaidan et al. 1984). The very low levels of adducts require more highly sensitive techniques such as ELISA, and studies using this technology have reported far better results. Unfortunately, no commercial ELISA kit is available yet.

Very little is known about sources of false-positive results for acetaldehyde adducts except that diabetics have levels of HA adducts and glycated hemoglobin twice as high as alcoholics (Sillanaukee et al. 1991).

Levels of HA adducts have also been noted to be higher in heavy drinkers than in abstainers (Gross et al. 1992). Sensitivity and specificity values of this potential marker among heavy-drinking males have been reported as 65 to 70 percent and 93 percent, respectively, with corresponding values for females of 53 percent and 87 percent (Worrall et al. 1991). On the other hand, Hazelett et al. (1998) did not find gender differences in the performance of HA adducts between genders and reported sensitivity and specificity values of 67 percent and 77 percent.

Immunoreactivity toward acetaldehyde-modified proteins was also found to be higher in plasma from alcoholics and patients with non-alcoholic liver disease. Nevertheless, the response in alcoholics was characterized by a higher IgA component than in patients with non-alcoholic liver disease or in control subjects (Worrall et al. 1991). Using mean values  $\pm$  2 standard deviations as a cutoff point, sensitivity and specificity in detecting alcoholic patients were 78 percent and 93 percent, respectively (Lin et al. 1993).

The possible utility of HA adducts as a marker of alcohol abuse during pregnancy has also been investigated. Sixty-three percent of mothers who delivered children with fetal alcohol effects were reported as having elevated levels (Niemelä et al. 1991).

## Serotonin Metabolites

Serotonin (5-hydroxytryptamine [5-HT]) is a monoamine vasoconstrictor melatonin precursor. It is synthesized in the intestinal chromaffin cells or in the central or peripheral neurons and is found in high concentrations in many body tissues. Serotonin is produced enzymatically from

tryptophan by hydroxylation and decarboxylation. 5-Hydroxytryptophol (5-HTOL) and 5-hydroxyindole-3-acetic acid (5-HIAA) are end products in the metabolism of serotonin, with 5-HIAA being the major urinary metabolite. Alcohol consumption can alter the metabolism of serotonin by inducing a shift toward the formation of 5-HTOL. It is believed that the change induced by alcohol intake is due to a competitive inhibition of aldehyde dehydrogenase by acetaldehyde, which inhibits 5-HIAA formation, and through an increase of NADH levels, which favors the formation of 5-HTOL.

The response of 5-HTOL to alcohol is dose dependent, and the excretion of this metabolite does not normalize for several hours after blood and urinary ethanol levels have returned to baseline levels. Therefore, 5-HTOL has been regarded as a marker of recent alcohol consumption.

As 5-HTOL increases 5-HIAA decreases, so the ratio of 5-HTOL/5-HIAA has been proposed as an even more sensitive marker of recent alcoholic drinking than 5-HTOL in isolation (Voltaire et al. 1992). Use of this ratio would also correct for urine dilution as well as for fluctuations in serotonin metabolism due to dietary intake of serotonin (Feldman and Lee 1985).

In social drinkers, a fiftyfold increase in 5-HTOL/5-HIAA ratio was measured in the first morning void, when ethanol in breath was no longer measurable (Bendtsen et al. 1998; Jones and Helander 1998). Compared with other markers of recent alcohol intake, such as blood and urinary methanol, 5-HTOL/5-HIAA remains elevated for a longer time (6–15 hours vs. 2–6 hours for methanol) after blood alcohol levels have returned to normal levels. Increased levels of the 5-HTOL/5-HIAA ratio have been reported in association with disulfiram treatment, calcium cyanamide therapy, and glyburide treatment (Borg et al. 1992).

In a healthy group of volunteers who had ingested alcohol (3–98 g) the previous afternoon or evening, 87 percent of the men and 59 percent of

the women evidenced increased 5-HTOL/5-HIAA in the first morning urine (Helander et al. 1996). Voltaire et al. (1992) proposed a 5-HTOL/5-HIAA ratio  $> 20$  pmol/nmol as an indicator of recent alcohol consumption.

### **Ethanol**

The physical presence of ethanol in urine, serum, or saliva can be easily determined (Tu et al. 1992) and was one of the first parameters considered as a marker for alcohol consumption. Additionally, by using ethanol as a marker to assess intake, false-positive results can be eliminated. Furthermore, a positive test result for blood ethanol per se as well as a demonstration of high alcohol tolerance has been considered as an index of heavy drinking (Hamlyn et al. 1975; Lewis and Parton 1981). Unfortunately, the rapid elimination of ethanol from the blood nearly always makes it impossible to assess alcohol ingestion beyond the most recent 6–8 hours and, hence, the test may be of limited value in assessment of chronic heavy drinking.

Accelerated alcohol metabolism has been observed in regular drinkers (Kater et al. 1969; Ugarte et al. 1977). Notably, ethanol elimination rate (EER) has been found to be 70 percent higher in alcoholics than in control subjects. Correlations between EER and self-reported alcohol consumption have been found, as have correlations between EER and several other markers of alcohol abuse. Sensitivity and specificity values for this potential marker in detecting alcohol consumption  $> 50$  g/d have been reported as 88 percent and 92 percent, respectively (Olsen et al. 1989).

### **Transdermal Devices**

Concentration of ethanol in transdermal fluid and mean concentration of ethanol in blood are related in a linear function. The “sweat patch” is a noninvasive method employing salt-impregnated absorbent pads protected by a plastic chamber with attached watertight adhesive that collects



transdermal fluid steadily for at least 10 days. This device has been designed to estimate the alcohol consumption of drinking subjects. Levels of ethanol in the sweat patch can identify individuals drinking  $> 0.5$  g of ethanol/kg/d.

During an 8-day study in which healthy subjects consumed alcohol under controlled conditions, sweat patches were able to distinguish drinkers from nondrinkers with perfect sensitivity and specificity. It was also possible to distinguish different levels of alcohol consumption (M. Phillips and McAloon 1980). Unfortunately, field trials of the sweat patch have failed to replicate these results (E.L. Phillips et al. 1984). The primary difficulty has been with ethanol storage and losses due to evaporation, back-diffusion, and bacterial metabolism (E.L. Phillips et al. 1984; Parmentier et al. 1991).

The adaptation for transdermal detection of ethanol of the electrochemical technology used for many years in sensor cells such as the portable alcohol Breathalyzers has prompted development of an experimental transdermal alcohol sensor (TAS) by Giner, Inc. This device, which is currently being refined, detects ethanol vapor at the surface of the skin by using an electrochemical cell that produces a continuous current signal proportional to ethanol concentration. The device contains a system to monitor continuous contact with skin and records the data at 2- to 5-minute intervals, for a period of up to 8 days.

When tested among healthy subjects drinking under controlled conditions, it was determined that the sensor signal paralleled the blood alcohol concentration, although with some delay (Swift et al. 1992). The threshold sensitivity for the TAS was a blood alcohol concentration of approximately 20 mg/dL. No false-positive TAS signals were detected in sober subjects, including those with liver or renal disease.

## **Ethyl Glucuronide**

Ethyl glucuronide (EtG) is a nonvolatile, water-soluble, direct metabolite of ethanol. It is present in various body fluids and hair. The detoxification pathway of alcohol elimination via conjugation with activated glucuronic acid represents about 0.5 percent of the total ethanol elimination. The glucuronidation of alcohol was first described in the beginning of the 20th century by Neubauer (1901); it was subsequently detected in human urine (Jaakonmaki et al. 1967; Kozu 1973).

EtG peaks 2–3.5 hours later than ethanol (Alt et al. 1997) and provides a timeframe of detection for up to 80 hours. The half-life of EtG is 2–3 hours (Schmitt et al. 1997). Results from a study on the kinetic profile of ethanol and EtG in healthy moderately drinkers who ingested a single dose of ethanol showed that a serum ethanol concentration less than 1 g/L and serum EtG higher than 5 mg/L was suggestive of alcohol misuse (Schmitt et al. 1997). Since investigations of EtG are preliminary in nature, no information is yet available about the minimal dose of alcohol needed to increase its levels, nor has a commercial kit yet been marketed.

## **BIOMARKERS IN COMBINATION**

Since none of the biomarkers currently available offers perfect validity as a reflection of heavy drinking, considerable research has been undertaken to evaluate using them in combination. Originally, these investigations took the form of deriving multivariate combinations of a large number of markers to distinguish heavy drinkers from other groups or to identify whether or not an alcoholic patient in treatment had relapsed to drinking. One of the earliest and most successful attempts to use biomarkers in combination was by Irwin and colleagues (1988). They found that patients who had relapsed by 3 months after discharge from inpatient care generally had GGT

levels  $\geq 20$  percent, ASAT levels  $\geq 40$  percent, or ALAT levels  $\geq 20$  percent those measured at the time they left the facility.

More recently, researchers have attempted to develop screening or relapse-monitoring biochemical profiles by labeling as positive individuals who are above standard screening cutoff values on at least one of two or more biomarkers. The combination of CDT and GGT has most frequently been used for this purpose. In a review of these studies it was found that use of such a "binary inclusion rule" raised screening sensitivity by more than 20 percent above that achieved by either marker in isolation but resulted in minimal loss of specificity, suggesting that these two markers are validly identifying somewhat different groups of alcoholics (Litten et al. 1995). In general, although CDT has been shown to identify relapse far better than GGT, at least among males, the two markers in combination tend to yield even higher sensitivity (Allen and Litten 2001). CDT has also been combined effectively with ASAT (Gronbaek et al. 1995), B-hex (Stowell et al. 1997a), and SA (Pönniö et al. 1999).

With the exception of some early work using quadratic discriminant functions, all of these combinatorial strategies have involved a "multiple cutoff" approach (i.e., if any of the biomarkers is above its reference range, the case is termed positive). Recently, however, two "compensatory" models have been proposed (i.e., if the sum of the scores on the separate tests exceeds some pre-derived cutoff value, the test is regarded as positive).

Based on a community sample of more than 7,000 Finns, Sillanaukee and colleagues (2000) found that use of an additive combination of natural logs of GGT and CDT volumes

$$(8 \times \ln \text{GGT} + 1.3 \times \ln \text{CDT})$$

distinguished heavy drinkers ( $> 280$  g/wk) from individuals drinking at lower levels more effectively for males and as effectively for females as did either GGT or CDT alone.

Another compensatory model has been proposed by Harasymiw and Bean (2001), in which values on five biomarkers were combined to maximize separation between heavy drinkers recruited from substance abuse treatment centers and light drinkers or nondrinkers from religious groups (mainly Mormon) and 12-step programs.

Yet another approach to consideration of CDT and GGT was taken by Allen and colleagues (1999), who evaluated the likelihood of three types of relapse as a function of patients' quartile scores on CDT and GGT separately and in various combinations.

Although most combinatorial strategies involve evaluation of the biomarkers simultaneously, it is possible that use of them sequentially might prove more cost-effective. This is often termed *reflex testing*. Reynaud and colleagues (1998), for example, provided evidence supporting the use of CDT in individuals with GGT and MCV levels within normal limits. In distinguishing alcohol-dependent patients of this type from control subjects, the sensitivity and specificity of CDT were 84 percent and 92 percent, respectively.

### USE OF BIOMARKERS IN ALCOHOL TREATMENT RESEARCH

Increasingly, laboratory tests are being used in studies to evaluate treatment efficacy. Despite the fact that they do not fully mirror the drinking behavior, they can enhance the credibility of the research because they are not vulnerable to dissimulation by the subject. (Mundle et al. [1999], for example, noted that 15 percent of the patients in an alcohol treatment study who denied drinking nevertheless had high levels of CDT, GGT, or both.) To the extent that biomarkers provide valid information about outcome beyond that yielded by self-report or other means, their use can also enhance statistical power in clinical trials. (Ironically, awareness by the subject that his or her laboratory test may corroborate drinking

status may itself also prompt more honest self-reporting, further enhancing statistical power). Some biomarkers, most particularly the liver function tests GGT, ASAT, and ALAT, provide important information on health status, a goal of alcohol treatment in its own right. Finally, biomarker changes may also inform data-monitoring boards on the safety of an intervention, especially a medication, under investigation.

A recent review of the literature on the use of biochemical markers in alcohol medication development trials revealed that they have been used in the following ways (Allen et al. 2001):

- Description of the sample
- Determination of inclusion or exclusion of potential research participants
- Assessment of drug safety
- Specification of treatment outcome (usually as secondary outcome variables but occasionally as primary outcome variables)
- As a means of correcting for erroneous self-report of abstinence

To the extent that different individuals may vary on the biomarkers to which they respond, it is recommended that more than one measure be included in trials, particularly CDT and GGT. Although the ratio 5-HTOL/5-HIAA has rarely been used as an outcome measure, it too shows promise in this regard. As noted earlier, MCV, however, is generally not recommended for relapse monitoring since it returns to within normal limits rather slowly after onset of abstinence. Finally, if the technological difficulties can be resolved, the acetaldehyde adducts and transdermal devices might also be used in alcohol treatment efficacy trials.

## CLINICAL USE OF BIOMARKERS

Biomarkers in clinical practice have been generally used as a means of screening patients for a possible problem with alcohol. Although typically used in

primary care settings, they have also been used in specialized medical settings such as emergency rooms, psychiatric clinics, gynecological clinics, and internal medicine practices. In most instances self-report procedures such as the Alcohol Use Disorders Identification Test will provide more accurate results, but in some situations, such as following trauma, it is possible that the patient may be unable to present an accurate drinking history. In still other instances, patients may be reluctant to acknowledge their level of consumption or its adverse consequences. Addition of biomarkers may thus identify some individuals in need of alcohol treatment who would not be discovered by a self-report. (As observed earlier, the patient's awareness that his or her self-report is subject to corroboration by laboratory tests may also prompt higher levels of candor on the self-report measures.) We would recommend that biochemical measures and self-report screening measures be used in combination. Further, we suggest that more than one biomarker be used for screening purposes. This combination might consist of, for example, GGT, CDT, and MCV.

A second potential clinical use of biomarkers is to assist in differential diagnosis to determine whether or not alcohol use may be prompting or exacerbating a presenting medical problem. This information can provide the clinician useful guidance on clinical management.

Third, giving patients feedback on biochemical measure levels in an empathic manner may help motivate positive drinking behavior change. For example, biomarkers were used in this way in the motivational enhancement strategy of Project MATCH (Miller et al. 1994).

Fourth, frequent monitoring of biomarker levels during the course of alcohol treatment may provide the clinician a means of early recognition of relapse which, in turn, may suggest the need to intensify or redirect efforts to prevent further drinking. In particular, several studies have considered the potential of CDT elevation as a means of recognition of relapse to drinking. All the projects produced positive results and, importantly, in two

of them CDT levels rose several weeks before patients admitted to their therapist that they had returned to drinking (Allen and Litten 2001). A combination of markers, such as CDT and GGT, is recommended for monitoring drinking status of patients in treatment. Testing should probably be quite frequent early in the course of followup, since risk of relapse appears highest then. Its frequency can then diminish as the patient's course of sobriety stabilizes.

More detailed recommendations for use of biomarkers in clinical contexts are offered by Allen and Litten (2001).

### RESEARCH NEEDS

Despite the large number of studies (approximately 1,200) published on biomarkers, several fundamental questions remain and clearly warrant research.

Most importantly, dose-response relationships need to be specified. The markers should be better characterized by the drinking patterns required to elevate them. It is also important to determine underlying physiological differences and drinking pattern differences in patient responsiveness to alternative biomarkers.

Little research has been performed addressing the important issue of how to sequence a particular biological measure in a battery of other biomarkers and self-report measures. In screening for alcohol problems a particular "index of suspicion" might be appropriate before a specific biomarker is used. This index of suspicion might involve a questionable self-report or ambiguous findings on a clinical exam. Investigations of effective algorithms to quantify various indices of suspicion and the incremental informational value for clinical decisionmaking resulting from use of biomarkers are needed.

Since none of the existing biomarkers is optimal, research to identify an accurate, easy-to-measure, low-cost, nonreactive marker of drinking continues to be a priority. Research could also

determine the best manner for combining and scoring relapse biomarkers.

Research is also needed to determine the impact of biomarker information as a source of feedback to patients and to devise treatment strategies that optimize this information as a means of enhancing motivation.

Finally, information on several applied usage parameters is needed to include the extent to which repeating laboratory tests is reactive (i.e., itself influences drinking or influences patient self-reports of drinking status).

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# Diagnosis

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Diagnosis has played a major part in the history of medicine and psychiatry. *Diagnosis* refers to the definition or classification of disorders, and *diagnostic systems* are proposed definitions for one or more disorders (Robins and Guze 1970; National Institute on Alcohol Abuse and Alcoholism 1995). *Methods* of diagnosis involve the use of scientific procedures to establish the description and etiology of a disorder through evaluation of its history and present manifestation (Jacobson 1989).

This chapter reviews methods that are used in the diagnosis of alcohol problems or, in the language of the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV), the alcohol use disorders (American Psychiatric Association 1994).

The chapter has four major aims:

- To present a brief overview of background information and definitions regarding psychiatric diagnosis
- To provide a description and critical review of diagnostic measures that were identified and that met criteria for inclusion in this *Guide*
- To make recommendations about the clinical and research applications of the measures
- To identify needs for research on diagnostic measures

## BACKGROUND AND DEFINITIONS

Many diagnostic systems of alcohol problems could be created (Clark et al. 1995). However, the major distinction among systems that have been or could be developed is whether they are categorical or dimensional. Both types of systems have been proposed and used in the description of alcohol problems (e.g., National Council on Alcoholism 1972; Rinaldi et al. 1988; Schuckit et al. 1988; Keller and Doria 1991; Nathan and Langenbucher 1999).

Dimensional systems specify features (e.g., symptoms) of a disorder or problem as existing on a continuum, so that more or less of those features can be quantified. Similarly, other relevant characteristics of a disorder, such as severity, are conceptualized as existing on a continuum. Categorical systems, on the other hand, define a disorder on the basis of a cluster of symptoms that ideally are discrete from clusters of symptoms that define other disorders that are included in the diagnostic system (e.g., Blashfield 1989; Nathan and Langenbucher 1999; Widiger and Clark 2000).

In the United States, the categorical DSM system has had the greatest influence on the diagnosis of alcohol use and other psychiatric disorders. Accordingly, the methods of assessment discussed in this chapter are most relevant to the

diagnosis of alcohol use disorders according to the DSM. Because of the nature of the DSM system, measurement for diagnosis of other substance use disorders also is discussed. It is important to note here that DSM-IV was developed to be consistent with the 10th revision of the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10), which, as its name implies, is used around the world; ICD-10 was published in 1992 by the World Health Organization (WHO). Criteria for alcohol use disorders, particularly for alcohol dependence, are similar in the DSM and ICD systems; this will be apparent later in this chapter in a comparison of the two systems' definitions of alcohol use disorders. Development of criteria for both systems was heavily influenced by the drug dependence syndrome construct.

In a 1981 memorandum, WHO presented a full discussion of the drug dependence syndrome construct. It was noted that

drug dependence is a syndrome manifested by a behavioral pattern in which the use of a given psychoactive drug, or class of drugs, is given a much higher priority than other behaviors that once had higher value. The term syndrome is taken to mean no more than a clustering of phenomena so that not all the components need always be present, or not always present with the same intensity. (pp. 230–231)

Moreover, the dependence syndrome is seen as existing in degrees and is measured by drug use and associated behaviors. Importantly, a distinction is made between dependence and “disabilities” (e.g., social, occupational, and financial problems related to drug use) in the WHO paper, because not everyone who suffers such disabilities would be determined to be drug dependent according to the definition of the drug dependence construct. However, as alcohol dependence increases in severity, it is more likely that the individual will suffer alcohol-related disabilities.

## Diagnosis of Alcohol Use Disorders According to DSM-IV

Table 1 presents the DSM-IV criteria for diagnosis of alcohol dependence. For comparison purposes, the alcohol dependence criteria according to the ICD-10 also are presented in table 1. It is important to note that both DSM and ICD refer to “substance” dependence; the criteria in table 1 have been written for alcohol. Table 1 illustrates the comparability of the DSM and ICD systems in their criteria for the diagnosis of alcohol dependence. In addition, the diagnostic criteria reflect the influence of the construct of the dependence syndrome in their emphasis on the cognitive or behavioral correlates of alcohol use or its procurement (the last four symptoms for DSM in table 1) as well as evidence for tolerance to alcohol and the alcohol withdrawal syndrome (the first two symptoms for DSM). Given these similarities, it is not surprising that there is considerable evidence that the two sets of criteria yield comparable rates of diagnosis of alcohol dependence (Hesselbrock et al. 1999).

Either one of the symptoms of tolerance and withdrawal defines “physiological dependence” in DSM, as indicated in table 1; the diagnosis is indicated as being with or without physiological dependence. The development of physiological dependence has been demonstrated for some of the substances included in the DSM-IV substance use disorders group. Because both tolerance and withdrawal have been clearly demonstrated for alcohol (Maisto et al. 1999), these two criteria apply to the diagnosis of alcohol dependence.

DSM-IV is a *polythetic* system, in that an individual does not have to meet all of the equally weighted criteria included in a diagnostic category for a diagnosis to be made. Therefore, as table 1 shows, all seven of the criteria do not have to be met for a diagnosis of alcohol dependence to be assigned; three are sufficient. It has been inferred from this system that as the number of criteria met

**TABLE 1.— DSM-IV and ICD-10 diagnostic criteria for alcohol dependence**

	DSM-IV	ICD-10
<b>Symptoms</b>	A maladaptive pattern of alcohol use, leading to clinically significant impairment or distress as manifested by three or more of the following occurring at any time during the same 12-month period:	Three or more of the following have been experienced or exhibited at some time during the previous year:
• Tolerance	• Need for markedly increased amounts of alcohol to achieve intoxication, or reduced effect with continued use of the same amount of alcohol	• Increased doses are needed to achieve effects once produced by lower doses
• Withdrawal	• The characteristic withdrawal syndrome for alcohol, or alcohol or a closely related substance is taken to relieve or avoid withdrawal symptoms	• When drinking has ceased or been reduced: The characteristic alcohol withdrawal syndrome ensues, or alcohol or a closely related substance is used to relieve or avoid withdrawal symptoms
• Impaired control	• Persistent desire or at least one unsuccessful effort to cut down or control drinking • Drinking in larger amounts or over a longer period than the person intended	• Difficulties controlling drinking onset, termination, or levels of use
• Neglect of activities	• Important social, occupational, or recreational activities given up or reduced because of drinking	• Progressive neglect of alternative pleasures or interests in favor of drinking
• Time spent drinking	• A great deal of time spent in activities necessary to obtain alcohol, to drink, or to recover from its effects	• A great deal of time spent in activities necessary to obtain alcohol, to drink, or to recover from its effects
• Drinking despite problems	• Continued drinking despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to be caused by or exacerbated by alcohol use	• Continued drinking despite clear evidence of overtly harmful physical or psychological consequences
• Compulsive use	• None	• A strong desire or sense of compulsion to drink

**TABLE 1.— DSM-IV and ICD-10 diagnostic criteria for alcohol dependence (continued)**

	DSM-IV	ICD-10
<b>Duration criterion</b>	None specified. Three or more dependence criteria must be met within the same year and must occur repeatedly as specified by duration qualifiers associated with criteria, such as “often,” “persistent,” and “continued”	None. Three or more dependence criteria must be met during the previous year
<b>Dependence subtyping criterion</b>	With physiological dependence: evidence of tolerance or withdrawal Without physiological dependence: no evidence of tolerance or withdrawal	None

Source: Adapted from National Institute on Alcohol Abuse and Alcoholism. Diagnostic Criteria for Alcohol Abuse and Dependence. *Alcohol Alert*, No. 30 (PH 359). [Bethesda, MD]: the Institute, 1995.

for diagnosis increases, the severity of dependence increases. Furthermore, a logical result of the system is that as the number of the same criteria that are met in a group of individuals with the diagnosis increases, heterogeneity decreases in that group regarding alcohol-related characteristics.

There are six “course specifiers” of dependence, which are described in detail in DSM-IV (American Psychiatric Association 1994, pp. 179–180). Four of these specifiers pertain to remission of dependence and are applied to the diagnosis only if no criteria for abuse or dependence have been met for a least 1 month. The remaining two course specifiers apply if individuals are on agonist therapy or if they are residing in a controlled environment (American Psychiatric Association 1994, p. 180). If either of these latter two specifiers applies, then the disorder does not qualify for any of the remission course specifiers.

Table 2 lists the DSM-IV criteria for alcohol abuse and the ICD-10 criteria for “harmful use,” which may be viewed as the counterpart diagno-

sis. Similar to dependence, both systems refer to “substance” use/abuse, and the criteria in table 2 have been written for alcohol. Although both sets of criteria refer broadly to negative consequences of alcohol use, DSM uses the term “alcohol abuse” and ICD-10 uses the term “harmful use of alcohol.” The term *harmful use* was created for ICD-10 so that health problems that are related to alcohol use are not underreported (National Institute on Alcohol Abuse and Alcoholism 1995).

The DSM-IV abuse criteria emphasize the consequences of alcohol use, and only one of the four criteria must be met for the diagnosis of abuse to be made. It is interesting to note that, somewhat inconsistent with the theoretical statement of the drug dependence syndrome, dependence is not entirely independent of disabilities (consequences) in DSM-IV (Grant and Towle 1991). In this regard, the symptom for dependence listed in table 1, “drinking despite problems,” overlaps to a degree with the fourth criterion for abuse, “continued alcohol use despite having

**TABLE 2.—Criteria for alcohol abuse (DSM-IV) and harmful use of alcohol (ICD-10)**

<p><b>DSM Alcohol Abuse</b></p> <p>A. A maladaptive pattern of alcohol use leading to clinically significant impairment or distress, as manifested by one or more of the following, occurring within a 12-month period:</p> <ol style="list-style-type: none"> <li>(1) Recurrent drinking resulting in a failure to fulfill major role obligations at work, school, or home</li> <li>(2) Recurrent drinking in situations in which it is physically hazardous</li> <li>(3) Recurrent alcohol-related legal problems</li> <li>(4) Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol</li> </ol> <p>B. The symptoms have never met the criteria for alcohol dependence.</p> <p><b>ICD-10 Harmful Use of Alcohol</b></p> <p>A. A pattern of alcohol use that is causing damage to health. The damage may be physical or mental. The diagnosis requires that actual damage should have been caused to the mental or physical health of the user.</p> <p>B. No concurrent diagnosis of alcohol dependence.</p>
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Source: Adapted from National Institute on Alcohol Abuse and Alcoholism. Diagnostic Criteria for Alcohol Abuse and Dependence. *Alcohol Alert*, No. 30 (PH 359). [Bethesda, MD]: the Institute, 1995.

persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol.”

Two additional points regarding diagnoses of abuse and dependence should be made. First, each diagnosis has a time contingency. Criteria for abuse or dependence must have been met in the last 12 months in order for the diagnosis to be called current. It is also possible to assign lifetime (i.e., before the last 12 months) diagnoses of alcohol abuse or dependence, and several of the structured diagnostic methods described later offer this feature. The second point is that, as seen in table 2, a DSM-IV diagnosis of alcohol abuse cannot be made if criteria for a diagnosis of alcohol dependence have ever been met.

The preceding discussion covering definitions of diagnosis and the drug dependence syndrome, along with a description of the DSM criteria for

alcohol use disorders, provides the conceptual rationale for choosing the instruments that are reviewed in this chapter. Instruments designed to help obtain DSM or ICD diagnoses of alcohol (or, more generally, substance) use disorders are included. More focused measures relating to the dependence syndrome and to the criteria for formal diagnoses are also covered. These include measures of consequences of alcohol use, control over alcohol use, urges and craving (to consume alcohol), and withdrawal. All of these measures—the instruments designed to yield formal diagnoses as well as the more focused measures—are referred to in this chapter as diagnostic measures.

### **Validity of Psychiatric Diagnosis**

In the course of research on psychiatric taxonomic systems in the United States, generally accepted criteria for evaluating the validity of diagnostic

categories have evolved. These criteria include clinical description, laboratory studies, delimitation from other disorders, followup studies (i.e., stability and prognostic value of a diagnosis), and family studies, which pertain to etiology of disorders (Woodruff et al. 1977, p. 443; Todd and Reich 1989; Nathan and Langenbucher 1999). Essentially, these criteria specify that valid diagnostic categories are discrete, are based in etiologic research, enhance our ability to predict the course of a disorder, and enable prescriptive treatment assignment.

In the last several years, a considerable amount of research has been generated that has addressed the validity of the DSM-IV definitions of alcohol use disorders in adults. This research has suggested that the distinction between alcohol abuse and dependence is valid (Hasin and Paykin 1999; Nelson et al. 1999) and has shown the importance of withdrawal in diagnosing alcohol dependence specified with physical dependence (Langenbucher et al. 2000). Furthermore, Hasin and Paykin's (1998) study suggested that the requirement of meeting three of the seven criteria for a diagnosis of alcohol dependence is valid. In addition, a study by Reynaud et al. (2000) of the use of laboratory tests to make a diagnosis of alcohol abuse reflects increasing interest in the use of such methods to arrive at diagnoses of the alcohol use disorders.

However, DSM-IV still falls considerably short of the mark of a valid diagnostic system according to the standards described earlier. For example, the diagnostic categories in DSM are not for the most part etiologically based because of the limits of our knowledge about the development of most of the identified psychiatric disorders. In addition, knowledge of diagnosis does not lead to prescriptive treatments for the vast majority of disorders, particularly when considering psychosocial treatments (Beutler and Clarkin 1990). In planning treatment, it generally is necessary to go beyond diagnosis, such as by determin-

ing the antecedent and consequent conditions of the symptoms and behaviors that constitute a diagnosis. Certainly this is true in psychological and social treatments for the vast majority of cases of alcohol problems.

Furthermore, diagnostic categories are not discrete. Instead, there is considerable overlap across some diagnostic categories and heterogeneity within categories. For example, in a general population survey study of DSM-III-R (DSM-IV's predecessor) (American Psychiatric Association 1987), Grant and colleagues (1992) found 189 subtypes (466 are possible) of alcohol dependence diagnoses based on combinations of symptoms whose criteria were met in the sample. In addition, the number of subtypes found covaried with subject demographic factors such as gender, age, and race.

With the evidence on the validity of diagnoses, it might be legitimately argued that the assignment of alcohol use disorder diagnoses does little to enhance treatment or research. However, there are several compelling reasons for continuing to assign diagnoses as part of clinical and research practice. First, the assignment of diagnoses that can be reliably derived greatly improves communication among clinicians and researchers. That is, diagnoses aid clinical description. Alcohol problems is one area of clinical practice that has been chronically beset with ambiguity and disagreement concerning definition, and the creation of diagnostic criteria that can, for the most part, be operationalized as in DSM-IV has alleviated such problems of definition considerably. Improvement in communication among professionals about what they are treating and studying also tends to accelerate advances in research, which in turn will help to refine the diagnostic system itself.

Another reason to assign diagnoses is that they can be useful in planning treatments. In this regard, psychiatric diagnostic categories consist of covarying symptoms and behaviors, so that knowing one symptom helps to predict the exist-



tence of others. Although this feature alone does not lead to prescriptive treatments, elaboration of detail about symptoms, such as by learning their antecedent and consequent conditions, is essential to treatment planning.

Taken together, these advantages provide a solid rationale for continuing to assign diagnoses as part of treatment and research on alcohol use disorders. As a result, we argue that diagnostic measures do have clinical and research utility. We explore this point in more detail later in discussions of individual measures.

## DIAGNOSTIC MEASURES

There is no shortage of measures that could have been chosen for inclusion in this chapter. The 18 measures that were selected for review met the criteria for inclusion outlined in the introduction to this *Guide*. The full name of each measure and its abbreviation are listed here:

- Alcohol Craving Questionnaire (ACQ-NOW)
- Alcohol Dependence Scale (ADS)
- Clinical Institute Withdrawal Assessment (CIWA-AD)
- Composite International Diagnostic Interview (CIDI core) Version 2.1
- Diagnostic Interview Schedule for DSM-IV (DIS-IV) Alcohol Module
- Drinker Inventory of Consequences (DrInC)
- Drinking Problems Index (DPI)
- Ethanol Dependence Syndrome (EDS) Scale
- Impaired Control Scale (ICS)
- Personal Experience Inventory for Adults (PEI-A)
- 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])

- Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA-II)
- Severity of Alcohol Dependence Questionnaire (SADQ)
- Short Alcohol Dependence Data (SADD)
- Substance Abuse Module (SAM) Version 4.1
- Substance Dependence Severity Scale (SDSS)
- Substance Use Disorders Diagnostic Schedule (SUDDS-IV)
- Temptation and Restraint Inventory (TRI)

Tables 3A and 3B summarize the major features of these measures. The purpose of each measure is listed because several different types of measures (e.g., measures of nomenclature, severity of dependence, and consequences) are called diagnostic in this chapter. Clinical utility is listed because a major aim of this chapter is to address clinicians' assessment needs, and the diagnostic measures vary in the degree to which they assist clinicians in treatment planning, implementation, and evaluation. Training requirement is included because of the substantial variability among the diagnostic measures on that dimension; how accessible a measure is to a clinician or researcher with specific resources could depend in part on the extent of training that is required to use it.

A number of table entries are "NA" (not applicable) in the columns relating to whether a measure has been normed. For measures designed to give diagnoses according to a nomenclature system such as DSM, this dimension is not relevant, because such measures are criterion linked. That is, respondents either will or will not meet preset criteria for some designation, in this case a psychiatric diagnosis. A legitimate question is whether subgroups vary in the frequency with which they meet the criteria for a diagnosis, but the criteria themselves typically would not be adjusted for use with different groups of individuals

**TABLE 3A.—Diagnostic instruments: Descriptive information**

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
ACQ-NOW	To measure acute alcohol craving	Measure of change pre- to posttreatment	Adults	All current drinkers	No	No
ADS	To measure severity of alcohol dependence, based on alcohol dependence syndrome	Screening and case finding; level of treatment and treatment goal planning	Adults	Wide variety of settings	Yes	Various treatment samples
CIWA-AD	Converts DSM-III-R items into scores to track withdrawal severity	Aid in adjustment of care related to withdrawal severity	Adults	Adults in alcohol withdrawal	NA	NA
CIDI core Version 2.1	To assess DSM-IV and ICD-10 diagnoses	Aid in treatment planning	Adults	General population, general medical patients, psychiatric patients	NA	NA
DIS-IV Alcohol Module	To provide a structured measure of DSM-IV criteria for alcohol abuse and dependence	Designed for epidemiology research; clinical use possible, especially clinical research	Adults	Age 18 and older, wide sociodemographic range	NA	NA
DrInC	To measure consequences of alcohol use	Relates to abuse diagnosis; help in giving patients feedback about their alcohol use	Adults	Inpatient and outpatient clinical samples; homeless and college populations	Yes	Inpatients and outpatients in alcohol treatment; males and females
DPI	To assess drinking problems in older adults	Relates to abuse diagnosis; help in giving patients feedback about their alcohol use	Adults 55 and older	Adults 55 and older	No	NA

TABLE 3A.—Diagnostic instruments: Descriptive information (continued)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
EDS	To measure elements of alcohol dependence syndrome	Monitor dependence severity over time	Adults	Individuals with alcohol use disorders; college students; general population of drinkers	No	No
ICS	To measure actual and perceived control over drinking	Aid in diagnosis and specification of treatment goals	Adults	Individuals with any degree of alcohol dependence	Yes	Clinical sample of problem drinkers and non-problem samples
PEI-A	To measure substance use and resulting problems	Aid in case identification and treatment referral	Adults	Adults suspected of alcohol or other drug-related problems	Yes	Treatment-seeking samples and general community
PRISM	To provide a semi-structured measure of DSM-III, DSM-III-R, and DSM-IV diagnoses and related factors	Mainly research, but clinical use possible	Adults	Community samples; alcohol and other drug clinical samples	NA	NA
SSAGA-II	To derive substance use and other diagnoses according to DSM-III-R, DSM-IV, and ICD-10; other data may also be collected	Designed for research; aid in treatment planning	Adults	General population of adults	No	No
SADQ	To measure severity of alcohol dependence, based on alcohol dependence syndrome	Aid in treatment goal specification and in assessment of withdrawal severity	Adults	Problem drinkers in treatment of various kinds	Yes	Inpatient, outpatient, and community-based treatment agency attenders in several countries

TABLE 3A.—Diagnostic instruments: Descriptive information (continued)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
SADD	To provide a measure of dependence on alcohol free of cultural bias	Aid in treatment goal specification	Adults	Clinical samples with mild to moderate dependence; nonclinical samples in some cases	Yes	Young male offenders
SAM Version 4.1	More detailed version of the CIDI substance use section	Aid in treatment planning	Adults, adolescents >16 years	General and clinical populations, excluding those with severe retardation or severe organic brain syndrome	No	NA
SDSS	To provide a dimensional measure of DSM-IV and ICD-10 dependence and abuse criteria	Aid in treatment planning and evaluation	Adults, adolescents >16 years	Clinical populations	No	No
SUDDS-IV	To provide structured measures of DSM-III and DSM-III-R substance use disorders	Aid in treatment planning	Adults	Chemical abuse and dependence populations; dual-diagnosis populations	NA	NA
TRI	To measure preoccupation with control over drinking	Aid in treatment planning	Adults	Individuals concerned about their drinking	Yes	No

Note: The instruments are listed in alphabetical order by full name; see the text for the full names of the instruments. DSM-III = *Diagnostic and Statistical Manual of Mental Disorders, Third Edition*; DSM-III-R = *Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised*; DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*; ICD-10 = *International Statistical Classification of Diseases and Related Health Problems, 10th rev.*; NA = not applicable; P&P = pencil and paper; SA = self-administered.

TABLE 3B.—Diagnostic instrument: Administrative information

Instrument	Format options	Time to administer	Training needed?	Computer scoring avail.?	Fee for use?
ACQ-NOW	P&P SA	5–10 min	No	No	No
ADS	P&P SA; interview; computer SA	5 min	“Basic”	Yes	No
CIWA-AD	Observation	2 min	Yes	No	No info
CIDI core Version 2.1	Interview; computer SA	70 min	Yes	Yes	Yes
DIS-IV Alcohol Module	Interview	10–20 min	Yes	Yes	Yes
DrInC	P&P SA	10 min	No	No	No
DPI	P&P SA	3–5 min	No	No	No
EDS	P&P SA	5–10 min	No	No	No
ICS	P&P SA	5–10 min	Yes	No	No
PEI-A	P&P SA	45 min	No	No	No
PRISM	Interview	1–5 h	Yes	Yes	No
SSAGA-II	Structured interview	45 min–4 h	Yes	Yes	No
SADQ	P&P SA	5 min	No	No	No
SADD	P&P SA; interview	2–5 min	No	No	No
SAM Version 4.1	Interview	10–20 min	Yes	Yes	No
SDSS	Interview	15–40 min	Yes	Yes	No
SUDDS-IV	Interview; computer SA	30–45 min	Yes	Yes	Yes
TRI	P&P SA	10 min	No	No	No

Note: The instruments are listed in alphabetical order by full name; see the text for the full names of the instruments. P&P = pencil and paper; SA = self-administered.

unless some change in the nomenclature itself occurred. Similarly, normative data are irrelevant for the CIWA scales, because they are designed to measure specified symptoms of alcohol withdrawal. Again, the criteria for defining a person as in or not in withdrawal would not be expected to vary according to subgroup.

### **Constructs Measured**

We have arbitrarily classified the selected diagnostic instruments according to six of the constructs they were designed to measure: nomenclature, severity of dependence, severity of withdrawal, preoccupation with control over alcohol, craving, and consequences and problems. These constructs are not independent in the sense that they all relate to the formal diagnosis of substance use disorders. Although it is conceivable that several measures could be placed in more than one category, each is classified in what seems to be the best fitting group.

#### *Nomenclature*

The CIDI core, the DIS-IV Alcohol Module, the PRISM (formerly SCID-A/D), the SAM, the SSAGA-II, and the SUDDS-IV were designed to provide diagnoses of substance use disorders according to the DSM or ICD systems. Most of the measures, however, are geared to DSM, given that they were developed in the United States.

The formats of these measures may be defined as structured or semi-structured. The primary difference between the two formats is the degree of interviewer judgment that is required to determine if a respondent meets a diagnostic criterion. The most extreme example of a structured measure is the DIS-IV, designed primarily for administration by lay interviewers for purposes of epidemiologic research. Although structured interviews tend to have high reliability, many clinicians have found that these instruments produce an interview process in which respondents

mechanically give a series of “yes” or “no” answers (Spitzer 1983). The SCID was developed to address this concern; interviewers retain discretion to probe for information from the respondent, but their questioning is guided by the need to collect information relevant to specific diagnostic criteria.

A few of the nomenclature measures cover other (than substance use) Axis I or Axis II (in DSM terms) disorders. Examples are the CIDI, the SSAGA-II, the PRISM, and the Schedule for Clinical Assessment in Neuropsychiatry (SCAN; fact sheet not included) (Wing et al. 1990). The reason for including measures of diagnoses other than the substance use disorders is the importance of dual diagnoses in both clinical and research contexts. Considerable attention has been given to the problem of individuals who present with a substance use disorder and one or more other Axis I or II disorders (e.g., Frances and Miller 1991; Nathan and Langenbucher 1999).

#### *Severity of Dependence*

The measures included in this category are the ADS, the EDS, the SADD, the SADQ, and the SDSS. They were designed to reflect the alcohol dependence syndrome construct (Edwards and Gross 1976), which is the more specific case of the drug dependence syndrome defined earlier.

#### *Severity of Alcohol Withdrawal*

The CIWA-AD focuses on standard symptoms of the alcohol withdrawal syndrome, the presence of which is evidence for physical dependence on alcohol. Such information is directly relevant to the diagnosis of alcohol dependence according to DSM-IV, as a distinction is made according to the presence or absence of “physiological dependence.”

### *Preoccupation With Control Over Alcohol*

Measures in this category (the ICS and the TRI) generally concern discrepancies between intended and actual use of alcohol and the psychological and behavioral correlates of individuals' efforts to modulate their alcohol use. As such, these measures reflect the part of the alcohol dependence syndrome that pertains to the individual's control over alcohol consumption and its associated features.

### *Craving*

Craving often is conceptualized as a subjective motivational state that represents a motivational process that contributes to alcohol dependence. Craving has been conceptualized as a unidimensional or multidimensional emotional state (Love et al. 1998; Tiffany et al. 2000), and craving measures that have been used in clinical and most research contexts use self-report methods. The measure of craving covered in this chapter is the ACQ-NOW.

### *Consequences and Problems*

Measures in this category include the DrInC, the DPI, and the PEI-A. They focus on biopsychosocial events or experiences and their perceived connections to the individual's alcohol consumption. Measures of consequences of alcohol use are directly relevant to the abuse diagnosis.

### **Special Populations**

The diagnostic measures discussed here were not developed specifically for different subgroups of individuals, with a few exceptions. One important subgroup marker is age, because it can influence both the format and content of items that constitute a measure. The measures described in this chapter were developed for individuals at least 18 years of age, although the SAM and the SDSS may be used

with 17-year-olds. One measure, the DPI, was developed specifically for use with adults age 55 and older. The chapter by Winters includes diagnostic measures for adolescents.

Although a measure may not be developed specifically for use with a particular group, possible differences in responding among subgroups are described in table 3A when subgroup norms are available. Such information helps researchers to interpret any given individual's score or performance on a measure. It is important to emphasize in discussing subgroup data that such information does not address the possible bias or lack of sensitivity that may exist in a measure for one or more subgroups. For example, it is plausible that types of alcohol-related consequences vary with age, so that failure to take such age-related differences into account would render a measure less sensitive for certain subgroups, such as young adolescents or the elderly. Such reasoning was the basis of developing the DPI, which was designed to be more sensitive than typical consequences measures to the experiences of those age 55 and older.

### **Psychometric Properties of the Measures**

Table 4 presents information on the reliability and validity data that are available for the diagnostic measures. The three kinds of reliability reported are test-retest, split-half, and internal consistency; the three kinds of validity are content, criterion, and construct. (Table 4 also shows that interrater reliability data are available for the SSAGA-II.) Consistent with the criteria that were followed in choosing the measures for this *Guide*, at least some information is available on the psychometric properties of all the instruments selected; see the appendix for more detail.

The diagnostic measures differ in the extent of psychometric data that are available. For example, only one type of reliability has been reported for the DIS-IV Alcohol Module (test-retest). In contrast, the ADS has far more extensive psychometric data

**TABLE 4.—Availability of psychometric data on diagnostic instruments**

Instrument	Reliability		Validity			
	Test-Retest	Split-half	Internal consistency	Content	Criterion	Construct
ACQ-NOW			•	•	•	•
ADS	•		•	•	•	•
CIWA-AD	•	•		•	•	•
CIDI core Version 2.1	•				•	
DIS-IV Alcohol Module <sup>1</sup>	•					
DrInC	•		•		•	•
DPI			•		•	•
EDS	•		•		•	•
ICS	•		•	•	•	
PEI-A	•		•	•	•	•
PRISM	•		•			•
SSAGA-II		Interrater		•		
SADQ	•			•	•	•
SADD	•	•		•		•
SAM Version 4.1						
SDSS	•		•		•	•
SUDDS-IV		•		•	•	•
TRI			•		•	•

Note: The instruments are listed in the same order as in table 3; see the text for the full names of the instruments.

<sup>1</sup> The fact sheet for the DIS-IV Alcohol Module indicates that validity studies of the instrument have been completed, but the type of evidence for validity was not specified.

available. Typically, if other considerations are held constant, the measure with stronger (extent and magnitude) psychometric evidence is preferred.

### Research and Clinical Utility

Diagnostic measures can provide several kinds of information important to the clinician. The measures of nomenclature may contribute to the planning of the setting (inpatient or outpatient, for example), intensity, and substance use outcome goals of treatment. In this regard, a diagnosis of alcohol abuse versus dependence may have implications for each of these aspects of treatment

planning (Maisto and Connors 1990) in that abuse typically can be treated with less intense, outpatient modalities. Furthermore, moderate drinking typically would not be considered to be an advisable outcome goal for individuals diagnosed as alcohol dependent but might be relevant for some individuals with an abuse diagnosis.

In addition, the identification of psychiatric disorders that are concurrent with an alcohol use disorder can influence treatment planning in significant ways. For example, the presence of an Axis I disorder might indicate a need for psychotropic medication in conjunction with psychosocial rehabilitation for alcohol-related



problems. Although measures of nomenclature can provide information that is extremely useful in treatment planning, diagnoses of substance use disorders are not prescriptive for rehabilitation efforts. That is, knowledge of a diagnosis of substance use disorder does not in itself provide an adequate basis for developing a full treatment plan.

The measures concerning the severity of dependence (the ADS, the EDS, the SADQ, and the SADD) also are relevant to planning drinking outcome goals. Individuals with a greater degree of dependence severity tend to be poorer candidates for moderate drinking outcomes (Rosenberg 1993). Similarly, measures of control over alcohol and craving are useful in planning drinking outcome goals, as less control over alcohol would be more indicative of an abstinence goal. Severity of dependence is also relevant to level and intensity of treatment of the substance use disorders. The CIWA-AD, which specifically reflects physiological dependence on alcohol, relates directly to managing treatment of the alcohol withdrawal syndrome. For instance, studies have cited the utility of the CIWA-AD in determining the dosage of medication required for treating patients in alcohol withdrawal (Wartenberg et al. 1990; Sullivan et al. 1991).

Measures of consequences (the DrInC, the DPI, the PEI-A), besides their relevance to the abuse diagnosis, can be used clinically as a vehicle for giving patients feedback regarding their alcohol use. The detailed information about alcohol-related consequences that these measures provide can be used to show patients the connections between their alcohol consumption and the biopsychosocial consequences they experience. In particular, such information has proved extremely valuable for motivational interventions, which are designed to help the patient move forward in the process of changing patterns of alcohol use (Miller and Rollnick 1991). Information about consequences is a major part of a functional analysis of alcohol use, which is often used in

behavioral approaches to the treatment of the alcohol use disorders (Miller and Hester 1989; Hester and Miller 1995).

The developers of the ADS noted that it is useful for screening and case identification. This is a possibility, given its content and brevity. However, to date the ADS has been used primarily for measuring the severity of dependence in individuals who already have been identified as having alcohol problems. Moreover, a number of self-report measures have been developed explicitly for purposes of screening and case identification; the performance (sensitivity and specificity) of many of them is excellent (see the chapter by Connors and Volk in this *Guide*).

Many of the diagnostic measures may be administered to the same individuals on multiple occasions over the course of and following the completion of treatment. The major consideration is that the time reference for which a measure pertains (e.g., last 30 days, last 6 months, last year) is taken into account. Repeated measurement is vital to monitoring the progress and maintenance of change in an individual. It also is a premise of this *Guide* that collection of such evaluation data is essential to improving the effectiveness of alcohol treatment.

All of the instruments listed in tables 3A and 3B that do not measure nomenclature are suitable for research, and as the fact sheets in the appendix show, most of the measures have been used in a variety of research contexts. Three of the nomenclature measures (the DIS-IV Alcohol Module, the PRISM, and the SSAGA-II) were designed for use in research and are suited to that context because of their high degree of structure. Although these measures could be used in clinical settings, and indeed have been used in clinical trials of alcohol treatment that occurred in typical clinical settings, clinicians tend to prefer less structure in a diagnostic instrument. However, such structure is valuable in the research context because it is conducive to a high degree of reli-

bility in making diagnoses, and it reduces costs substantially in interviewer training and data collection time.

### **RECOMMENDATIONS FOR SELECTING A DIAGNOSTIC MEASURE**

A number of instruments are available to measure nomenclature-based diagnoses and related constructs. The instruments discussed here have psychometric data available in differing types and amounts. (Evaluation of the quality of those data requires consultation of the sources cited.) In addition, the instruments have a history of application in different clinical and research contexts. However, there are differences among the instruments relevant to a given construct that would affect the decision to use an instrument at a given time. The information that generally would be needed to select an instrument is contained in tables 3A, 3B, and 4.

Before selecting a diagnostic measure, the clinician or researcher must answer two fundamental questions: What (construct) needs to be measured, and what is the purpose (clinical or research) of measurement? Answers to those questions should immediately narrow the field of diagnostic measures considerably. Psychometric evidence for a measure is the next important consideration, as stronger psychometric data make one measure preferable to another that is comparable on all other dimensions. Another point to consider is whether information is available on the psychometric properties of a measure for the specific population to be assessed.

These more conceptual and technical questions should be followed by two more pragmatic ones. The first is, What resources are available for obtaining and administering a measure? This includes the availability of time to administer a measure, funds to pay for a measure if it is not in the public domain, and funds to hire and train a

staff with the credentials needed to administer a measure.

The second pragmatic question concerns the resources available to score a measure. Some of the diagnostic measures are relatively brief and can easily be scored by clinical or clerical staff. Other measures are scored most efficiently by computer software, in which case the data usually can be sent to an outside company to be scored, or software can be purchased to do the scoring on an in-house computer. With regard to computerized scoring, the resource question is whether funds are available either to pay for scoring or to purchase scoring software.

### **SUGGESTIONS FOR RESEARCH**

Table 3A highlights the need for more data on the use of measures with specific subgroups of interest. At present, a number of the diagnosis measures have been used only with restricted populations, so interpretation of the findings with particular subgroups might be difficult. Such research would also contribute to another important research need, which is design of measures specifically geared to certain subpopulations. Measures so developed would be more sensitive to the population-specific clinical or research needs than would measures based on the general (typically most prevalent) population(s).

Moreover, development of population-specific measures could lead to modification of the construct in question. For example, a major question is whether the DSM criteria for substance use disorder are relevant to adolescents, because the criteria are derived from research with adults. Research on applicability to adolescents might lead to adjustment of the criteria for that age group (and thus to a change in the construct) or to confirmation that the current criteria are as relevant to adolescents as they are to adults (Martin et al. 1995). Discussion of the applicability of available

measures for use with adolescents is presented in the chapter by Winters. Similar questions can be raised about measures of any of the constructs relevant to diagnosis and for any defined subpopulation.

The construct of craving has been important clinically in the treatment of alcohol use disorders for many years, but empirically supported measures of craving for alcohol have appeared only recently. In fact, the first edition of this *Guide*, which was published in 1995, did not include any measures of craving, because there were none that met the psychometric criteria for inclusion in that book. However, in the last several years, measures of craving have been developed that have research and clinical utility and that are empirically supported.

There are important research questions about the measurement of craving that need to be addressed. One of these was mentioned earlier: whether craving is conceptualized best as a unidimensional or a multidimensional construct, and which concept is best suited to different research or clinical problems. A second important question is the influence of context on self-reports of craving, given the evidence that cues or situations that remind individuals with alcohol use disorders of previous alcohol use can readily trigger craving. Finally, current measures do not distinguish between gradual and abrupt changes in craving, which are of considerable importance.

Another major research need is for additional data on psychometric properties. Table 4 shows a range of types of psychometric information available for the various diagnostic measures; additional psychometric research ultimately would provide the field with more sensitive and valid measures of diagnosis. The fact sheets for the diagnostic measures that appear in the appendix show differences in the amount of research done on them beyond the original development studies. As research and clinical applications of the diagnosis measures increase, an empirical base will

emerge for continued refinement and understanding of the data that the measures provide.

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# Alcohol Consumption Measures

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Contributions from markedly different kinds of studies—biogenetic, epidemiologic, longitudinal, population surveys, clinical analog, and treatment outcome—have advanced our understanding of alcohol use and abuse. Although different studies examine issues from different perspectives, they have one thing in common—the assessment of alcohol consumption. Alcohol consumption, however, is a complex behavior that can change considerably over time.

Twenty-five years ago very few drinking measures existed. Today the situation has changed dramatically (Alanko 1984; Room 1990; L.C. Sobell and Sobell 1992, 1995). Multiple measures are now available. Thus, the issue now is how to select the best measure for a given purpose, as each measure has advantages and limitations. This chapter, like most in this *Guide*, was first published in 1995 (L.C. Sobell and Sobell 1995). This update reviews the literature on drinking measures published through mid-2001, presents new measures that met the inclusion criteria for this volume, and provides recommendations about what drinking measures to use and for what purpose.

When selecting a drinking measure, a decision must be made about the type of information needed (e.g., level of precision, timeframe, amount of time that can be devoted to data collection). Ultimately, the utility of a drinking measure for research and/or clinical purposes will rest on its intended use. Therefore, the following questions need to be answered when selecting a drinking measure:

- How is the information to be used?
- Over what time interval should data be collected?
- How long will it take to collect the data?
- What type of drinking information (e.g., precision) is needed?
- What level of training or expertise is needed to administer the instrument?
- Is the measure psychometrically reliable and valid?

Another critical but often overlooked issue is the interviewer's role. The ease with which respondents complete drinking measures depends partly on the interviewer's attitude. The interviewer's familiarity with the method and with techniques to elicit recall will not only facilitate completion of the measures but will also ensure more accurate data collection.

## **SELF-REPORT ISSUES**

Because the assessment and evaluation of drinking is largely dependent on self-reports, validity and reliability are important issues. The primary issue is whether such reports are accurate. Several reviews of the validity and reliability of self-reports of drinking have been published, so only selected issues will be addressed in this chapter, and then only briefly. Interested readers should consult the reviews noted in this chapter for in-depth discussions.

## **Clinic Populations**

Most information from alcohol abusers in research and clinical settings, whether for diagnostic, assessment, treatment, or outcome purposes, comes from clients (Del Boca and Noll 2000). Consequently, the alcohol field is greatly dependent on self-reports. Several comprehensive reviews of the validity and reliability of alcohol abusers' self-reports have concluded that self-reports are generally accurate and can be used with confidence if the data are gathered under specific conditions (Babor et al. 1990; Maisto et al. 1990; L.C. Sobell and Sobell 1990; Brown et al. 1992; Babor et al. 2000). Factors shown to enhance accurate self-reporting include when people are (a) alcohol free when interviewed; (b) given written assurances of confidentiality; (c) interviewed in a setting that encourages honest reporting (e.g., clinical or research versus probation office); (d) asked clearly worded objective questions (e.g., "How many times have you been arrested for drunk driving?") versus subjective questions (e.g., "Did you get drunk last night?"); and (e) provided memory aids (e.g., calendar for aiding recall of drinking).

With one or two exceptions, these reviews have shown that alcohol abusers usually describe themselves more negatively (i.e., more heavy drinking and related consequences) than does data from other sources (e.g., reports from collaterals or liver function tests). There is one condition, however, when alcohol abusers' self-reports tend to underestimate consumption—when they are interviewed with any alcohol in their system (L.C. Sobell and Sobell 1990; L.C. Sobell et al. 1994). Interestingly, alcohol abusers also report that their self-reports would be most accurate when they are alcohol free, and that their self-reports would likely be increasingly inaccurate as a function of the amount of alcohol they had consumed (L.C. Sobell et al. 1992). One way to ensure that people are alcohol free when interviewed is to use a breath tester to

assess alcohol use before the interview (L.C. Sobell et al. 1994); several inexpensive portable breath testers are available. It should be noted that therapists' judgments about clients' level of drinking are frequently inaccurate (M.B. Sobell et al. 1979), probably because of the phenomenon of tolerance.

A sizable body of literature clearly demonstrates that as a group alcohol abusers' self-reports of their drinking and related consequences can be used with confidence (Schwarz 1999; Babor et al. 2000; Del Boca and Noll 2000). While some small proportion of alcohol abusers' self-reports in each study will be inaccurate, currently, with a few exceptions, it is difficult to identify individuals who give inaccurate self-reports (reviewed in Toneatto et al. 1992). Two conditions, however, that are predictive of less consistent self-reports are (a) alcohol abusers who report a long drinking history (i.e., years problem drinking) (Toneatto et al. 1992; Drake et al. 1995; Babor 1996) and (b) questions that require a subjective judgment (i.e., difficult to define or ambiguous) (see Toneatto et al. 1992).

## **Survey Studies**

Reports of drinking in population surveys have shown bias in terms of aggregate consumption. When projected to the total population, for example, this bias only accounts for a portion of total beverage sales (reviewed in Midanik 1982; Poikolainen and Kärkkäinen 1985). Several explanations have been offered regarding why alcohol consumption is underreported in general population surveys (Midanik 1982; Alanko 1984; Lemmens and Knibbe 1993; Göransson and Hanson 1994):

- Heavy drinkers have a high nonparticipation rate in surveys.
- Forgetting increases with increasing consumption.
- The study method may be prone to bias. For example, quantity-frequency (QF) measures (estimates of average quantity and frequency; see the "Review of

Drinking Measures” section of this chapter) result in greater underestimates than daily diaries.

- Questionnaire construction may affect responses (e.g., questionnaires with more questions about atypical drinking result in reports of greater consumption).
- Timeframe may affect response (e.g., seasonal variation affects estimates).

Several studies show that with minimal sampling problems and heavy drinking factored into aggregate consumption, the variability between reports of drinking and alcoholic beverage sales figures can be substantially reduced (Midanik 1982). A report describing two Swedish alcohol surveys sheds some light on discrepancies between reports gathered using different methods (Kuhlhorn and Leifman 1993). Both surveys were conducted by respected research groups and used large numbers of respondents. The two surveys yielded very large differences in their retail sales coverage rates (i.e., registered alcoholic beverages sales), namely, 75 percent and 28 percent. In the survey with a high coverage rate, respondents’ daily drinking patterns were able to reflect heavy drinking on weekends by dividing a “normal week’s” drinking into four periods (Monday–Thursday, Friday, Saturday, and Sunday). Because the survey with a low coverage rate used a QF measure, a “normal week’s” drinking could not be similarly derived. A test of internal validity of the survey with the higher coverage confirmed that the increased coverage was due to the refined nature of the questions.

Other surveys using heavy or atypical drinking questions have reported similar increases in estimates of alcohol consumption. Polich and his colleagues (Polich and Orvis 1979; Armor and Polich 1982) used an adjusted QF method that asked for typical and atypical drinking and found that, by adding questions about heavy drinking days, there was a 43 percent increase in daily per capita consumption. In a study by Göransson and

Hanson (1994), while 15.1 percent of consumers increased their reported drinking using an adjusted QF measure, the overall change in weekly per capita consumption was modest.

Some survey studies have used a recent drinking occasions measure (also called the Finnish period estimate method) or a situation-specific measure (Mäkelä 1971; Hilton 1986; Midanik 1994; Single and Wortley 1994; Wyllie et al. 1994). Such measures ask respondents to report their alcohol use over a time interval involving a number of drinking occasions or specific drinking situations. For each measure, several variations are possible, and, as one might expect, studies using different variants have resulted in different amounts of alcohol reported consumed.

### Self-Report Summary

The literature suggests that although the accuracy of an individual’s report may be difficult to determine, from a group perspective self-reports of alcohol use from clinical and nonclinical samples are accurate when people are interviewed under the conditions discussed earlier. In addition, it appears that questions about heavy or atypical drinking must be included to accurately capture a person’s total alcohol consumption.

## REVIEW OF DRINKING MEASURES

Although a number of drinking measures have been developed and reported in the literature, only five satisfied the criteria for inclusion in this *Guide*. Tables 1A and 1B provide descriptive and administrative information for these five measures; see the fact sheets in the appendix for more detail. Table 2 lists how each of these five measures has been psychometrically evaluated. Four of the measures assess drinking only; Form 90 also assesses domains other than alcohol use.

All five measures have been used with adults and adolescents. Most have been used with clinical



**TABLE 1A.—Drinking measures: Descriptive information**

Measure	Purpose	Clinical utility	Drinking variables generated	Assessment timeframe	Target population	Groups used with
TLFB	Assessment of daily drinking; several dimensions of drinking can be separated and examined	Individual picture of main features of past drinking; advice and feedback during treatment; monitoring progress	Daily drinking into user-defined categories, variability, pattern, level of drinking, time to first relapse	Retrospective recall of 30–360 days before interview	Adults and adolescents	Alcohol abusers and normal drinkers; males and females; college students
Form 90	Assessment of daily drinking using a calendar and weekly grid	Individual picture of main features of drinking in the 90 days before last drink	Same as for TLFB except uses a 90-day interval before last drink	Retrospective recall of 90 days before last drink	Adults and adolescents	Alcohol abusers and normal drinkers; males and females
DSML	Daily recall of drinking	Advice and feedback during treatment; monitoring progress	Same as for TLFB	Recall of daily drinking	Adults and adolescents	Alcohol abusers and normal drinkers; males and females; college students
LDH	Chronological recall of drinking patterns from adolescence to adulthood	Information about lifetime drinking patterns	QF average and maximum of drinking phases	Retrospective lifetime assessment of drinking	Adults and adolescents	Alcohol abusers and normal drinkers
QF measures <sup>1</sup>	Assessment of drinking	Rapid information about number of days drinking and overall consumption	QF, QF volume, volume variability	Retrospective recall of typical month or last 30 days	Adults and adolescents	Alcohol abusers and normal drinkers; college students

Note: The measures are listed in the same order in which they are discussed in the text; see the text for the full names of the measures.

<sup>1</sup> Individual QF measures are summarized in table 3.

TABLE 1B.—Drinking measures: Administrative information

Measure	Languages other than English	Administration options	Time to administer (min.)	Scoring time (min.)	Training needed?	Computerized version? <sup>1</sup>	Fee for use?
TLFB	Belgian Dutch, Belgian French, French, German, Japanese, Polish, Spanish, Swedish	P&P, interview, computer	10–15 for 90 days, 30 for 360 days	10 for P&P, 5 for computer	Yes	Yes	No for P&P, yes for computerized version
Form 90	None	Interview	40–60 (assessment version)	20	Yes	No	No
DSML	Japanese, Polish, Spanish, Swedish	P&P	NA	NA	No	No	No
LDH	None	Interview	20–30	5–10	Yes	No	No
QF measures <sup>2</sup>	Spanish	P&P	4–60	5	No	No	No

Note: The measures are listed in the same order in which they are discussed in the text; see the text for the full names of the measures.

NA = not applicable; P&P = pencil and paper.

<sup>1</sup> Computer version of the measure, not computerized scoring.

<sup>2</sup> Individual QF measures are summarized in table 3.

**TABLE 2.—Availability of psychometric data on drinking measures**

Measure	Reliability		Validity		
	Stability	Internal consistency	Content	Criterion	Construct
TLFB	•		•	•	•
Form 90	•			•	•
DSML	NA		•		•
LDH	•		•		•
QF measures	•		•	•	•

Note: The measures are listed in the same order in which they are discussed in the text; see the text for the full names of the measures. NA = not applicable.

and normal drinker populations and evaluated with males and females. The five drinking measures can be classified into one of two general recall methods: (a) *Quantity-Frequency*: retrospective estimates of average daily consumption and the average frequency with which consumption occurs; and (b) *Daily Drinking*: retrospective estimates of drinking that occur on each day in the interval.

Four of the five measures collect retrospective data (i.e., information about alcohol use after it occurs). The one concurrent measure, Drinking Self-Monitoring Log (DSML), asks people to record their drinking at about the same time as it occurs. The assessment timeframe over which the measures obtain data range from daily recall, to retrospective recall of drinking in the past year, to lifetime drinking. Not all of the measures inquire about a specific interval; some ask about a “typical” period. Only one of the drinking measures is available in a computerized format. With respect to administration time, the measures vary from about 5 minutes for a brief QF measure, to 30 minutes for a 12-month Timeline interview, to 40–60 minutes for Form 90. Time to score the measures is relatively short (i.e., 5–20 minutes). Some training is required for administration of all of the measures. All pencil-and-paper versions of the measures are available for use without charge.

The summaries presented below will help readers select a measure best suited for their purpose (see the fact sheets in the appendix to this *Guide* for more detail). Selecting a drinking measure requires consideration of several factors: population, time available for the assessment, how the information will be used, timeframe of reports, and the types of information needed. While day-by-day precision cannot be assumed or necessarily expected with any measure, some measures will provide a more complete picture of a person’s drinking than others will.

**Alcohol Timeline Followback**

The Alcohol Timeline Followback (TLFB), a daily drinking estimation method, provides a detailed picture of a person’s drinking over a designated time period. The TLFB method was originally developed as a research tool for use with alcohol abusers, but it has since been adapted for use in clinical settings and has been extended to measure drug and cigarette use (L.C. Sobell et al. 1994; L.C. Sobell and Sobell 1995, 2000). The TLFB has been extensively evaluated with a wide range of clinical and nonclinical populations (L.C. Sobell and Sobell 1992, 1995, 2000) and was chosen by the American Psychiatric Association

as having met criteria for inclusion in their *Handbook of Psychiatric Measures* (American Psychiatric Association 2000).

The TLFB is a calendar-based form in which people provide retrospective estimates of their daily drinking, including abstinent days over a specified period of time ranging up to 12 months prior to the interview. Memory aids are used to enhance recall. The amount of time needed to administer the TLFB varies as a function of the assessment interval (e.g., 90 days = 10–15 minutes; 12 months = 30 minutes).

The TLFB can generate a number of variables that provide more precise and varied information about a person's drinking than is produced by QF methods. The TLFB can generate variables to portray pattern, variability, and level of drinking. Administration of the TLFB is flexible: It can be self-administered or administered in person by trained interviewers, and it is available in pencil-and-paper and computerized formats (L.C. Sobell and Sobell 1996a). It has been translated into French, German, Japanese, Polish, Spanish, and Swedish. The TLFB can collect drinking data for different purposes (i.e., assessment, followup, and collateral followup) and by multiple methods (i.e., in person or by phone, mail, or computer). Finally, the TLFB has very good psychometric characteristics with a variety of drinker groups.

Daily drinking recall methods and retrospective daily diaries that are like the TLFB method have been used in other studies with similar results (Redman et al. 1987; Werch 1989; Flegal 1990; Webb et al. 1990; O'Hare 1991; O'Hare et al. 1991; Webb et al. 1991; Lemmens et al. 1992). The TLFB was adapted for use in Project MATCH (Miller and Del Boca 1994; Tonigan et al. 1997), a multisite matching trial of the National Institute on Alcohol Abuse and Alcoholism (NIAAA). This adaptation, called Form 90, assesses drinking as well as other domains and is discussed later in this chapter.

### **Alcohol Timeline Followback (TLFB)**

**RECOMMENDED USE:** To evaluate specific changes in drinking. Use when relatively precise estimates (versus QF methods) of drinking are necessary, especially when a complete picture of the distribution of drinking days (i.e., high- and low-risk days) is needed.

**ADVANTAGES:** This is the measure of choice when drinking is variable (e.g., problem or binge drinkers), or when relatively precise estimates of drinking are needed (e.g., frequency of drinking at specific levels). The pattern, variability, and level of drinking can be profiled using variables such as percentage of days drinking at different levels or the pattern of weekend/weekday drinking.

A discussion of the results of the TLFB with the client can be used to point out triggers to use, high-risk situations, and relapse periods. Repeated administrations of the TLFB from assessment, over the course of treatment, and throughout followup will produce a continuous profile of changes in drinking. The profile can assist clients in seeing where progress has been made and where problems still exist. A video is available to train interviewers in how to use this method (L.C. Sobell and Sobell 1996b).

The TLFB can be used in treatment as an advice-feedback tool. For example, using the information provided by a client on the TLFB, a personalized feedback summary that includes group norm comparisons of the person's drinking in the past year as well as health risk indicators and the cost of drinking can be prepared. Such feedback can be used to enhance a client's motivation and increase commitment to change (L.C. Sobell et al. 1996; Treatment Improvement Protocol Series 35 Consensus Panel 1999).

**LIMITATIONS:** If time is at a premium or less precise information about drinking is needed (e.g., some survey studies), the TLFB would be too

demanding. In addition, in some situations (e.g., mailed-out questionnaires) the TLFB may not be justified because it increases the burden on respondents, which may in turn result in increased attrition rates (Cunningham et al. 1999; L.C. Sobell et al. in press). In such cases, a QF measure can increase the percentage of clients for followup, albeit with less specific drinking data (L.C. Sobell et al. in press).

### **Form 90**

Form 90 can generate baseline and followup information. Besides collecting daily drinking information for 90 days prior to the last drink, Form 90 also collects data on other aspects of clients' functioning (e.g., use of drugs; experience with medical and psychological treatments; lifestyle activities such as work, school involvement, and religious participation). Form 90, which was developed for Project MATCH (1993),

combined two previously published methods for assessing alcohol consumption. A calendar base is used to ensure a continuous record for each day in the assessment period, in the manner of the Timeline Followback (TLFB) method ([L.C.] Sobell and Sobell 1992). Because drinking patterns often manifest consistency from week to week or from episode to episode, a grid averaging method (Miller and Marlatt, 1984) was incorporated to capture efficiently such consistent patterns when they occur, inserting them into appropriate sections of the calendar (Tonigan et al. 1997, p. 358).

Form 90 has been shown to have convergent validity with QF and grid measures (Grant et al. 1995) as well as satisfactory reliability "when interviewers have received careful training and supervision in its use" (Tonigan et al. 1997, p. 358). Form 90 can be used to collect drinking data

for various applications (i.e., intake; telephone followup; collateral intake and followup).

### **Form 90**

**RECOMMENDED USE:** To evaluate specific changes in drinking before and after treatment for 90 days before the date of the last drink. Use when relatively precise estimates of drinking are needed.

**ADVANTAGES:** When drinking is variable (e.g., problem or binge drinkers) or when relatively precise estimates of drinking are needed (e.g., frequency of drinking at specific levels). The pattern, variability, and level of drinking can be profiled using variables such as percentage of days drinking at different levels or the pattern of weekend/weekday drinking. Assessment data from Form 90 can be used in treatment as an advice-feedback tool to enhance a client's motivation to change.

**LIMITATIONS:** If time is at a premium or less precise information about drinking is needed (e.g., survey studies or physicians' offices), Form 90 would be too demanding because it takes 40–60 minutes to obtain 90 days of drinking and related information. Although Form 90 can collect sequential 90-day chunks of drinking data, its psychometric evaluation has been limited to the 90 days before the date of the last drink. Thus, if more than 90 days are needed (e.g., comparable 1-year pretreatment and 1-year posttreatment data), then the TLFB method should be used because it has good psychometric characteristics for daily drinking data up to 360 days from the date of the interview. In addition, Form 90 cannot be used in some situations (e.g., mailed-out questionnaires, surveys, and self-help interventions) because the authors feel it requires trained interviewers.

### **Drinking Self-Monitoring Log**

Self-monitoring of drinking involves recording consumption on a daily or a drink-by-drink basis.

In contrast to other measures in this chapter, which are retrospective, self-monitoring is intended to concurrently record different aspects of alcohol use (e.g., amount, frequency, mood, urges) when it occurs. Self-monitoring has been widely used for assessment and treatment monitoring of different behaviors (Korotitsch and Nelson-Gray 1999). With respect to alcohol use, several logs and diaries have been used over the years (Vuchinich et al. 1988; L.C. Sobell et al. 1994). Because drinking is recorded either when it occurs or shortly thereafter, this method is subject to fewer memory problems than retrospective measures (Samo et al. 1989; M.B. Sobell et al. 1989; Lemmens et al. 1992). That is, slightly higher frequency of drinking is reported by DSML than by retrospective methods, although reports of amount consumed per drinking day are not affected by method type. One limitation, however, is that not all individuals comply with self-monitoring instructions (Sanchez-Craig and Annis 1982).

An important issue with assessing drinking concurrently is that while accuracy might improve, recording one's drinking may be reactive (i.e., the method of recording may impact drinking by reducing it) and could seriously confound research designs. Not only is the evidence for the reactivity of self-monitoring weak, but few studies have used clinical populations (Nelson and Hayes 1981; Korotitsch and Nelson-Gray 1999). In two clinical trials where self-monitoring was used as a control/waiting condition, significant reductions in drinking were observed (Harris and Miller 1990; Kavanagh et al. 1999). It should be noted, however, that for clinical purposes, reactivity may be desirable (e.g., feedback is intended to encourage clients to reduce their drinking).

#### **Drinking Self-Monitoring Log (DSML)**

**RECOMMENDED USE:** When slightly more accurate information about the frequency of

drinking is necessary or desired, and for obtaining reports of daily drinking reports during treatment.

**ADVANTAGES:** Self-monitoring provides feedback about treatment progress and can be used to identify situations that pose a high risk of relapse (e.g., monitoring urges); it also gives clients an opportunity to discuss their drinking during treatment. When used during treatment in conjunction with a retrospective daily recall method, self-monitoring provides a continuous record of daily drinking from pretreatment throughout treatment. Discussion of self-monitoring during treatment gives clients advice and feedback about changes in their drinking and related behaviors (e.g., urges, avoidance of high-risk situations) and allows them to evaluate their progress toward their goals. Such advice can enhance or strengthen motivation for change. For example, if positive changes have occurred, discussion of these changes can be used to increase a client's self-efficacy (e.g., "That is a big change from when you entered treatment. How were you able to not drink this past week?").

**LIMITATIONS:** Because self-monitoring cannot provide retrospective drinking data, it can only be used for pretreatment assessment if a baseline monitoring period precedes treatment. In addition, some individuals will not comply with instructions to self-monitor their drinking.

#### **Lifetime Drinking Measures**

Measures of lifetime drinking structurally parallel QF methods because they ask about average quantities and average frequencies of drinking, but over an entire drinking career or very long time periods (L.C. Sobell et al. 1993). Three different lifetime drinking measures have been developed. The first and most widely used, the Lifetime Drinking History (LDH) (Skinner and Sheu 1982), is a structured QF measure that captures distinct phases and changes in a person's lifetime

drinking patterns by asking about the typical and maximum quantity consumed per occasion as well as the frequency of drinking for the typical and maximum amount. Because the LDH allows respondents to report their own temporal phase changes, it uses a floating time interval to collect data. The goal is to obtain information about people's alcohol use over their drinking career, specifically capturing major changes in drinking patterns. To better capture frequent heavy drinking patterns, a maximum frequency category was added to the original LDH (L.C. Sobell et al. 1988). The LDH takes about 20–30 minutes to complete.

The other two lifetime drinking measures have seen limited use and have each been evaluated in one study. Neither measure has involved clinical populations. The Concordia Lifetime Drinking Questionnaire (CLDQ) assesses lifetime drinking as well as drinking in the 30 days before the last drink (Chaikelson et al. 1994). The CLDQ, whose drinking questions were adapted from Armor and Polich (1982), is administered in a structured interview format and takes about 20 minutes to complete. Like the TLFB, the CLDQ uses visual aids for reconstructing lifetime drinking patterns.

The newest lifetime drinking measure, the Cognitive Lifetime Drinking History (CLDH) (Russell et al. 1997, 1998), “borrows heavily from Skinner’s LDH and employs some of the cognitive techniques from the Sobells’ Timeline Follow-back (TLFB) technique” (Lemmens 1998, p. 31s). Before completing the CLDH, respondents use a calendar to note important life events. The CLDH, a computer-administered interview, uses either a floating or a fixed interval (i.e., discrete time periods) and has demonstrated satisfactory reliability for estimates of times intoxicated in a lifetime.

In a thorough review of lifetime drinking measures, Lemmens concluded that while “reliability of lifetime drinking volume varies between 0.90 and 0.67, and is generally quite reliable” (Lemmens 1998, p. 30s), validity measures are

lacking. In another review, Gmel and colleagues (2000) stated that considerable research has been conducted on retrospective lifetime assessments, especially drinking measures, and that reports of distant consumption seem to be as good as and sometimes better than current reports of drinking as a measure of consumption.

### **Lifetime Drinking Measures**

**RECOMMENDED USE:** To obtain a lifetime or long-term (i.e., greater than the past year) summary of alcohol consumption. These measures take about 20–30 minutes to complete. They provide an overall picture of respondents’ alcohol consumption rather than a detailed daily account.

**ADVANTAGES:** Such measures are advantageous when a longer assessment interval is needed, such as when assessing drinking patterns from adolescence through adulthood, or over a selected time period in the distant past (e.g., natural recovery studies).

**LIMITATIONS:** Despite reasonably high reliability for an aggregate index of drinking, the LDH lacks precision for the most recent drinking period (Skinner and Allen 1982). Thus, if information about drinking in the past year is needed, a daily drinking estimation procedure should be used.

### **Quantity-Frequency Measures**

QF methods, of which there are many, inquire about “average” or “typical” consumption patterns, usually over a specific time period. These methods, also known as estimation formulas, require respondents to report an average pattern of consumption (e.g., “How many days *on average*—in a specific time interval—did you drink beer, and when you drank beer, *on average* how many beers did you drink?”). Most QF methods repeat these questions for each major alcoholic beverage type (i.e., beer, wine, hard liquor) and then sum across beverage types.

QF measures range from simple scales to sophisticated multidimensional scales. The two major types are single dimensional (e.g., average drinks/day) and multidimensional (e.g., volume variability and volume pattern). The simplest QF measure assesses amount of drinking on average drinking days (Q) and the average number of days when alcohol was consumed (F). The two numbers (i.e., Q and F) are multiplied to derive an estimated total volume referred to as “QF.” The multidimensional measures classify individuals into drinker categories based on cross-classifications of quantity and frequency of drinking. The number of drinking categories that have been used for multidimensional measures ranges from 3 to more than 10. For more information, readers are referred to an excellent review of QF methods, including their development, rationale, questionnaire items, and a list of studies (Room 1990).

Although there are several QF variants, in tables 1A and 1B all measures are combined under one category labeled “QF measures.” To better understand the variability inherent in QF measures, table 3 lists the major QF measures, the types of drinking data that can be calculated, and the assessment period over which they can collect data.

For all QF measures the following two variables can be calculated: *average quantity per occasion*—average or typical amount of drinking on a given day—and *average frequency per occasion*—how often in a given time interval (e.g., per week, per month) a person consumes the average quantity. Because QF methods ask for average amounts, some methods have included measures of variability or maximum consumption to gather data for occasional heavy drinking. Thus, for some methods *maximum quantity* and *frequency of the maximum quantity* are also obtained. *Variability of quantity per occasion* was introduced in some methods to assess the proportion of drinking occasions in which different numbers of drinks (e.g., 1–2, 5–9,  $\geq 10$ ) were consumed.

The first QF measure, developed 50 years ago (Straus and Bacon 1953), classified drinkers by their “typical” drinking patterns. Although this first QF measure inquired about drinking in the past year, subsequent measures have assessed drinking over shorter intervals such as the past 30 days. By today’s standards, the first QF measure was primitive because it only asked for the average amount consumed on a given occasion and the average frequency of drinking for three beverage types.

One major criticism of early QF measures was that by only measuring quantity and frequency there was no indication of the variability of a respondent’s drinking (Room 1990). Thus, early QF measures were not sensitive to individuals who drank infrequently and consumed large amounts when they drank. For example, consider the following three drinking patterns: someone who drinks 2 drinks every day for a week, someone who drinks 14 drinks on a single day, and someone who has 7 drinks 2 days a week. Although all three patterns result in the same total amount consumed per week (i.e., 14 drinks), if they are extended out over several years they would not only represent very different drinking styles but would also result in different health risks. Recognizing this problem, Cahalan and his colleagues developed two alternative QF measures that assessed the variability of drinking habits (Alanko 1984; Room 1990). For each beverage type, these two methods inquired about the frequency of drinking and the “proportion of drinking occasions” for the various numbers of drinks. The category classifications and calculations for both measures are described in detail elsewhere (Cahalan et al. 1969).

The first measure, Quantity-Frequency Variability (QFV) Index, extended the QF measure by measuring maximum quantity per occasion (Cahalan et al. 1969). The proportion of occasions for the QFV Index is determined by asking how often the person consumed 5+, 3–4, and 1–2 drinks. Proportions are defined on a 4-point scale ranging from nearly every time



**TABLE 3.—Summary of quantity-frequency drinking measures**

Measure (reference)	Drinking variables						Assessment timeframe
	Average/ typical quantity per occasion	Average frequency per occasion	Variability of quantity per occasion	Maximum quantity	Frequency of maximum quantity	Aggregate volume <sup>1</sup>	
Quantity-Frequency (Straus and Bacon 1953)	•	•					Past year
Volume-Variability Index (Cahalan and Cisin 1968)	•	•	•			•	Average/month
Quantity-Frequency Variability Index (Cahalan et al. 1969)	•	•					Average/month
Volume-Pattern Index (Bowman et al. 1975)	• <sup>2</sup>	• <sup>2</sup>				•	Maximum of 3 months
NIAAA Quantity Frequency (Armor et al. 1978)	•	•					Past 30 days
Khavari Alcohol Test (Khavari and Farber 1978) <sup>2</sup>	•	•			•		None stated
Composite Quantity Frequency Index (Polich and Orvis 1979)	•	•					30 days before last drink for quantity-frequency, past year for high frequency
Rand Quantity Frequency (Polich et al. 1981)	•	•	•				30 days before last drink
Graduated-Frequency Measure (Clark and Midanik 1982; Midanik 1994) <sup>3</sup>	•	•	•	•	•	•	Past 12 months
Lifetime Drinking History (Skinner and Sheu 1982)	•	•	•	•	• <sup>4</sup>	•	Lifetime
Concordia Lifetime Drinking Questionnaire (Chaikelson et al. 1994)	•	•		• <sup>5</sup>			Lifetime/30 days before last drink
Cognitive Life Drinking History (Russell et al. 1997)	•	•	•	•	•	•	Lifetime

<sup>1</sup> Average drinks per day in the interval.<sup>2</sup> Modified version of Quantity-Frequency Variability Index  
(Cahalan et al. 1969).<sup>3</sup> Combined beverage use (e.g., two beers and one glass of wine).<sup>4</sup> Frequency of maximum amount category added by L.C. Sobell et al. (1988).<sup>5</sup> Current drinking questions from Armor and Polich (1982).

to never. Based on respondents' answers regarding the alcoholic beverage consumed most often, a complicated classification schema with 11 classes of quantity and variability components was developed (Cahalan et al. 1969). The QFV Index is derived by combining the quantity-variability classification for the beverage most often consumed with frequency of drinking any alcoholic beverage. Lastly, although somewhat arbitrary, these QFV classifications led to the creation of five drinker groups: heavy, moderate, light, infrequent, and abstainers.

The second QF variability measure, the Volume-Variability (VV) Index, classifies drinking into eight categories (see Cahalan et al. 1969, p. 215) based on the aggregate volume ( $Q \times F$ ) and the maximum quantity variables (Cahalan and Cisin 1968). The VV Index was developed based on the "principle that spacing or bunching of drinks is more important than aggregate volume in characterizing an individual's drinking patterns" (Cahalan et al. 1969, p. 17). The VV Index computes a person's average daily volume (multiplying the frequency of drinking each beverage—i.e., number of days drinking per 30 days—by estimated quantity of the beverage consumed per occasion) and then classifies drinkers as to whether they ever had as many as 5 drinks on one occasion (Cahalan et al. 1969).

Cahalan and his colleagues recommended using the VV Index because it has "all of the useful characteristics of the QFV Index and also preserves the distinction between those who consume a given volume by bunching or massing their drinks and those who space them out" (Cahalan et al. 1969, p. 17). Compared with the QFV Index, the VV Index is more sensitive to differences in the middle range of drinking (noted in Khavari and Farber 1978). As additional surveys were conducted, it became apparent that the upper range category of 5+ drinks was insensitive to very heavy drinking (i.e., substantial numbers of individuals drink at these levels).

Consequently, Cahalan and his colleagues combined two methods: "proportion of occasions" questions for 5+, 3–4, and 1–2 drinks and nonbeverage-specific questions for 8–11 and 12+ drinks for a 1-year reporting period (Room 1990).

The Khavari Alcohol Test (Khavari and Farber 1978), a 12-question version of the QF method used by Cahalan and his colleagues (1969), asks respondents to report their usual frequency of drinking, the usual amount consumed per occasion, the maximum amount consumed on any one occasion, and the frequency of the maximum amount. These four questions are repeated for each of three alcoholic beverage types. Respondents are first categorized into 1 of 11 frequency categories, and then their drinking is plotted and compared with normative values.

In an effort to avoid the classification of drinkers into discrete categories, Bowman and his colleagues (1975) developed a continuous measure reflecting the volume and pattern of a person's drinking. The volume component is an aggregate volume measure derived from QF data, and the pattern component is an adjusted standard deviation measure indicating the degree of volume variability over time. Although the Volume-Pattern Index was an attempt to improve on previous QF methods, it has been criticized as cumbersome in terms of data manipulation and transformations (Khavari and Farber 1978). Further, because it asks for very detailed drinking information, it can take 30–60 minutes to complete.

The NIAAA QF measure, a variant of the original QF measure, was used in national drinking surveys conducted in the early 1970s as part of NIAAA's public service advertisement campaigns. NIAAA also used this QF measure in its evaluation of alcohol treatment centers (Armor et al. 1978). The Rand QF (Polich et al. 1981), like the NIAAA QF, asks respondents to recall how much they consumed on a typical day during the 30 days before their last drink for each beverage type. Respondents are also asked to recall the

number of days drinking at or exceeding fairly high levels (i.e., 6–9 drinks, 10+ drinks) during this same interval. The intent of the Rand QF is to determine a person's typical drinking pattern and then to assess atypical, heavy drinking.

The Composite QF Index (Polich and Orvis 1979), an unusual QF hybrid, asks about the 30 days before the last drinking occasion for all alcoholic beverages combined (versus specific types of alcohol). It also asks about the frequency of heavy drinking (i.e., 8+ drinks) in the past year. By adding questions for the past year to the typical 30-day window, this measure assesses recent and distant heavy drinking.

The LDH (Skinner and Sheu 1982) and related lifetime drinking measures are specialized QF methods that were described earlier. Unlike other QF measures, these measures ask about lifetime drinking.

The Graduated-Frequency (GF) Measure (Clark and Midanik 1982; Midanik 1994) was developed in response to criticisms that QF measures failed to account for occasions when different types of beverages were combined (e.g., beer and whiskey on the same day). The GF Measure asks respondents to report the frequency of their drinking for different levels of drinking (e.g., 1–2 drinks or 3–4 drinks; highest level is most ever consumed) in the last year for combined beverage types. The GF and LDH methods are among the few QF measures that ask questions for all alcoholic beverages combined. Because there are no standardized ways to assess alcohol consumption in epidemiologic studies, one study compared three widely used methods (QF, GF, and weekly drinking recall) for estimates of high-risk drinking and consequences (Rehm et al. 1999). The GF Measure yielded much higher estimates of the prevalence of high-risk drinking and consequences.

### **Quantity-Frequency (QF) Measures**

**RECOMMENDED USE:** QF methods generally provide reliable information about total consumption (quantity) and number (frequency) of drinking days. They are most useful when a quick measure of drinking is needed and when drinking is unpatterned.

**ADVANTAGES:** QF methods provide a quick and easy estimate when information needs are limited to a rough estimate of the total amount consumed or of the total number of drinking days in an interval, or if time is at a premium (e.g., physician's office) and knowledge of atypical drinking is not needed.

**LIMITATIONS:** There is no shortage of reviews and critiques of problems with QF methods (Polich and Kaelber 1985; Room 1990; L.C. Sobell and Sobell 1992). Although the GF Measure escapes many of the limitations that befall other QF methods, it is at the expense of a much longer administration time. QF measures reflect less drinking, and they tend to misclassify drinkers compared with daily diary or TLFB reports. Many QF methods also do not ask for different types of alcoholic beverages consumed (e.g., three beers and two glasses of wine) on the same day. Unfortunately, when QF methods (e.g., the Volume-Pattern Index and the GF Measure) do ask about combined beverage use, the result is a longer administration time. In addition, QF methods cannot provide a picture of unpatterned fluctuations in drinking. Finally, because days of sporadic heavy drinking commonly and frequently occur in clinical populations, assessment of such drinking is important. Unfortunately, with the exception of the GF Measure, such drinking days are not captured by QF methods.

## COMPARISONS AMONG DRINKING MEASURES

Room (1990) reported that when two different studies added questions on the frequency of consuming 8+ drinks as compared with a cutoff with 5+ drinks, the total average drinking volume was raised by 16 percent and 36 percent, respectively. This should not be surprising given the early criticisms of QF methods as insensitive to atypical heavy drinking days. More recently, Midanik (1994) compared a typical QF measure with the GF Measure. The latter measure involved a series of questions about single and combined beverage use that yielded measures of the frequency of consuming specific numbers of drinks over the past year. Overall, the GF Measure yielded higher estimates of alcohol use, while the QF measure provided a higher estimate of lighter drinkers and a lower estimate of heavier drinkers.

As noted earlier (Kuhlhorn and Leifman 1993), a report describing two Swedish alcohol surveys showed significant differences in their coverage of beverage sales reports, with a daily drinking format yielding considerably greater coverage (75 percent) of beverage sales compared with a QF method (28 percent).

Rehm and his colleagues compared three ways of assessing high-risk drinking in surveys—GF, typical QF, and weekly drinking (i.e., 7 days before the survey)—and found that “the GF measure had much higher sensitivity than the other measures for identifying potentially harmful levels of consumption . . . because it is more effective in capturing episodes of very high consumption” (Rehm et al. 1999, p. 222). While they also concluded that a brief QF measure would be sufficient if a genuine average across all drinking situations was the desired effect, for many cultures and social groups the GF Measure would be preferred.

Use of varying recall strategies resulted in twice as many older adults being classified as nondrinkers by short interval measures (i.e., 7-day daily diary and 7-day QF) compared with a longer interval (Werch 1989). This finding highlights the problem of using a short timeframe to gather data for infrequent drinkers. The 7-day retrospective diary also resulted in greater reported daily alcohol use and a greater number of drinks reported consumed per week than either the 7-day or 28-day QF measure. Further, the GF Measure, because of its beverage-specific assessment, has been shown to result in higher drinking estimates than typical QF measures. The GF Measure captures days of sporadic heavy drinking better than QF measures because of the former’s elaborate series of questions. A study comparing three QF methods—global, beverage specific, and beverage specific with drink size—found that adding beverage type and drink size estimates to QF measures increased reported daily alcohol consumption (Williams et al. 1994).

Several studies have compared various QF measures with the TLFB or similar daily drinking measures and have found that daily measures almost always provide greater estimates of drinking than QF measures (Cooney et al. 1984; M.B. Sobell et al. 1986; Fitzgerald and Mulford 1987; Redman et al. 1987; L.C. Sobell et al. 1988; Werch 1989; Flegal 1990; Saunders and Conigrave 1990; O’Hare et al. 1991; Duffy and Alanko 1992; Lemmens et al. 1992). Because studies comparing daily drinking measures and QF measures have been reviewed in considerable detail elsewhere (see L.C. Sobell and Sobell 1992), they will not be reviewed here except for a few notable findings.

Two studies that compared data from the TLFB and different QF measures found large differences between reports on the TLFB compared with QF drinker classifications (M.B. Sobell et al. 1986; L.C. Sobell et al. 1988; L.C.

Sobell and Sobell 1992). For example, one QF method that classified drinkers as heavy consumers found that their TLFB reports for amount consumed over 90 days ranged from 30 to 370 standard drinks. Similar wide-ranging classifications occurred for the variables mean drinks per drinking day and number of days drinking. Other studies have found similar discrepancies. For example, in a study assessing dietary consumption where drinking was recorded as part of a QF dietary questionnaire or a self-reported diet diary (i.e., no separate alcohol data collection), 31 percent of heavy drinkers identified by their daily diary reports were classified as moderate drinkers by QF methods (Flegal 1990). In another study, the QF methods failed to detect 78 percent of heavy drinkers identified by daily diary reports (Redman et al. 1987).

One study more than others illustrates the problem of QF methods' insensitivity for assessing atypical drinking (Fitzgerald and Mulford 1987). After asking a routine set of QF questions, seven additional questions were asked inquiring about *atypical* drinking. As a result of these questions, 35 percent of all adults reported more drinking. Moreover, "the addition of atypical drinking to ordinary consumption increased the total consumption estimate for adults by 14 percent" (Fitzgerald and Mulford 1987, p. 208). Interestingly, the GF Measure (Hilton 1989) and a recent occasions recall measure (Wyllie et al. 1994) both showed consistent results with a daily diary (30 and 7 days, respectively) when data were examined at a population level.

Although daily drinking measures are typically superior to QF measures, a recent study (L.C. Sobell et al. in press) found good correspondence between a QF and a TLFB measure. As part of a large ( $N = 825$ ) community self-help intervention (L.C. Sobell et al. 1996, 2002), drinking was assessed in two ways: mailed-in 360-day TLFB assessment and telephone Quick Drinking Screen (QDS) (QF summary measure). Five measures of

consumption comprising the QDS were found to yield very similar data (e.g., days drinking  $\geq 5$  drinks/day in the past year: TLFB = 164.4, QDS = 176.5; drinks per week past year: TLFB = 31.9, QDS = 31.3). Although the QDS has an advantage in terms of speed and brevity, like all QF summary measures it does not allow for an evaluation of temporal patterning or variability of drinking.

The QDS, besides being used for screening, was also used to collect followup data for alcohol abusers who were not willing to complete a lengthy followup interview by mail or phone. This resulted in an additional 29 percent (189/656) of respondents providing drinking data at the 1-year followup (L.C. Sobell et al. 2002). A brief variant of Form 90 has similarly been used to gather data for clients unwilling or unable to complete a followup interview (Miller and Del Boca 1994).

A problem shared by retrospective measures, whether they are daily drinking or QF measures, is forgetting. This is exemplified in studies that have compared retrospective measures, such as the TLFB with the concurrent measure of self-monitoring. Even though both methods measure daily drinking, studies have found that self-monitoring resulted in a slightly higher frequency of drinking days compared with TLFB or daily diary methods (Samo et al. 1989; M.B. Sobell et al. 1989; Lemmens et al. 1992), but no differences in reported quantity per drinking day. This suggests that errors are mainly related to forgetting rather than minimization of drinking. Research indicates that errors in judgments for the frequency of other behaviors relates to memory and contextual cues (Menon and Yorkston 2000).

Another study (Searles et al. 2000) compared drinking reports using an interactive voice response (IVR) system with the TLFB. Using an IVR system, people call a toll-free number daily and respond to telephone prompts to report their drinking for the previous day. While correlations between the IVR and TLFB for amount consumed, drinking days, and heavy drinking

days were modest, there was large variability in individual participant correlations between their TLFB and IVR reports. This replicates a finding by Vuchinich et al. (1985), who found strong correlations between TLFB aggregate data (e.g., total number of days drinking) but found lower correspondence for day-by-day reports. This suggests that precise day-by-day reports obtained at two different times or by two different methods are inconsistent but that overall reported levels of consumption are reliable.

More research is needed on the IVR procedure: (a) it has not been evaluated with alcohol abusers; (b) it has not been evaluated in a clinical setting; (c) there has been no validation that respondents have been alcohol free when providing IVR reports; and (d) there has been no demonstration that IVR produces reports that are superior to self-monitoring, a much less costly alternative concurrent measure. In addition, concerns about reactivity with this procedure are similar to those for daily self-monitoring logs. That is, the very act of reporting one's drinking may affect an individual's drinking, and concurrent reporting methods might make it difficult to identify treatment effects in some situations (e.g., controlled trials). Another problem with the IVR procedure is that it is unknown what level of compliance would occur without incentives. Searles et al. (2000) paid participants 50¢ per day for reporting, plus a bonus of \$1 per week for reporting all 7 days, and a bonus of \$500 for participation in the 2-year study. All participants also competed for entry into a drawing for a \$6,000 prize, to be divided among those with the best calling records (\$3,000 for the best record). Participants were also paid \$25 for their interviews every 3 months. Interestingly, even with incentives, Searles et al. (2000) reported that a third of participants refused to continue when the initial 7-month study was extended to 24 months.

A final and important issue regarding concurrent versus retrospective measures is that concurrent measures have little utility for assessment of pretreatment drinking. The only way that pretreatment data can be gathered prospectively is to have

individuals self-monitor before they begin treatment. Such a procedure has two serious drawbacks. First, it would necessitate delaying treatment for the sole purpose of gathering pretreatment data prospectively, and such a procedure seems ethically objectionable. Second, the self-monitoring might be reactive, raising questions about whether the assessment data are representative of pretreatment drinking. Consequently, retrospective methods are likely to be the procedure of choice for gathering pretreatment assessment information.

In summary, there are two main dimensions along which self-reported measures of alcohol consumption differ: (a) *summary* (e.g., QF) versus *daily drinking* measures (e.g., TLFB) and (b) *retrospective* (e.g., TLFB and QF) versus *concurrent* (e.g., self-monitoring and IVR) measures. In terms of summary versus daily drinking measures, although QF measures can provide reliable information about total consumption and number of drinking days, with the exception of the GF Measure they have some serious limitations when compared with daily recall methods:

- They do not measure sporadic heavy drinking, which is clinically important.
- Many QF methods do not correct for days when more than one type of alcoholic beverage is consumed.
- QF methods cannot provide a temporal picture of drinking patterns.
- Newer variants of QF methods, while designed to more accurately reflect actual drinking, take more time to collect drinking data, thus negating the advantage of brevity of early QF methods.

In terms of retrospective versus concurrent measures, it is recommended that a daily drinking estimation procedure be used to gather pre- and posttreatment information for clinical and research purposes. For within-treatment data, self-monitoring can be used. The downside of using retrospective measures to gather pretreatment data

and concurrent measures to gather followup data would be the introduction of a methodological bias that works against finding treatment effects (i.e., even if there were no treatment effect, one would expect retrospective reports of pretreatment drinking to be lower than prospective reports of posttreatment drinking). Thus, it may be better to use retrospective measures for both purposes, an approach that would be expected to keep errors consistent across temporal intervals. Ultimately, the choice of what measure to use will depend on its intended purpose (Leigh 2000).

### DEVELOPING A CONSENSUS

In April 2000, 40 researchers from 12 countries came together at a thematic conference of the Kettil Bruun Society for Social and Epidemiological Research on Alcohol (Dawson and Room 2000). The conference had three goals, one of which was “developing a consensus set of questionnaire items for measuring alcohol consumption, including both a minimum set of essential items for addressing policy concerns and other desirable items for more extensive research purposes” (Dawson and Room 2000, p. 2). This ambitious goal resulted in several recommendations (e.g., temporal reference period for assessing drinking; quantity thresholds) that collectively are a major step forward in developing consensus on what has always been a thorny issue—when and how to best measure alcohol use. Although it is clear from the recommendations that there is no flawless measure and that the best measure will depend on the purpose of the assessment, the recommendations are important and have been summarized in the appendix to this chapter. Readers interested in the rationale and discussion surrounding these recommendations are referred to the source article (Dawson and Room 2000) and 12 other articles that were part of a special issue on measuring alcohol consumption in the *Journal of Substance Abuse* (Volume 12, 2000, pp. 1–212).

### SUMMARY

Since the first QF method appeared half a century ago, the assessment of drinking has advanced considerably. Today a variety of measures are available to retrospectively assess drinking over varying time intervals. Many of these measures have both clinical and research utility with a variety of drinker groups. Although several studies suggest that memory aids can be used to enhance recall of drinking (Midanik and Hines 1991; L.C. Sobell and Sobell 1992; Hammersley 1994; Single and Wortley 1994), additional research evaluating contextual cues to improve recall accuracy is encouraged. It is important to remember that almost all drinking measures are retrospective and, as such, they require people to provide their “best estimate” of their past drinking. Thus, some amount of error is expected.

Two articles comparing different ways of measuring risky or hazardous drinking in surveys end with the same recommendations as this chapter. In the first article, Rehm and his colleagues (1999) compared three ways of assessing high-risk drinking and concluded that we still have much to learn about how best to assess alcohol consumption and that the method used should be determined by the objective of the assessment. In the second article, Dawson concluded that efforts to promote the use of a “single ‘best’ measure of *any* aspect of alcohol consumption may be unrealistic or even counterproductive, simply because the measures that work best for one application may not be the best for *all* applications” (Dawson 2000, p. 91).

Finally, consistent with the intent of this volume and as recognized by others (L.C. Sobell et al. 1994; Treatment Improvement Protocol Series 35 Consensus Panel 1999), drinking measures, like other alcohol assessment measures, should be designed whenever possible to have research and clinical utility.

## APPENDIX: DRINKING GUIDELINES<sup>1</sup>

Recommendations: For developing a consensus set of questionnaire items for measuring alcohol consumption, including both a minimum set of essential items for addressing policy concerns and other desirable items for more extensive research purposes.

### 2.1 Reference period for reporting

- a. A past-year reference period is recommended for linking alcohol consumption with alcohol-related consequences.
- b. To characterize drinking occasions at the individual level, a period of varying length that incorporates the past four drinking occasions is recommended.
- c. To characterize drinking occasions at the aggregate level, asking about consumption on the last one or two occasions might be considered, though this approach is not satisfactory for characterizing the individual respondent's drinking.

### 2.2 Measuring frequency of drinking

- a. Questions on drinking frequency should not be asked in a totally open-ended format (e.g., number of times per year).
- b. Frequency should be asked in terms of pre-specified frequency range categories or in terms of times per week, falling back on times per month or per year for infrequent drinkers.
- c. Frequency categories should be arrayed in terms of descending order; i.e., the most frequent first.

### 2.3 Measuring quantity of drinks: per occasion or per day?

- a. For maximum cross-cultural comparability, quantities should be asked in terms of number

of drinks per day, with a day defined to include continued drinking past midnight.

### 2.4 Asking specified quantities “up” or “down”?

- a. Additional methodological studies are recommended to determine whether it is preferable to ask about specific quantity ranges in ascending or descending order.

### 2.5 Quantity thresholds

- a. Quantity thresholds should, at minimum, include numbers of standard drinks corresponding to 144 g, 96 g, and 60 g ethanol. Additional lower quantity thresholds are desirable if the questions are used to estimate volume.

### 2.6 Different thresholds for women and men?

- a. In view of the continuing debate concerning different quantity thresholds for men and women, a prudent approach is to select a single set of quantity thresholds or bands that include all the cut points thought to represent hazardous and/or harmful consumption for both men and women, and to confirm gender differences in the course of analysis, rather than by building assumptions into the questions used to obtain the data.

### 2.7 Cumulative or discrete quantity bands in “graduated frequency” approaches?

- a. Cumulative quantity bands, beginning with the larger quantity thresholds first and working down, are recommended for asking about the frequency of drinking different amounts in instruments intended for cross-cultural use.

<sup>1</sup> Reprinted from *Journal of Substance Abuse*, Vol. 12, Dawson, D.A., and Room, R. Towards agreement on ways to measure and report drinking patterns and alcohol-related problems in adult general population surveys: The Skarpo Conference overview, pp. 1–21, Copyright 2000, with permission from Elsevier.



### 2.8 Usual-quantity questions

- a. A single question on usual quantity should not form the sole basis for estimating volume of consumption, but it is useful to ask for comparative purposes.

### 2.9 Specific beverage types

- a. Questions on individual beverage types should be included. If space does not permit asking detailed questions on quantity and frequency for each beverage type, limited questions on frequency of drinking each beverage or type of beverage most frequently consumed are still useful.
- b. The types of beverages included must vary to reflect individual countries' consumption patterns.

### 2.10 More precise measurement of indicators of attained BALs

- a. Questions on duration of drinking occasions and body mass index (height, weight, age, gender) should be included to interpret effects of quantity consumed on BALs.

### 2.11 Context-of-drinking questions

- a. Recommended measures of drinking context include at meals vs. not at meals, weekday vs. weekend, in public vs. at home, alone vs. others.

### 2.12 Frequency of getting drunk/intoxication

- a. Questions on frequency of drunkenness/intoxication are preferable to those on feeling the effects.
- b. Although variable in their own right, these should not be used as proxies for frequency of heavy drinking.

### 2.13 Minimum set of questions on drinking amount and pattern

- a. abstinence—lifetime and past 12 months
- b. overall frequency of drinking (all alcoholic beverages together)
- c. usual quantity of drinking (all alcoholic beverages together)
- d. frequency of consuming > 60 g ethanol in a day (1st alternative: if usual quantity was > 60g, ask frequency of consuming > 96 g; alternative: largest amount drunk in a day in the past 12 months and how often that amount was consumed)
- e. frequency of drunkenness (if possible)

### 2.14 Recommended set of questions on drinking amount and pattern

- a. abstinence—lifetime and past 12 months
- b. largest amount drunk in last 12 months (maximum quantity), all beverages together
- c. graduated frequencies questions, all beverages together:  
cut-offs: \*  $\approx 24$  and/or  $\approx 36, 60, 96, 144, 240$ g for largest amount (less desirable alternative: frequency of drinking > 60 g)
- d. overall frequency of drinking, all beverages together  
(critical if graduated frequencies questions cannot be summed to estimate overall frequency of drinking, e.g., if only asking frequency of drinking > 60 g; desirable even when graduated frequencies are asked)
- e. beverage-specific frequencies of drinking  
(if there is an emphasis on measuring volume of drinking, frequency categories should be fairly fine, e.g.: twice a day, daily, 5–6 times a week/nearly every day, 3–4 times a week, once or twice a week, 2–3 times a month, once a month, 6–11 times a year, 1–5 times a year)
- f. beverage-specific usual quantities of drinking
- g. beverage-specific size of usual drink

- h. frequency of drunkenness and number of drinks to feel drunk
- usual quantity of drinking, all beverages combined
  - frequency of consuming maximum quantity, all beverages combined (high priority if graduated frequencies questions are not asked)
  - frequency of drinking “enough to feel the effects” and number of drinks for that
  - beverage-specific maximum quantities and associated frequencies
  - body weight and height
  - context of drinking and duration of drinking occasions

### 3. Aggregating drinking patterns for analysis

- a. Volume of drinking  
Frequency of 5+ or frequency of 8+ or maximum Q
- b. Volume of drinking  
Variance in volume or volume-specific binge measure (higher quantity cut-off for higher volumes)
- c. Frequency of drinking  
Usual/average quantity per occasion  
Variance of quantity or frequency of 5+, etc.

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# Assessment of Alcohol and Other Drug Use Behaviors Among Adolescents

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Alcohol and other drug (AOD) involvement by adolescents is still a major public health issue in this country.<sup>1</sup> We know that teenagers often abuse alcohol and other substances and that their development is hindered by such abuse as they age into adulthood (Children's Defense Fund 1991). Whereas the 1970s was marked by large gaps in knowledge about what contributes to the onset and course of AOD use in teenagers and how to best measure its signs and symptoms, the past 15 years have been characterized by a rapid growth of research in the development of screening and assessment tools for measuring the extent and nature of adolescent AOD use disorders and related problems (Leccese and Waldron 1994). This body of research has improved the assessment process by introducing more standardization to the field and permitting a wide network of professionals with diverse training and backgrounds to more objectively participate in the assessment process.

The inclusion of this new chapter in the second edition of this *Guide* speaks to the growing recognition that the adolescent assessment literature is a significant body of research in the alcoholism and drug addiction field. The chapter provides an overview of several issues pertinent to evaluating adolescents for AOD use and related problems. It is organized around four major themes: developmental issues that highlight the importance of assessing young people from a theoretical perspective and with instruments that are distinct from

adult models; validity of self-report; types of instruments available for a range of assessment goals; and research needs in the field.

## DEVELOPMENTAL ISSUES

### Differences Between Adults and Adolescents

The technical understanding of alcoholism and drug addiction has strong links to established beliefs about adult experiences, yet the applicability of adult models to adolescents has been questioned (Tarter 1990; Winters 1990). Findings suggest that most adolescents do not show the same psychological, behavioral, and physiological characteristics that are central to adult models (Kaminer 1991). One area of difference is in the pattern of AOD use and the development of substance use disorders. According to a number of clinical and community studies, adolescents are less likely to abuse just alcohol but are more likely to abuse marijuana and other drugs concurrently with alcohol (Center for Substance Abuse Treatment 1999). Yet it is likely that adults who are in treatment for substance problems are there

<sup>1</sup> In this chapter, *adolescent* is given the standard definition—12–18 years of age. This definition is appropriate given that most assessment measures are validated and standardized on teenagers in this age range. Also, tobacco products are not addressed in this chapter because adolescent assessment instruments have not yet routinely incorporated smoking behavior as part of their item content.



because of alcohol dependence. These differences in use patterns between the two age groups probably reflect differences between generations, as well as the effects of age. A related issue is that adolescents and adults differ in terms of the rate at which the addictive process progresses. It has been found that teenagers can meet formal diagnostic criteria for substance abuse or dependence diagnoses within a year or two of initial use (Martin et al. 1995). Adults usually take much longer to acquire a diagnosable substance use disorder. Thus, time can be a misleading element in defining adolescent substance use disorders.

### **Normative Versus Clinical Considerations**

Perhaps the most important developmental factor in the assessment of AOD involvement among adolescents is the need to distinguish normative and developmental roles played by AOD use in this age group. In a strict sense, the normal trajectory for adolescents is to experiment with the use of alcohol, and to some extent other drugs. As described in the classic research by Kandel and colleagues (Kandel 1975; Yamaguchi and Kandel 1984), adolescents experiment with substances typically in a social context involving the use of so-called gateway substances, such as alcohol and cigarettes. Nearly all adolescents experiment to some degree with alcohol, which makes it difficult to determine when adolescent AOD use has negative long-term implications versus various short-term effects and perceived social payoff. Also, it is developmentally typical for adolescent AOD use to have a transitory component; many adolescents outgrow their use of AODs, experimenting with a wide range of substances for a while, and then abandoning their use (Shedler and Block 1990). Thus, few youth advance to more serious levels of AOD use, such as prolonged heavy drinking and regular use of marijuana (Yamaguchi and Kandel 1984). The best available survey data suggest that relatively low percentages of young people develop a substance dependence disorder during adolescence (see table 1 for a summary of

relevant studies).<sup>2</sup> By contrast, this temporary experimentation process is not typical of adult alcoholism or addiction, which is characterized more by well-established patterns of use.

Further blurring the distinction between normative and clinical distinctions of adolescent AOD use is the finding that the presence of *some* abuse symptoms is not all that rare among adolescents who use alcohol and other drugs (Martin et al. 1995; Harrison et al. 1998). A survey of public school attendees in Minnesota found that among youth who reported any recent substance use, 14 percent of 9th graders and 23 percent of 12th graders reported at least one abuse symptom (Harrison et al. 1998).

### **Definitional Issues**

Another important difference between adolescents' and adults' involvement with AOD is that the DSM-IV criteria for substance use disorders may not be highly applicable to adolescents (American Psychiatric Association 1994; Martin and Winters 1998). There are several concerns about the appropriateness of DSM-IV criteria substance use disorders for adolescents. Some symptoms reveal very low base rates among young people, as in the case of withdrawal symptoms and related medical problems, which likely only emerge after years of continued drinking or drug use. Two symptoms of abuse, hazardous use and substance-related legal problems, appear to have limited utility because they tend to occur only within a particular subgroup of adolescents. Langenbucher and Martin (1996) found that these symptoms were rare in early adolescence but were highly related to male gender, increased age, and symptoms of conduct disorder.

Some other limitations of DSM-IV criteria are as follows: (1) an important symptom of dependence,

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<sup>2</sup> No national prevalence study of adolescent substance use disorders has been published. However, the Second National Comorbidity Study, which is currently in field trials, includes a large adolescent sample that will be assessed for substance disorders.

**TABLE 1.—Rates (%) of adolescent substance use disorders in community samples**

Sample	Any abuse	Any dependence	Alcohol abuse	Alcohol dependence	Any alcohol use disorder
Minnesota Student Survey <sup>1</sup>					
9th graders	7	4			
12th graders	16	7			
Oregon high schools <sup>2</sup>					
14–18 years old			2	4	
New York State households <sup>3</sup>					
14–16 years old					4
17–20 years old					15

<sup>1</sup> Data from Harrison et al. 1998.

<sup>2</sup> Data from Lewinsohn et al. 1996.

<sup>3</sup> Data from Cohen et al. 1993

tolerance, has low specificity in that its presence does not clearly distinguish adolescents with different levels of drinking problems (Martin et al. 1995); (2) the one-symptom threshold for DSM-IV diagnosis of substance abuse, in conjunction with the broad range of problems covered by abuse symptoms, produces a great deal of heterogeneity among those with an abuse diagnosis (Winters 1992); (3) abuse symptoms are usually considered prodromal to the onset of dependence symptoms, but the onset of abuse symptoms does not always precede the onset of dependence symptoms (Martin et al. 1996); and (4) some youth fall between the “diagnostic crack” in that they report only one or two dependence symptoms, which falls short of meeting the three-or-more symptom rule for a substance dependence disorder, and also manifest no abuse symptoms, which fails to qualify them for an abuse diagnosis (Hasin and Paykin 1998; Martin and Winters 1998).

### Cognitive Factors

Developmental considerations are relevant with respect to assessing cognitive factors that may be linked to AOD use. A growing body of research

highlights the role of beliefs or schemas in the onset and course of AOD use (Keating and Clark 1980; Christiansen and Goldman 1983). This research has been directed at demonstrating either that groups with different behaviors, such as alcohol consumption patterns, possess different cognitions (Johnson and Gurin 1994) or, conversely, that groups with different cognitions show more likelihood of future alcohol use behaviors (Christiansen et al. 1989).

Generally speaking, four broad factors have been the focus of these cognitive-related investigations: reasons for drug use, drug use-related expectancies, readiness for behavior change, and self-efficacy.

### *Reasons for Drug Use*

Adolescent AOD use may involve recreational benefits (e.g., to have fun), social conformity, mood enhancement, and coping with stress (Petratis et al. 1995). Youth with a substance use dependence disorder assign more importance to the social conformity and mood enhancement effects of drug use compared with less-experienced adolescent AOD users (Henly and Winters 1988).

### *Drug Use–Related Expectancies*

Relevant expectancies for young people include negative physical effects, negative psychosocial effects, future health concerns, positive social effects, and reduction of negative affect (e.g., Brown et al. 1987). It is common for adolescent AOD users to ignore or discount its negative effects or consequences, and many have an illusion of control over such use (Botvin and Tortu 1988). It stands to reason that a diminished concern about the dangers of AOD use translates to a lower motivation to seek treatment or to change one's behavior when faced with treatment.

### *Readiness for Behavior Change*

This domain involves a host of related motivational factors, including problem recognition, readiness for action, treatment suitability (availability and accessibility), and influences that lead to coercive pressure to seek treatment. These factors may influence attitude toward subsequent treatment, including adherence to treatment plans (Prochaska et al. 1992). Although little empirical work has been published on the determinants of motivational variables that promote positive change in adolescents, adolescents are probably subject to many of the same underlying motivational forces that influence change in adults suffering from addictions (Prochaska et al. 1992; H.J. Shaffer 1997). For example, AOD users are keenly aware that AOD involvement produces several personal benefits, and these benefits may prevent users from recognizing the personal costs of such use. Until the users begin to realize that the costs of the addictive behavior exceed the benefits, they are unlikely to want to stop. For developmental reasons, young people may have more trouble than adults projecting the consequences of their use into the future (Erikson 1968). Their AOD use has not occurred over an extended period of time, and thus chronic negative consequences have not yet accumulated.

To further aggravate the change process, the adolescents may have experienced coercive pressure to seek and continue treatment.

### *Self-Efficacy*

Self-efficacy, or the confidence in personal ability, has been shown to predict a variety of health behavior outcomes (O'Leary 1985; Grembowski et al. 1993), including alcohol treatment outcome (Miller and Rollnick 1991). Self-efficacy may increase attention to goal attainment; thus it is important to measure goal setting and achievement, as well as other constructs believed to underlie self-efficacy, such as the client's perceptions of personal ability to overcome barriers to change (Miller 1983).

### **Measurement Implications**

An important developmental consideration for the assessment process is that many adolescents are developmentally delayed in their social and emotional functioning (Noam and Houlihan 1990). These developmental delays may affect perception and willingness to report AOD use experiences and resulting problems. Admitting a personal problem with substances to an adult counselor requires a modicum of self-insight. Various motivations, attitudes, and behaviors common to adolescents, such as self-centeredness, risk taking, and rebellion against traditional values, are unlikely to promote personal insight into the seriousness of one's drug use. This issue may underlie why counselors lament that adolescent clients so often lack "insight" about the importance of changing their AOD use lifestyle.

Another measurement consideration within the context of developmental progress of young people is the selection of appropriate assessment instruments. Assessment questionnaires and interviews require that the assessor consider the developmental suitability of the tool. Some assessment instruments have been primarily normed and validated

on older adolescents (e.g., over 16 years), and thus their use among younger teenagers may not be appropriate. Also, it is important that pencil-and-paper assessment tools be written at a grade level that is appropriate for the majority of potential clients. Given the high base rate of learning and reading problems among drug-abusing adolescents (Latimer et al. 1997), questionnaires that are long and written at too high a grade reading level may prove to be quite difficult for many young clients.

### **VALIDITY OF SELF-REPORT**

The use of questionnaires and interview schedules assumes that self-report is valid. The extent to which individuals in clinical and legal settings deny AOD involvement, or exaggerate AOD use behaviors, has been the focus of attention for many researchers (Babor et al. 1987). Fortunately for those who rely on the self-report method, there are several lines of evidence for the validity of adolescent self-reports of AOD problems (Winters et al. 1991; Maisto et al. 1995): A large proportion of youth in drug treatment settings admit to use of substances; few treatment-seeking adolescents endorse questions that indicate blatant faking of responses (e.g., admit to the use of a fictitious drug); agreement with data collected in other ways, such as urinalysis and parent reports; and consistency of disclosures across time.

Several factors appear to increase the validity of self-report: providing confidentiality of self-report (Harrell 1997), building rapport with the client, using biological assays such as urinalysis (Wish et al. 1997), and using standardized tests. Also, given the pitfalls of collecting retrospective data, it is becoming more commonplace in alcohol research to utilize the Timeline Followback (TLFB) procedure developed by Sobell and Sobell (1992). The TLFB was originally developed as an interviewing procedure designed to gather retrospective reports of daily occurrence of alcohol

consumption and quantities consumed. There is an extensive literature demonstrating the reliability and accuracy of up to 1-year retrospective timeline alcohol data collected from clinical and nonclinical samples ages 18 and over (Sobell and Sobell 1992), and there are early indications that this procedure is promising for collecting information on daily use of other drugs and among adolescents (Brown et al. 2000).

Despite these data supporting the validity of self-report among adolescent drug abusers, several cautions about this method are noteworthy. Some settings, such as the juvenile criminal justice system, may not contribute to voluntary disclosure of drug use. For example, data from the Drug Use Forecasting study suggest that nearly half of all adolescents who are arrested deny or minimize illicit use of drugs (Harrison 1995; Magura and Kang 1997). Another issue is the reliability of self-report for substance use that is infrequent; teenagers have been shown to be inconsistent about their self-reported drug use over a 1-year period for drugs that were used on an infrequent basis (Single et al. 1975). Then there is the question of the reliability of information from the youths' parents, a commonly used information source regarding adolescent AOD use. Clinical experience has long suggested, however, that many parents cannot provide meaningful details about their child's AOD involvement and may underreport their child's AOD use compared with the child's report (Winters et al. 2000). Empirical studies on this topic have yielded inconsistent results. Investigators comparing diagnoses of substance use disorders based on parent reports with those based on self-reports have found diagnostic agreement ranging from 17 percent (Weissman et al. 1987) to 63 percent (Edelbrock et al. 1986).

### **MAJOR CLASSES OF INSTRUMENTS**

This section provides an overview of instruments within major classes of clinically oriented instruments

available in the adolescent AOD assessment field. The types of instruments described in this section are screening tools, comprehensive measures (this group is divided into diagnostic interviews, problem-focused interviews, and multiscale questionnaires), expectancy measures, and measures of problem recognition and readiness for change. Owing to the nature of psychoactive substance use by young people, most of these instruments address alcohol and other drugs rather than alcohol use only. Descriptive and administrative information on these instruments is provided in tables 2A and 2B (the instruments are listed in alphabetical order by full name), and an overview of the reliability and validity data is presented in table 3.

## **Screening**

Clinicians and researchers working with adolescents, like those working with adults, have available a wide range of approaches to screen substance use disorders and related characteristics. One approach is to use screening instruments—most commonly self-report questionnaires—to determine the possible or probable presence of a drug problem. One group of screening tools focuses exclusively on alcohol use. Another group of screening tools includes the relatively short measures that nonspecifically cover all drug categories, including alcohol. A third type assesses only drugs other than alcohol. The final group of screening tools consists of two multiscreen instruments that address several domains in addition to AOD involvement.

### *Tools That Assess Alcohol Use Only*

There are four screening tools that focus exclusively on alcohol use. The first is the Adolescent Alcohol Involvement Scale (AAIS) (Mayer and Filstead 1979), a 14-item self-report questionnaire that examines the type and frequency of alcohol use, as well as several behavioral and perceptual

aspects of drinking. An overall score, ranging from 0 to 79, labels the adolescent's severity of alcohol abuse (i.e., nonuser/normal user, misuser, abuser/dependent). Test scores are significantly related to substance use diagnosis and ratings from other sources, such as independent clinical assessments and parents, and estimates of internal consistency range from 0.55 in a clinical sample to 0.76 in a general sample (Moberg 1983). Norms for both clinical and nonclinical samples are available in the 13- to 19-year-old range.

Another alcohol-only screening tool is the Adolescent Drinking Index (Harrell and Wirtz 1989). This instrument's 24 items examine adolescent problem drinking by measuring psychological symptoms, physical symptoms, social symptoms, and loss of control. Written at a fifth-grade reading level, it yields a single score with cutoffs, as well as two research subscale scores (self-medicating drinking and rebellious drinking). The Adolescent Drinking Index yields high internal consistency reliability (coefficient alpha, 0.93–0.95) and has demonstrated validity in measuring the severity of adolescent drinking problems (e.g., it has revealed a very favorable hit rate of 82 percent in classification accuracy).

The third measure in the group is the 23-item Rutgers Alcohol Problem Index (RAPI) (White and Labouvie 1989). The RAPI measures consequences of alcohol use pertaining to family life, social relations, psychological functioning, delinquency, physical problems, and neuropsychological functioning. Based on a large general population sample, the RAPI was found to have high internal consistency (0.92) and, among heavy alcohol users, a strong correlation with DSM-III-R criteria for substance use disorders (0.75–0.95) (American Psychiatric Association 1987; White and Labouvie 1989).

The final measure in this group is the Adolescent Obsessive-Compulsive Drinking Scale (A-OCDS) (Deas et al. 2001). Developed to identify problem drinking, this 14-item instrument contains one scale that measures obsessive thoughts

**TABLE 2A.—Adolescent assessment instruments: Descriptive information**

Instrument	Purpose	Clinical utility	Adolescent groups used with	Norms avail.?	Normed groups
AAIS	Screen for alcohol use problem severity	Quick screen	Those referred for emotional or behavioral disorders	Yes	Normals; substance abusers
ADI	Assess DSM-IV substance use disorders and other life areas	Aids in case ID, referral, and treatment	Those suspected of substance use problems	NA	NA
ADAD	Assess substance use and other life problems	Aids in case ID, referral, and treatment	Those suspected of alcohol use problems	Yes	Normals; substance abusers
A-OCDS	Screen for craving and problem drinking	Screen	Those suspected of alcohol use problems	Yes	Alcohol abusers
AEQ-A	Assess adolescents' perceptions of alcohol effects	Aids in prevention and treatment planning	Those suspected of substance use problems	Yes	Normals
ASMA	Screen for drug use problem severity	Quick screen	Those referred for emotional or behavioral disorders	Yes	Normals
CMRS	Measure treatment receptivity	Aids in evaluating appropriateness of treatment	Those referred for drug abuse treatment	Yes	Substance abusers
CASI-A	Assess substance use and other life problems	Aids in case ID, referral, and treatment	Those suspected of substance use problems	NA	NA

**TABLE 2A.—Adolescent assessment instruments: Descriptive information** *(continued)*

Instrument	Purpose	Clinical utility	Adolescent groups used with	Norms avail.?	Normed groups
CDDR	Assess DSM-IV substance use disorders and other life areas	Aids in case ID, referral, and treatment	Those suspected of substance use problems	NA	NA
DAST-A	Screen for drug use problem severity	Quick screen	Those referred for emotional or behavioral disorders	Yes	Substance abusers
DAP	Screen for drug use problem severity	Quick screen	Those referred for emotional or behavioral disorders	Yes	Pediatric population
DUSI-R	Screen for substance use problem severity and related problems	Screen	Those referred for emotional or behavioral disorders	Yes	Substance abusers
GAIN	Assess substance use and other life problems	Aids in case ID, referral, and treatment	Those suspected of substance use problems	NA	NA
PBDS	Assess reasons for drinking/drug use	Aids in prevention and treatment planning	Those suspected of substance use problems	Yes	Normals; substance abusers
PEI	Measure substance involvement and related psychosocial factors	Aids in case ID, referral, and treatment	Those suspected of substance use problems	Yes	Normals; substance abusers
PESQ	Screen for substance use problem severity	Quick screen	Those referred for emotional or behavioral disorders	Yes	Normals; substance abusers

**TABLE 2A.—Adolescent assessment instruments: Descriptive information** (continued)

Instrument	Purpose	Clinical utility	Adolescent groups used with	Norms avail.?	Normed groups
POSIT	Screen for substance use problem severity and related problems	Screen	Those referred for emotional or behavioral disorders	Yes	Normals; substance abusers
PRQ	Assess recognition of substance use problems	Screen	Those at risk for substance use problems	Yes	Substance abusers
RAPI	Screen for alcohol use problem severity	Quick screen	Those at risk for alcohol use problems	Yes	Normals; substance abusers
SCID SUDM	Assess DSM-IV substance use disorders	Aids in case ID, referral, and treatment	Those suspected of substance use disorders	NA	NA
SASSI-A	Screen for substance use problem severity and related problems	Screen	Those referred for emotional or behavioral disorders	Yes	Normals; substance abusers
T-ASI	Assess substance use and other life problems	Aids in case ID, referral, and treatment	Those at risk for substance use problems	NA	NA
T-TSR	Assess the type and number of program services	Aids in describing services received	Those receiving treatment for substance use problems	NA	NA

Note: This table is based on information provided by the literature or by authors of the measures. The instruments are listed in alphabetical order by full name. DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*; ID = identification; NA = not applicable.



**TABLE 2B.—Adolescent assessment instruments: Administrative information**

Instrument	Format	Time to administer (min.)	Training needed?	Time to score (min.)	Computer scoring avail.?	Fee for use?
AAIS	14-item questionnaire	5	No	5	No	No
ADI	Structured interview	45	Yes	15–20	No	Yes
ADAD	Structured interview	45–55	Yes	10	No	Yes
A-OCDS	14-item questionnaire	5–10	No	1	No	No
AEQ-A	90-item questionnaire	20–30	No	10	No	No
ASMA	8-item questionnaire	5	No	2	No	No
CMRS	25-item questionnaire	10	No	5	No	No
CASI-A	Semi-structured interview	45–55	Yes	15	Yes	Yes (computer version)
CDDR	Structured interview	10–30	Yes	10	No	No
DAST-A	27-item questionnaire	5	No	5	No	No
DAP	30-item questionnaire	10	No	5	No	No
DUSI-R	159-item questionnaire	20	No	10–15	Yes	Yes
GAIN	Semi-structured interview	45–90	Yes	15	Yes	No
PBDS	10-item questionnaire	5	No	5	No	No
PEI	276-item questionnaire	45–60	No	5	Yes	Yes
PESQ	40-item questionnaire	10	No	5	No	Yes
POSIT	139-item questionnaire	20–25	No	10–15	Yes	No
PRQ	24-item questionnaire	5	No	5	No	No
RAPI	23-item questionnaire	10	No	5	No	No
SCID SUDM	Semi-structured interview	30–90	Yes	10–15	No	No
SASSI-A	81-item questionnaire	10–15	No	5	Yes	Yes
T-ASI	Semi-structured interview	20–45	Yes	10	No	No
T-TSR	Semi-structured interview	10–15	Yes	5	No	No

Note: This table is based on information provided by the literature or by authors of the measures. The instruments are listed in alphabetical order by full name; see the text for the full names of the instruments.

**TABLE 3.—Availability of psychometric data on adolescent assessment instruments**

Instrument	Reliability			Validity		
	Temporal stability	Split-half	Internal consistency	Content	Criterion	Construct
AAIS	•		•		•	•
ADI	•		•*	•	•	•
ADAD	•		•*	•	•	•
A-OCDS	•		•	•	•	
AEQ-A			•	•	•	•
ASMA			•	•	•	•
CMRS			•	•	•	
CASI-A	•		•	•	•	•
CDDR	•	•	•	•	•	•
DAST-A	•		•	•	•	•
DUSI-R	•	•	•	•	•	•
GAIN	•	•	•	•	•	•
PEI	•		•	•	•	•
PESQ	•		•	•	•	•
POSIT	•		•	•	•	•
PRQ			•	•	•	
RAPI		•	•	•	•	
SCID SUDM			•*	•	•	
SASSI-A			•	•	•	
T-ASI	•		•*	•	•	•
T-TSR	•			•		

Note: This table is based on information provided by the literature or by authors of the measures. Instruments are listed in the same order as they appear in table 2; see text for full names of instruments.

\*Reliability estimates based on interrater reliability.

about drinking and a second scale that measures compulsive drinking behaviors. The A-OCDS has very favorable reliability evidence, and it has shown the ability to differentiate adolescent problem drinkers from less severe groups of adolescent drinkers (Deas et al. 2001).

#### *Tools That Assess All Drug Categories*

Examples of this group of screening tools are the Drug and Alcohol Problem (DAP) Quick Screen

(Schwartz and Wirtz 1990), the Personal Experience Screening Questionnaire (PESQ) (Winters 1992), and the Substance Abuse Subtle Screening Inventory for Adolescents (SASSI-A) (Miller 1985).

The 30-item DAP was tested in a pediatric practice setting (Schwartz and Wirtz 1990), in which the authors report that about 15 percent of the respondents endorsed 6 or more items, considered by the authors to be a cut score for “problem” drug use. Item analysis indicates that the items

contribute to the single dimension score, but no reliability or criterion validity evidence is available.

The 40-item PESQ consists of a problem severity scale (coefficient alpha, 0.91–0.95) and sections that assess drug use history, select psychosocial problems, and response distortion tendencies (“faking good” and “faking bad”). Norms for normal, juvenile offender, and drug-abusing populations are available. The test is estimated to have an accuracy rate of 87 percent in predicting need for further drug abuse assessment (Winters 1992).

The 81-item adolescent version of its adult companion tool, the SASSI-A yields scores for several scales, including face valid alcohol, face valid other drug, obvious attributes, subtle attributes, and defensiveness. Validity data indicate that SASSI-A scale scores are highly correlated with Minnesota Multiphasic Personality Inventory (MMPI) scales and that its cut score for “chemical dependency” corresponds highly with intake diagnoses of substance use disorders (Risberg et al. 1995). However, claims that the SASSI-A is valid in detecting *unreported* drug use and related problems are not empirically justified (Rogers et al. 1997).

#### *Tools That Assess Only Drugs Other Than Alcohol*

The Adolescent Drug Involvement Scale (ADIS) (Moberg and Hahn 1991) is a modified version of the AAIS. Psychometric studies on the 13-item questionnaire reveal favorable internal consistency (0.85) for the drug abuse severity scale. Validity evidence indicates that the ADIS correlates 0.72 with drug use frequency and 0.75 with independent ratings by clinical staff. A successor instrument to the ADIS that screens for substance abuse problems including alcohol is being field tested by the authors.

The Drug Abuse Screening Test for Adolescents (DAST-A) (Martino et al. 2000) was adapted from Skinner’s adult tool, the Drug Abuse Screening Test (Skinner 1982). The 27-item DAST-

A reveals favorable reliability data and is highly predictive of DSM-IV drug-related disorder when tested among adolescent psychiatric inpatients.

The Assessment of Substance Misuse in Adolescence (ASMA) (Willner 2000) is an 8-item questionnaire that has been tested in a large sample of general students. It has a very favorable internal consistency (0.90), and total score was significantly related to several indices of drug and alcohol use.

#### *Multiscreen Tools That Assess AOD Use and Other Domains*

The 139-item Problem Oriented Screening Instrument for Teenagers (POSIT) (Rahdert 1991) is part of the Adolescent Assessment and Referral System developed by the National Institute on Drug Abuse. It screens for 10 functional adolescent problem areas: substance use, physical health, mental health, family relations, peer relationships, educational status, vocational status, social skills, leisure and recreation, and aggressive behavior/delinquency. Cut scores for determining need for further assessment have been rationally established, and some have been confirmed with empirical procedures (Latimer et al. 1997). Convergent and discriminant evidence for the POSIT has been reported by several investigators (e.g., McLaney et al. 1994; Dembo et al. 1997).

The Drug Use Screening Inventory (revised) (DUSI-R) is a 159-item instrument that describes AOD use problem severity and related problems. It produces scores on 10 subscales as well as one lie scale. Domain scores were related to DSM-III-R substance use disorder criteria in a sample of adolescent substance abusers (Tarter et al. 1992). An additional psychometric report provides norms and evidence of scale sensitivity (Kirisci et al. 1995).

#### **Comprehensive Assessment**

If an initial screening indicates the need for further assessment, clinicians and researchers can

use various diagnostic interviews, problem-focused interviews, and multiscale questionnaires. These instruments yield information that can more definitively assess the nature and severity of the drug involvement, to assign a substance use disorder and to identify the psychosocial factors that may predispose an individual to drug involvement and maintain the involvement.

### *Diagnostic Interview*

Diagnostic interviews, which address DSM-based criteria for substance use disorders, include both general psychiatric interviews that contain specific sections for assessing substance use disorders and interviews that primarily focus on AOD use disorders. The majority of them are structured, that is, the interview directs the interviewer to read verbatim a series of questions in a decision-tree format, and the answers to these questions are restricted to a few predefined alternatives. The respondent is assigned the principal responsibility to interpret the question and decide on a reply.

There are four well-researched diagnostic interviews that address a wide range of psychiatric disorders. The first one, the Diagnostic Interview for Children and Adolescents (DICA) (Herjanic and Campbell 1977; Reich et al. 1982), is a 416-item structured interview that currently has a DSM-IV version available (Reich et al. 1991). Psychometric evidence specific to substance use disorders has not been published on the DICA, but some of the other sections have been evaluated for reliability and validity (Welner et al. 1987).

An instrument that has undergone several adaptations is the Diagnostic Interview Schedule for Children (DISC) (Costello et al. 1985; D. Shaffer et al. 1993, 1996). Separate forms of the interview exist for the child and the parent. As part of a larger study focusing on several diagnoses, Fisher and colleagues (1993) found the DSM-IV-based DISC to be highly sensitive in correctly identifying youth who had received a

hospital diagnosis of any substance use disorder ( $n = 8$ ). Both interview forms (parent and child) had a sensitivity of 75 percent. For the one parent-child disagreement case, the parents indicated that they did not know any details about their child's substance use.

The Schedule for Affective Disorders and Schizophrenia for School-Aged Children (Kiddie-SADS or K-SADS) is a well-known semi-structured interview organized around Research Diagnostic Criteria and adapted for young clients based on the Schedule for Affective Disorders and Schizophrenia developed by Endicott and Spitzer (1978). The DSM-IV alcohol and drug questions are contained in the lifetime version of the interview (K-SADS-E-5) (Orvaschel 1995). However, no psychometric data on the substance use disorder section of the K-SADS-E-5 have been reported.

The fourth general psychiatric interview for consideration is the Structured Clinical Interview for the DSM (SCID) (Spitzer et al. 1987). Interviewers rate each symptom as absent, subclinical, or clinically present. The SCID Substance Abuse Disorders Module (SUDM) is widely used to assess substance use disorders among adults and has shown good reliability in field trials (e.g., Williams et al. 1992). Martin and colleagues (1995) modified the DSM-III-R version of the SCID to assess DSM-IV substance use disorders among adolescents. Symptoms and diagnoses showed good concurrent validity, and preliminary analyses suggested moderate to good interrater reliability for this interview (Martin et al. 2000).

Another set of diagnostic interviews focus on alcohol and other substance use disorders. The Adolescent Diagnostic Interview (ADI) (Winters and Henly 1993) assesses DSM-IV symptoms associated with psychoactive substance use disorders as well as other content domains of interest to clinicians (e.g., substance use consumption history, psychosocial stressors, other psychiatric disorders). Evidence that support the interview's psychometric

properties has been reported (Winters and Henly 1993; Winters et al. 1993, 1999a).

The other substance use disorder–focused interview is the Customary Drinking and Drug Use Record (CDDR) (Brown et al. 1998). The CDDR measures AOD use consumption, DSM-IV substance dependence symptoms (including a detailed assessment of withdrawal symptoms), and several types of consequences of AOD involvement. There are both lifetime and prior 2 years versions of the CDDR. Psychometric studies provide supporting evidence for this instrument’s reliability and validity (Brown et al. 1998).

### *Problem-Focused Interviews*

Many problem-focused interviews are adapted from the well-known adult tool, the Addiction Severity Index (ASI) (McLellan et al. 1980). Content typically measured by interviews in this group are drug use history; drug use–related consequences and other functioning difficulties often experienced by drug-abusing adolescents such as legal, school, and social problems; and, in some instances, formal diagnostic criteria for abuse and dependence.

The Adolescent Drug Abuse Diagnosis (ADAD) (Friedman and Utada 1989) is a 150-item structured interview that measures medical status, drug and alcohol use, legal status, family background and problems, school/employment, social activities and peer relations, and psychological status. The interviewer uses a 10-point scale to rate the patient’s need for additional treatment in each content area. These severity ratings translate to a problem severity dimension (no problem, slight, moderate, considerable, and extreme problem). The drug use section includes a detailed drug use frequency checklist and a brief set of items that address aspects of drug involvement (e.g., polydrug use, attempts at abstinence, withdrawal symptoms, and use in school). Psychometric studies on the ADAD, using a broad

sample of clinic-referred adolescents, provide favorable evidence for its reliability and validity. A shorter form (83 items) of the ADAD intended for treatment outcome evaluation is also available.

The Adolescent Problem Severity Index (APSI) was developed by Metzger and colleagues (Metzger et al. 1991) of the University of Pennsylvania/VA Medical Center. The APSI provides a general information section that measures the reason for the assessment and the referral source, as well as the adolescent’s understanding of the reason for the interview. Additional sections of the APSI include drug/alcohol use, family relationships, education/work, legal, medical, psychosocial adjustment, and personal relationships. Limited validity data for the alcohol/drug section have been reported (Metzger et al. 1991).

Another ASI-adapted interview is the Comprehensive Addiction Severity Index for Adolescents (CASI-A) (Meyers et al. 1995). The CASI-A measures education, substance use, use of free time, leisure activities, peer relationships, family (including family history and intrafamilial abuse), psychiatric status, and legal history. At the end of several major topics, space is provided for the assessor’s comments, severity ratings, and ratings of the quality of the respondent’s answers. An interesting feature of this interview is that it incorporates results from a urine drug screen and observations from the assessor. Psychometric studies on the CASI-A have been reported (Meyers et al. 1995).

The fourth ASI-adapted interview is the Teen Addiction Severity Index (T-ASI) (Kaminer et al. 1991). The T-ASI consists of seven content areas: chemical (substance) use, school status, employment/support status, family relationships, legal status, peer/social relationships, and psychiatric status. A medical status section was not included because it was deemed to be less relevant to adolescent drug abusers. Patient and interviewer severity ratings are elicited on a 5-point scale for

each of the content areas. Psychometric data indicate favorable interrater agreement and validity evidence (Kaminer et al. 1993). Kaminer has developed a health service utilization tool that compliments the T-ASI, named the Teen Treatment Services Review (T-TSR) (Kaminer et al. 1998). This interview examines the type and number of services in and out of the program that the youth received during the treatment episode.

The final instrument for consideration in this group is the Global Appraisal of Individual Needs (GAIN) (Dennis 1999). This semi-structured interview covers recent and lifetime functioning in several areas, including substance use, legal and school functioning, and psychiatric symptoms. Very favorable reliability and validity data are associated with the GAIN, including data for the substance use disorders section when administered to a treatment-seeking adolescent population (Dennis 1999; Buchan et al. 2002). A shortened version of the GAIN is being developed.

### *Multiscale Questionnaires*

The self-administered multiscale questionnaires range considerably in length; some can be administered in fewer than 20 minutes, whereas others may take an hour. Yet many of them share several characteristics: Measures of both drug use problem severity and psychosocial risk factors are provided; strategies are included for detecting response distortion tendencies; the scales are standardized to a clinical sample; and the option of computer administration and scoring is available. Five examples of instruments in this group are summarized here.

The Adolescent Self-Assessment Profile (ASAP) was developed on the basis of a series of multivariate research studies by Wanberg and colleagues (Wanberg 1992). The 225-item instrument provides an in-depth assessment of drug involvement, including drug use frequency and drug use consequences and benefits, as well as the

major risk factors associated with such involvement (e.g., deviance, peer influence). Supplemental scales, which are based on common factors found within the specific psychosocial and problem severity domains, can be scored as well. Extensive reliability and validity data based on several normative groups are provided in the manual.

The Chemical Dependency Assessment Profile (CDAP) (Harrell et al. 1991) has 232 items and assesses 11 dimensions of drug use, including expectations of use (e.g., drugs reduce tension), physiological symptoms, quantity and frequency of use, and attitude toward treatment. A computer-generated report is provided. Limited normative data are available thus far on only 86 subjects (Harrell et al. 1991).

The Hilson Adolescent Profile (HAP) (Inwald et al. 1986) is a 310-item questionnaire (true/false) with 16 scales, two of which measure AOD use. The other content scales correspond to characteristics found in psychiatric diagnostic categories (e.g., antisocial behavior, depression) and psychosocial problems (e.g., home life conflicts). Normative data have been collected from clinical patients, juvenile offenders, and normal adolescents (Inwald et al. 1986).

Another true/false questionnaire is the 108-item Juvenile Automated Substance Abuse Evaluation (JASAE) (ADE, Inc. 1987). This is a computer-assisted instrument that produces a five-category score, ranging from no use to drug abuse (including a suggested DSM-IV classification), as well as a summary of drug use history, measure of life stress, and a scale for test-taking attitude. The JASAE has been shown to discriminate clinical groups from nonclinical groups.

The Personal Experience Inventory (PEI) (Winters and Henly 1989) consists of several scales that measure chemical involvement problem severity, psychosocial risk, and response distortion tendencies. Supplemental problem screens measure eating disorders, suicide potential, physical/sexual abuse, and parental history of

drug abuse. The scoring program provides a computerized report that includes narratives and standardized scores for each scale, as well as other various clinical information. Normative and psychometric data are available (Winters and Henly 1989; Winters et al. 1996, 1999b).

### **Expectancy Measures**

The Alcohol Expectancy Questionnaire—Adolescent Form (AEQ-A) is a 90-item questionnaire that measures an individual's expected or anticipated effects of alcohol use (marijuana and cocaine versions are available as well) (Brown et al. 1987). Six positive expectancies are measured (global positive effects, social behavior change, improvement of cognitive/motor abilities, sexual enhancement, increased arousal, and relaxation/tension reduction), and one negative expectancy is measured (deteriorated cognitive/behavioral functioning). Favorable reliability and validity evidence exists for the AEQ-A (Brown et al. 1987; Christiansen et al. 1989; Smith et al. 1995).

The Decisional Balance Scale consists of a 16-item scale that measures two drinking factors: advantages of drinking and disadvantages of drinking. Both scales have adequate internal reliability (0.81 and 0.87) (Migneault et al. 1997).

The final expectancy measure is Petchers and Singer's (1987) Perceived Benefit of Drinking Scale (PBDS). This 10-item scale was constructed to serve as a nonthreatening problem severity screen. It is based on the approach that beliefs about drug use, particularly regarding expected personal benefits of drug use, reflect actual use. Five perceived-benefit questions are asked regarding use of alcohol and then are repeated for drug use. The scale has moderate internal reliability (0.69–0.74) and is related to several key indicators of drug use behavior when tested in school and adolescent inpatient psychiatric samples (Petchers and Singer 1990).

### **Problem Recognition and Readiness for Change Measures**

Two adolescent measures of motivational variables associated with changing one's AOD behavior were located in the literature. The 24-item Problem Recognition Questionnaire (PRQ) consists of separate factors pertaining to drug use problem recognition and readiness for treatment (i.e., action orientation). The scale was developed with a combination of rational and empirical procedures. The PRQ factors have adequate internal reliability and were shown to be predictive of posttreatment functioning in an adolescent substance-abusing population (Cady et al. 1996).

The therapeutic community treatment research group at the National Development and Research Institutes, Inc., in New York developed the Circumstances, Motivation, Readiness and Suitability (CMRS) scales (DeLeon et al. 1994). Although the CMRS was originally developed for use with adults in a therapeutic community setting, it has been evaluated for use with drug-abusing adolescents (Jainchill et al. 1995). The questionnaire consists of four scales, and the total score is designed to predict retention of treatment. The scales are Circumstances (external motivation), Motivation (internal motivation), Readiness (for treatment), and Suitability (perceived appropriateness of the treatment modality). The scales have favorable internal consistency (alphas ranging from 0.77 to 0.80), and they moderately predict short-term (30-day) retention.

### **Treatment Planning**

It is worthwhile to consider the assessment instruments reviewed above in terms of how they can contribute to the treatment referral and planning process. Screening tools are appropriate for settings where the need is great to efficiently screen a high volume of young people for suspected problems. Several of the available

screening tools contain scoring rules that specifically guide the user as to the likelihood that the client needs a comprehensive assessment.

The comprehensive instruments more directly assist the user with the treatment planning process in several ways. The reality of many treatment programs is that eligibility for treatment requires formally demonstrating the presence of a DSM-based alcohol or substance use disorder. Thus, the many adolescent diagnostic interviews that are organized around the DSM-based criteria for abuse and dependence disorders are quite relevant for this purpose (e.g., ADI, CDDR, DISC). The multiscale questionnaires and problem-focused interviews, with their attention to several characteristics of AOD use and to underlying psychosocial risk factors that may have contributed to the AOD involvement, can provide meaningful information to assist the counselor in developing client-tailored treatment goals.

Many of the comprehensive and other (expectancy and readiness to change) instruments reviewed above contain scales that measure negative consequences of drug use, psychosocial and social reasons for drug use, and individual and environmental risk factors commonly associated with the onset or maintenance of adolescent drug use (e.g., peer drug use). Examples of such instruments are the ASAP, the CASI-A, the PEI, and the T-ASI. These scales can aid the counselor in helping the young client gain insight about his or her drug problems, as well as highlighting the inter- and intrapersonal factors that need to be targeted to reverse the drug habit (e.g., heavy peer drug use points to the need for increasing non-drug-using friends in the person's social life).

## RESEARCH NEEDS

Reviews of existing adolescent AOD involvement instruments indicate that, as a whole, there is a wealth of evidence that relevant constructs can be

measured reliably and validly in this field (Leccese and Waldron 1994). As summarized in table 3, the extant psychometric data are quite abundant for temporal stability, internal consistency, and content and criterion validity. However, several instruments lack important validity data. For example, many tests do not report validity evidence among subpopulations of young people defined by age, race, and type of setting (e.g., juvenile detention program or treatment program), and data regarding the test's ability to measure clinical treatment outcomes are almost nonexistent. Whereas available measures are generally adequate for assessing predisposing risk factors and relevant AOD treatment outcomes, most have not been formally evaluated as a measure of change (Stinchfield and Winters 1997). A good measure of change should meet the condition that its standard error of measurement is sufficiently minimal to permit its use in detecting small to medium change over time (Jacobson and Truax 1991).

Beyond these psychometric considerations, other issues pertaining to the research and clinical utility of adolescent assessment instruments remain unresolved. One issue is whether current assessment tools can adequately identify several distinct levels along the problem severity continuum. As already noted, it is unclear whether the distinction between substance abuse and substance dependence is diagnostically meaningful when applied to adolescents, and there is the need for more precise measures of the heterogeneous group of youth that meet criteria for abuse, particularly alcohol abuse (Martin and Winters 1998). A second major unresolved issue is the need for more precise identification of related psychosocial problems that may contribute to the onset and maintenance of AOD involvement. Many existing tools assess psychosocial risk factors historically, which does not permit an understanding of the extent to which risk factors may precede the AOD use or be a consequence of it. A final research issue is that most current assessment instruments do not readily translate into specific treatment interventions for primary and



secondary problems, nor do they facilitate the “matching” of subgroups of adolescent AOD abusers with different levels of treatments.

## CONCLUSION

Considerable progress has been achieved since the mid-1980s in the development of a vast array of assessment tools for the identification, assessment, and treatment of adolescents suspected of involvement with alcohol, marijuana, and other drugs. The decision to include a separate chapter on adolescent assessment in the second edition of this *Guide* is a testament to the maturation of this sector of the assessment instrumentation field. Despite some needs for further growth and sophistication, this assessment foundation bodes well for the field as it continues to fill knowledge gaps in epidemiology, prevention, and treatment.

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# Assessment To Aid in the Treatment Planning Process

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Assessment of alcohol and other drug (AOD) use problems serves multiple functions (e.g., Shaffer and Kauffman 1985; Jacobson 1989*a*, 1989*b*; Allen and Mattson 1993; Carroll 1995; Donovan 1995; Carey and Teitelbaum 1996; Donovan 1998). The Institute of Medicine (1990) and others (e.g., Carroll 1995) have suggested three stages of a comprehensive assessment for all individuals seeking specialized treatment for alcohol problems: a screening stage, a problem assessment stage, and a personal assessment stage. The first two stages involve screening, case finding, and identification of a substance use disorder; an evaluation of the parameters of drinking behavior, signs, symptoms, and severity of alcohol dependence, and negative consequences of use; and formal diagnosis of alcohol abuse or dependence. Each of these aspects of the assessment process is covered in detail in other chapters in this *Guide*.

Although these drinking-related parameters are important in defining the person's treatment needs, a broader range of factors must be considered in the treatment planning process because alcohol use both affects and is affected by a number of other areas of life function (Donovan 1988; Institute of Medicine 1990; Donovan 1992, 1998). The personal assessment stage recommended by the Institute of Medicine focuses on this broader array of personal problems being experienced by the individual. Carroll (1995) suggested that this stage involves a comprehensive description of the individual and his or her circumstances (e.g., demo-

graphic characteristics, concurrent problems, comorbid psychiatric disorders, family history). The process should focus on clients' strengths as well as weaknesses, problems, and needs. Some of the identified problems may be fairly directly related to alcohol use (contingent problems), while others may not be at all attributable to alcohol use (noncontingent problems). Examples may include psychological, social, and vocational problems, each of which may involve an interactive relationship with drinking. The provision of a comprehensive assessment is consistent with the recommendations derived from a biopsychosocial model of addictions and the process of assessment (Donovan 1988) and is a requirement of a number of accrediting bodies such as the Joint Commission on Accreditation of Healthcare Organizations or the Commission on Accreditation of Rehabilitation Facilities.

Within the clinical context, the primary goal of assessment is to determine those characteristics of the client and his or her life situation that may influence treatment decisions and contribute to the success of treatment (Allen 1991). Additionally, assessment procedures are crucial to the treatment planning process. Treatment planning involves the integration of assessment information concerning the person's drinking behavior, alcohol-related problems, and other areas of psychological and social functioning to assist the client and clinician to develop and prioritize short- and long-term goals for treatment, select the most appropriate interventions



to address the identified problems, determine and address perceived barriers to treatment engagement and compliance, and monitor progress toward the specified goals, which will typically include abstinence and/or harm reduction and improved psychosocial functioning (P.M. Miller and Mastria 1977; L.C. Sobell et al. 1982; Washousky et al. 1984; L.C. Sobell et al. 1988; Bois and Graham 1993).

The assessment and treatment planning process should lead to the individualization of treatment, appropriate client-treatment matching, and the monitoring of goal attainment (Allen and Mattson 1993). The Institute of Medicine (1990) noted that treatment outcomes may be improved significantly by matching individuals to treatments based on variables assessed in the problem assessment and personal assessment stages of the comprehensive assessment process. Although the results of Project MATCH have raised questions about the viability of matching treatments to client attributes (Project MATCH Research Group 1997*a*), there was evidence on a number of variables, including anger, severity of concomitant psychiatric problems, and social support for drinking, that was sufficient to warrant continued attempts to identify potential matches between client characteristics and types of treatment (Project MATCH Research Group 1997*b*, 1998). Similarly, there is evidence that matching therapeutic services to the presence, nature, and severity of problems clients present at treatment entry leads to improved outcomes (McLellan et al. 1997). Assessment at intake will continue to be instrumental in attempting to match clients to the most appropriate available treatment options; however, assessment also should be viewed as a continuous process that allows monitoring of treatment progress, refocusing and reprioritizing of treatment goals and interventions across time, and determination of outcome (Donovan 1988; Institute of Medicine 1990; L.C. Sobell et al. 1994*a*; Donovan 1998).

This chapter reviews a number of instruments that are available to assist the clinician and clinical researcher in the personal assessment stage

and in the development of appropriate treatment plans. This review attempts to provide information that has clinical utility and that can assist in the planning and conduct of treatment in clinical settings. The instruments include those assessing the areas of readiness to change, expectations about alcohol's effects, self-efficacy expectancies, drinking-related locus of control, family history of alcoholism, and extra-treatment social support for abstinence. A number of multidimensional measures and those developed specifically for treatment placement are also reviewed.

Tables 1A and 1B provide descriptive information on these instruments, and table 2 summarizes available information concerning the reliability and validity of these instruments. The information in these tables has been derived primarily from the fact sheets in the appendix and from the published literature. A number of other instruments that may be of assistance to the treatment planning process but that did not meet the inclusion criteria are also discussed in the text. Also, several reviews provide more detailed information about the assessment process in addictive behaviors and about specific assessment instruments and procedures (e.g., Donovan and Marlatt 1988; L.C. Sobell et al. 1988; Jacobson 1989*a*, 1989*b*; Institute of Medicine 1990; Allen 1991; Donovan 1992; Addiction Research Foundation 1993; Allen and Mattson 1993; Connors et al. 1994; Longabaugh et al. 1994; L.C. Sobell et al. 1994*a*, 1994*b*; Carroll 1995; Carey and Teitelbaum 1996; Donovan 1998).

### **PROBLEM RECOGNITION, MOTIVATION, AND READINESS TO CHANGE**

An important construct within the alcoholism field is the degree to which drinkers are aware of the extent of their drinking patterns, such as quantity and frequency of drinking, the negative physical and psychosocial consequences of their drinking, and their perception of these patterns and consequences as problematic. The goal of using screening instruments is, in fact, to increase

**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information**

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	
					?	Normed groups
F-SMAST/ M-SMAST	To provide a structured measure of mother’s and father’s lifetime alcohol abuse	Aids in determining parental history of alcohol abuse	Adults and adolescents	Non-problem drinkers, problem drinkers, alcoholics	No	NA
ASI	To provide information on recent (past 30 days) and lifetime medical, employment and support, AOD use, legal, family/social, and psychiatric problems related to AOD use	Identifies problem areas in need of targeted intervention; aids in treatment planning and outcome evaluation	Adults	Adults seeking treatment for substance abuse problems; psychiatrically ill, homeless, pregnant, and prisoner populations	Yes	Males and females; alcohol, opiate, and cocaine treatment groups; psychiatrically ill substance users; pregnant substance users; gamblers; homeless persons; probationers; and employee assistance clients
AASE	To measure self-efficacy concerning alcohol abstinence, defined in terms of temptation to drink and confidence about not drinking in high-risk situations	Identifies high-risk situations in which the individual is highly tempted and has low levels of confidence; aids in developing relapse prevention interventions	Adults	Problem drinkers, alcoholics in treatment	Yes	Outpatient substance abusers
ADCQ	To measure perceived costs and benefits associated with changing drinking behavior	Measures relative motivation to change drinking behavior	Adults	Problem drinkers, alcoholics in treatment	?	?

**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information** (*continued*)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
ABS	To measure beliefs about the effects of three amounts of alcohol on behavior and the utility of drinking in producing desired behavioral or emotional outcomes	Identifies expectancies about alcohol's effects on different behaviors and feelings, the usefulness of alcohol for different reasons or desired outcomes, and how these expectancies vary with the amount of alcohol	Adults	Non-problem drinkers, problem drinkers, and alcoholic clients in treatment	No	NA
AEQ-S	To provide a brief measure of both positive and negative alcohol-related expectancies	Assesses the effects desired from alcohol	Adults	College student drinkers and alcoholics	?	?
AEQ	To assess positive expectancies adults hold about alcohol's effects	Assesses alcohol's perceived reinforcing effects related to initiation and maintenance of, and relapse to, alcohol	Adults	College student drinkers and alcoholics	Yes	Clinical and nonclinical samples of drinkers
ADRS	To measure level of awareness or minimization of alcohol-related problems	Measures awareness of problems and perceived need or motivation to change drinking behavior	Adults	Alcoholics in treatment	?	Alcoholics in treatment

**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information** (*continued*)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
AUI	To provide a multidimensional assessment of alcohol use, styles, patterns, and perceived benefits of drinking	Aids in differential treatment assignment based on drinking patterns and styles	Adults and adolescents > 16 years	Alcoholics in treatment, DWI offenders	Yes	?
AWARE	To measure “warning signs” or high-risk situation potentially predictive of relapse	Identifies potential relapse risk and precipitants	Adults	Alcoholics in treatment	No	Alcoholics in treatment
CDAP	To provide a multidimensional assessment of AOD use history, patterns of use, beliefs and expectancies, symptoms, self-concept, and interpersonal relationships	Provides information in format useful for case conceptualization and treatment planning	Adults and adolescents >16 years	Adults and adolescents with chemical dependency problems	Yes	Alcohol abusers, polydrug abusers, social drinkers
CDP	To provide a multidimensional assessment of drinking history and behavior, motivation for treatment, demographics, and self-efficacy	Provides a systematic and consistent data set at intake for treatment planning	Adults	Adults entering alcohol treatment programs, problem drinkers	Yes	Alcohol abusers, males and females

**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information** (*continued*)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
DEQ	To assess positive and negative expectancies about alcohol's effects	Assesses alcohol's perceived reinforcing effects related to assertion, affective change, sexual enhancement, cognitive change, and tension reduction	Adults	Community drinkers, problem drinkers, hospitalized alcoholics	Yes	Adult clinical patients, adult community drinkers, university students
DRSEQ	To provide a multi-dimensional assessment of the strength of self-efficacy to refuse drinking in various situations	Identifies efficacy in drink refusal ability in social pressure, opportunistic, and emotional relief situations, targeting them for interventions	Adults	Adult non-problem drinkers, problem drinkers, alcoholic clients in treatment	Yes	Adult clinical patients, adult community drinkers, university students
DRIE	To provide a multi-dimensional assessment of an individual's perception of locus of control related to drinking behavior	Assesses relative degree of personal control of drinking behavior and for recovery; can be used to target expectancies for intervention	Adults	Problem drinkers, adults entering alcohol treatment programs	No	NA

**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information** (*continued*)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
FTQ	To assess history of alcohol problems in first- and second-degree relatives	Aids in determining risk for more serious alcohol problems and relapse vulnerability among those with positive family history	Adults	General population, problem drinkers, alcoholics	NA	NA
IPA	To assess level of social support for sobriety and for continued drinking	Determines relative support from family and friends for sobriety vs. continued drinking	Adults and adolescents	Alcoholics in treatment	Yes	Alcoholics in outpatient and aftercare treatment
IDS	To measure degree of heavy drinking in different situations over the past year	Develops a client profile of those situations having greatest risk of heavy drinking and/or relapse, to aid in planning relapse prevention	Adults	Clients seeking or in treatment for an alcohol problem	Yes	Age groups, males and females
MSAPS	To provide a multi-dimensional measure of problems related to AOD use	Assesses presence and severity of psychological, behavioral, and social problems	Adults	Substance abusers in treatment	No	NA

**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information** (*continued*)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
MSQ	To identify problem drinkers' maladaptive patterns that underlie their motivations for drinking alcohol	Identifies clients' concerns in major life areas, their relationship to motivations for drinking, and targets for systematic motivational counseling to change motivational patterns	Adults and adolescents	Substance abusers, cases of work inhibition/burnout, a wide range of counselees	Yes	College students, chemically dependent veterans, alcoholic inpatients, traumatically brain-injured rehabilitation patients
NAEQ	To assess the extent to which immediate, short-term, and long-term negative consequences are expected to occur if one were to drink	Identifies negative expectancies that may serve as a deterrent and represent motivation to stop or restrain drinking	Adults	Problem drinkers about to enter or currently in treatment	Yes	Non-problem abstainers; light, moderate, and heavy social drinkers; posttreatment relapsers and abstainers
PEI-A	To provide a multi-dimensional measure of AOD problem severity and psychosocial problems	Identifies substance abuse patterns and associated psychosocial problems	Adults	Substance abusers in treatment, criminal offenders	Yes	Treatment-seeking and normal community samples

**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information** (*continued*)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
RTCQ	To determine stage of readiness for change among substance abusers	Assesses readiness to change drinking behaviors; may aid in treatment planning	Adults and adolescents; hazardous and harmful drinkers who are not seeking treatment	Outpatients in general medical settings, head trauma and spinal cord injury individuals, psychiatric patients	Yes	Excessive drinkers identified in general medical practice at general hospital
RTCQ-TV	To determine stage of readiness for change among substance abusers seeking or in treatment	Assesses readiness to change drinking behaviors; may aid in treatment planning	Adults and adolescents	Individuals in alcohol treatment	Yes	Alcohol dependents and abusers in treatment
RFDQ	To measure reasons given for returning to drinking after a period of abstinence	Identifies relapse risk and potential relapse precipitants in negative emotions, social pressure, and craving dimensions	Adults	Alcoholics in treatment	No	NA
RAATE-CE and RAATE-QI	To provide a multidimensional assessment of motivation for and resistance to current and long-term treatment, severity of biomedical and psychiatric or psychological problems, and social and environmental support	Aids in assigning individuals to appropriate level of treatment, in making continued stay or transfer decisions during treatment, and in documenting appropriateness of discharge	Adults	Problem drinkers about to enter or currently in treatment	Yes	Ethnic groups; middle-class and lower socioeconomic status groups



**TABLE 1A.—Assessment instruments for treatment planning: Descriptive information** (*continued*)

Instrument	Purpose	Clinical utility	Target population	Groups used with	Norms avail.?	Normed groups
SCQ	To assess self-efficacy, or how confident an individual is that he or she will be able to resist the urge to drink or drink heavily in potential high-risk situations	Develops a client profile of the degree of confidence in resisting urges to drink in those situations having the greatest risk of heavy drinking and/or relapse, to aid in planning relapse prevention	Adults	Problem drinkers in treatment	Yes	Age and gender
SOCRATES	To assess stage of readiness to change drinking behavior	Identifies stage of readiness to change, helping to determine stage-appropriate interventions	Adults	Alcohol abusers and alcohol-dependent individuals	Yes	Alcoholics in treatment
URICA	To assess stage of readiness to change drinking behavior	Identifies stage of readiness to change, helping to determine stage-appropriate interventions	Adults	Alcohol abusers and alcohol-dependent individuals	Yes	Adult outpatient alcoholism treatment population
YWP	To assess alcohol-related workplace activities, particularly adverse effects of drinking on work performance, support for drinking, and support for abstinence	Determines the level of social support in the workplace that would either facilitate recovery or increase risk of relapse	Adults	Individuals in treatment for alcohol problems; employee assistance programs	Yes	Individuals in alcohol treatment

Note: Instruments are listed in alphabetical order by full name; see the text for the full names. A question mark in a table cell indicates that no information is available. AOD = alcohol and other drug; NA = not applicable.

**TABLE 1B.—Assessment instruments for treatment planning: Administrative information**

Instrument	No. of items (no. of subscales)	Format options	Time to administer	Training needed?	Time to score/ interpret	Computer scoring avail.?	Fee for use?
F-SMAST/ M-SMAST	13	P&P	5 min	No	5 min	No	No
ASI	~200 (7)	P&P, computer, interview	50–60 min	Yes	5–10 min	Yes	No
AASE	20 Efficacy, 20 Temptation (4)	P&P	10 min	No	5–10 min	No	No
ADCQ	29 (2)	P&P	10–15 min	No	5–10 min	No	?
ABS	48 (7)	P&P	15 min	No	15 min	No	No
AEQ-S	40 (8)	P&P	5–10 min	No	?	No	No
AEQ	120 (90 scored) (6)	P&P, computer	10–15 min	No	?	?	No
ADRS	8	Interview guided by a decision tree	10–15 min	Yes	?	No	?
AUI	228 (24)	P&P, computer	35–60 min	Yes	3–5/10 min	Yes	Yes
AWARE	28 (1)	P&P	10–15 min	No	5–10 min	?	?
CDAP	232 (10)	P&P, computer	45 min	No	5 min	Yes	Yes
CDP	88	Interview	1–2 h	Yes	30 min	Yes	Yes
DEQ	43 (6)	P&P	15 min	No	15–20 min	No	No
DRSEQ	31 (3)	P&P	10 min	No	10 min	No	No
DRIE	25 (3)	P&P	10 min	No	5–10 min	No	No
FTQ	NA	P&P, interview	5 min	No	2–3 min	No	No
IPA	19	Interview	20–30 min	Yes	30 min	No	No
IDS	42 or 100 (8)	P&P, computer	15–20 min	No	5 min	Yes	Yes
MSAPS	37 (3)	Interview	30 min	Yes	15 min	No	?
MSQ	NA	P&P	2–3 h (1 h for the briefer version)	Yes	Highly variable depending on objectives	Yes	Yes
NAEQ	22 or 60 (5)	P&P, computer, interview	15–20 min	No	5 min	Yes	Yes
PEI-A	270	P&P, computer	45 min	No	2 min	Yes	Yes

**TABLE 1B.—Assessment instruments for treatment planning: Administrative information** (*continued*)

Instrument	No. of items (no. of subscales)	Format options	Time to administer	Training needed?	Time to score/ interpret	Computer scoring avail.?	Fee for use?
RTCQ	12 (3)	P&P	2–3 min	No	1–2 min	No	No
RTCQ-TV	15 (3)	P&P	2–3 min	No	1 min	No	No
RFDQ	16 (3)	P&P	5 min	No	3–5 min	No	?
RAATE-CE and RAATE-QI	35 (5) in CE 94 (5) in QI	Interview (CE), P&P (QI)	20–30 min for CE, 30–45 min for QI	Yes	5 min	No	Yes
SCQ	39 (8)	P&P, computer	8–10 min	No	5 min	Yes	Yes
SOCRATES	19 or 39 (3)	P&P	10–15 min for 39-item version	No	5–10 min	No	No
URICA	28 or 32 (4)	P&P	5–10 min	No	5–10 min	No	No
YWP	13 (3)	P&P	5 min	No	5 min	No	No

Note: Instruments are listed in alphabetical order by full name; see the text for the full names. A question mark in a table cell indicates that no information is available. NA = not applicable; P&P = pencil and paper.

**TABLE 2.—Availability of psychometric data on treatment planning measures**

Measure	Reliability			Validity		
	Test-Retest	Split-half	Internal consistency	Content	Criterion	Construct
F-SMAST/M-SMAST	•	•	•	•	•	•
ASI	•	•	•	•	•	•
AASE			•		•	•
ADCQ			•		•	•
ABS					•	•
AEQ-S			•		•	•
AEQ	•		•	•	•	•
ADRS			<sup>1</sup>	•		•
AUI	•		•	•	•	•
AWARE	•		•		•	•
CDAP	•		•	•		•
CDP	•			•	•	
DEQ	•		•	•	•	•
DRSEQ	•		•	•	•	•
DRIE		•	•		•	•
FTQ	•				•	
IPA			•		•	•
IDS	•		•	•	•	•
MSAPS			•		•	•
MSQ	•		•	•	•	
NAEQ	•	•	•		•	•
PEI-A	•		•	•	•	•
RTCQ	•		•	•	•	•
RTCQ-TV	•		•		•	•
RFDQ			•		•	•
RAATE	•		•	•		•
SCQ	•		•	•	•	•
SOCRATES	•		•		•	•
URICA			•		•	•
YWP			•		•	•

Note: Measures are listed in the same order as in table 1; see the text for the full names.

<sup>1</sup>Reliability estimates based on interrater reliability.

the individual's awareness and increase problem recognition. Such awareness is an important step in the process to initiate behavior change and treatment-seeking behavior (Donovan and Rosengren 1999; Tucker and King 1999).

There have been two prominent views about the alcoholic's "inability to recognize" or "lack of awareness" of his or her problems. One view is that this is part of a defensive process of "denial," or the tendency of heavy drinkers to minimize or deny that they have a "drinking problem." This stance, thought to be unconscious and protective of the individual's perception of self, has continued to exert an important influence both in definitions of alcoholism (e.g., Morse and Flavin 1992) and in the development of patient placement criteria (e.g., Mee-Lee et al. 1996).

An alternative model of behavior change presented by Prochaska and DiClemente is applicable to addictive behaviors and has come to serve as the frame of reference for assessing motivation or readiness to change (Prochaska and DiClemente 1986; Prochaska et al. 1992). They suggest that individuals go through a series of stages in this decisionmaking process, ranging from precontemplation to taking positive steps to initiate change. Each stage reflects an increased level of problem recognition and commitment to change the addictive behavior. Many individuals have gone for years without perceiving that they have a problem, seemingly oblivious to the negative consequences that others are able to observe. This behavior, characteristic of the precontemplation phase, has often been thought of as denial. Other individuals have contemplated the need for changing their drinking for some time but have not been sufficiently committed to take action. Others may have attempted action in the past but have since resumed use, raising questions in their minds about the efficacy of treatment and their ability to reach their goals. Others, acknowledging the need to change, may still be influenced by their perceptions of the positive benefits derived from drinking and are unable to make a firm commitment to take action.

Each of these two views of denial and readiness has generated assessment measures and procedures meant to determine "where the client is" with respect to problem recognition and readiness for behavior change. Clinical lore has suggested that one of the most important steps in the counseling and recovery process is to identify and "break through" the individual's denial, often through the use of confrontational therapeutic approaches, so that he or she can take steps necessary to seek treatment. The importance of this task led Goldsmith and Green (1988) to develop the Alcoholism Denial Rating Scale (ADRS). They define alcoholic denial as "the alcoholic's inability to connect his drinking with its resulting consequences" (Breuer and Goldsmith 1995, p. 171). The intent of the scale is to quantify denial, in order to aid counselors in enhancing treatment and its outcome. An 8-point scale is used to define a continuum from denial to awareness. The individual reporting that he or she has no problem at all and has no awareness of alcohol-related problems is at one end of the continuum. The midpoint represents an awareness of some alcohol-related problems but with none of them viewed as being out of control. The other end of the continuum is the individual who indicates that he or she has pervasive alcohol-related problems and that his or her life is out of control because of drinking. These ratings are made by clinicians following an interview with the individual that focuses on AOD use and his or her perception of the use pattern. The rating process is aided by the use of a decision tree model and descriptions of behavior and life circumstances at each of the eight levels.

Preliminary and subsequent reports suggest that the ADRS has a good to relatively high level of interrater reliability, and the level of agreement is increased by using a semi-structured interview format and the decision tree (Goldsmith and Green 1988; Breuer and Goldsmith 1995). Newsome and Ditzler (1993) also found the scale to be useful clinically by providing a heuristic tool that can be used (1) to determine issues, decisions, and prioritization regarding admission to treatment among those seeking treatment; (2) to iden-

tify and intervene preventively with individuals who are at high risk of early discharge; and (3) to assess treatment progress.

Assessment is often the first step in the formal process of treatment for an addictive disorder. Choosing to change one's drinking pattern or give up alcohol or other drugs is not a decision arrived at easily. Individuals vary widely in their readiness to change, being more or less ready to stop drinking or other drug use. The level of motivation for change or for treatment will vary across individuals seeking treatment and will fluctuate within each individual across time. Even presenting for treatment intake does not reliably gauge the client's level or locus (e.g., intrinsic vs. extrinsic) of motivation. One task of the assessment process is to evaluate and attempt to enhance the individual's motivation and readiness to change and to engage in treatment (Donovan 1988; W.R. Miller 1989a; W.R. Miller and Rollnick 1991; Horvath 1993).

Clearly, knowing the stage of readiness to change drinking behavior is an important component in the treatment planning process (Connors et al. 2001). A number of assessment instruments have been developed to assist the clinician in determining the stage of readiness for change among problem drinkers or alcoholics. All are based on Prochaska and DiClemente's stages of change model. The Readiness To Change Questionnaire (RTCQ), developed by Rollnick and colleagues (1992), is a 12-item questionnaire consisting of three subscales that correspond to the precontemplation, contemplation, and action stages as reflected in the factor structure derived from principal components analysis. Each of these scales consists of 4 items presented as 5-point rating scales ranging from strongly agree to strongly disagree. Despite the relative brevity of the scales, Rollnick and colleagues found that Cronbach alpha levels, reflecting their internal consistency, ranged from 0.73 for precontemplation to 0.85 for action in a sample of excessive drinkers (i.e., harmful and hazardous drinkers) identified in a general medical setting. A similar range was found for the test-retest reliability coefficients.

Two methods have been developed to assign drinkers to one of the three stages. The first involves assigning the individual to the stage having the highest raw score; in the event of tied scores, the person is assigned to the more advanced stage. The second method is a pattern or profile analysis of either the raw scale scores or standardized scale scores across the three scales. Both methods have been shown to have predictive validity. The stages to which excessive drinkers identified from general medical wards of a hospital were assigned, using either method, were associated with changes in drinking behavior at 8-week and 6-month followup points; those in the action stage consistently showed the greatest reduction in drinking (Heather et al. 1993). However, some have argued that the RTCQ does not measure distinct stages but rather represents a higher order measure of readiness that can be scaled along a continuum with a high level of internal consistency and predictive power (Budd and Rollnick 1997).

The RTCQ thus appears to provide a brief assessment instrument that can be used to identify readiness to change, predict subsequent drinking, direct the selection of interventions, and serve as an outcome or process measure to evaluate brief interventions among individuals identified as having drinking problems but who are not actively seeking specialized alcoholism treatment. The scale has been used with a variety of such groups, including outpatients in general medical settings (e.g., Hapke et al. 1998; Samet and O'Connor 1998), head trauma and spinal cord injury individuals (e.g., Bombardier et al. 1997; Bombardier and Rimmele 1998), and psychiatric patients (e.g., Blume and Schmaling 1997; Blume and Marlatt 2000).

The authors emphasize that the RTCQ was developed primarily for use with hazardous or harmful drinkers in general medical settings who are *not* seeking treatment for alcohol problems. Its use with problem drinkers in treatment has led to considerably lower estimates of reliability and different factor structures (Gavin et al. 1998); this was particularly true for the precontemplation ( $\alpha = 0.30$ ) and contemplation ( $\alpha = 0.52$ )

scales. These low internal consistency estimates raise a question about the utility of the RTCQ in treatment settings (Gavin et al. 1998). This has led to subsequent work to develop measures more appropriate to individuals in treatment. One such measure is the Readiness To Change Questionnaire Treatment Version (RTCQ-TV) (Heather et al. 1999). Through a series of factor analyses a 15-item scale was derived. It includes 5 items each for the precontemplation, contemplation, and action stages. Of these, the internal consistency reliability of the contemplation scale was the lowest ( $\alpha = 0.60$ ), with that of the precontemplation ( $\alpha = 0.68$ ) and action ( $\alpha = 0.77$ ) scales somewhat higher. As an index of concurrent validity the RTCQ-TV scale scores were correlated with those from the University of Rhode Island Change Assessment (URICA) (McConaughy et al. 1983). The RTCQ-TV scales were significantly and most highly correlated with the corresponding scales on the URICA. It was also found that a significantly higher percentage of clients who at followup (an average of 7.4 months after the initial assessment) were classified as having “good” outcomes (either abstinent or drinking below recommended levels) were in the action stage at intake (57 percent), compared with the rate of clients having good outcomes who were in the contemplation stage (35 percent). Although Heather and colleagues indicated that additional research is necessary to determine the psychometric properties of the RTCQ-TV with different populations, they suggested that it is preferable for clinicians dealing with clients in treatment settings to shift from the original RTCQ to the new version specifically developed for use with clinical populations (Heather et al. 1999).

Another relatively new scale focused on use within a clinical setting is the Alcohol and Drug Consequences Questionnaire (ADCQ) (Cunningham et al. 1997). This scale derives from the general theoretical notion, and from related clinical interventions, that represent a form of decisional balance. A number of such measures have been developed previously and have explored the

“pros” and “cons” of continued alcohol use (e.g., Migneault et al. 1999). However, the ADCQ focuses on the costs and benefits of stopping or changing one’s drinking. The ADCQ consists of two subscales. A 14-item subscale asks individuals to endorse those negative consequences or perceived costs involved in choosing to change their substance use pattern. A complementary 15-item subscale asks them to endorse the positive outcomes or perceived benefits derived from making such a change. Each of these subscales has an internal consistency index above 0.90. It was found that individuals who rated the perceived benefits of change higher at intake or those who rated the perceived costs of change as lower at intake were less likely to drink and drank on fewer days during a 1-year followup. Although the ADCQ appears to be a promising measure, further psychometric evaluations, such as those reported by Carey and colleagues (2001), are needed.

Two measures have been increasingly used to determine the readiness for change among problem drinkers who are seeking treatment. The first is the URICA, mentioned earlier in this chapter. This scale was originally developed as part of the evaluation of the change process in psychotherapy (McConaughy et al. 1983). It has become a primary measure used in the context of Prochaska and DiClemente’s stages of change model and has had its greatest application in the area of smoking cessation (e.g., DiClemente et al. 1991). More recently it has been applied in the evaluation of individuals having drinking problems (DiClemente and Hughes 1990) and other drug problems (Abellanas and McLellan 1993). The scale originally consisted of 32 items presented with a 5-point response scale (from strong disagreement to strong agreement). The items are worded so that individuals respond to their perception of a general “problem” that they define themselves; the initial instruction set is used to focus the respondent’s attention to drinking as the problem to be considered.

The URICA scale operationally defines four theoretical stages of change, each assessed by eight items: precontemplation, contemplation,

action, and maintenance. However, subsequent factor analyses with alcoholic subjects in an outpatient treatment program led to a reduction of the items to 28, with 7 per subscale (DiClemente and Hughes 1990). Cluster analysis yielded five patterns of respondents. Those in the precontemplation group view themselves as not having a problem. Those in the ambivalent group appear to be reluctant or ambivalent about changing their behavior. Those in the participation group appear to be highly invested and involved in change. Those in the uninvolved or discouraged group appear to have given up on the prospect of change and are not involved in attempting to do so. Those in the contemplation group appear to be interested in making changes, are thinking about it, but have not yet begun to take action. The subtypes were found to differ significantly with respect to the pattern of alcohol use, the perceived benefits of drinking, and the incidence of negative alcohol-related consequences. The validity of these typologies has been largely corroborated in subsequent cluster analyses of AOD clients seeking treatment (Carney and Kivlahan 1995; el-Bassel et al. 1998).

Willoughby and Edens (1996; Edens and Willoughby 2000) derived and replicated a two-cluster solution on the URICA in evaluating alcohol-dependent veterans in a residential setting. The two clusters appeared to resemble the precontemplation and contemplation/action stages. Their findings suggest that those individuals classified as members of the precontemplation group were less worried about their drinking and were less interested in receiving help than those in the contemplation/action group. Individuals classified as members of the precontemplation group were also found to be less likely to complete treatment (Edens and Willoughby 2000). Carbonari and DiClemente (2000) also found that profiles derived from the URICA, self-efficacy (confidence of remaining abstinent and temptation to drink), and the use of cognitive and behavioral change strategies were related to drinking outcomes in both outpatient and aftercare samples from Project MATCH. This body of results

suggests that the URICA can be used to identify clinically meaningful motivational subtypes of treatment-seeking alcoholics.

The second measure receiving increased attention in the determination of readiness for change among problem drinkers seeking treatment is the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES) (W.R. Miller et al. 1990; W.R. Miller and Tonigan 1996). This scale is available in either a 39-item version or an abbreviated 19-item version. Like the RTCQ, but unlike the URICA, the SOCRATES items are worded specifically in reference to changing drinking behavior. These items are responded to along a 5-point Likert scale (from strong agreement to strong disagreement). The measure has been shown to have adequate levels of internal and test-retest reliability as well as construct and criterion validity (W.R. Miller and Tonigan 1996). Conceptually, the SOCRATES assesses the stage of readiness expressed by the individual within the theoretical framework proposed by Prochaska and DiClemente, namely, precontemplation, contemplation, determination or preparation, action, and maintenance. Factor analytic studies by Miller and colleagues, however, indicate three empirically derived scales: Readiness for Change, Taking Steps for Change, and Contemplation (W.R. Miller and Tonigan 1996). Isenhardt (1994) similarly found three factors on the SOCRATES, labeled Determination, Action, and Contemplation. Subsequent factor analyses with heavy-drinking college students (Vik et al. 2000) were generally consistent with the three factors. Also, the results of cluster analyses (Isenhardt 1994) suggest three groups based on the pattern of their factor scores. These were similar in nature to those obtained by DiClemente and Hughes (1990) using the URICA, namely the ambivalent, uninvolved, and active groups. These groups were found to differ significantly with respect to the pattern and styles of drinking and drinking-related consequences as measured by the Alcohol Use Inventory (AUI), which is discussed later in this chapter.

Despite the general consistency in the findings concerning the factor structure of the SOCRATES,



Maisto and colleagues (1999) found only two principal factors among a sample of “at risk” drinkers recruited from primary care medical clinics: a *problem recognition* factor and a *taking action* factor. The first factor was based on a scale that appeared to measure reliably the perceived degree of severity of an existing alcohol problem (nine items, Cronbach alpha = 0.91) using items from Miller and Tonigan’s Ambivalence and Recognition scales; the second factor was based on a scale composed of items that focus on taking action to change or to maintain changes that have already been made (six items, Cronbach alpha = 0.89). These two factors also were found through confirmatory factor analysis to best fit the SOCRATES data when compared with the three-factor solution derived by Miller and Tonigan (1996). At the initial assessment the problem recognition factor was most highly correlated with measures of alcohol problems and symptoms of dependence (e.g., Alcohol Dependence Scale, Alcohol Use Disorders Identification Test, Drinker Inventory of Consequences, Short Michigan Alcoholism Screening Test [SMAST; see the discussion later in this chapter]); while also significantly correlated with these measures, the magnitude of the relationships was considerably lower for the taking action factor. It was also found that the problem recognition factor at baseline significantly predicted the number of drinks, drinks per drinking day, number of heavy-drinking days, and number of negative consequences at a 6-month followup, even after age, gender, race, severity of dependence, baseline measures of each of the outcome criterion variables, and the two SOCRATES baseline factor scores were taken into account. In each case, higher scores on the problem recognition factor were associated with heavier drinking and more negative consequences. The taking action factor at baseline, however, did predict these outcome measures.

Carey and colleagues (2001) found significant correlations between the ADCQ subscales and subscales from the SOCRATES among psychiatric patients. The taking steps factor was negatively associated with the perceived costs of quitting

(−0.28) and positively (0.64) with the anticipated benefits of quitting. The problem recognition factor from the SOCRATES was positively related (0.70) to the anticipated benefits of quitting. The taking steps factor was also found to be negatively related to the perceived benefits of drinking/substance use (−0.45) and positively related to the perceived negative consequences of drinking/use (0.47).

Although the stages of change model has been critiqued on methodological and conceptual grounds (e.g., Sutton 1996; Whitehead 1997; Joseph et al. 1999), the assessed stage of a client’s readiness to change has direct implications for the development of initial interventions meant to enhance the likelihood of the client engaging in and complying with treatment (Annis et al. 1996; Sutton 1996; Connors et al. 2001). Carey and colleagues (1999) provided a thorough review of a number of measures of readiness to change among substance abusers and some comparative information that may help the clinician choose which of these measures to use. The approach taken by the clinician in attempting to accomplish this task will differ depending on the client’s stage of readiness to change (Prochaska and DiClemente 1986; Prochaska et al. 1992; Connors et al. 2001). For example, a client who is in the early stages of the behavior change process, in which he or she is contemplating change and moving toward making a commitment and taking action, will likely benefit most from approaches that increase one’s information and awareness about oneself and the nature of the problem, lead to self-assessment about how one feels and thinks about oneself in light of a problem, increase one’s belief in the ability to change, and reaffirm one’s commitment to take active steps to change (Prochaska et al. 1992; Horvath 1993).

In addition to being consistent with “practice wisdom” and theoretical approaches to change, the proposed focus on such awareness-raising factors for those in the precontemplation and contemplation phases is also consistent with evidence from individuals who had resolved an alcohol problem on their own without the aid of formal treatment. L.C. Sobell and colleagues

(1993) found that over half of the recoveries of such individuals could be characterized by a cognitive evaluation of the pros and cons of continued drinking.

For some individuals, the events that led them to contemplate the need for change or to take steps to seek help may be sufficient for them to stop drinking or modify their alcohol use patterns without more formal treatment (L.C. Sobell et al. 1993; Marlatt et al. 1997; Donovan and Rosengren 1999; Tucker and King 1999). For others, brief interventions based on a comprehensive assessment of their addictive behaviors and related life areas, the provision of feedback and advice to the client, and a focus on increasing motivation for change have been found to increase the likelihood of clients following through on referrals to seek and enter treatment (e.g., Heather 1989; W.R. Miller 1989a; Bien et al. 1993; Wilk et al. 1997).

In a review of measures of readiness to change, Carey and colleagues (1999) indicated that despite their common theoretical background, their high popularity among clinicians, and their heuristic value in working with clients, each measure has psychometric limitations of one sort or another. Because of this they caution that these scales should be viewed as experimental in nature and should not be used in isolation to make important clinical decisions.

### ALCOHOL-RELATED EXPECTANCIES AND SELF-EFFICACY

Clinicians and clinical researchers have increasingly focused on the role of cognitive factors in decisions to drink and in drinkers' responses to alcohol (Oei and Jones 1986; Young and Oei 1993; Oei and Baldwin 1994; Oei and Burrow 2000; B.T. Jones et al. 2001). Two broad categories of such cognitive factors having implications for the development and maintenance of drinking problems and for potential relapse following treatment are (1) the individual's expectations about drinking and the anticipated effects

of alcohol and (2) the individual's expectations about one's ability to cope adequately with problems (self-efficacy expectations). These categories and related instruments are discussed in the following sections.

### Alcohol-Related Expectancy Measures and Reasons for Drinking

Alcohol-related expectancies typically refer to the beliefs or cognitive representations held by the individual concerning the anticipated effects or outcomes expected to occur after consuming alcohol. These expectancies are shaped by an individual's past direct or indirect experience with alcohol and drinking behavior (Connors and Maisto 1988a). To the extent that these representations are activated and accessible to the individual in drinking-related situations, they are hypothesized to determine the anticipated outcomes in using alcohol and to mediate subsequent drinking behavior (Rather and Goldman 1994; Stacy et al. 1994; Palfai and Wood 2001).

It is often presumed that individuals drink in order to achieve or enhance the emotional or behavioral outcomes that they expect; thus, these expectancies are often viewed as being reflective of the individual's possible "reasons for drinking" (Cronin 1997; Galen et al. 2001). Individuals differ with respect to both their experiences with alcohol and drinking and with the resultant beliefs and expectations they hold about alcohol's anticipated effects. To the extent that individuals are found to hold expectancies that serve a functional role in maintaining problematic drinking behavior, they may be assigned to treatment strategies designed to challenge or modify their beliefs about alcohol's effects on mood and behavior and to substitute more adaptive or realistic expectations, with the prediction that decreases in positive expectancies associated with alcohol would be associated with a decrease in drinking behavior (Oei and Jones 1986; S.A. Brown et al. 1988; Connors and Maisto 1988a; Connors et al. 1992; Darkes and Goldman 1993; Oei and Baldwin 1994; Darkes and Goldman 1998).

A number of measures of alcohol-related beliefs and expectancies have been developed and are available to help the clinician determine the nature, strength, and valence of these beliefs. The Alcohol Expectancy Questionnaire (AEQ) (S.A. Brown et al. 1980, 1987a) continues to be the most widely used alcohol expectancy measure in both research and clinical settings. The AEQ is a 90-item self-report form, presented with a forced choice (i.e., agree/disagree) response format that assesses a diverse array of anticipated experiences associated with alcohol use. It was developed empirically by refining a larger pool of verbatim statements of adult men and women ages 15–60 years, with diverse ethnic backgrounds and drinking histories (from nondrinkers to chronic alcoholics). The adult version is designed to assess the domain of alcohol reinforcement expectancies and consists of six factor-analytically derived subscales: positive global changes in experience, sexual enhancement, social and physical pleasure, social assertiveness, relaxation/tension reduction, and arousal/interpersonal power. The scale has been shown to have a high level of internal consistency, test-retest reliability, and concurrent validity.

A recent factor analytic study identified a number of meaningful dimensions derived from the AEQ (Vik et al. 1999). The authors suggested that the AEQ content could be considered to fall along two dimensions, namely the valence of the anticipated alcohol-related effects (positive/negative) and the degree of personal versus more social context of the expected outcomes. The authors described four resultant hypothetical factors: social enhancement, social coping, personal enhancement, and personal coping. The results of a confirmatory factor analysis supported the presence of the hypothesized four factors. These factors were found to have a high degree of concurrent, convergent, and discriminant validity.

The AEQ has been evaluated in clinical and nonclinical populations. As an example in a nonclinical sample, Williams and Ricciardelli (1996) found that scores on the AEQ were related to alcohol dependence symptoms among heavy-drinking young adults. More specifically, high

scores among young men on the social assertiveness, sexual enhancement, and arousal/interpersonal power scales were predictive of higher symptoms of loss of control over drinking. The pattern of findings among females was much more complex. With respect to clinical populations, the AEQ total score and subscale scores have been found to differentiate alcoholic from nonalcoholic respondents and to be predictive of current and future drinking practices, persistence and participation in treatment, and relapse following treatment (S.A. Brown 1985a, 1985b; S.A. Brown et al. 1987a).

Despite the systematization brought to the assessment of alcohol expectancies by the AEQ, investigators and clinicians have noted a number of theoretical and practical limitations in its utility. These include its reliance on a forced-choice response format that does not allow determination of the strength of the expectancies; a confounding of global or general beliefs with personal ones; its focus on positive outcome expectancies without assessing expectancies concerning anticipated negative outcomes; its restriction to a single “dose” or level of alcohol in the instruction set to reference expectancies (e.g., a “few drinks”), thus precluding examination of variation in expectancies over different dose levels; and the lack of a measure of frequency of occurrence or personal importance associated with each of the expectancies (e.g., Southwick et al. 1981; Leigh 1989a, 1989b, 1989c; Collins et al. 1990; Oei et al. 1990; Adams and McNeil 1991; Leigh and Stacy 1991; Connors et al. 1992; Leigh and Stacy 1993). These concerns have led to the development of a number of subsequent expectancy measures, each of which attempts to address one or more of the noted limitations.

The Alcohol Effects Questionnaire-Self (AEQ-S) (Rohsenow 1983), a revision and extension of the AEQ, was developed as a brief method of assessing both the positive and negative effects people expect alcohol to have on them. It was intended to have several advantages over the earlier AEQ. It is briefer (40 true/false items); it assesses undesirable effects of alcohol (impairment and irresponsibility)

as well as positive reinforcing effects; and it assesses only personal beliefs (beliefs about the effects of alcohol on the individual) rather than mixing personal beliefs with general beliefs (beliefs about the effects of alcohol on people in general). The AEQ-S was developed by taking the 5 items that loaded most highly on the six factors of AEQ, adding 2 items assessing verbal aggression and deleting from the arousal/interpersonal power scale 1 item that had loaded on two factors, and adding 5 items assessing cognitive and physical impairment and 4 items assessing carelessness or lack of concern about consequences. All items were then reworded to reflect personal beliefs. The AEQ-S consists of eight rational scales: Global Positive, Social and Physical Pleasure, Sexual Enhancement, Power and Aggression, Social Expressiveness, Relaxation and Tension Reduction, Cognitive and Physical Impairment, and Careless Unconcern. Internal consistency indices across subscales ranged from 0.49 to 0.74 for college student drinkers and from 0.37 to 0.85 among alcoholics in treatment. Factor analysis of the AEQ-S on college students (Rohsenow 1983) largely supported the first six rationally derived factors and combined the two negative scales into one factor. The AEQ-S has been used largely as a research instrument to explain or predict behaviors or responses of individuals in other areas, such as aggression after drinking (Rohsenow and Bachorowski 1984) and cue reactivity (Rohsenow et al. 1992).

George and colleagues (1995) modified and extended the AEQ-S in an attempt to maintain the benefits of this instrument (e.g., brevity and negative expectancies) while shifting the response format to a 6-point rating scale (from strongly agree to strongly disagree) to allow information about strength of endorsement. This measure is called the AEQ-3 (i.e., third revision of the Alcohol Expectancy Questionnaire). The structure derived from confirmatory factor analysis of the AEQ-3 was found to be relatively consistent with that proposed by Rohsenow (1983) and was relatively invariant across gender and ethnic groups.

It appears that neither the AEQ-S nor the AEQ-3 has been used in clinical applications to date,

and neither appears to have been used in recent research.

Another measure of expectancies is the Drinking Expectancy Questionnaire (DEQ) (Young and Knight 1989; Young et al. 1991a). It also attempts to improve on the AEQ by phrasing items consistently in the first person, measuring both positive and negative expectancies, and balancing the valence of items selected for the questionnaire by providing a multiple-response format (Young and Knight 1989). The DEQ consists of 43 items developed using both community and clinical populations. Each item is rated on a 5-point rating scale from strongly disagree to strongly agree. Five subscales, derived from factor analysis, relate to specific alcohol expectancies of assertion, affective change, sexual enhancement, cognitive change, and tension reduction. A sixth factor, dependence, is more general and relates to perceived level of alcohol involvement. Analyses suggest that the alcohol-related beliefs assessed by the DEQ are relatively stable and traitlike, being relatively unaffected by drinking (Young et al. 1989). The total score and the subscale scores of the DEQ have been found to correlate with measures of frequency of drinking, but not quantity consumed, in a community sample (N. Lee and Oei 1993a). As an example, those who expected greater negative affective states when drinking reported that they drank both their usual and maximum amounts of alcohol less often.

The Alcohol Beliefs Scale (ABS) (Connors et al. 1987; Connors and Maisto 1988b; Connors et al. 1992) is a two-part, 48-item questionnaire. It attempts to incorporate information concerning strength of endorsement, dose-related changes in the anticipated effects of alcohol, and the perceived utility of alcohol in inducing a number of emotions or behaviors. On part A of the scale (26 items), subjects indicate the extent to which each of three different amounts of alcohol (one to three standard drinks, four to six standard drinks, and "when drunk") increases or decreases behaviors and feelings such as judgment, problem solving, depression, aggression, stress, and group interaction. The ratings are made on an 11-point

scale ranging from a “strong decrease in behavior or feeling” to a “strong increase in behavior or feeling”; a rating of zero is used to indicate no change in the behavior or feeling as a result of drinking. Four domains have been derived from the items contained in part A: control issues, sensations, capability issues, and social issues. On part B of the scale (22 items), drinkers rate how useful the consumption of each of the three doses of alcohol would be for a variety of reasons (e.g., to relax, to become more popular, to become uninhibited, to relieve depression, and to forget worries). These estimates are also made on an 11-point scale ranging from “not at all useful” to “very useful.” The factors derived from part B have been labeled as useful in feeling better, useful for being in charge, and useful for alleviating aversive states.

Results suggest that alcoholics differ from problem drinkers and non-problem drinkers with respect to the expected effects of alcohol and its anticipated utility. In general, alcoholics anticipated less impairment on the control and capability factors. A dose-response relationship was noted, with all drinkers expecting increased impairment with increasing doses. An interaction between drinker group and dose was found on a number of subscales of part B, suggesting differences in the perceived utility to induce moods and behaviors as a function of severity of drinking problem and amount consumed. As an example, higher doses of alcohol were perceived as increasingly useful in reducing emotional distress, with the magnitude of the increases in this perceived utility being greatest for alcoholics. There also appears to be an interaction with respect to perceived effects and utility across doses as a function of gender and ethnicity (Connors et al. 1988).

Fromme, Stroot, and Kaplan (1993) developed the Comprehensive Effects of Alcohol (CEOA) scale. The scale was developed initially through exploratory factor analysis. This process identified four positive expectancy factors, consisting of 22 items: sociability, tension reduction, “liquid courage,” and sexuality. Three negative expectancy factors were also derived, consisting

of 19 items: cognitive and behavioral impairment, risk and aggression, and self-perception. All items focus on discrete rather than global effects of alcohol and all are worded to focus on the person’s own expectations rather than those of people in general. The scale has two parts. In the first part, the individual indicates the level of agreement with the expectancy statement on a 4-point scale from “disagree” to “agree.” In the second part, the individual is asked to provide a subjective evaluation of the expected effects on a 5-point scale from “bad” through “neutral” to “good.” The latter scale was developed because there is considerable individual difference in the perceived desirability of a given effect of alcohol, and as such it is preferable to assess the person’s evaluation rather than make inferences about it. Individuals are also asked to estimate the number of standard drinks that they would need to consume to experience each of the anticipated effects. The CEOA scale was demonstrated to have adequate levels of internal consistency, temporal stability, and construct validity. The positive and negative expectancy and evaluation scale scores were also related to measures of quantity and frequency of drinking and weekly alcohol consumption among college students.

Guarna and Rosenberg (2000) explored the situational specificity of expectancies measured by the CEOA scale. Driving under the influence (DUI) offenders were asked to complete the scale under a number of different response sets. They were asked to respond as if they had consumed either small or large amounts of alcohol, beer, wine, mixed drinks, or straight liquor. Respondents’ expectancies were found to vary across both the quantity and the beverage categories. The greatest number of negative expectancies was associated with drinking straight liquor, with the highest level of positive expectancies associated with drinking beer. Of interest, consuming a large amount of alcohol was associated with both more positive and more negative expectancies than drinking small amounts.

Leigh (Critchlow 1987; Leigh 1987, 1989b, 1989c) developed the Effects of Drinking Alcohol

(EDA) scale as a measure of both expectations about the consequences of drinking and subjective evaluations of the relative desirability of these consequences as part of a utility analysis of drinking behavior. The utility of a behavior is viewed as a function of the perceived probability of its occurrence and the desirability of the anticipated consequences if the behavior does occur. This general principle guided the development of this questionnaire, which lists 20 possible effects of alcohol, both positive and negative. Individuals are asked to rate the probability of experiencing each of the effects on a 5-point rating scale from "very unlikely" to "very likely." They are instructed to use as a reference for their ratings the consumption of enough alcohol to "be under the influence." Individuals are also asked to evaluate each effect based on their personal experience along a 5-point scale from "very good" to "very bad." Utility scores have been found to be positively related to drinking; this appears to be particularly due to the increased expectations of positive consequences of drinking and more positive evaluation of all consequences by heavier drinkers (Critchlow 1987; Leigh 1987). Also, individuals tend to believe that alcohol effects, particularly for socially undesirable behaviors, are more likely to happen to others than to themselves (Leigh 1987). The EDA scale has been found to be comparable to the AEQ in its ability to predict drinking behavior among college students (Leigh 1989a). The EDA scale has recently served as one of the criterion measures used to determine the convergent and divergent validity of the newly derived four-factor subscales of the AEQ (Vik et al. 1999).

Leigh and Stacy (1993) subsequently developed another measure of expectancies through a series of factor and structural equation analytic techniques. The resultant untitled 34-item scale consists of two broad categories of positive and negative alcohol effects. The positive effects category has four subscales: social facilitation, fun, sexual enhancement, and tension reduction/negative reinforcement. The negative effects category also has four subscales: social, emotional, physical, and cognitive/performance. Using a 5-point

scale from "no chance/very unlikely" to "certain to happen," individuals are asked to rate the likelihood that each of the consequences would happen to them if they drank. The structural equation modeling suggested that although negative expectancy was significantly related to alcohol use, positive expectancy was a stronger predictor of drinking behavior, and as such may represent a more powerful motivator of drinking.

One of the expectancy measures that has been used the most over the recent past is the Negative Alcohol Expectancy Questionnaire (NAEQ) (B.T. Jones and McMahon 1992, 1993; McMahon and Jones 1993a, 1993b). Unlike the AEQ, which focused exclusively on anticipated positive effects of alcohol, the NAEQ assesses the extent to which an individual expects negative consequences to occur if he or she were to drink. There is no specification in the instruction set to indicate the amount of alcohol that is to serve as a reference for judging the likely occurrence of these negative consequences. The expected negative consequences may serve as a behavioral deterrent and represent motivation to stop or restrain drinking (rather than motivation to drink, as expected positive consequences might measure) (McMahon and Jones 1993b). The potential negative consequences are measured over three consecutive time contexts: on the same day as the drinking, the next day following drinking, and continued drinking at the current level over a prolonged period. Each item consists of a statement about a negative consequence of drinking alcohol that could conceivably occur; responses are measured in terms of how likely each consequence would be expected to occur, on a 5-point scale from "highly unlikely" to "highly likely." The standard NAEQ has a total of 60 items; a short version (22 items) is also available. Five subscales have been developed. The first three correspond to the three timeframes (same day, next day, and long term); proximal (same day) and distal (next day + long term) subscales are also included.

In a study comparing the NAEQ and the AEQ assessed at intake to a nonresidential alcohol treatment program, the NAEQ was found to predict

time to first drink following treatment; positive expectancies, as measured by the AEQ, were not predictive (B.T. Jones and McMahon 1994a). The total score of the NAEQ was predictive of alcohol consumption at a 3-month followup; the total score of the AEQ was not predictive (B.T. Jones and McMahon 1994b). However, the positive global changes subscale of the AEQ was found to be positively related to posttreatment drinking, while the distal subscale of the NAEQ (reflecting expected negative consequences with continued long-term drinking) was negatively related to posttreatment drinking.

These results reflect the differential motivational factors represented by positive and negative expectancies in relationship to drinking behavior (McMahon and Jones 1993c). N.K. Lee and colleagues (1999), in a general community sample, found that negative expectancies were most prominently associated with the frequency of drinking and positive expectancies were associated primarily with the quantity of alcohol consumed. Also, both the NAEQ and the RTCQ were found to predict time to first drink following treatment. However, the RTCQ and NAEQ were uncorrelated, suggesting that they measure different aspects of client motivation (McMahon and Jones 1996).

Devine and Rosenberg (2000) evaluated the relative contribution of both negative expectancies, measured by the NAEQ, and positive expectancies, measured by the AEQ, on self-reported alcohol use among DUI offenders. Baseline measures of expectancies were related to the self-reported number of drinking days at a 3-month followup assessment. They also looked at subgroups that were defined by being either high or low on the two expectancy measures. What was of note was that those in the low positive/high negative group drank considerably less frequently than those in the high positive/high negative group. The authors suggest that the apparent inhibition of drinking previously found associated with high levels of negative expectancies may be lessened when the person also has high levels of positive expectancies.

Clearly, there is a wide variety of measures of alcohol-related expectancies from which to choose, many with a number of features in common as well as common variance in assessing aspects of the expectancy domain (Leigh 1989b; B.T. Jones et al. 2001). From a clinical perspective, an important limitation of many of the scales is that they have been used more with college students and/or general population samples than with alcoholics in treatment. The decision of which of these scales to use in a clinical or research setting should thus be guided by the empirically determined or hypothesized relationship between a particular measure of beliefs and the prediction of specific drinking behaviors or treatment outcomes. The evolution of the available expectancy scales, however, suggests that it is important to consider both positive and negative consequences, to ask about both the likelihood of occurrence of these consequences and the subjective appraisal of the relative desirability of each if it does occur, and to assess changes in these expectancies as a function of differing levels of alcohol intake.

Leigh and Stacy (1994) suggested that there may be an important artifact involved in the many alcohol expectancy scales that have been developed to date. That is, by providing the individual with a structured questionnaire that provides a listing of a number of possible consequences, the individual's responses are likely to be cued. As such, these responses actually may not be representative of those expected effects that are the most salient for the person. They suggest and demonstrate the potential benefit of eliciting expectancy responses from an open-ended questionnaire. Individuals were asked to "list all the good or pleasant things that might happen to you as a result of drinking alcohol." A similar method was used to elicit a listing of bad or unpleasant outcomes. Although the resultant categories of responses appear consistent with those obtained using more structured questionnaires, the percentage of responses in each category differed considerably across subgroups of drinkers. Thus, it may be important to consider the benefits derived from both the more structured questionnaire and the

more open-ended approaches in attempting to assess both a broad range of and more personally salient alcohol-related expectancies.

Cox and Klinger (1988) proposed a motivational model of drinking behavior that has led to the development of an assessment of individuals' expectancies in relationship to a number of treatment-relevant goals using a mixed ideographic and nomothetic method (Klinger 1987). People who drink alcohol excessively are assumed to do so because drinking serves some function in their lives (Cox and Klinger 1988, 1990). Although a wide range of biological, psychological, and social factors may influence drinking, the final common pathway to alcohol use is motivational in nature. An individual is assumed to choose to take a drink or not based on the belief that the anticipated positive affective consequences of drinking outweigh those of not drinking. An important factor in this balance is the individual's current incentives. To the extent that individuals do not have other non-alcohol-related sources of satisfaction, are not making progress toward reaching positive goals, or are burdened by a number of negative life activities, the greater the likelihood of expecting that alcohol will counteract negative emotions and lead to or enhance positive emotions.

This motivational model of drinking provides the framework within which the Motivational Structure Questionnaire (MSQ) (Klinger and Cox 1985, 1986) was developed. The MSQ identifies those maladaptive motivational patterns that underlie the consumption of alcohol by problem drinkers. It is a self-administered semi-structured questionnaire that requires approximately 2–3 hours to complete; a briefer version is also available, requiring about 1 hour to complete (Cox et al. 1991a). Individuals are asked to identify their current concerns in major life areas such as their interests, activities that they are engaged in, problems, general and specific concerns, goals, joys, disappointments, hopes, and fears. They then are asked to make judgments about the pursuit of goals associated with each area of concern along dimensions that will reveal the structure of their motivation. These judgments include factors such as the

degree of commitment to pursuing each goal; the amount of positive affect expected by achieving a particular goal and the amount of negative affect associated with not attaining it; the perceived probability of success and time urgency associated with pursuing a goal; and the perceived impact of continued alcohol use on attaining the goal. A computer program scores the MSQ and generates quantitative indices that include the value, perceived accessibility, and imminence of the alcoholic's goals; the pattern of commitment to these goals; and the nature of the individual's desires and roles regarding them (Cox et al. 1991b). A motivational profile is then derived to depict the significant features of the individual's motivational structure and to identify problematic motivational patterns. Thus, the MSQ can be used at the beginning of treatment to identify and specify patients' motivational problems and their impact on the motivation to drink alcohol. The information derived from the MSQ can also provide the basis for initiating Systematic Motivational Counseling (Cox et al. 1991b), an approach developed to facilitate changing drinkers' maladaptive motivational patterns. A detailed manual to guide the counseling technique is available (Cox et al. 1993).

Recently Cox and colleagues (2000) explored the relationship between the MSQ and a measure of readiness to change in a group of alcoholics entering inpatient treatment. Factor analysis derived two factors on the MSQ, adaptive motivation and maladaptive motivation. The nature of patients' motivational structure was related to readiness to change. High scores on the adaptive motivation factor, reflecting a commitment to pursue goals having emotionally satisfying outcomes, were positively related to determination to change and negatively related to denial of one's alcohol problem.

### **Drinking Relapse Risk and Self-Efficacy**

A second major cognitive factor to be incorporated into the assessment of alcohol abusers is that of self-efficacy (DiClemente 1986; Wilson 1987a, 1987b). While this construct plays a prominent role in cognitive-behavioral models of problem



drinking, considerably less research attention has been focused on its assessment and its relationship to drinking behavior than has been given to alcohol-related outcome expectancies (Young et al. 1991*b*; Oei and Baldwin 1994). The concept of self-efficacy, originally developed by Bandura (1977, 1986), has been adapted and expanded to be applied in the area of addictive behaviors (Rollnick and Heather 1982; Baer and Lichtenstein 1988). Within the context of alcohol problems, this construct has been defined in terms of the beliefs that individuals hold or their level of confidence concerning their ability to resist engaging in drinking behavior (Young et al. 1991*b*; Oei and Baldwin 1994). The adaptation of the self-efficacy construct to the addictions has also led to modifications in its assessment (Young et al. 1991*b*). Strength of self-efficacy is typically defined as the mean self-efficacy ratings across situations, and generality of self-efficacy is usually estimated as the variability of these ratings across situations. Additionally, Sitharthan and Kavanagh (1991) recommended a measure of the level of self-efficacy, defined as the number of situations in which the individual had the maximum rating of confidence about not drinking.

The cognitive-behavioral model of relapse developed by Marlatt and colleagues (Marlatt and Gordon 1980, 1985) has served as a heuristic framework to guide the development of measures of self-efficacy in substance abuse. Although there have been challenges to the reliability and validity of Marlatt's original taxonomy of relapse precipitants (Marlatt and Gordon 1980; Zywiak et al. 1996), this taxonomy has led to the generation of categories of situations having high relapse potential. Implicit in the operational definition of self-efficacy, and explicit in Marlatt's model of relapse, is the assumption that the strength of efficacy is dependent on the availability and accessibility of emotional and behavioral skills necessary to cope with situations that are appraised as a challenge to one's perception of control and which, therefore, may precipitate a relapse. It is assumed that the greater the individual's available repertoire of coping skills, the greater the strength

of self-efficacy, and the lower the probability of relapse or drinking in a given situation.

The instruments developed by Annis and colleagues are probably the most widely used methods to date for assessing self-efficacy in relationship to drinking (e.g., Annis and Davis 1988*a*, 1988*b*, 1991). Two parallel measures, administered either as self-report forms or via computer, are typically used in combination in the assessment process. Each scale takes approximately 15–20 minutes to complete. The first is the Inventory of Drinking Situations (IDS) (Annis 1982; Annis et al. 1987). The original version of the IDS was a 100-item self-report questionnaire designed to assess situations in which the client drank heavily over the past year. A 42-item version is also available (Isenhardt 1991, 1993). Eight general categories of drinking situations, based on Marlatt's classification system (Marlatt and Gordon 1980, 1985), are assessed: unpleasant emotions, physical discomfort, pleasant emotions, testing personal control, urges and temptations, conflict with others, social pressure to drink, and pleasant times with others. Clients are instructed to rate on a 4-point rating scale (from "never" to "almost always") their frequency of heavy drinking in each of 100 situations during the past year. Clients define "heavy drinking" in terms of their own consumption pattern and their perception of what constitutes "heavy" for them. M.B. Sobell and Sobell (1993) suggested that at the start of the questionnaire clinicians might ask clients to note the number of standard drinks they would consider to constitute "drinking heavily" as a way to provide a reference point for their responses to the IDS.

From the client's responses on the IDS, a problem index score, ranging from 1 to 100, can be calculated for each of the eight categories of drinking situations. By plotting the eight problem index scores, a client profile can be constructed to show the client's areas of greatest risk for heavy drinking and to help target and guide interventions. Profiles that show variability across situations, or differentiated profiles, are more helpful in the identification of specific intervention targets than are generalized or flat profiles that have little variation across situations. Evidence also suggests

that clients with differentiated profiles may have better outcomes in relapse prevention treatment than those with generalized profiles (Annis and Davis 1991).

Annis and Graham (1995) also described the use of a profile method in which clients are categorized into one of four categories based on their responses on the IDS: high negative profile, high positive profile, low physical discomfort profile, and low-testing personal control profile. Differences were found across the profiles on a number of measures. Clients with high negative profiles, compared with those with high positive profiles, tended to drink alone, to have high levels of alcohol dependence, and to be women. Those with high positive profiles, compared with clients having low physical discomfort profiles, appeared to have less serious or chronic alcohol problems.

Studies of the psychometric properties of the IDS suggest that the 42-item version has adequate levels of reliability and is comparable with the 100-item version (Cannon et al. 1990; Isenhardt 1991, 1993; Victorio et al. 1996; Carrigan et al. 1998; Breslin et al. 2000; Stewart et al. 2000). However, initial factor analyses of the 100-item version at the item level failed to support the presence of the eight rationally derived Marlatt drinking relapse categories. Rather, a smaller number of factors were obtained. On the 100-item IDS, Cannon et al. (1990) found three primary factors representing categories of situations in which alcoholics are likely to drink: negative affective states, positive affective states combined with social cues to drink, and attempts to test one's ability to control one's drinking. Isenhardt (1991) found five factors, having some conceptual overlap with those obtained by Cannon et al.: negative emotions, social pressure, testing personal control, physical distress, and positive emotions. An item-level principal components analysis replicated this factor structure with the 42-item version of the IDS, although a second-order principal components analysis at the scale level suggested a single-factor solution (Isenhardt 1993). More recent factor analytic investigations of the IDS have fairly consistently found three higher order factors corresponding to positively

reinforcing situations, negatively reinforcing situations, and temptation or testing personal control, with a number of lower order factors corresponding to the more specific relapse situations (Victorio et al. 1996; Carrigan et al. 1998; Stewart et al. 2000). The level of specificity in the drinking categories used will vary based on clinical needs; however, Annis and colleagues (1987) recommended the use of the full IDS-100 and the eight relapse risk categories of the original scale for maximal utility in treatment planning and intervention targeting.

The second instrument developed by Annis and colleagues is the Situational Confidence Questionnaire (SCQ, or SCQ-39) (Annis 1987; Annis and Graham 1988). This is a 39-item self-report questionnaire designed to assess the concept of self-efficacy for alcohol-related situations. Whereas the IDS attempts to determine the relative cue strength for drinking in each of the situations, the SCQ attempts to determine the individual's current level of confidence or strength of self-efficacy that he or she can encounter each of these situations without drinking heavily. Clients are asked to imagine themselves in the same set of drinking situations as presented in the IDS and for each situation to rate on a 6-point scale how confident (ranging from "not at all confident" to "very confident") they are that they will be able to resist the urge to drink heavily in each situation.

As was found with the IDS, it appears that there are fewer than eight meaningful categories of drinking situations assessed by the SCQ based on the results of factor analysis. Sandahl, Linberg, and Ronnberg (1990), for instance, found four factors at the item level of analysis. As would be expected, these factors parallel those that have been found on the IDS: unpleasant emotions, social pressure, testing personal control, and positive emotions.

Higher levels of drinking and/or severity of alcohol dependence appear to be inversely related to an individual's level of drinking-related self-efficacy; further, lower levels of self-efficacy are associated with greater expectancies about the

potential positive benefits of drinking (e.g., belief that drinking will improve social involvement and reduce depression and tension) (Skutle 1999).

An individual may be at the lowest level of self-efficacy when he or she enters treatment. A client's responses on the SCQ-39 can be used to monitor the development of the client's self-efficacy in relation to coping with specific drinking situations (identified and prioritized by use of the IDS) over the course of treatment or with increasing sobriety. It would be expected that self-efficacy would increase across treatment, and this appears to be the case (e.g., Burling et al. 1989; P.J. Miller et al. 1989; Sitharthan and Kavanagh 1991; Rychtarik et al. 1992; S.A. Brown et al. 1998; Long et al. 1999). Burling et al. (1989), for example, found that self-efficacy increased during the course of inpatient treatment and was higher for those individuals who were abstainers at a 6-month followup than for those who had relapsed. Presumably, one would expect a relative increase in efficacy in those situations that have been the focus of intervention (Annis and Davis 1988*b*). Also, S.A. Brown et al. (1998) found not only that self-efficacy increased across the course of treatment but also that positive drinking-related outcome expectancies decreased. The greatest decrease in positive expectancies about the anticipated effects of alcohol was among patients who entered treatment with less confidence to resist drinking when compared with those having higher initial levels of self-efficacy. The assumption that higher levels of self-efficacy would be associated with lower levels of relapse or posttreatment drinking has also been supported (e.g., Solomon and Annis 1990; Sitharthan and Kavanagh 1991; Rychtarik et al. 1992), although this has not been a universal result (e.g., Mayer and Koeningsmark 1992). Greenfield and colleagues (2000) found that a cutoff score of 45 on the SCQ during inpatient treatment quite accurately differentiated alcoholics who relapsed early and drank more heavily at a 12-month followup than those having scores less than 45. Those with scores less than 45 had a median of 30 days to relapse following treatment compared with the 135 days to relapse for those with scores above 45. However, the level of effi-

cacy at the beginning or end of treatment has not been consistently related to outcome (e.g., Langenbucher et al. 1996).

DiClemente et al. (1994) noted that the SCQ may not be an appropriate measure to use when attempting to assess self-efficacy in abstinence-oriented treatment programs. The SCQ focuses on measuring the individual's ability to resist the urge to drink heavily, not necessarily to refrain from drinking completely. They suggested that the goals of treatment (e.g., abstinence or harm reduction) should correspond to the type of efficacy being assessed. As such, they expressed some concern that the efficacy to avoid drinking heavily as manifested on the SCQ may miss some important aspects of the efficacy to remain abstinent. To this end, DiClemente et al. (1983, 1994) developed a measure that focuses on the individual's efficacy or confidence to abstain from alcohol across a range of situations also derived from Marlatt's eight primary relapse categories and from surveys of drinkers in treatment.

The resultant scale, the Alcohol Abstinence Self-Efficacy (AASE) Scale, consisted of 49 items. Each item was rated on two separate 5-point rating scales (from "not at all" to "extremely") to reflect both the temptation to drink and the confidence or efficacy to abstain in each of the situations. The AASE Scale has been used in conjunction with the evaluation of treatment for alcohol-dependent individuals (Ito et al. 1988). Following an inpatient hospitalization, individuals involved in a relapse prevention aftercare group showed a significant decrease in their level of temptation and an increased level of self-efficacy over the 8-week course of aftercare. However, subjects involved in an interpersonally based aftercare group therapy program demonstrated no significant changes in either temptation or confidence across the corresponding 8-week treatment phase. DiClemente and Hughes (1990) also found that alcoholics entering outpatient treatment who were discouraged, less motivated, and less ready to engage in behavior change activities demonstrated the highest level of temp-

tation and the lowest level of confidence compared with those closer to action.

The original AASE Scale was shortened through a series of empirical steps to 20 items in an attempt to increase its ease of inclusion in assessment batteries and to improve on its psychometric properties (DiClemente et al. 1994). Based on a sample of alcoholics involved in outpatient treatment, 9 of the original 49 items were initially eliminated due to poor item statistics in preliminary analyses; the remaining 40-item self-efficacy (confidence) scale was subjected to an oblique factor analysis. A four-factor solution was chosen as the best fit for the data. A large negative affect factor included items that measured both intrapersonal (“When I am feeling depressed”) and interpersonal (“When I feel like blowing up because of frustration”) negative affect. Items from these two potential subscales were highly correlated, producing a single first factor. Social situations (“When I am being offered a drink in a social situation”) and the use of alcohol to enhance positive states (“When I am excited or celebrating with others”) represented a social/positive emotion factor. The third factor, physical and other concerns, consisted of varied items representing physical discomfort or pain (“When I am experiencing some physical pain or injury”), concerns about others (“When I am concerned about someone”), and dreams about drinking (“When I dream about taking a drink”). The final factor, withdrawal and urges, represented withdrawal (“When I am in agony because of stopping or withdrawing from alcohol use”), craving (“When I am feeling a physical need or craving for alcohol”), and testing willpower (“When I want to test my willpower over drinking”). These four factors have been replicated among drug-abusing probationers (Hiller et al. 2000).

Those five items having the highest and clearest factor loading on each of the four factors were then assessed for internal consistency. The Cronbach alpha coefficients ranged from 0.81 for the withdrawal and urges factor to 0.88 for the negative affect factor; the total scale had an alpha of 0.92. A similar pattern of results was found in

subsequent analyses of the temptation items. The Cronbach alphas ranged from 0.60 for the physical and other concerns factor to 0.99 for the negative affect factor. A moderate inverse relationship was found between temptation and efficacy scales. That is, temptation appears to be a separate construct but related to efficacy, with higher levels of efficacy associated with less temptation). There was evidence of construct validity, convergent validity, and divergent validity when examining the relationships of the self-efficacy scales and measures of motivation and of alcohol use patterns on the AUI. There were no apparent differences in self-efficacy between men and women (DiClemente et al. 1994).

Carbonari and DiClemente (2000) investigated the utility of client profiles based on the combination of the stage of readiness to change and self-efficacy. The derived profiles differentiated among both aftercare and outpatient clients with respect to both their 1-year posttreatment drinking categories (i.e., abstinent, moderate, and heavier drinking) and their use of cognitive and behavioral change processes.

The Drinking Refusal Self-Efficacy Questionnaire (DRSEQ) (Young et al. 1991*b*) is a self-report questionnaire developed initially on a sample of predominantly female young adults from colleges and a community youth group; it was subsequently evaluated in a general adult sample from a large government agency. It assesses the individual's confidence that he or she will not drink in a number of situations. An initial item pool was developed from other self-efficacy questionnaires, from Marlatt's interpersonal and intrapersonal precipitants of relapse, and from interviews with young problem drinkers. Individuals were to rate each item on a 6-point scale ranging from “I am very sure I would drink” to “I am very sure I would not drink.” The 31 items that met final inclusion criteria were subjected to principal axis factor analysis. Three factors were derived: self-efficacy in situations of social pressure (“When friends are drinking”), self-efficacy in situations of opportunistic drinking (“When you are listening to music or reading”), and self-efficacy in situations character-

ized by a need for emotional relief (“When you feel frustrated”). High degrees of internal consistency and test-retest reliability were found for each of these three subscales.

In the college sample, the measures of self-efficacy were found to contribute significantly to the prediction of alcohol consumption (particularly self-efficacy in social pressure situations) and to the discrimination of problem drinkers from non-problem drinkers (all three subscales were significant discriminators). However, self-efficacy did not emerge as a significant predictor of alcohol consumption in an independent sample of individuals manifesting alcohol-related problems. In the adult sample of government employees, a single self-efficacy summary score accounted for the greatest amount of variance (26.3 percent) in the prediction of alcohol consumption, even when other variables such as age, gender, alcohol-related expectancies (the DEQ), and alcohol problems (the Michigan Alcoholism Screening Test [see the chapter by Connors in this *Guide*]) were included in the regression analysis. Recent studies have explored the relationship between drink refusal self-efficacy and alcohol-related expectancies in predicting drinking behavior in general and clinical populations (Oei et al. 1998; Connor et al. 2000; Oei and Burrow 2000; Young and Oei 2000).

Litman and colleagues developed the Relapse Precipitants Inventory (RPI), the Coping Behaviours Inventory (CBI), and the Effectiveness of Coping Behaviours Inventory (ECBI) (Litman et al. 1977, 1979, 1983a, 1983b, 1984; Litman 1986). Although not used extensively since their introduction in the literature, these scales have been used in clinical research and have potential utility in the assessment of relapse risk.

The RPI consists of 25 items, reflecting a variety of drinking situations. The individual is asked to rate the extent to which each situation is “dangerous to staying off drink” using a 4-point scale from “very dangerous” to “not at all.” Initial factor analyses suggested a four-factor solution; a subsequent set of analyses on a new sample suggested three factors: unpleasant mood states,

external events/euphoria, and decreased cognitive vigilance. In a retrospective analysis comparing individuals who were either relapsers or survivors, relapse was associated with more situations overall being rated as dangerous as well as with higher scores on the unpleasant mood states and external events/euphoria factors. The same pattern of findings was obtained in a prospective study, with the total number of relapse precipitants and these two factors differentiating between relapsers and survivors at followups from 6 to 15 months post-treatment.

The CBI and the ECBI assess the behavioral and emotional coping strategies the individual uses to avoid relapse and the perceived effectiveness of these strategies. The CBI consists of 36 items reflecting ways in which individuals may try to avoid drinking when they are tempted to start drinking again. The individual rates each item on a 4-point scale reflecting the frequency of attempting each strategy, from “usually” to “never.” The ECBI uses the same 36 items but asks the individual to rate how well each of the coping strategies has worked for them. The CBI has been found to have four factors: positive thinking, negative thinking, distraction/substitution, and seeking social supports. The same factor structure was found for the ECBI.

While no differences were found between relapsers and survivors in a prospective study on the frequency of using different coping strategies, differences were found on the ECBI in the pattern of perceived effectiveness of these strategies. At the beginning of treatment, individuals who were more likely to maintain posttreatment abstinence tended to perceive themselves as having more effective coping strategies overall and as rating positive thinking and avoidance as more effective than those who would relapse during followup. Similarly, Ito et al. (1988) found that alcoholics evidenced an increased frequency of use of both cognitive and behavioral coping strategies across 8 weeks of aftercare treatment. Cognitive coping assessed by the CBI at intake contributed significantly to the discrimination between those who relapsed and those who abstained over a 6-month followup

period even after demographic measures and indices of chronicity of alcohol problems were entered first into the discriminant function analysis (Ito and Donovan 1990). Patients abstinent for the entire 6-month period had fewer years of problem drinking, had fewer prior alcohol treatments, and used more cognitive coping strategies than did those who relapsed. The CBI has also been used as part of the assessment battery in the exploration of the validity of Marlatt's relapse taxonomy (Maisto et al. 1996) and in the comparison of individuals having a cocaine-only addiction versus those with a cocaine-alcohol comorbidity (Schmitz et al. 1997).

Two relatively new scales may prove useful in future attempts to assess relapse risk. The first is the Reasons for Drinking Questionnaire (RFDQ) (Zywiak et al. 1996). This 16-item scale is an adaptation for use with alcohol of a scale originally developed by Heather, Stallard, and Tebbutt (1991) for use with heroin addicts. Individuals are asked to rate how important each of the 16 reasons were to their resuming drinking along a 10-point scale (0 = not at all important, 10 = very important). Three factors were derived. The first and most prominent was negative emotions, the second involved social pressure and positive emotion, and the third was an amalgam of physical withdrawal, wanting to get high, testing personal control, and urges to drink. High scores on the negative emotions scale were associated with high levels of anger, depression, and alcohol dependence and were predictive of blood alcohol concentration on the first day of a relapse, the duration of the relapse, and the likelihood of a second relapse.

The second relatively new scale is a measure based on Gorski's post-acute withdrawal model of relapse (Gorski 1990). W.R. Miller and Harris (2000) compiled an initial list of 37 relapse-related warning signs, the Assessment of Warning-Signs of Relapse (AWARE). Each individual rates the extent to which each statement applies to him or her along a 7-point Likert scale (1 = never, 7 = always). Responses of alcoholics in treatment were subjected to factor analysis. It was found that 28 of the initial 37 items defined a single factor, which had a Cronbach alpha coefficient greater than 0.90. The

scale had a test-retest reliability of 0.80 over a 2-month followup interval. Further, individuals with high scores on the AWARE had significantly higher relapse rates than those with lower AWARE scores.

L.C. Sobell and colleagues have offered a number of important caveats concerning the assessment of relapse risk and self-efficacy; although their comments were directed specifically at the IDS and the SCQ, they apply equally well to the evaluation of the other questionnaire measures of self-efficacy reviewed above. L.C. Sobell et al. (1994a) noted that the situations identified by measures such as the IDS as potentially risky have only been *associated with* heavy drinking; therefore, one cannot presume a causal link between the types of situations endorsed, drinking behavior, and relapse probability. A number of other factors, such as coping skills deficits, may represent a common third factor that may moderate this relationship. Second, while using such scales to assess temptation, confidence, and coping can be useful clinically in the treatment planning process, these scales only identify generic situations or general problem areas. Also, an important fact arising from the investigation of Marlatt's relapse taxonomy is that the high-risk situation associated with one's most recent relapse has a very low probability of being the situation predictive of the next relapse in the future (Maisto et al. 1996). Sobell et al. (1994a) indicated that it is important to explore in more depth the unique and personally relevant high-risk situations or areas where the client lacks self-confidence for resisting drinking. One might choose to expand more fully on those situations associated with frequent heavy drinking, high temptation ratings, and/or low levels of perceived confidence on the structured questionnaires. Sobell et al. (1994a) also recommended that clinicians ask clients to describe in detail their three highest risk situations for drinking over the past year.

The last recommendation is consistent with the development and use of semi-structured, individualized approaches to the assessment of self-efficacy. K.J. Miller and colleagues (1994), for example, examined the usefulness of an individu-

alized approach to the assessment of self-efficacy in an outpatient alcohol treatment program. An Individualized Self-Efficacy Survey (ISS) was developed for each client. This survey was derived by (1) administering a questionnaire about drinking patterns to identify important problem areas for the individual (e.g., work, children, marital problems) and specific drinking antecedents and (2) constructing a 15-item scale using each drinker's most important drinking cues. The method of having clients choose their own high-risk drinking cues appeared to be clinically useful. Ratings on the ISS were reflective of changes in perceived efficacy over the course of treatment, and ISS scores at the end of treatment were predictive of subsequent relapse.

A second example of an ideographic approach to assessment is the Substance Abuse Relapse Assessment (SARA) developed by Schonfeld and colleagues (Schonfeld et al. 1989; Peters and Schonfeld 1993; Schonfeld et al. 1993). The SARA is a semi-structured interview protocol that was developed to assist clinical staff in developing relapse prevention goals by identifying high-risk situations and deficits in coping skills. It assesses AOD use patterns, antecedents or precipitants of drinking and drug use, and positive and negative consequences of drinking. Although the focus of the assessment is on a "typical drinking day" over a 30-day period, the interview could also quite easily be adapted to focus on single or multiple relapse episodes. In addition to being asked about the parameters of their use patterns, such as the number of days of use and number of days of intoxication, clients are also asked to classify their use patterns as steady, periodic or binge, weekend use, or infrequent. The interview focuses on situations, thoughts, feelings, cues, and urges as related to drinking and/or other drug use; each of these is assessed as an independent category that is probed for occasions of drinking or other drug use. To provide additional structure to the assessment of emotions as a possible antecedent of drinking, clients are provided with a list of 28 positive and negative emotions and are asked to choose that feeling most prominent immediately before drink-

ing, to explain what that emotion means to them, and to continue doing this until they have rank-ordered the five most notable emotions experienced prior to use. In addition, clients are asked how they dealt with these thoughts and feelings on days when they experienced them but did not drink. They are also asked about their responses to prior "slips." Information derived from the 45- to 60-minute interview is used by the clinician to complete relapse prevention planning forms that provide an overview of the individual's substance abuse behavior chain, the current level of necessary coping skills to avoid relapse, the level of confidence the client has in his or her ability to avoid relapse, and a set of goals for relapse prevention interventions targeted on those situations, thoughts, feelings, cues, and urges identified as having a high risk for relapse.

While measures of self-efficacy, whether self-report questionnaires or interviews, appear to have a number of potential clinical and research applications, questions remain concerning their use. The first question is which measure(s) to use. Selection of a measure depends on the treatment goal (abstinence or harm reduction), the amount of time available, and the availability of staff for interviews versus self-report approaches. Second, how can one best use these measures in some meaningful combination? For example, the AASE Scale has both confidence and temptation ratings; the IDS and SCQ are often presented together; and the RPI and CBI or ECBI are used in conjunction. However, each often appears to be analyzed separately. DiClemente and colleagues (1994) noted that temptation scores reflect the cue strength of each situation in terms of its ability to precipitate alcohol consumption. This level of temptation may be relatively independent of rated confidence in each situation. Thus, temptation to drink in one situation can be low while efficacy to abstain is quite high. Or, as is more often likely to be the case during the early stages of the treatment and recovery process, the individual may experience high temptation but have only moderate to high levels of efficacy to abstain based on skills and commitment. Similarly, the individual may

report high frequencies of heavy drinking in a situation on the IDS, suggesting high cue strength, yet may have a high level of confidence on the SCQ. Conversely, a situation may occur relatively infrequently but is one in which the person expresses very little efficacy. A similar set of patterns could be described for the relationship between the rated danger of potential relapse situations and coping on the RPI and CBI. Complicating the picture even more is the potential situation in which an individual may report frequently using a given coping strategy when confronted with a high-risk situation yet perceiving this strategy as relatively ineffective.

The point of this discussion is to note that in a clinical context it is important to integrate the information derived from these various sources in order to determine an accurate estimate of relapse risk and to develop an appropriate intervention. Litman (1986) began to explore the relationship between relapse risk and coping styles. DiClemente et al. (1994) suggested that the relationship between efficacy and temptation presents an important area for future research. It appears that the difference between the temptation and efficacy scores of the AASE Scale, as well as their correlations, provides important and potentially useful information related to stages of behavior change for alcohol-dependent clients (DiClemente and Hughes 1990).

### **Relationship Between Alcohol-Related Outcome Expectancies and Self-Efficacy Expectancies**

Research is needed on the relationship between alcohol-related outcome expectancies and self-efficacy expectancies. Young and colleagues have noted that self-efficacy is an important construct in understanding relapse or treatment success; however, the precise role that outcome expectancies play in relapse and how such expectancies relate to self-efficacy have received relatively little direct evaluation (Young et al. 1991*b*; Young and Oei 1993; Oei et al. 1998; Oei and Burrow 2000; Young and Oei 2000). Oei and Baldwin (1994)

suggested that these two expectancy constructs play different but complementary roles. Alcohol-related outcome expectancies appear to operate in a “weighing up” process in which the individual assesses the relative anticipated positive and negative consequences associated with taking a drink. To the extent that the individual believes that a consequence will occur and that desirable consequences are more likely to occur than undesirable ones, then the likelihood of drinking is high. Self-efficacy expectancies, on the other hand, do not contribute to this weighing-up process. Rather, they are hypothesized to intervene between the weighing up and the behavioral response.

N. Lee and Oei (1993*b*) investigated the relationship of these two constructs, as operationalized by the DEQ and the DRSEQ, to drinking behavior among a general population sample. It was found that they had differing predictive utilities depending on the parameter of drinking being considered. Low levels of self-efficacy in general, and more specifically in those situations where there was an opportunity to drink, were related to a higher frequency of usual alcohol consumption and larger maximum quantities consumed on any one drinking occasion. The alcohol-related outcome expectancies were related to frequency of drinking but not to quantity of alcohol consumed. Those individuals who expected greater negative affective states while drinking drank their usual and maximum amounts less often, while those who had higher expectations of poor control over drinking drank their usual and maximum amounts more often. The complexity of these relationships, as well as similar ones found in a college sample (Baldwin et al. 1993), likely reflects the nature of the interactions between self-efficacy and alcohol expectancies and their influence on drinking behavior. It is clear that this area warrants further investigation.

### **PERCEIVED LOCUS OF CONTROL OF DRINKING BEHAVIOR**

A final set of cognitions that have played a role in some cognitive-behavioral models of problem



drinking and alcoholism is the individual's perception of control (e.g., Donovan and O'Leary 1983; Carlisle 1991). The concept of locus of control, originally developed by Rotter (1966, 1975), refers to the extent to which an individual believes that the outcomes of important life events are under personal control (internal locus of control) or under the influence of chance, fate, or powerful others (external locus of control). Rotter suggested that the predictive utility of the locus of control construct is increased by using measures directly related to the behavior under consideration rather than ones assessing a more generalized perception of control.

To this end, Keyson and Janda (1972) developed a locus of control scale that measures control expectancies related to drinking behavior. This scale, which was subsequently reproduced as the Drinking-Related Locus of Control Scale (Lettieri et al. 1985) and is also known as the Drinking-Related Internal-External Locus of Control Scale (DRIE), assesses the specific beliefs the individual holds concerning his or her perceptions of control with respect to alcohol, drinking behavior, and recovery. It is a 25-item self-report questionnaire adapted from Rotter's conceptual model and assessment method. In a forced-choice format, individuals are asked to choose which of two response options best matches their beliefs. These response options include an internal ("I have control over my drinking") and an external ("I feel completely helpless when it comes to resisting a drink") alternative. The scale is scored in the direction of increasing externality.

Donovan and O'Leary (1978) found that the DRIE has a high degree of reliability; is multidimensional, having empirically defined factors assessing perceived control over interpersonal factors, intrapersonal factors, and general factors associated with drinking; and differentiates between alcohol-dependent individuals (more external scores) and nondependent drinkers. They also found that an external locus of control was associated with more physical, social, and psychological impairment from drinking. Hartmann (1999) found a similar factor structure among

alcoholics; however, female alcoholics had a more elaborated sociability dimension than did male alcoholics. In contrast, Hirsch and colleagues (1997) failed to replicate the three-factor structure found previously by others. Instead they found a single factor that seemed to tap into a dimension of perceived helplessness and inability to abstain from alcohol.

Clements et al. (1995) found that being an adult child of an alcoholic was associated with a more external perception of control on the DRIE. Further, those who were both alcoholic and had an alcoholic parent had considerably higher scores on the DRIE than those with either one of these two conditions. Collins et al. (2000) found that the Cognitive and Emotional Preoccupation subscale from the Temptation and Restraint Inventory (TRI) was strongly and positively associated with the DRIE, while the Cognitive and Behavioral Control subscale was positively and moderately correlated with the DRIE. The DRIE has been found to differentiate between drinking groups with varying histories of drinking problems and sobriety or with varying degrees of commitment to change, with more internal scores being associated with longer periods of sobriety or more advanced action in the recovery process (Mariano et al. 1989; Strom and Barone 1993). Consistent with this pattern, the perception of control appears to become more internal over the course of alcohol treatment; individuals with more external perceptions are also more likely to drop out of treatment prematurely (J.W. Jones 1985; Prasadarao and Mishra 1992). There appears to be a complex interactive relationship between the primary reasons alcoholics give for their pretreatment drinking and their drinking-related locus of control in predicting posttreatment relapse (Kivlahan et al. 1983), suggesting possible avenues of treatment matching within a relapse prevention framework. Following treatment, alcoholics having an internal drinking-related locus of control were less likely to relapse, drank less and were less likely to have a more prolonged drinking episode if they did relapse, and had a better

overall drinking-related outcome than alcoholics with an external DRIE score (Koski-Jannes 1994).

The DRIE represents an additional measure to consider in the assessment of those cognitions that may be related to the maintenance of, cessation of, and relapse to drinking behavior. Its relationship with the other cognitive constructs discussed in this chapter, namely alcohol-related outcome expectancies and self-efficacy expectancies, needs to be pursued further.

### MEASURES OF FAMILY HISTORY OF ALCOHOL PROBLEMS

Shiffman (1989) indicated that in addition to assessing factors that are relatively proximal in time to a relapse episode (e.g., temptation and confidence levels), a comprehensive assessment should also measure factors in the individual's life that are more distal, both in time and influence, on drinking. These more distant, often relatively enduring and unchanging personal characteristics may provide the background context that predisposes individuals toward involvement with alcohol, differing patterns of drinking, and potentially increased risk of relapse. From a clinical perspective, focusing on such distal background factors may help to predict who will relapse, but not when they will relapse (Shiffman 1989). A potentially important background characteristic in this regard is a positive family history of alcoholism, which may represent such a predisposing variable (e.g., Schuckit 1991; Tarter 1991). This variable may influence the nature and strength of alcohol-related expectancies and have an interactive effect on drinking behavior among young adults (e.g., S.A. Brown et al. 1987*b*; L.M. Mann et al. 1987; Sher et al. 1991), as noted above in the discussion of the role of parental alcohol problems on drinking-related locus of control (Clements et al. 1995). Positive family history may also be a contributing factor to an alcoholic subtype having a significantly different developmental course, different patterns of drinking and related problems, and poorer treatment prognosis (Babor et al. 1992*a*, 1992*b*; Litt et al. 1992).

Determination of the presence or absence of a family history of alcoholism has been based primarily on individuals' self-reports concerning the drinking behavior and consequences of their parents or first-degree relatives. In some cases, this has involved the use of structured diagnostic interview protocols, such as the Family History–Research Diagnostic Criteria (FH-RDC) (Endicott et al. 1975; Merikangas et al. 1998), in which the individual is interviewed with a focus on parental drinking behavior and other psychiatric disorders to determine whether the diagnostic criteria of alcohol abuse or dependence are met.

A number of relatively brief and reliable self-report forms have been developed to assist in the assessment of familial alcohol problems. One such measure is the Family Tree Questionnaire for Assessing Family History of Alcohol Problems (FTQ) (R.E. Mann et al. 1985). The FTQ is a brief, easily administered questionnaire that provides subjects with a consistent set of cues for identifying blood relatives with alcohol problems. Subjects are given a family tree diagram that includes first-degree (parents and siblings) and second-degree (grandparents, aunts, and uncles) relatives. To assure comparability in the frame of reference used in classifying relatives with respect to their drinking, individuals are provided with a set of descriptions for each of four possible drinker categories. They are asked to classify their blood relatives on their mother's side and father's side of the family into one of the following categories: (1) never drank (a person who never consumed alcoholic beverages); (2) social drinker (a person who drinks moderately and is not known to have or have had an alcohol problem); (3) possible problem drinker (a person who the individual believes or was told might have [had] an alcohol problem but where there is a lack of certainty); and (4) definite problem drinker (only those persons either known to have received treatment for an alcohol problem or who have experienced several alcohol-related consequences).

The FTQ has been shown to have satisfactory reliability with alcohol abusers and normal drinkers. The reliability of subjects' classification

of paternal and maternal first-degree and second-degree relatives of alcoholic and non-alcoholic subjects was examined. Results indicated that both alcoholics and non-alcoholic subjects reliably classified their relatives as alcoholics or problem drinkers over a 2-week test-retest interval (R.E. Mann et al. 1985). Similar high levels of test-retest reliability were found in classification of family members even over an approximately 4-month interval (Vogel-Sprott et al. 1985). Using liberal criteria (e.g., relative known to be a problem drinker) provided a more sensitive basis for the diagnosis of relatives' alcohol problems than more stringent criteria (e.g., relative definitely an alcoholic with reported consequences or prior treatment) (R.E. Mann et al. 1985). Evidence for this questionnaire's validity derives from the fact that alcohol abusers had a higher number of family history-positive relatives than non-alcohol-abusing subjects. Alcoholics in treatment with a positive family history of alcoholism, as assessed by the FTQ, had an earlier onset of drinking, higher indices of quantity and frequency of drinking, a greater preoccupation with drinking, a more sustained drinking pattern, more serious negative psychosocial consequences from drinking, and a greater reliance on alcohol to manage their moods than those alcoholics without a history of familial alcoholism (Worobec et al. 1990).

A second set of measures of familial alcohol problems is based on an adaptation of the Short Michigan Alcoholism Screening Test (Selzer et al. 1975). These scales, the Adapted Short Michigan Alcoholism Screening Test for Fathers (F-SMAST) and Mothers (M-SMAST), were developed by Sher and Descutner (1986). The individual is asked to respond to each of the 13 items of the SMAST with respect to either father's or mother's drinking behavior or alcohol-related negative consequences, with a dichotomous response format (yes/no). Separate forms are provided for the assessment of each parent with appropriate modifications in the wording. Individuals are also asked to make a global judgment concerning whether they think their father or mother is (was) an alcoholic.

Overall, there was a relatively high level of reliability as defined as the extent of agreement between the responses on each item between sibling pairs who rated each parent. Agreement was higher for those items asking about specific behavioral acts or consequences (e.g., seeking help, being arrested); lower levels of agreement were found on items that required the individual to make an inference (e.g., the presence or absence of guilt about drinking, what others thought about the parent's drinking). Reliability also appeared to be higher for ratings of fathers' drinking than for mothers' drinking. Crews and Sher (1992) replicated this finding with a larger sample. They also replicated the previous finding that a cutoff score of 5 to define parental alcoholism was best in terms of maintaining a high level of intersibling agreement.

In an extension of their previous work, Crews and Sher (1992) found that these scales had a high degree of test-retest stability and internal consistency, that there is a high level of agreement in the diagnosis of parental alcoholism derived from the F-SMAST or M-SMAST and from the individual's responses to the FH-RDC about each parent's drinking, and that there is a high correlation between the individual's scores on the F-SMAST and M-SMAST for each parent and the parents' actual scores when taking the SMAST about their own drinking behavior. Parental history of alcoholism, as measured by these adapted SMAST scales, appears to serve as an increased risk factor in the subsequent diagnosis of alcohol disorders (Kushner and Sher 1993) and to interact with personality factors to define different subtypes of drinking disorders among young adults (Martin and Sher 1994).

## **EXTRA-TREATMENT SOCIAL SUPPORT**

An important area to consider as part of the assessment process is the extent and nature of the individual's social support system. Perceived social support may serve as a moderator of the relationship between a positive family history of

alcoholism and the development of alcohol problems (Ohannessian and Hesselbrock 1993). Litman (1986) noted that the ability to access social support was one of the main methods of coping in an attempt to avoid relapse as assessed by the CBI. Also, social skills training programs, often incorporated into the treatment for alcoholism, are thought to operate in part by enhancing the client's social support for sobriety and providing more appropriate alternatives for coping with interpersonal stress than drinking (Monti et al. 1994). The nature of social support and the level of the individual's investment in it also appear to interact with different types of treatment to affect differential outcomes, suggesting the possibility of using the domain of social support for the purposes of treatment matching (Longabaugh et al. 1995a).

Much research has examined the role of general social support in the recovery process. However, a number of authors have questioned whether this is the most appropriate focus (e.g., Havassy et al. 1991; Beattie et al. 1993). Rather, there is an increasing awareness that a more critical variable to assess is the degree of support the social network provides specifically for abstinence versus continued drinking. Beattie et al. (1993) suggested that general social support is most likely to affect the individual's sense of subjective well-being, whereas alcohol-relevant social support is more directly related to alcohol involvement. Havassy et al. (1991) noted that both social integration and abstinence-specific functional support are important in predicting relapse.

Longabaugh and colleagues have developed a family of measures that are designed to assess different areas of alcohol-specific social support. They have separated the influence of individuals in the client's work environment (if he or she is working) from the support provided by family and friends. The measure derived to assess the former is Your Workplace (YWP) (Beattie et al. 1992). The YWP is a 13-item self-report measure that can be administered either as an interview or a self-administered scale. It was developed from the responses of alcoholics in treatment. The scale has

been found to have three factor-analytically derived subscales: Adverse Effects of Drinking on Work Performance, Cues and Support for Consumption, and Support for Abstinence.

The reliability indices of these three subscales ranged from 0.61 to 0.78. The YWP subscales were unrelated to measures of general workplace support as measured by the Work Environment Scale (Billings and Moos 1982), while the YWP subscales assessing adverse effects of drinking on work performance and support for consumption were related to concurrent measures of drinking behavior. Supporting the relative importance of alcohol-specific measures of support, the YWP subscale assessing support for consumption was related to higher numbers of drinks per drinking day and the number of heavy drinking days during months 7–12 following treatment, while the Support for Abstinence subscale was related to lower levels drinking on drinking days. However, none of the indices of general workplace support predicted drinking behavior following treatment.

Rice, Longabaugh, and Stout (1997) reported on an extensive psychometric evaluation of YWP using the large sample of participants in Project MATCH. Confirmatory factor analysis supported the original three-factor solution obtained by Beattie et al. (1992). These subscales appear to be relatively independent, sharing less than 20 percent of variance, suggesting that each assesses a different component of support. Further, the internal consistency estimates for these three subscales were in the same range as those previously obtained. Correlation analyses indicate, as would be expected, that the Adverse Effects subscale was positively related and the Support for Abstinence subscale was negatively related to measures of drinking. It should be noted that support for abstinence from the YWP was not correlated with a measure of general social support from friends and family (Rice and Longabaugh 1996). However, these indices of general and alcohol-specific social support have a complex relationship in which each appears to add uniquely to subsequent drinking by alcoholics in treatment (Beattie and Longabaugh 1999). The alcohol-related measure was consistently more highly related to

outcome than the measure of general support; both were related to percentage of days abstinent at 3 months posttreatment; but only the alcohol-specific measure was significantly related to percentage of days abstinent at the 15-month followup.

The Important People and Activities (IPA) instrument was developed to assess alcohol-specific social support from family and friends (Clifford et al. 1992; Beattie et al. 1993; Clifford and Longabaugh 1993; Longabaugh et al. 1993, 1995a, 1995b). The IPA is an interviewer-administered instrument that provides information about those individuals with whom clients have frequent contact, how important each of these individuals is to the clients, how much they like each of these individuals, and how these individuals respond to clients' drinking and abstinence. Clients also rate the drinking behavior of those important individuals in their social network as well as the frequency with which these individuals drink during activities that are important to or valued by the client.

The IPA is meant to tap into three primary domains: attitudinal and behavioral support from members of the social network for drinking, the lack of sanctions against drinking, and attitudinal and behavioral support for abstinence. The Cronbach alpha coefficient of internal consistency for items assessing these three areas ranged from 0.61 to 0.78 (Clifford et al. 1992; Beattie et al. 1993). An index of affiliative support for alcohol involvement versus abstinence has been developed (Longabaugh et al. 1993). Those individuals characterized as having interpersonal networks supportive of alcohol involvement have important people who are perceived as more accepting of the clients' drinking and who are more likely to be drinkers themselves. Conversely, those characterized as having a network supportive of abstinence have important people who are perceived as less accepting of the clients' drinking and are more likely to be abstainers themselves. Beattie et al. (1993) found that this index of affiliative support for alcohol involvement correlated significantly with a similar index of workplace support for alcohol involvement as measured by the YWP; however, the IPA index of support for drinking

was not correlated significantly with actual pretreatment drinking behavior.

Longabaugh and colleagues (1993, 1995a) found that three different forms of alcoholism treatment had differential outcomes as a function of the nature of the client's alcohol-specific social support and the investment in this support network. At the 18-month followup (Longabaugh et al. 1995a), those subjects who had either a network that was unsupportive of abstinence or a low level of investment in their network had better outcomes following an extended relationship enhancement therapy. A broad-spectrum treatment approach was most effective with clients who had both a social network unsupportive of abstinence and a low investment in their network or with clients who were highly invested in a social network that was supportive of abstinence. More recently, Longabaugh and colleagues (1998) found that 12-step facilitation therapy was particularly effective with alcoholics having a social network supportive of their continued drinking. Clearly, the results suggest that a therapeutic focus should be directed toward the enhancement of interpersonal relationships, the development of a social network supportive of abstinence, and a means of facilitating the client's investment in this group. While this seems like a straightforward goal, it is an area typically underemphasized in the treatment process (Beattie et al. 1993).

The Significant-Other Behavior Questionnaire (SBQ) (Love et al. 1993) was developed to assess the responses of a single significant other to the presence or absence of drinking in alcohol-involved clients. The SBQ is a 24-item questionnaire that uses a 5-point response scale for the client to rate the likelihood that a significant other would respond in a variety of ways to the client's drinking. Two forms are available, allowing the client to rate the significant other's behavior from either the client's or the significant other's point of view. Four factors were derived for both the client form and the significant other form of the SBQ. On the client form these included the perception that the significant other punishes drinking, supports sobriety,

supports drinking, and withdraws from the patient when drinking. Internal consistency indices for these four subscales ranged from 0.75 to 0.87. The same patterns of factors and item loadings on factors were found on the significant other form and on the client form. With the exception of the subscale measuring perceived withdrawal from the patient when drinking, the SBQ subscales showed fair concordance between the client and corresponding significant other scores. General social support from family and friends was not related to the rated support of the significant other for drinking or sobriety. However, the SBQ subscales also demonstrated a relative independence from measures of drinking behavior and sobriety.

### MULTIDIMENSIONAL ASSESSMENT MEASURES

Drinking behavior and alcohol problems are multidimensional. As such, it is often important to have a broad overview of the parameters of drinking, the expectancies that accompany and potentially maintain alcohol use, and the biopsychosocial aspects of the individual's life that are affected by drinking (Donovan 1988). Assessments thus need to be relatively broad to capture the extent and complexity of the multiple facets of alcohol problems. This can be done by the use of instruments derived from a variety of assessment domains or that assess a broad range of factors within a single interview or questionnaire. A number of such instruments are reviewed in this section.

The Addiction Severity Index (ASI) (McLellan et al. 1980, 1992*b*) is one of the most frequently used measures in substance abuse treatment and outcome evaluation; it is widely used as an intake evaluation form to aid in identifying areas in need of treatment and as a multidimensional measure of treatment outcome. The ASI can be used to effectively explore problems within any adult group of individuals who report substance abuse as their major problem.

The ASI is a semi-structured interview designed to provide an overview of a variety of problem areas related to substance use rather than focusing on any single area. The items on the ASI address seven rationally developed potential problem areas in substance-abusing patients: medical status, employment and support, drug use, alcohol use, legal status, family/social status, and psychiatric status. Factor analysis has suggested that the ASI may have four independent empirically derived factors: chemical dependence, criminality, psychological distress, and health-related problems (Rogalski 1987). A trained technician or counselor can gather information on recent (past 30 days) and lifetime problems in each of these problem areas.

Following the completion of each section of the interview, the client is asked to rate on a 5-point scale (from "not at all" to "extremely") the extent to which he or she feels troubled or bothered by the problem and the extent to which the client feels a need for counseling or treatment for this problem. The interviewer also makes a severity rating on a 10-point scale for each problem area based on a review of the client's responses to the interview items. The interviewer also rates his or her level of confidence that the client has understood and answered the questions truthfully. In addition to these subjective ratings, composite scores, representing weighted mathematical combinations of specific items, are computed to provide more objective measures of problem severity during the prior 30 days. A number of clinical indices, based on responses to both the lifetime and recent (30-day) problem questions, have been developed and evaluated in conjunction with the composite scores as well as the subjective ratings (T.G. Brown et al. 1999; Alterman et al. 2000*a*, 2001).

The ASI has been used across a wide range of clinical groups of substance abusers and treatment settings, including gender and ethnic groups (e.g., J.A. Lee et al. 1991; L.S. Brown et al. 1993), groups of clients differing in their primary drug of choice and seen in multiple treatment centers (e.g., McLellan et al. 1985, 1994), psychiatrically

impaired groups (Hodgins and El-Guebaly 1992; Appleby et al. 1997; Zanis et al. 1997), homeless substance abusers (Argeriou et al. 1994; Zanis et al. 1994; Joyner et al. 1996), and those with differing HIV serostatus (Davis et al. 1995).

Overall, the ASI and its subscales have demonstrated a high degree of concurrent validity against established and previously validated measures of psychosocial problems (Kosten et al. 1983; Hendricks et al. 1989), test-retest reliability and stability across relatively short and longer term time intervals (McCusker et al. 1994; Stoffelmayr et al. 1994; Zanis et al. 1994; Cacciola et al. 1999), and interrater reliability (Alterman et al. 1994; Stoffelmayr et al. 1994). These high levels of internal consistency and validity have been found even in a very large field study lacking the rigorous controls over administration that has typically accompanied most of the previous psychometric evaluations (Leonhard et al. 2000). However, the level of interrater agreement appears to be considerably lower for the clinician severity ratings than for the composite scores (Alterman et al. 1994). Additional and continued training and monitoring may be necessary to maintain high levels of agreement across raters over time (Fureman et al. 1994). This training can be supplemented by using standardized case vignettes (Cacciola et al. 1997). The psychiatric severity scale from the ASI has been found to be a potentially important measure with respect to matching clients to different intensities and types of treatment (McLellan et al. 1983; McLellan 1986) or aftercare services (Kadden et al. 1989).

Although there are a number of potential limitations of the scale that its authors acknowledge (McLellan et al. 1992*b*, 1992*c*), the ASI has been widely accepted as an extremely useful instrument in the field (Grissom and Bragg 1991). In fact, both computerized (Carise et al. 1999; Butler et al. 2001) and self-report versions (Rosen et al. 2000) of the ASI have been developed. Although the authors of the scale have not recommended or supported the development of computerized administration of the ASI, they have recognized that

adding items to extend the coverage of areas of particular clinical interest or relevance can increase the scale's clinical utility (McLellan et al. 1992*b*, 1992*c*). Some of the deficiencies in content coverage have been addressed in the most recent edition of the ASI (McLellan et al. 1992*b*), which includes additions to the AOD use, legal, and family/social areas. Accompanying software is available that can be used to score the ASI by computer, generate composite scores, and convert scores into computer-generated reviews of history and initial treatment plans. Jacobson (1989*a*) suggested that the available clinical and research evidence and the range and flexibility of the instrument's applications strongly support the ASI being included as a part of a pretreatment evaluation process.

The development and use of the Treatment Services Review (TSR) as a companion instrument to the ASI allows clinicians and administrators to determine the extent to which those problems identified at intake by the ASI have been addressed during the course of treatment (McLellan et al. 1992*a*; Alterman et al. 1993, 2000*b*). Such an evaluation of the linkage between severity of problems and service utilization is an area of relevance clinically but also could be incorporated into the broader context of quality assurance and quality improvement reviews at a programmatic level. It is possible to estimate costs of clinical services and cost offsets of providing these services from either the ASI or the TSR (French et al. 2000*a*, 2000*b*).

A second multidimensional measure with a long history of use in alcoholism treatment and research is the Alcohol Use Inventory (Wanberg et al. 1977; Wanberg and Horn 1983; Horn et al. 1987). The AUI was developed within a differential conceptual and measurement model of alcoholism. It was developed and validated on several large samples of alcoholics admitted to inpatient treatment, with subsequent developmental work on outpatient samples and groups of driving while intoxicated (DWI) offenders (Horn et al. 1987). The inventory consists of 228 items that can be administered either as a self-report questionnaire or via computer. The multiple alternative items

contribute to a set of 24 scales (17 first-order factors, 6 second-order factors, and 1 third-order factor). The AUI scales were empirically constructed from a series of factor analytic studies of large sets of items measuring aspects of the use and abuse of alcohol. They provide operational indicators for important constructs of a multiple-condition or differential theory of the use and abuse of alcohol (Wanberg and Horn 1983).

The AUI is based on a theory about how people differ in their perceptions of benefits derived from drinking, in their styles of drinking, in their ideas about the consequences of drinking, and in their thoughts about how to deal with drinking problems. Correspondingly, four broad domains are assessed by the scales: perceived benefits of drinking (e.g., mood management, social enhancement), styles or patterns of drinking (e.g., solitary vs. gregarious, continuous), physical and psychosocial consequences of drinking (e.g., symptoms of alcohol dependence, behavioral impairment), and concerns and acknowledgment of problems which reflect the individual's awareness of drinking problems and readiness to accept help for these problems.

Studies reported by the instrument authors (Horn et al. 1987) indicate that the AUI scales demonstrate good to excellent levels of internal consistency, test-retest reliability, and both concurrent and construct validity. The pattern of these findings concerning the AUI's reliability and validity has been replicated and extended by other investigators (e.g., Rohsenow 1982; Skinner and Allen 1983; Tarter et al. 1987; Isenhardt 1990). However, Chang, Lapham, and Wanberg (2001) found the reliability estimates to be lower in a sample of DUI offenders than in the normative sample.

The AUI has been used in a wide range of applications, some of which are described here. DiClemente and Hughes (1990) found that groups of alcoholics differing in their readiness to change as measured by the URICA differed across AUI subscales. Similarly, alcoholic subtypes based on personality types defined by either their Millon Clinical Multiaxial Inventory (MCMI) or their Minnesota Multiphasic Personality Inventory

profiles have been found to differ with respect to the symptoms and consequences of alcohol use as assessed by the AUI (Robyak et al. 1984; Corbisiero and Reznikoff 1991). Conversely, subtypes of alcoholics derived by cluster analyzing AUI scale scores were found to differ with respect to the personality and symptom scales of the MCMI-II (Donat 1994).

A number of more recent studies have investigated the derivation of clinical subtypes based on the AUI (Rychtarik et al. 1998, 1999; Chang et al. 2001). Rychtarik and colleagues derived and independently replicated eight subtypes, with variations within three light, moderate, and heavy drinking groups. These groups included low severity, gregarious drinkers; low severity, steady drinkers; overall moderate-low severity drinkers; moderate severity, solitary, mental enhancement drinkers; moderate severity, gregarious drinkers; steady, solitary, moderate impairment drinkers; higher severity, mental enhancement drinkers; and high severity, compulsive, mood management drinkers. These groups differed across a number of dimensions, including client background, cognitive functioning, psychosocial functioning, history of alcohol use, and pretreatment drinking behavior; they also differed in percentage of days abstinent and drinks per drinking day at a 12-month posttreatment followup. The AUI has also served as the primary dependent measure in studies examining patterns, perceived benefits, and consequences of drinking among heavy social drinkers (Rohsenow 1982), male and female alcoholics and non-alcoholics (Olenick and Chalmers 1991), and Black and White alcoholics (Robyak et al. 1989).

Although it has an extensive background as a research instrument, the AUI was developed primarily as a clinical assessment tool. Based on their psychometric analysis, Skinner and Allen (1983) suggested that the AUI has considerable promise as a differential assessment instrument. It can provide a profile across the 24 scales, reflecting the individual's unique pattern and style of use, perceived benefits derived from drinking, and the resultant physical and psychosocial consequences (Donat 1994; Rychtarik et al. 1998, 1999;



Chang et al. 2001). The individual's scale scores and profile can also be compared with normative information (Horn et al. 1987). The authors suggest that this information can help the clinician select the most appropriate treatment setting (e.g., inpatient vs. outpatient), intensity, or modality (e.g., group vs. individual therapy, behavioral vs. insight-oriented therapies). The test manual (Horn et al. 1987) provides a number of relatively specific recommendations concerning the treatment implications for scores on given scales or typologies of alcoholics based on the pattern of relationships among scales. While this seems to be one of the many potential benefits of the AUI, further research is needed to validate its utility in this treatment-matching process.

W.R. Miller and Marlatt (1984, 1987) introduced a family of structured multidimensional clinical interviews known as the Comprehensive Drinker Profile (CDP). This family includes the standard CDP and an abbreviated form (the Brief Drinker Profile), both of which are administered at intake, the Follow-up Drinker Profile to assess treatment outcome, and the Collateral Interview Form, which provides a systematic method of eliciting information about the client from a significant other. The 88 items of the CDP, which requires 1–2 hours to administer, are designed to obtain both objective and subjective data on a client's status at intake and followup in multiple domains: demographic information, drinking history (e.g., quantity, frequency, pattern, drinking settings, dependence symptoms), motivation (e.g., reasons for drinking, alcohol-related expectancies), and self-efficacy (e.g., selection of client's own treatment goals, perceived likelihood of achieving these goals). The CDP has been used to compare the characteristics of alcohol-dependent men and women at treatment entry (W.R. Miller and Cervantes 1997) and to compare the relative effectiveness and cost-effectiveness of a 5-week inpatient program and a 2-week in- and day-patient regime (Long et al. 1998).

Jacobson (1989a) noted that the style of conducting the interview, as outlined in the manual, is quite individualized and is intended

both to facilitate information gathering and to engage and motivate the client in the assessment and treatment process. The nonconfrontational, empathic, nonjudgmental, and supportive style advocated for use in the CDP interview process appears to have served as the background from which more formalized motivational interviewing techniques have emerged (W.R. Miller 1983; W.R. Miller and Rollnick 1991; W.R. Miller et al. 1993). The manual also provides a number of clinical implications associated with certain response patterns, suggesting treatment-matching recommendations, some of which are based on previous treatment outcome research and others based on clinical observations (Jacobson 1989a).

The Chemical Dependency Assessment Profile (CDAP) (Davis et al. 1989; Harrell et al. 1991) is a multidimensional, self-report clinical research questionnaire composed of 232 multiple-choice, true/false, and open-ended items. Its primary purpose is to evaluate parallel dimensions of cognitive and behavioral dysfunction related to alcohol use, use of other drugs, and mixed or polydrug abuse over a 2-month time period prior to entering treatment. The CDAP assesses chemical use history, patterns of use, use beliefs and expectancies, use symptoms, self-concept, and interpersonal relations. Content dimensions, rationally developed based on clinician card sorts of items, provide measures of quantity and frequency of use, physiological symptoms, situational stressors, antisocial behavior, interpersonal skills, affective dysfunction, attitude toward treatment, and degree of life impact. Also, three scales of expectancies concerning the anticipated effects of alcohol (tension reduction, social facilitation, and mood enhancement) were included from a measure previously developed and validated by Farber et al. (1980).

Harrell et al. (1991) found the Cronbach coefficients of internal consistency to range from 0.78 to 0.88 across the CDAP subscales. Similarly high test-retest reliabilities were found (with all but one scale exceeding 0.83) following a 1-week interval. Results of factor analyses at the scale level suggested three primary factors: (1) behavioral/

physiological (composed of the physiological symptoms, affective dysfunction, antisocial behavior, and quantity/frequency of use dimensions and the tension reduction expectancy), (2) social (composed of the interpersonal skills dimension and the social facilitation and mood enhancement expectancies), and (3) cognitive (composed of the situational stressors and the attitude toward treatment dimensions). Significant differences were found across the problem dimensions and expectancy scales among samples of alcohol abusers, polydrug abusers, and social drinkers, with the clinical groups evidencing a greater degree of dysfunction and stronger expectancies than the group of social drinkers. Harrell et al. (1991) suggested that the CDAP reliably assesses a number of dimensions thought to be important in attempting to match substance-abusing clients to treatments. Although this measure appears to be of potential use in clinical practice, there is no recent evidence in the literature concerning its further development.

A relatively new instrument is the Minnesota Substance Abuse Problems Scale (MSAPS) (Westermeyer et al. 1998). This is a semi-structured interview protocol that attempts to assess a broad range of psychological, behavioral, and social problems associated with AOD use. It was designed to be completed within a 30-minute interview. Three factors were derived from a factor analysis of the 37 items of the scale: the Psychiatric-Behavioral Problems scale (14 items), the Social Problems scale (11 items), and the Addictive Use Symptoms scale (12 items). The Cronbach alpha measures of internal consistency were 0.83, 0.82, and 0.79, respectively. The pattern of correlations with measures of psychological distress, depression, anxiety, social problems, and substance use and problems suggests that the MSAPS scales have a high degree of concurrent validity.

Another relatively new instrument is the Personal Experience Inventory for Adults (PEI-A) (Winters 1999). The measure has two parts. The first part, Problem Severity, consists of 120 questions organized around 10 problem severity scales,

3 validity scales, and AOD use consumption characteristics (e.g., quantity, frequency, duration, age of onset); an additional research scale assesses receptivity to treatment. The second part, Psychosocial Problems, consists of 150 items distributed across 8 personal risk adjustment scales, 3 environmental scales, 10 problem screens, and 2 validity scales. Adequate to good internal consistency indices were obtained. The median alpha levels for the 10 Problem Severity scales were 0.89, 0.81 for the 11 Psychosocial Problems scales, and 0.63 for the 5 validity scales. One-week test-retest reliability was also acceptable. The scales demonstrated a high level of concurrent validity when correlated with measures of psychopathology and psychological functioning, alcohol dependence, reports of clients' behavior as provided by a significant other, DSM-III-R diagnoses (American Psychiatric Association 1987), and referral recommendations (no treatment, outpatient treatment, or residential treatment).

### **MEASURES TO ASSIST IN DIFFERENTIAL TREATMENT PLACEMENT**

Client-treatment matching attempts to place the client in those treatments most appropriate to his or her needs. There are a number of dimensions on which treatments may vary and which need to be considered in attempting to make an appropriate referral or match (Marlatt 1988; W.R. Miller 1989*b*; Institute of Medicine 1990; Donovan et al. 1994; Gastfriend and McLellan 1997). Among these dimensions are treatment setting (e.g., inpatient, residential, outpatient), treatment intensity, specific treatment modalities, and the degree of therapeutic structure. A number of possible variables may interact with these dimensions to lead to differential outcomes, making the clinician's task more difficult.

The American Society of Addiction Medicine (ASAM) has established a set of rationally developed criteria for admission, placement, discharge, and transfer of individuals with alcohol problems to different levels of care (Hoffman et al. 1987, 1991;

Mee-Lee et al. 2001). These criteria, which are based on a consensus of treatment specialists, are meant to facilitate the matching of patients to the most appropriate level of care (Gastfriend et al. 2000). They are also assumed to facilitate clinical decisions that will lead to increased quality of care while maintaining fiscal accountability (e.g., managed care considerations). Separate criteria have been developed for adults and adolescents. The criteria are based on an assessment of six general problem areas: acute intoxication and/or withdrawal potential; biomedical conditions and complications; emotional, behavioral, or cognitive conditions or complications; readiness to change (previously treatment acceptance or resistance); relapse, continued use, or continued problem potential; and recovery/living environment. From this assessment, one of four levels of care is selected as the most appropriate: outpatient treatment of less than 9 hours per week, intensive outpatient or partial hospitalization with a minimum of 9 hours per week, medically monitored intensive inpatient treatment, or medically managed inpatient treatment.

Despite potential limitations in the ASAM placement criteria (McKay et al. 1997), these criteria have been used increasingly in a variety of States and clinical settings (e.g., Gondolf et al. 1996; Gregoire 2000; Heatherton 2000). Further, there is increasing evidence concerning their validity and clinical, administrative, and fiscal utility (Turner et al. 1999).

A pair of complementary instruments, one interviewer-administered and the other a self-report questionnaire, have been developed to provide a standardized assessment of the dimensions included in the ASAM criteria: the Recovery Attitude and Treatment Evaluator (RAATE) Clinical Evaluation (CE) and Questionnaire I (QI) (Mee-Lee 1988; Mee-Lee et al. 1992; Smith et al. 1992, 1995). The RAATE-CE and RAATE-QI instruments were designed to assist in placing patients into the appropriate level of care at admission, making continued stay or transfer decisions during treatment (utilization review), and documenting appropriateness of discharge.

The RAATE-CE is a 35-item structured clinical interview, which may be administered by a trained technician or counselor in 20–30 minutes. It uses five scales to measure the constructs of resistance to treatment (current treatment/recovery motivation and denial), resistance to continuing care (future and long-term treatment/recovery motivation and denial), severity of biomedical problems, severity of psychiatric/psychological problems, and social/environmental support (the extent to which family, friends, and others in the individual's home setting are supportive of or detrimental to recovery). Severity profiles, based on a 5-point rating scale, can be derived for each of these areas and can be used to determine initial treatment matching, admission and placement, continued stay, and treatment planning decisions. The interrater reliability on the severity ratings was higher with raters having more clinical expertise than with less skilled clinicians (Mee-Lee 1988). The lowest levels of agreement were for the dimensions assessing the acuity of biomedical and psychiatric problems. These initial severity ratings have subsequently been revised to be less reliant on clinical judgment; the severity scale has been changed to a 4-point rating, and profiles are based on standard scores that are based on a rational expert judgment approach (Smith et al. 1992). Smith et al. (1992) found that the RAATE-CE's average interrater reliability (across three experienced nonmedical chemical dependency clinicians) ranged from 0.59 to 0.77, and the internal consistency reliabilities ranged from 0.65 to 0.87. The lowest level of interrater reliability was again associated with the severity of psychiatric problems; however, the biomedical acuity scale had the highest level of agreement among the raters.

The RAATE-QI is a 94-item true/false self-report questionnaire, taking approximately 30–45 minutes to complete. It was designed to be compatible with and assess the same five underlying dimensions as the RAATE-CE from the patient's point of view (Smith et al. 1995). In addition, an experimental validity scale, composed of infrequently endorsed items, attempts to detect patients who either are in

extreme denial or who are responding in a pattern suggestive of falsification. Scores from the five primary scales are converted to standard scores and profiled with respect to problem severity. Also, there is a conversion table available to translate client severity scores to ASAM criteria. The RAATE-QI internal consistency reliabilities ranged from 0.63 to 0.78, and the test-retest reliabilities (over a 24-hour period) ranged from 0.73 to 0.87.

Najavits and colleagues (1997) evaluated the interrater reliability of the RAATE-CE. Both professional-level raters (e.g., master's degree or above) and nonprofessional interviewers administered the measure. A high level of agreement was found across all the raters, although the reliability was somewhat higher for the professional raters. Internal consistency coefficients ranged from 0.45 for the resistance to treatment scale to 0.71 for the social and environmental support scale. Exploratory factor analysis led to a four-factor solution. These factors to a large extent mirrored the a priori rational subscales of the RAATE. The factors were labeled psychological problems, acceptance of alcohol/drug problems, family and environmental problems, and biomedical problems. Gastfriend and colleagues (1995) also found evidence for the validity of the RAATE-CE, with scores on the RAATE subscales being predictive of the level of care to which alcoholics in a detoxification unit were subsequently referred. Britt et al. (1995) investigated the usefulness of the RAATE in relation to attrition from treatment for pregnant and postpartum women. They found no differences across three groups (completers, dropouts, and administrative discharges) on the RAATE-CE. However, on the self-report RAATE, it was found that those women who completed the treatment had lower ratings on resistance to treatment and continuing care; those who completed less than 1 month of treatment had the highest resistance scores.

The COMPASS (Craig and Craig 1988) is an interesting and potentially useful multidimensional instrument for both the general purpose of assessing adult or adolescent alcohol-involved

individuals and the specific purpose of assisting the clinician in making treatment referral and placement decisions. The scale is a 98-item, direct question, self-report questionnaire designed to measure the frequency of substance abuse and personal adjustment problems experienced over the last 6-month time period. The focus is on assessing the frequency of occurrence of behaviors associated with substance use rather than on issues such as quantity and frequency of drinking or other substance use. The scale assesses two broad dimensions, each with a number of rationally developed subscales. The first area consists of four substance abuse scales assessing dimensions consistent with DSM-III criteria of substance use disorders: psychological dependence (frequency of drinking alcohol for its actual or expected effects in assisting the person cope with various life situations); abusive, secretive, and irresponsible use (how frequently negative consequences of excessive drinking are experienced); interference due to use (frequency of alcohol use negatively affecting function in a variety of life areas); and signs of withdrawal. The second area includes three personal adjustment scales: frustration problems, interpersonal problems, and self-image problems. Additionally, a number of validity scales are included to identify response patterns suggestive of defensiveness, inconsistency, or minimization. Based on data provided in the COMPASS manual (Craig and Craig 1988), test-retest reliability over a 7-day interval was high, ranging from 0.89 to 0.91 for the substance abuse scales and from 0.78 to 0.86 for the personal adjustment scales. Significant differences between a sample of substance abusers in an inpatient treatment program and a general population sample who had reported using at least one psychoactive drug over the previous 6 months suggest discriminant validity of the scale.

The COMPASS is presented as a measure useful to treatment selection. It takes into account both the severity of substance abuse problems and the severity of personal adjustment problems. The total scores from the substance abuse and personal adjustment problems dimensions are entered onto

a referral guide. Based on the severity of the individual's scores on these two dimensions, specific recommendations are made to refer the individual to substance abuse information/education classes, outpatient counseling, intensive outpatient treatment, inpatient hospitalization, or inpatient hospitalization with substantial structured aftercare. The COMPASS appears to have potential clinical and research utility, but it needs considerably more developmental work and psychometric research to extend the test developers' initial work on reliability, concurrent validity with other relevant measures, and predictive validity with respect to the differential effectiveness of treatments to which individuals are assigned via the referral guide versus other clinical methods of treatment matching.

### SUMMARY

This chapter's review of instruments potentially helpful in the treatment planning process should not be seen as exhaustive. Other measures of similar assessment domains likely exist and may be useful to the clinician. There are also a number of other important assessment domains that were not included in this review. Examples include affective states, such as anxiety and depression; cognitive/neuropsychological functioning; the concurrent use of other drugs with alcohol; the presence of comorbid major (Axis I) psychiatric disorders and personality disorders (Axis II); and perceived barriers to treatment (L.C. Sobell et al. 1994a). These domains clearly should be considered for inclusion in clinical assessment protocols, since these areas have been shown to affect the course of treatment and recovery.

For a comprehensive and thorough treatment plan to be developed, information derived from the assessment domains reviewed above must be integrated with that derived from the diagnostic process and the assessment of the parameters of drinking behavior. While the assessment involved in diagnosis will allow the determination of the client's meeting certain criteria, it does not

provide much information about the overall parameters of the target behaviors, namely alcohol consumption or other drug use, or other psychosocial factors. The role of assessment goes beyond that of classifying the individual's problem diagnostically to providing a more extensive picture of other areas of life functioning. A major function in initial assessment and at followup is to determine the individual's general quality of life (Longabaugh et al. 1994).

Shiffman (1989) suggested that three levels of information are necessary in order to gain a sense of the individual's "relapse proneness," and thus are relevant to treatment planning. These fall along a continuum of their proximity, in both time and influence, to the probability of relapse. The first of these represents general personal characteristics, such as demographic variables, personality factors, degree of dependence on the addictive behavior, and family history of addictions. Somewhat closer in time and influence are "background variables" likely to be experienced during the time of treatment and maintenance, such as the degree of personal, professional, and/or interpersonal stress and the availability of individuals supportive of the positive changes being implemented and of continued abstinence. The third and most proximal level includes those factors most directly associated with high-risk relapse situations. Examples of this category include the perceived self-efficacy or level of confidence that one will not relapse when encountering situations involving risk factors (e.g., social pressure to use, interpersonal conflict, depression, urges and temptation [e.g., Annis and Davis 1988a, 1988b]), the expectations that one holds about the positive outcomes associated with the addictive behavior (e.g., Goldman et al. 1987), and the coping skills available to deal specifically with the temptations to engage in the addictive behavior (Litman 1986; Shiffman 1989). Shiffman (1989) indicated that the more distal characteristics provide the background against which the relative risk of more proximal factors is moderated by their influence on the person's appraisal of the situational factors in the relapse situation.

An important component of personal resources that needs to be considered in the assessment process is the individual's more generalized coping and problem-solving abilities. DeNelsky and Boat (1986) provided a model of psychological assessment, diagnosis, and treatment that is based on the individual's coping skills and deficits in dealing with interpersonal relationships, thoughts, and feelings; approaches to oneself and life; and the ability to sustain goal-directed effort. The availability of such skills is seen as important in dealing with problems that can be anticipated to occur during the course of the treatment and maintenance phases and, as such, should have an effect on the probability of relapse.

The assessment process should be comprehensive; however, from a practical perspective, one also needs to be relatively parsimonious, given the array of areas that could be assessed (Donovan 1988; Institute of Medicine 1990; L.C. Sobell et al. 1994a, 1994b). A number of different strategies can be used to provide a framework and direction for the assessment process in each of the systems and domains noted above. The first is to use a sequential approach, in which a less intensive screening of a broad range of areas is conducted; those areas noted as being potentially problematic can be pursued further with more intensive and specialized assessment (Skinner 1988; Institute of Medicine 1990). The second is a form of clinical hypothesis testing, in which the clinician formulates hypotheses about the individual's behavior based on his or her theoretical perspective and collects information through the assessment process to test the apparent validity of these hypotheses (Shaffer and Kauffman 1985; Shaffer and Neuhaus 1985; Shaffer 1986). Each of these approaches is meant to provide information about the most critical factors needed to determine the assignment of the client to treatment.

Assessment is the initial step in the longer term process of therapy and behavior change. Its functions extend well beyond that of information gathering. The hope is that the clinician, through the assessment process, will motivate the individual, helping him or her move from the point of

contemplating the need to change, through the action phase of change, and into a productive maintenance of the desired new behavior pattern. It is also hoped that the clinician can use the results from the assessment process to facilitate the selection of the most appropriate treatment intensity, modality, and setting and in so doing maximize the chances of success for the client (Institute of Medicine 1990; Connors et al. 1994).

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# Assessing Treatment and Treatment Processes

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Glaser (1980) noted that assessing treatment and treatment processes had not been a high priority in the alcohol treatment field. Subsequent to his observation, however, a surge of interest in treatment assessment has taken place among administrators, researchers, and clinicians. Indeed, a recent issue of *Substance Use & Misuse* (Magura 2000) contained several articles on substance abuse treatment assessment. That interest has been spurred by several developments. One is an expanding focus on systems analysis and between-program differences, prompted by efforts toward health care reform. In order to describe programs and examine interrelationships among program characteristics and quality of care indices, policymakers, administrators, and researchers recognized the need for instruments to assess program-level variables.

A second reason for rising interest in treatment assessment has been increasing recognition of the complex nature of predominantly psychosocial interventions, such as those often used to treat alcohol use disorders even when pharmacologic agents also are provided. One example of this complexity is “therapist effects” in the delivery of treatment (Najavits and Weiss 1994; Najavits et al. 2000), that is, the way in which the “same” treatment can be delivered quite differently by different therapists. Treatment researchers have become aware of the need to not only facilitate the provision of standardized treatment through the use of therapist training, supervision, and treatment manuals (e.g., K.M. Carroll 1997) but also to assess the implementation of the complex, multifaceted treatments they are studying. For

example, it is important to document that distinctive treatments have been applied in comparative evaluations, especially in studies of patient-treatment matching, and to conduct treatment process analyses to identify “active ingredients of treatment” and “mechanisms of change.”

On the clinical side, treatment providers need instruments with which to assess the quality of treatment provision, as well as the progress of their clients during treatment. Their motivation is the same as that among researchers: Such instruments are seen as essential elements in the effort to improve clinical care.

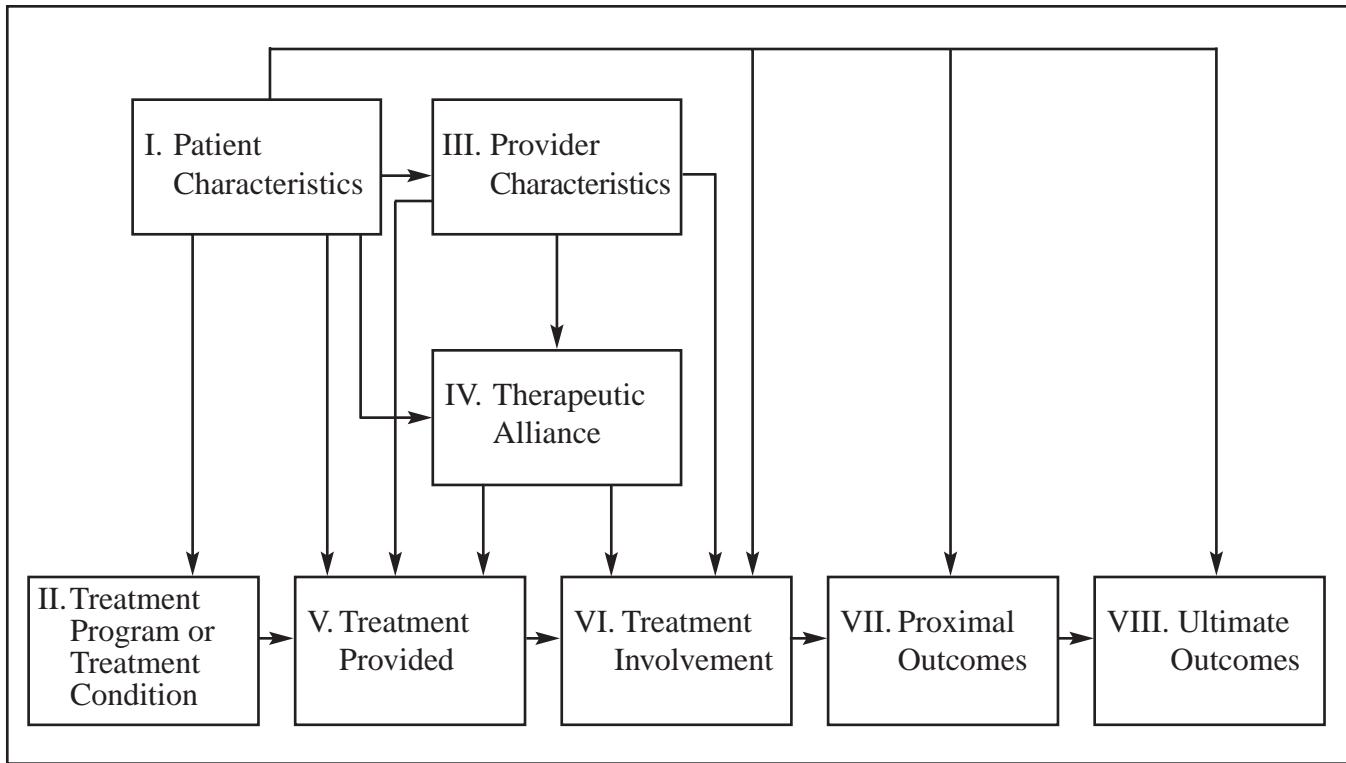
This chapter first presents a broad, multilevel model of the treatment processes. Then, measures of the different domains of treatment variables addressed by the model are reviewed. The predominantly recent interest in the assessment of treatment continues to be reflected in the availability of only a few established measures. A number of promising instruments are reviewed, however. When multiple measures assess a particular domain, descriptive and psychometric data for them are presented in tabular form. The final section considers additional work needed to develop high-quality measures of treatment and treatment processes.

## CONCEPTUAL MODEL OF THE TREATMENT PROCESS

To provide a guide for the review of available instruments and to highlight their uses, it is helpful to have a conceptual model of the treatment process. The model presented in figure 1, although



**FIGURE 1.—A conceptual model of the treatment process**



simplified, captures most of the major domains involved in the treatment process. It depicts patient, program, and provider determinants of treatment provided to patients, the therapist-patient relationship or therapeutic alliance, and patients' involvement in treatment, as well as the mediating variables (proximal outcomes) that link treatment provided and patient involvement in treatment to ultimate outcomes, such as abstinence or reduced alcohol consumption.

**Patient Characteristics**

Although patient characteristics (panel I in figure 1) are not components of the treatment process, they can affect access to treatment, treatment selection and treatment planning, involvement in treatment, and treatment outcomes. In addition to these direct effects, patient variables can influence or moderate the relationship between treatment and outcomes, by affecting links in the causal chain connecting treatment provision/patient involvement in treatment to proximal and ultimate

outcomes (not illustrated in figure 1; see Finney 1995). For example, Smith and McCrady (1991) found that patients who scored higher on abstract reasoning ability were better able to learn coping skills during treatment than were patients with lower neuropsychological functioning. In another type of treatment, cognitive functioning might not affect what is acquired during the course of treatment. Although the treatment process cannot be considered apart from treatment recipients, the assessment of patient characteristics is not covered here, where the focus is on the assessment of treatment-related variables.

**Program-Level Characteristics**

Program-level characteristics (panel II in figure 1) are general factors related to the program's organization and structure, policies, services, treatment orientation, social environment, and readiness for organizational change. Relevant organizational or structural variables include ownership, physical design features (e.g., number of buildings), size

(number of patients), aggregate patient characteristics, types of staff, program policies, and desired length or amount of treatment. Policies are the structured procedures that programs use to address different situations (e.g., problem behaviors among patients). Program services include those activities oriented toward treating alcohol use disorders, as well as problems in other areas of patients' lives. Treatment orientation refers to the treatment modality or modalities applied at the program (or in treatment research, in the treatment condition). Environmental characteristics refer here to the social climate of a program (e.g., Moos 1997). Finally, one new measure focuses on substance abuse programs' readiness for change to implement evidence-based treatment practices.

### **Provider Characteristics**

The quality of alcohol treatment is determined, not only by the therapeutic techniques applied, but also by the characteristics of individual treatment providers (panel III in figure 1). In particular, this domain of variables refers to within-program variation in provider characteristics (aggregate, program-level staff characteristics are considered in panel II). Gerstein (1991) argued that "the competence, quality, and continuity of individual caregivers are likely to be critical elements in explaining the differential effectiveness of [substance abuse] treatment programs" (p. 139). In the alcohol treatment field, the few studies that have been conducted (e.g., W.R. Miller et al. 1980; Valle 1981; McLellan et al. 1988; Sanchez-Craig et al. 1991; Project MATCH Research Group 1998; for reviews, see Najavits and Weiss 1994; Najavits et al. 2000) indicate that therapist characteristics play an important role in determining clients' treatment retention and outcomes.

### **Therapeutic Alliance**

One of the key factors affecting the impact of alcohol treatment, especially psychosocial treatments, is the quality of the alliance or relationship that is developed between the therapist and client

(panel IV in figure 1). A positive therapeutic alliance can be viewed as a necessary but insufficient condition for patients' becoming involved in treatment, making treatment-specified intermediate changes on proximal outcomes (see below), and experiencing positive ultimate outcomes. The quality of the therapeutic alliance affects and is affected by the treatment provided, and moderates the impact of treatment provided on patients' involvement in treatment. The most direct influences on the therapeutic alliance, however, are patients' characteristics and providers' characteristics. In the Project MATCH outpatient sample, more positive ratings of the therapeutic alliance by both patients and therapists were associated with greater attendance at treatment sessions and a higher percentage of days abstinent during treatment and over the 12 months following treatment (K.M. Carroll et al. 1997; Connors et al. 1997; K.M. Carroll et al. 1998*b*; Connors et al. 2000; for other studies, see Belding et al. 1997; Ojehagen et al. 1997; De Weert-Van Oene et al. 1999; Petry and Bickel 1999; Raytek et al. 1999; Fenton et al. 2001).

The measures used to assess therapeutic alliances in alcohol and other drug abuse treatment research are general measures developed for the psychotherapy field. For example, De Weert-Van Oene et al. (1999) used the Helping Alliance Questionnaire to assess the therapeutic relationship as perceived by 340 substance abuse patients (six coding instruments were used by Fenton et al. 2001). Because no measures have been developed specifically for alcohol treatment, they are not reviewed here.

### **Treatment Provided/Treatment Involvement**

Alcohol treatment programs typically provide psychosocial and/or pharmacologic interventions to patients. To the extent that it is constant across all patients, treatment provided is a program-level characteristic (panel II in figure 1). In most programs, however, the treatment provided varies across patients (panel V). For example, it may be thought that some patients require only a brief intervention, whereas others need longer term treatment.

In addition to determining what has been provided to patients, it is also possible to ascertain to what extent patients have been involved in treatment (panel VI). For example, instead of simply determining the number of group therapy sessions a patient attended, it is possible to assess such constructs as the patient's contributions to group discussions. Presumably, patient involvement in treatment would be more strongly associated with proximal and ultimate outcomes (see figure 1) than the treatment offered to individual patients.

### **Proximal Outcomes**

Proximal outcome variables (Rosen and Proctor 1981; panel VII in figure 1) refer to cognitions, attitudes, personality variables, or behaviors that, according to the treatment theory under investigation, should be affected by the treatment provided, and should, in turn, lead to positive ultimate outcomes (e.g., abstinence or reduced alcohol consumption). An Institute of Medicine (1989) panel found that "little research has been devoted to the short-term impact of specific [alcoholism treatment] program components" (p. 159), and suggested that such short-term gains could be studied quite readily. Proximal outcome variables can be assessed at any point between treatment entry and the assessment of ultimate outcomes. When assessed during treatment, proximal outcomes constitute an important method that clinicians can use to assess patients' treatment progress. For researchers, proximal outcomes, assessed during or after treatment, are key components in treatment process analyses.

### **Ultimate Outcomes**

Ultimate outcomes (panel VIII in figure 1) refer to the end points that the treatment is supposed to effect. All treatment programs for alcohol use disorders attempt to impact drinking behavior, with many seeking to eliminate it entirely and others seeking to limit it to levels that do not cause adverse consequences. Some programs also seek to have a broader impact on patient functioning

by effecting improvements in such life areas as employment, social functioning, physical health, and/or psychological functioning (for an in-depth discussion of outcome assessment, see Tonigan's chapter in this *Guide*). Treatment process models may specify different dimensions of treatment that should impact different areas of patients' functioning.

## **MEASURES OF TREATMENT AND TREATMENT PROCESSES**

In this section, measures are reviewed that tap the different treatment domains (panels II–VII) in the conceptual model outlined above, except for therapeutic alliance.

### **Program-Level Characteristics**

Several instruments have been developed to gather information on program-level characteristics. Most assess a mixture of variables pertaining to program structure (setting, aggregate staff characteristics, aggregate patient characteristics), policies (e.g., disciplinary procedures), and services. In addition, a few instruments focus on assessing program treatment orientation; others assess program social climate. Finally, a recently developed instrument assesses the readiness of a treatment program to implement evidence-based treatment practices.

#### *General Measures*

Five general program-level instruments are described in table 1: the National Drug and Alcoholism Treatment Unit Survey (NDATUS) (Office of Applied Studies 1991), the National Drug Abuse Treatment System Survey (NDATSS) (McCaughrin and Price 1992; Price and D'Aunno 1992), the Drug and Alcohol Program Structure Inventory (DAPSI) (Peterson et al. 1993, 1994a, 1994b), the Residential Substance Abuse and Psychiatric Programs Inventory (RESPPI) (Timko 1994, 1995, 1996), and the Addiction Treatment Inventory (ATI) (Carise et al. 2000).

**TABLE 1.—Measures of general program-level characteristics**

**Measure:** National Drug and Alcoholism Treatment Unit Survey (NDATUS)

**Citation:** Office of Applied Studies 1991

**Description:** The NDATUS is a brief questionnaire (five pages) that covers (a) the overall organization and structure of programs (ownership, funding sources and levels, organizational setting, capacity in different treatment settings using different treatment modalities, hours of operation, etc.), (b) staffing and staff characteristics, (c) services (e.g., methadone dosages), (d) policies, and (e) clients and client characteristics. The 1989 NDATUS was augmented in 1990 by the Drug Services Research Survey (DSRS) (Office of Applied Studies 1992a, 1992b) to obtain additional data in the areas of facility organization and staff, client data, services, and costs and charges. Using data from the 1991 NDATUS, Rodgers and Barnett (2000) found that private, for-profit substance abuse treatment programs tended to be smaller and more likely to provide treatment in only one setting. Public programs and nonprofit programs generally had more treatment staff; Federal and for-profit programs had more psychologists and physicians. In 1992, the NDATUS evolved into the Uniform Facility Data Set (UFDS), sponsored by the Office of Applied Studies.

**Measure:** National Drug Abuse Treatment System Survey (NDATSS)

**Citations:** McCaughrin and Price 1992; Price and D’Aunno 1992

**Description:** The NDATSS was used to assess 575 outpatient drug abuse treatment units in 1988 and to follow up on 481 of those programs in 1990. The survey consists of two separate telephone interviews. The *Director’s Interview* assesses the unit’s funding, licensing, and accreditation; client information; evaluation and monitoring of clients; relationships with other treatment organizations; relationship with parent organization (if any); changes in the unit over time; and demographic information about the respondent. The *Clinical Supervisor’s Interview* focuses on the delivery of treatment services and estimated treatment outcomes. Each interview takes about 90 minutes to complete. NDATSS data have been extensively analyzed. For example, McCaughrin and Price (1992) examined program characteristics associated with two measures of treatment outcome: the proportion of clients who met goals set in treatment (a proximal outcome) and the proportion of clients who continued to misuse alcohol or drugs (an ultimate outcome). They found that aftercare services and smaller client-staff ratios were linked with more positive outcomes of both types.

**Measure:** Drug and Alcohol Program Structure Inventory (DAPSI)

**Citations:** Peterson et al. 1993, 1994a, 1994b

**Description:** The DAPSI obtains data on program structure (size, intended duration, staffing, and other resources), aggregate patient characteristics, policies (e.g., admission, disciplinary, and discharge policies), and services (assessment, treatment, supportive, and aftercare activities). The resulting data were used to develop a typology of inpatient programs (Peterson et al. 1993). In addition, Peterson et al. (1994b) found lower-than-expected case mix—adjusted readmission rates in programs that had a longer intended duration of treatment, more assessment interviews with family and friends, and more patients who were referred from the criminal justice system.

**TABLE 1.—Measures of general program-level characteristics (continued)**

**Measure:** Residential Substance Abuse and Psychiatric Programs Inventory (RESPPI)

**Citations:** Timko 1994, 1995, 1996

**Description:** Adapted from the Multiphasic Environmental Assessment Procedure (Moos and Lemke 1994), the RESPPI consists of a rating scale and three instruments that tap separate domains of program characteristics: (a) policies and services, (b) physical features, and (c) aggregate patient characteristics (the Community-Oriented Programs Environment Scale [Moos 1989] is used to tap treatment climate). The *Rating Scale for Observers* consists of 27 items that cover four dimensions: physical attractiveness, environmental diversity (extent of stimulation and variety), resident functioning, and staff functioning. The 140-item *Policy and Service Characteristics Inventory* (PASCI) taps nine dimensions: expectations for functioning, acceptance of problem behavior, policy choice, resident control, policy clarity, provision for privacy, health and treatment services, availability of daily living assistance, and social-recreational activities. The PASCI also includes a preliminary measure of substance use regulations. The *Physical and Architectural Characteristics Inventory* consists of 117 items that assess seven dimensions: community accessibility, physical amenities, social-recreational aids, prosthetic aids, safety features, staff facilities, and space availability. The *Resident Characteristics Inventory* (RESCI) is a 95-item interview for the program administrator or other staff member. In addition to information on residents' demographic characteristics, diagnoses, length of stay, and in-program outcomes, the RESCI assesses seven dimensions: social resources, mental functioning, activity level in the program, activities in the community, use of health and treatment services, use of daily living assistance, and use of social-recreational activities. Internal consistency reliability estimates (Cronbach alphas) for most of the RESPPI subscales are moderate to high, and most subscales exhibit high test-retest or interobserver correlations. Comparing substance abuse and psychiatric programs, hospital- and community-based programs, and public, nonprofit, and for-profit programs, Timko (1995) found differences in each RESPPI domain. With respect to policies and services, for example, substance abuse programs had more restrictive admission policies, were less tolerant of problem behaviors, and provided less individual choice and privacy, more formal structures, and less daily living assistance than did psychiatric programs (see also Timko and Moos 1998; Timko et al. 2000a, 2000b). Initial data with the RESPPI are promising. The instrument provides a comprehensive profile of a program, including extensive coverage of physical design features.

**Measure:** Addiction Treatment Inventory (ATI)

**Citation:** Carise et al. 2000

**Description:** The ATI is a six-page questionnaire that can be completed by a program director or senior administrator in 30–45 minutes. The ATI assesses a program's organizational structure (ownership and affiliation, setting, capacity, length of treatment, patient assessments); patient profile (age range, gender, substances used, and residential, medical, and legal characteristics); service profile (drug, alcohol, medical, employment, social, family, and psychological/psychiatric services); staffing mix (full- and part-time staff in various categories); and financing (insurance payments, grants, self-pay, charitable contributions). Given that the ATI is being used in the Drug Evaluation Network System (DENS) (Carise et al. 1999), a large-scale treatment assessment effort, substantial ATI data should be available on a wide-range of substance abuse treatment programs.

Table 1 is not a comprehensive list of general program-level instruments. For example, Carise et al. (2000) reviewed the Service Delivery Unit Questionnaire from the National Evaluation of Substance Abuse Treatment conducted by the National Center on Addiction and Substance Abuse (CASA), administrative interviews used in the National Treatment Improvement Evaluation Study, the Alcohol and Drug Services Survey conducted by Brandeis University with funding from the Substance Abuse and Mental Health Services Administration, and program administrator and director interviews from the National Treatment Center Study sponsored by the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Other instruments for assessing general program characteristics were included in the Treatment Outcome Prospective Study (Hubbard et al. 1989), the Drug Abuse Treatment Outcome Study (Etheridge et al. 1995; Broome et al. 1999), a study of then Veterans Administration substance abuse programs (Nirenberg and Maisto, 1990), and the Program Identification and Description Form used by the Institute of Behavioral Research at Texas Christian University.

Many of these instruments are lengthy and cover a variety of topics. Potential users should review them carefully to determine which best applies in a particular situation. In some cases, a combination of items from different instruments may provide the most appropriate fit. Most of these measures rely on a key informant, such as the program or the clinical director, who is invested in the program being assessed. More research is needed to establish the reliability and validity of data gathered in this manner.

### *Measures of Treatment Orientation*

Treatment orientation refers to the treatment approach or modality. Treatment orientation can be conceptualized as the immediate goals emphasized in treatment and the specific therapeutic techniques used to bring about those goals. Two basic methods are considered here for assessing

treatment orientation at the program or treatment condition level: coding therapy sessions and administering questionnaires.

*Coding Tapes.*—The more common approach is to audio- or videotape treatment sessions and then to code them, or transcriptions of them, regarding the extent to which a treatment protocol, usually embodied in a treatment manual, has been followed. For example, in an effort to determine the distinctiveness of coping skills and interaction therapy aftercare sessions, Getter et al. (1992) had raters code each 1-minute segment of 15-minute recordings of therapy session audiotapes with respect to the presence or absence of (a) education/skill training, (b) problem solving, (c) role-playing, (d) identifying high-risk situations, (e) interpersonal learning, (f) expression/exploration of feelings, and (g) here-and-now focus. Significant differences were found between coping skills and interactional groups on all dimensions, except for identifying high-risk situations. For other examples of this approach, see DiClemente et al. (1994b), Barber et al. (1996), and K.M. Carroll et al. (1998a, 2000).

Waltz et al. (1993) reviewed methods of assessing adherence to and competence in (quality of) applying treatment protocols. Videotapes are the preferred source of data because they provide more information than do audiotapes. Assessment methods range from checklists for the presence or absence of specific techniques and behaviors, to frequency ratings, to inferences about the quality of treatment or therapist competence in applying the therapy. Waltz et al. noted that the expertise and therapeutic experience needed by raters/coders increase with complexity of the treatment provided and of the inferences made.

Waltz et al. made several recommendations for using this treatment assessment approach. Perhaps the most important was to use adherence-to-protocol measures that include four types of treatment features: those essential and unique to a particular treatment approach, those essential but not unique to an approach, those acceptable but not necessary in a particular approach, and those that are not to be used in applying the treatment. Clearly, the first

and, to a lesser extent, the last categories are the most useful in distinguishing different treatments applied in a comparative treatment trial.

*Questionnaire Measures.*—An alternative approach to coding tapes or transcripts of treatment sessions is to use questionnaires to gather data on treatment orientation. Four such questionnaires are described in table 2. Two assess multiple treatment orientations: the Drug and Alcohol Program Treatment Inventory (DAPTI) (Peterson et al. 1994a; Swindle et al. 1995) and a measure for assessing treatment orientation as perceived by counselors (Kasarabada et al. 2001). The other two assess individual treatment orientations; specifically, therapeutic community treatment environments (the Survey of Essential Elements Questionnaire [SEEQ] [Melnick and De Leon 1999; Melnick et al. 2000]) and social model treatment programs (Social Model Philosophy Scale [SMPS] [Kaskutas et al. 1998]).

The advantages of the questionnaire approach relative to coding tapes or transcripts are that questionnaires (a) are less expensive and time-consuming to administer and score and (b) provide overall assessments of treatment orientation (rather than samples of specific treatment sessions) as perceived by multiple respondents. For example, an expanded version of the DAPTI was included in a survey of program directors and used to classify programs as having a 12-step, cognitive-behavioral, or eclectic treatment orientation in an evaluation of Department of Veterans Affairs (VA) substance abuse treatment (Ouimette et al. 1997). Program orientation was verified by examining staff responses to the DAPTI.

### *Measures of Social Climate*

Rudolf Moos and his colleagues developed two measures—the Ward Atmosphere Scale (WAS) (Moos 1989, 1997) and the Community-Oriented Programs Environment Scale (COPEs) (Moos 1988b, 1997)—to tap the social climates of hospital- and community-based residential psychiatric and substance abuse treatment programs. Three domains of variables are assessed. The *relationship* subscales

are Involvement, Support, and Spontaneity. The *personal growth or treatment goal* subscales are Autonomy, Practical Orientation, Personal Problem Orientation, and Anger and Aggression. The *system maintenance* subscales are Order and Organization, Program Clarity, and Staff Control. Each of the 10 WAS and COPEs subscales consists of 10 items with a true/false response format. Item content is similar on the two measures, with some wording differences reflecting the different settings and staffing patterns of inpatient versus community-based programs.

Extensive psychometric data indicate that the WAS and COPEs subscales have adequate internal consistency, have high test-retest reliability, and are sufficiently independent (Moos 1988b, 1989, 1997). Normative data are available for the WAS based on a U.S. sample of 160 programs located in 44 hospitals in 16 States; COPEs normative data are available based on 54 programs. The construct validity of the WAS (and, by extension, the COPEs) was supported by expected correlations between WAS subscales and subscales on Ellsworth and Maroney's (1972) Perception of Ward subscales and by results from a number of research projects (for overviews, see Moos 1988b, 1989, 1997).

The WAS and COPEs have been used in various ways in substance abuse treatment evaluations (Finney and Moos 1984; Moos and Finney 1986; Moos 1988a). One is to assess treatment implementation by comparing program environments to normative data (Moffett 1984; Moos et al. 1990), concepts of an ideal program using Form I of the instruments (Bliss et al. 1976; Moffett and Flagg 1993), or theoretical specifications and/or expert judgments (Price and Moos 1975; Steiner et al. 1982; Moffett 1984). In addition, aggregate social climate scores have been linked to program-level outcomes (Bale et al. 1984), and individual perceptions have been linked to retention in substance abuse treatment (Harris et al. 1980; Bell 1985) and to patient posttreatment functioning (Fischer 1979; Moos et al. 1990). Finally, the WAS and COPEs have been used in a feedback process to assist treatment providers in changing treatment environments toward more ideal conditions or those specified by a treatment theory (e.g., Herrera and Lawson 1987).

**TABLE 2.—Measures of treatment orientation**

**Measure:** Drug and Alcohol Program Treatment Inventory (DAPTI)

**Citation:** Peterson et al. 1994a, Swindle et al. 1995

**Description:** The DAPTI assesses the distinctive goals and activities of Alcoholics Anonymous/12-step treatment, the therapeutic community approach, cognitive-behavioral treatment, insight/psychodynamic treatment, rehabilitation, dual diagnosis treatment, medical model treatment, and marital/family systems therapy. The current DAPTI consists of four goal and four activity items to assess each of the eight orientations; the eight subscales had moderate to high internal consistency reliability estimates. Swindle and his colleagues (1995) provided validity data in the form of DAPTI subscale scores for programs with independently established treatment orientations and correlations with treatment services as assessed by the DAPSI (see table 1). The DAPTI also has been used to assess community residential facilities for substance abuse patients (Moos et al. 1995). More generally, treatment providers can use the DAPTI to determine the extent to which the treatment staff of a program have similar views about what the program is trying to accomplish and about the therapeutic activities to be used to accomplish the program's treatment objectives.

**Measure:** Counselor Treatment Approaches

**Citation:** Kasarabada et al. 2001

**Description:** This multidimensional instrument assesses five treatment approaches: psychodynamic or interpersonal, cognitive-behavioral, family systems or dynamics, 12-step, and case management. For each of the first four modalities, items assess beliefs underlying the approach, practices appropriate in individual therapy, and practices appropriate in group therapy. Case management is an individual approach, so no group practices items were included. In addition, items were developed to tap general "group techniques" (e.g., "encouraging peer social support") and "practical counseling" (e.g., "developing rapport and trust"). The instrument consists of 48 items that assess 14 subscales. Construct validity was supported by the results of a confirmatory factor analysis in which subscale items loaded on the factor they were intended to assess, but not on other factors. Corresponding belief and practice subscales correlated highly, except for case management. Cronbach alphas for all subscales except psychodynamic and family systems beliefs were above 0.50 and most were over 0.70 (Kasarabada et al. 2001, p. 287). The fact that some of the subscales consist of only three items contributed to low internal consistency estimates.

**Measure:** Survey of Essential Elements Questionnaire (SEEQ)

**Citations:** Melnick and De Leon 1999; Melnick et al. 2000

**Description:** The SEEQ, which takes 20–30 minutes to complete, consists of 139 items that tap 27 domains related to therapeutic community (TC) treatment. The domains fall into one of six general dimensions: TC perspective on addiction and recovery (e.g., "Right living, including self-reliance and positive social and work-related attitudes is crucial to recovery from substance abuse"); agency treatment approach and structure (e.g., "The treatment approach centers on members' participation in the community"); community as therapeutic agent (e.g., "Status and privileges are related to progress in the program"); educational and work activities (e.g., "Work is used as part of the therapeutic program [i.e., to build self-esteem and social responsibility]"); formal therapeutic elements (e.g., "The members are reinforced for acting in a positive manner while negative behavior



**TABLE 2.—Measures of treatment orientation** (continued)

is met with confrontation”); and process (e.g., “The major goal of the primary treatment stage is the development of a set of values consistent with those of the community”). Respondents rate the items on 5-point Likert-type scales, from “extremely important” to “very little importance.” Based on data from directors of 59 of the 69 member programs in the Therapeutic Communities of America organization, internal consistency reliability estimates (coefficient alphas) for the six general dimensions ranged from 0.76 (TC perspective) to 0.94 (community as therapeutic agent) (Melnick and De Leon 1999). Alphas for the 27 domains generally were acceptable, with the exception of 8 domains that had coefficients below 0.70. A cluster analysis based on the 6 SEEQ dimensions classified 45 programs as either traditional TCs ( $n = 37$ ) or modified TCs ( $n = 8$ ) (Melnick and De Leon 1999; see also Melnick et al. 2000). Melnick et al. (2000) noted that although the SEEQ assesses important aspects of TC treatment, it does not assess the quality of those components.

**Measure:** Social Model Philosophy Scale (SMPS)

**Citation:** Kaskutas et al. 1998

**Description:** The SMPS assesses the extent to which substance abuse treatment programs embody the social model approach (Borkman 1990). The 33 items of the SMPS assess six subscales: physical environment, staff role, authority base, view of substance abuse problems, governance, and community orientation. In a sample of 27 residential programs, the Cronbach alpha for the overall scale was 0.92; subscale alphas ranged from 0.57 to 0.79. Some evidence of overall scale validity was provided by a correlation of 0.66 between SMPS overall scale scores and rankings by experts of the conformity of 15 programs to the social model.

Of all the program-level instruments reviewed here, the WAS and COPES have been the most widely used and have the most extensive psychometric data.

#### *Measure of Readiness To Implement Evidence-Based Practices*

Substantial interest has arisen in “translating” substance abuse treatment research into practice. The assumption is that implementing evidence-based treatment practices will improve quality of care and, consequently, patients’ outcomes. The Institute of Behavioral Research (IBR) at Texas Christian University has developed the Organizational Readiness for Change (ORC) instrument to assess this aspect of substance abuse programs. The ORC is a 115-item, self-administered questionnaire that takes approximately 25 minutes to complete. Separate forms are available for program directors/supervisors and counseling staff. The ORC assesses motivational factors

(program needs, training needs, and pressure to change), program resources (office facilities, staffing, training, computer equipment and electronic communications), and organizational dynamics (staff characteristics related to growth, efficacy, influence, adaptability, and clinical orientation; program climate related to mission, cohesion, autonomy, communication, stress, and flexibility). Copies of the ORC are available at [www.ibr.tcu.edu/pubs/datacoll/coresetforms.html#Form-ORC](http://www.ibr.tcu.edu/pubs/datacoll/coresetforms.html#Form-ORC). Although the ORC is sufficiently new that psychometric data are not available, it breaks important new ground in the assessment of substance abuse programs.

#### **Provider Characteristics**

The general program-level instruments reviewed above and in table 1 assess staff characteristics at the aggregate level. Some studies, however, have focused on variation in the characteristics of indi-

vidual staff members. Najavits and Weiss (1994) proposed six classes of relevant variables: knowledge of therapeutic techniques and substance use disorders; emotional attitudes, such as liking patients and helping orientation; general personality variables; relational style with patients; sociodemographic characteristics, such as experience and gender; and job characteristics, such as salary and perceived responsibilities. Beutler et al. (1986) provided an excellent review of therapist variables in the psychotherapeutic process. Given that review and space limitations, only one measure specific to alcohol treatment is reviewed here, a measure of staff members' "knowledge" or beliefs about alcohol abuse.

The Understanding of Alcoholism Scale (UAS), developed by Moyers and Miller (1993), initially consisted of 50 items. A factor analysis yielded three factors that were labeled Disease Model Beliefs (21 items), Psychosocial Beliefs (12 items), and Heterogeneity of Alcoholic Clients (8 items). Humphreys et al. (1996a) developed a short form of the UAS. Moyers and Miller found that treatment providers who were in recovery were more likely to endorse disease model beliefs (see also Humphreys et al. 1996b). Therapists who more strongly endorsed disease model beliefs were more likely to say they would impose a treatment goal on patients and would not offer treatment oriented toward non-problem drinking. Therapists endorsing psychosocial beliefs more strongly indicated they would be more likely to reach out to patients who had left treatment. Given its low internal consistency, Moyers and Miller (1993) recommended against using the client heterogeneity subscale of the UAS.

### **Treatment Provided/Patient Involvement in Treatment**

In pharmacologic studies, treatment provided and patients' compliance with treatment are assessed in terms of medications taken. Developments such as Medication Event Monitoring System (MEMS) vials that record the dates and times they are opened (e.g., Namkoong et al. 1999; Krystal et al.

2001) can yield more accurate compliance data than patient reports or pill counts. A more direct assessment of not only medication compliance but achievement of therapeutic doses can be obtained with chemical assays (e.g., Fuller et al. 1986; Helander 1998).

For psychosocial interventions, the simplest index of treatment provided/client involvement in treatment is time spent in treatment or the number of sessions attended. In treatment settings, program records can be used to determine sessions attended, or staff can record attendance. For assessing attendance at mutual-help groups, such as Alcoholics Anonymous (AA), individuals' retrospective reports can be unreliable. Yeaton (1994) assessed attendance at Manic-Depressive and Depressive Association (MDDA) self-help group meetings by asking attendees to complete a short assessment form and to include only the last seven digits of their social security numbers. Given that anonymity is stressed at MDDA meetings, Yeaton's methodology could be applied to assess attendance at AA meetings.

A 10-item checklist was developed by K.M. Carroll and colleagues (1998b) on which therapists could indicate whether or not they had provided selected aspects of cognitive-behavioral substance abuse treatment in a therapy session. For example, one item was: "Did you plan for high risk situations that may be encountered by the patient before the next session?" Unfortunately, low levels of agreement were found between therapists' responses and observer codings of videotapes of the same sessions. Therapists tended to record greater use of techniques than did observers.

A general measure of treatment provided is the Treatment Services Review (TSR) (McLellan et al. 1992; Zanis et al. 1997). The TSR is a 5-minute patient interview administered by a technician. It assesses the quantity and breadth of services targeted toward each of seven functioning areas that the patient feels he or she has been provided in the past week. The seven target areas are the same areas tapped by the Addiction Severity Index (ASI) (McLellan et al. 1985):

medical status, employment and support, drug use, alcohol use, legal status, family/social status, and psychiatric status. For each area, the TSR yields two summary scores reflecting the number of professional or specialist services and the number of significant group or individual discussions, including discussions in such groups as AA and Narcotics Anonymous (NA). A Teen-Treatment Services Review for use with adolescents in substance abuse treatment has been developed by Kaminer et al. (1998)

Test-retest reliabilities in the form of exact agreement in responses with a 1-day interval were high (McLellan et al. 1992). Initial validity data in the form of agreement with clinic records were acceptable. In addition, significant relationships were found between scores on the medical, drug, and psychiatric areas of need, as assessed by the ASI, and the corresponding TSR subscales (McLellan et al. 1992). Other validity data come from three studies that yielded TSR score variation that was commensurate with the different levels of services offered across programs (Alterman et al. 1993; McLellan et al. 1993a, 1993b). Overall, the TSR has shown that substance abuse treatment often focuses on patients' substance use disorders, while ignoring other problem areas in patients' lives (Alterman et al. 2000).

### **Proximal Outcomes**

Treatment providers sometimes assess clients during the course of treatment to determine to what extent deficits or dysfunction identified in the treatment planning process (see Donovan's chapter in this *Guide*) have been reduced or eliminated, and to identify therapeutic gains. For researchers, proximal outcome variables constitute mediating variables of interest in treatment process analyses. Thus, two important research bases for choosing among measures of relevant proximal outcome variables are (a) the extent to which they have been shown to be responsive to differences in treatment provided and (b) the extent to which they have been linked with such ultimate outcomes as abstinence or reduced

alcohol consumption. Theoretically guided sets of proximal outcome instruments are available for at least three prominent treatment approaches: therapeutic community treatment, cognitive-behavioral approaches, and traditional 12-step treatment.

### *Measures for Therapeutic Community Treatment*

Kressel and his colleagues (2000) developed a 98-item Client Assessment Inventory (CAI) and two summary measures, a 14-item Client Assessment Summary and similar 14-item Staff Assessment Summary. These instruments measure clients' progress in therapeutic community treatment with respect to 14 dimensions falling in one of four domains. The domain of "individual development" encompasses maturity (self-regulation and social management), responsibility (accountability, meeting obligations), and values (integrity and "right living"). "Socialization to the larger society" assesses drug/criminal lifestyle, images (social vs. antisocial lifestyle), work attitude, and social skills. "Psychological development" focuses on cognitive skills (awareness, judgment, insight, reality testing, decisionmaking, and problem-solving skills), emotional skills (communication and management of feeling states), and self-esteem/self-efficacy. Finally, the "community member" domain encompasses understanding of program rules, philosophy and structure, community engagement and participation; attachment, investment and stake in the community; and being a role model.

Internal consistency reliability estimates (Cronbach alphas) based on data from 346 therapeutic community residents ranged from 0.65 to 0.86 across the 14 dimensions assessed by the CAI. Clients who had been in treatment longer had more favorable proximal outcomes than clients with less tenure. The predictive validity of these indices is to be the focus of a future report. It is hoped that future studies will link therapeutic community orientation, as assessed by the SEEQ (see table 2), to client progress, as assessed by the CAI, across different therapeutic community programs.

### *Measures for Cognitive-Behavioral Treatment*

The behavioral focus in most cognitive-behavioral programs is on imparting coping skills that clients can use to avoid drinking or drinking excessively in situations that previously had been associated with heavy drinking. Primary cognitive proximal outcomes stressed in cognitive-behavioral treatment are an enhanced sense of self-efficacy (Annis and Graham 1988; Ito et al. 1988; Mayer and Koeningsmark 1992; McKay et al. 1993; DiClemente et al. 1994a; Goldbeck et al. 1997; Sklar et al. 1997; Brown et al. 1998; Coon et al. 1998; Long et al. 1998; Sklar and Turner 1999; Breslin et al. 2000; Greenfield et al. 2000; Long et al. 2000) and decreased positive and increased negative anticipated consequences of drinking (drinking expectancies) (e.g., Connors et al. 1993; B.T. Jones and McMahon 1996; Cunningham et al. 1997; Brown et al. 1998; Vik et al. 1999). Assessment of self-efficacy and drinking expectancies is discussed in the chapter by Donovan in this *Guide*.

*Role-Play Measures of Coping Skills.*— Behavioral measures of coping responses have been developed that involve obtaining patients' video- or audiotaped role-play responses to vignettes or situations. Table 3 provides descriptions of four role-play measures: the Situational Competency Test (SCT) (Chaney et al. 1978); the Adaptive Skills Battery (ASB) (S.L. Jones and Lanyon 1981; Nixon et al. 1992); the Problem Situation Inventory (PSI) (Hawkins et al. 1986; Wells et al. 1989); and the Alcohol-Specific Role Play Test (ASRPT) (Abrams et al. 1991; Monti et al. 1993). A fifth measure, the Interpersonal Situations Test (IST), was only used in one study (Twentyman et al. 1982), and no attempt was made to determine if the IST was responsive to treatment variations or linked with ultimate outcomes.

Although sharing a behavioral (role-play) approach to assessment, the four role-play measures in table 3 differ in their scoring procedures. All of the instruments assess "skill" in some sense, but they vary in other aspects of

responses that are coded. In the case of the SCT, the rapidity with which responses (at whatever skill level) are provided and the duration of responses are coded. The ASRPT assesses "anxiety" and also asks the respondent to assess his or her "urge to drink" in each situation. These latter two variables are not skills or aspects of skills. Other measures of "anxiety" or "social anxiety" (Heimberg et al. 1992), though not of anxiety in drinking-related situations, or of "temptation" (DiClemente and Hughes 1990), may provide a less time-consuming assessment format.

Reliability data in terms of rates of interrater agreement and internal consistency estimates are available for all four of the behavioral coping skills assessment procedures. Although they vary in amount (the data for the ASRPT are the most extensive), they do not provide a strong basis for choosing among measures. Other critical standards for evaluating these measures as proximal outcomes are the extent to which they have indicated more coping skills acquisition among patients exposed to skills-oriented than to other treatments, and the extent to which they have been linked to positive ultimate outcomes.

With respect to the first type of evidence, some dimensions of the SCT (Chaney et al. 1978; but see Smith and McCrady 1991), the PSI (Hawkins et al. 1986; but see Wells et al. 1994), and the ASRPT (Monti et al. 1990; Kadden et al. 1992) have been shown to be differentially responsive to treatment in at least one study, whereas this has not been demonstrated for the ASB (S.L. Jones et al. 1982). Overall, the evidence is mixed and the number of relevant studies is small, allowing no firm conclusions to be drawn. For studies with negative results, it is not clear whether such findings reflect inadequacies in the measures or in the interventions.

With respect to linkages between assessed coping skills and ultimate outcomes, again the evidence is mixed. Some dimensions of the SCT (Chaney et al. 1978), the PSI (Wells et al. 1989), and the ASRPT (Monti et al. 1990; Kadden et al. 1992), assessed during or at the end of treatment,

**Table 3.—Measures of coping responses**

**Role-Play Measures**

**Measure:** Situational Competency Test (SCT)

**Citation:** Chaney et al. 1978

**Description:** The SCT consists of 16 audiotape-recorded situations that are presented to patients who are asked to respond to each as they would in actual situations. Four situations assess responses in four of the likeliest relapse situations identified by Marlatt (1978): frustration and anger, interpersonal temptation, negative emotional states, and intrapersonal temptation. Responses are rated on response latency, duration of response, compliance versus assertiveness, and specification of problem-solving behavior.

**Measure:** Adaptive Skills Battery (ASB)

**Citations:** S.L. Jones and Lanyon 1981; Nixon et al. 1992

**Description:** The ASB is another early measure that taps coping skills in five types of situations identified by Miller (1976) as precipitants of drinking: social, such as peer pressure; situational, such as liquor advertisements; cognitive, such as self-derogation; physiological, such as pain; and emotional, such as anger. Patients are asked to describe either their usual or their best conceivable response to each of 30 situations as it is presented in a tape-recorded format. Responses are scored on a 3-point competency scale.

**Measure:** Problem Situation Inventory (PSI)

**Citations:** Hawkins et al. 1986; Wells et al. 1989

**Description:** The PSI consists of 47 situations presented by audiotape. Each situation taps one of five skills: avoiding drug use (5 items), avoiding alcohol use (7 items), coping with relapse (4 items), thinking about consequences (2 items), and general social problem-solving and stress coping (29 items). Responses to the situations are coded in terms of the presence of 21 components (e.g., “provides a reason”). For each situation, the total number of components identified in the response is scored. Bonus points are given for responses that contain additional behavioral components (e.g., “avoids drug-oriented settings” and “changes topic from drugs to safe subject”). Scores are reduced if the patient provides an aggressive, passive, or poorly executed response.

**Measure:** Alcohol-Specific Role Play Test (ASRPT)

**Citations:** Abrams et al. 1991; Monti et al. 1993

**Description:** With the ASRPT, a patient role-plays responses to 10 situations—5 interpersonal and 5 intrapersonal in nature. In contrast to the other measures, the ASRPT situations are presented live by a technician speaking from behind a screen. A male and a female confederate are used for the interpersonal situations. Subjects are instructed to respond to each situation as if they were in it and trying not to drink. After each role-play, the respondent rates his or her reactions on 11-point anchored Likert scales with respect to urge to drink, difficulty in dealing with the situation in real life, nervousness or anxiety, and skill. Responses are videotaped and rated for either social skill (for interpersonal situations) or coping skill (for intrapersonal situations), as well as for anxiety. In the study by Monti et al. (1990), responses also were rated for latency and for their effectiveness in preventing a person from drinking (see also Abrams et al. 1991).

**Table 3.—Measures of coping responses** (*continued*)**Pencil-and-Paper Measures**

**Measure:** Coping Behaviours Inventory (CBI)

**Citation:** Litman et al. 1979, Litman and Stapleton 1983; Litman et al. 1984; Maisto et al. 2000

**Description:** The CBI initially was a 60-item questionnaire (Litman et al. 1979). In later work (Litman and Stapleton 1983; Litman et al. 1984), a modified version of the CBI was employed, made up of 36 items. A principal components analysis yielded four factors: positive thinking, negative thinking, avoidance/distraction, and seeking social supports. Increases in patients' positive thinking and decreases in avoidance between intake and 6 weeks postdischarge were associated with avoiding relapse at followup 6–15 months later.

**Measure:** Processes of Change Questionnaire (POC)

**Citation:** Snow et al. 1994

**Description:** Building on previous work in the areas of smoking cessation and psychotherapy, the POC assesses process of change with respect to drinking problems. Processes of change “are covert and overt activities and experiences that individuals engage in when they attempt to modify problem behaviors” (Prochaska et al. 1992, p. 1107). As such, they can be conceptualized as coping responses. Initially, 6 items were used to tap each of 11 processes of change (e.g., self-liberation, counter-conditioning, environmental reevaluation). Eight of the 11 POC scales (stimulus control, helping relationships, behavioral management, evaluation, consciousness raising, social liberation, dramatic relief, and substance [medication] usage) were retained after a principal components analysis (30 items, overall). The 4-item substance (medication) usage subscale was unrelated to the other processes and exhibited a high level of kurtosis, so it was dropped in later analyses. Higher order, cognitive (consciousness raising, dramatic relief, evaluation, and social liberation) and behavioral (behavioral management, helping relationships, and stimulus control) processes of change indices were derived using confirmatory factor analysis.

**Measure:** Adolescent Relapse Coping Questionnaire (ARCQ)

**Citation:** Myers et al. 1993; Myers and Brown 1996

**Description:** The ARCQ consists of a description of a hypothetical situation that represents high risk for relapse (drugs and alcohol offered at a small social gathering at a friend's house), followed by appraisal questions that ask about self-efficacy for abstinence, perceived difficulty in coping, and importance of remaining abstinent. Coping strategies are assessed by 33 items; 21 are from the Ways of Coping Questionnaire (Folkman and Lazarus 1980), and 12 items were developed based on teenagers' responses to high-risk situations. A components analysis extended (Myers and Brown 1996) indicated three factors: a general cognitive/behavioral problem-solving coping strategies factor on which 12 items loaded, a “self-critical thinking” factor on which 7 items loaded, and an abstinence-focused factor on which 9 items loaded. Coefficient alphas for the three scales ranged from 0.78 to 0.82.

have been linked with drinking behavior at followup. On the ASB, both usual and best responses were rated as more skillful among persons who were seen as having better outcomes at a 1-year followup (S.L. Jones and Lanyon 1981). Unfortunately, the ASB was administered at followup, rather than during or at the end of treatment, so the relationships of ASB scores to outcome may reflect common method variance. In any event, they do not indicate *predictive* validity (see also Rosenberg's [1983] analyses of SCT responses).

The role-play measures combine situations that, although thought to be relapse-inducing, do not directly mention alcohol, with situations that directly involve alcohol use. For example, only 6 of the 10 ASRPT situations directly involve alcohol; 4 of the SCT situations directly assess drink refusal (Smith and McCrady 1991). Responses to ASB situations that mentioned drinking ( $n = 8$ ), as well as those that did not ( $n = 22$ ), were related to outcome. The correlation for the drinking-related situations was stronger, but not significantly so (S.L. Jones and Lanyon 1981). On the PSI, Wells et al. (1989) found that whereas general social/problem-solving skills among residents soon to be released from a therapeutic community program showed no relationship, specific alcohol-related skills were linked to reduced substance use 9 months later. However, among patients who had experienced a lapse, general skills appeared to "assist subjects to arrest lapses through problem solving or seeking support before they become extensive relapses" (Wells et al. 1989, p. 18). Thus, although general skills may play a role in limiting lapses, it appears that specific alcohol-related skills play a more important role in lowering the risk of any drinking. To reduce assessment time, some researchers/clinicians may wish to limit role-plays to only those situations involving alcohol.

*Pencil-and-Paper Measures of Coping Skills.*—Role-play measures of coping responses are relatively inconvenient to administer, time-consuming, and somewhat expensive to score. Pencil-and-paper measures of coping skills, although presumably not having the same level of ecological validity as role-

play measures, are convenient (they can be administered in a followup interview or as part of a self-administered questionnaire), are relatively inexpensive, and can tap both cognitive and behavioral coping methods. Three such measures are described in table 3: the Coping Behaviours Inventory (CBI) (Litman et al. 1979; Litman and Stapleton 1983; Litman et al. 1984; Maisto et al. 2000); the Processes of Change Questionnaire (POC) (Snow et al. 1994); and the Adolescent Relapse Coping Questionnaire (ARCQ) (Myers et al. 1993; Myers and Brown 1996).

Ito et al. (1988) administered the CBI at pretreatment, posttreatment, and followup to patients exposed to either interpersonal therapy or relapse prevention training. Cognitive coping scores (positive and negative thinking) increased from pre- to posttreatment significantly in each of the two treatment groups. Behavioral coping (avoidance and distraction/substitution) increased pre- to posttreatment for the overall sample; the increase was significant for the interpersonal therapy group, but not for the relapse prevention group. When the two treatment groups were combined, cognitive coping methods were associated with abstinence at a 6-month followup, but not with three other drinking-related outcome variables (Ito and Donovan 1990). (For another study using the CBI, see Shaw et al. 1990.)

With the POC, Snow et al. (1994) found that the use of more cognitive and behavioral approaches was correlated with a greater length of sobriety among former problem drinkers. Persons currently involved in AA indicated greater use of helping relationships, stimulus control, and behavior management in comparison with persons who had never been in AA or had only been involved in the past. Current and past AA members reported greater use of consciousness-raising than did persons who had never attended AA meetings. The POC is a promising instrument in need of further investigation. In particular, its validity should be examined by determining the responsiveness of particular processes to specific forms of treatment and by linking changes in processes to drinking behavior at followup.

Myers and Brown (1996) related scores on the ARCQ to the 1-year outcomes of 136 adolescents who had received inpatient substance abuse treatment. The ARCQ abstinence-focused coping factor was linked to reduced alcohol and other drug use during the followup year. In an earlier study (Myers et al. 1993), somewhat different ARCQ subscales predicted adolescents' outcome following inpatient substance abuse treatment. On the other hand, although Kelly et al. (2000) observed a significant relationship between adolescents' AA attendance during the first 3 months after inpatient substance abuse treatment and abstinence-focused coping assessed at the 3-month followup, they found no significant relationship between 3-month abstinence-focused coping and substance use assessed at a 6-month followup. As with the POC, more research is needed to determine the extent to which the ARCQ taps differential treatment response and is a predictor of treatment outcome.

Overall, although considerable research has been conducted on coping skills as proximal outcomes of cognitive-behavioral treatment, Morgenstern and Longabaugh (2000; see also Longabaugh and Morgenstern 1999) noted that there is relatively little research linking coping skills acquisition during treatment to posttreatment alcohol consumption, regardless of whether role-play or questionnaire measures are used. Whether these results reflect the conceptual inadequacy of the cognitive-behavioral treatment model or the psychometric inadequacy of current measures of coping skills remains to be determined.

#### *Measures for Disease Model/12-Step Treatment*

To the extent that traditional treatment programs encourage patients to become involved in 12-step groups in their communities, involvement in AA, NA, and Cocaine Anonymous can be considered a proximal outcome of traditional treatment (for studies of 12-step groups, portions of these same measures would be conceptualized as measures of treatment involvement [panel VI in figure 1]).

Most of these instruments have been developed for research purposes, but they also can be used to track patients' clinical progress. One measure, the Questionnaire of Twelve-Step Completion (Gorski 1990) was developed solely to allow 12-step group members or clinicians to track 12-step involvement; it is not reviewed here. An overview of many of these measures was provided by Allen (2000).

Table 4 describes seven measures of 12-step/AA treatment involvement: the Alcoholics Anonymous Involvement (AAI) Scale (Tonigan et al. 1996); the Steps Questionnaire (Gilbert 1991); the Spirituality Questionnaire (S. Carroll 1993); the Brown-Peterson Recovery Progress Inventory (B-PRPI) (Brown and Peterson 1991); the Self-Help Group Participation Scale and the Adoption of Self-Help Group Beliefs Scale (McKay et al. 1994); and the Alcoholics Anonymous Affiliation Scale (AAAS) (Humphreys et al. 1998). For the most part, no data are available indicating that the measures reviewed in table 4 are *differentially* responsive to 12-step-oriented treatment (although such a differential response seems likely given the 12-step specificity of these measures). Likewise, few findings are available that link scores on these measures to positive ultimate outcomes.

The measures have several problems that should be addressed. The AAI Scale, Spirituality Questionnaire, B-PRPI, and Self-Help Group Participation and Adoption of Self-Help Group Beliefs measures have only positively worded (or frequency of attendance) items and are thus vulnerable to an acquiescence response set. Some of the Steps Questionnaire items (e.g., "I am at the end of my rope because of my drinking," "My life has become unmanageable because of alcohol," "I cannot control my use of alcohol") are appropriate for an initial assessment of deficits, but, given the 12-step orientation toward surrender, seem ambiguous with respect to the assessment of improvement. Would an individual who has experienced 12 months of abstinence be expected to respond "yes" or "no" to such items? The Spirituality Questionnaire and B-PRPI mix items that tap behaviors (e.g., "read AA literature or other spiritual literature") or beliefs (e.g., "I



**TABLE 4.—Measures of 12-step/Alcoholics Anonymous (AA) involvement**

**Measure:** Alcoholics Anonymous Involvement (AAI) Scale

**Citation:** Tonigan et al. 1996

**Description:** The AAI is a 13-item self-administered questionnaire that assesses the respondent's commitment to AA and the extent of his or her "working" the program. Items tap attending AA meetings (including "90 meetings in 90 days"), having a sponsor, being a sponsor, celebrating an AA sobriety birthday, working each of the 12 steps, and having had a spiritual awakening. Two of the items are not used in calculating the overall AAI score, but assess 12-step exposure during treatment. Psychometric analyses were conducted using data from a sample of 1,726 participants in Project MATCH. A factor analysis yielded two factors that accounted for 49% of item variance: Attendance (accounting for 40% of the variance) and Involvement (accounting for 9% of the variance). Scores on the two factors correlated 0.64. The Cronbach alpha was 0.85 for the total AAI scale; it also was 0.85 for the Attendance subscale and 0.77 for the Involvement subscale. Test-retest correlations for the AAI and its subscales in a subsample of 76 persons who completed the AAI twice, 2 days apart, were 0.98 or 0.99.

**Measure:** Steps Questionnaire

**Citation:** Gilbert 1991

**Description:** The Steps Questionnaire consists of 42 items that measure attitudes and beliefs related to the first 3 of AA's 12 steps. A principal components analysis identified 23 items loading on three factors: Powerlessness, Higher Power, and Surrender. These three factors accounted for 59% of the total item variance. Only during-treatment Powerlessness predicted days sober at a 3-month followup (the only one out of 12 correlations that was significant). Gilbert (1991) also developed a second approach to scoring the Steps Questionnaire. To examine steps as a linear, hierarchical process, a Rasch analysis (similar to a Guttman scaling procedure) was conducted. Based on the results, 5 items were selected for each step. The 15-item Rasch analysis scale had a Cronbach alpha of 0.64.

**Measure:** Spirituality Questionnaire

**Citation:** S. Carroll 1993

**Description:** The 38 items in the Spirituality Questionnaire focus on involvement in Steps 11 (prayer and meditation) and 12 (helping other alcoholics). Coefficient alphas were 0.78 for the Step 11 subscale, 0.59 for the Step 12 subscale, and 0.78 for overall scores. Given the large number of items in each subscale, the low alphas suggest more than one construct is assessed by each. The Step 11 measure was significantly correlated with an increased sense of purpose in life and with length of sobriety in a sample of 100 AA members whose length of sobriety ranged from 7 days to 33 years (median of 3 years).

**Measure:** Brown-Peterson Recovery Progress Inventory (B-PRPI)

**Citation:** Brown and Peterson 1991

**Description:** The B-PRPI is a 53-item measure of behaviors, beliefs, and attitudes that is intended to assess a person's progress in a 12-step recovery program. Internal consistency reliabilities were 0.85 or higher. Length of sobriety was not related to total scores in an initial sample of 25 persons involved in the item development process. However, in a sample of 15 persons in outpatient treatment from

**TABLE 4.—Measures of 12-step/Alcoholics Anonymous (AA) involvement** (*continued*)

several 12-step-oriented programs, B-PRPI scores increased substantially pre- to posttreatment. Changes on the B-PRPI also were associated with changes in depression, hopelessness, self-concept, and other personality variables in directions that the authors report as supporting the criterion validity of the B-PRPI. In a more recent study, Carter (1998) compared 33 persons with alcohol/drug use disorders who had been in recovery for more than a year (mean 6.04 years) with 30 individuals who had a history of relapses and less than 1 year of recovery (mean 45 days). The former group scored significantly higher on the B-PRPI than the latter. Results are clouded, however, by differences between the groups on demographic characteristics and psychiatric diagnoses.

**Measure:** Self-Help Group Participation Scale; Adoption of Self-Help Group Beliefs Scale

**Citation:** McKay et al. 1994

**Description:** The 8-item Self-Help Group Participation Scale and the 4-item Adoption of Self-Help Group Beliefs Scale were used by McKay et al. (1994) to assess self-help group involvement. The internal consistency reliability estimates for the participation measure were 0.87 or higher at posttreatment and two followup points; coefficient alphas for the beliefs measure were 0.72–0.75. Endorsement of self-help group beliefs at the end of treatment was not associated with self-help participation following treatment. However, self-help group participation while in treatment was positively related to posttreatment participation in AA and Narcotics Anonymous. Neither measure assessed at treatment termination was associated with alcohol or cocaine use at followup, but posttreatment self-help participation was linked to positive outcomes (McKay et al. 1994).

**Measure:** Alcoholics Anonymous Affiliation Scale (AAAS)

**Citation:** Humphreys et al. 1998

**Description:** The AAAS is a 9-item scale that assesses attendance at AA meetings, having a sponsor, and reading AA literature. A factor analysis indicated a unidimensional scale, and internal consistency estimates of reliability were high (0.85 and 0.84 in treatment and community samples, respectively). Validity of the scale was suggested by higher scores for persons in treatment relative to individuals with alcohol problems in the community, and by persons in inpatient alcohol treatment scoring higher on it than persons in outpatient treatment (Humphreys et al. 1998).

believe in a power greater than myself”) with possible outcomes (e.g., “peace of mind” and even “abstinence or freedom from dependency”). The AAI Scale includes two items that refer to outcomes—having celebrated an AA sobriety birthday and having experienced a spiritual awakening. The utility of these scales for clinical monitoring and process analyses would be enhanced if their conceptual content was purified and separate subscales developed to assess actions, beliefs, and outcomes.

#### *Broader Assessment of Traditional Treatment Processes*

Morgenstern and his colleagues (1996) developed a self-report inventory to assess seven proximal outcomes in programs using a “traditional chemical dependency treatment” (TCDT) approach. Measures of proximal outcomes specific to TCDT include acknowledgment of powerlessness over substance use (Powerlessness—6 items) and Belief in a Higher Power (7 items), using items

from the Steps Questionnaire (Gilbert 1991). Other specific TCDT subscales assess commitment to affiliate with AA or NA (6 items), acknowledgment of having a disease of alcoholism or addiction (Disease Attribution—5 items), and beliefs that slips will inevitably lead to a full-blown relapse (Abstinence Violation Effect—5 items). The final two subscales assess commitment to lifetime abstinence (5 items) and intentions to avoid substance-related cues and situations that might lead to relapse (4 items), proximal outcomes viewed as common to TCDT and other treatment approaches. Coefficient alphas for the seven subscales ranged from 0.77 (Powerlessness and Abstinence Violation Effect) to 0.91 (Belief in a Higher Power). Validity data were presented in the form of correlations with counselor ratings. In addition, having had prior treatment was significantly associated with stronger Disease Attribution and Intention To Avoid High-Risk Situations.

Scores on the proximal outcome measures conceptualized as specific to TCDT increased significantly but moderately during treatment. However, scores on the common proximal outcomes (Commitment to Abstinence and Intention To Avoid High-Risk Situations) did not change significantly during treatment. Length of stay in treatment was unrelated to changes in either TCDT-specific or the general measures. Common, but not TCDT-specific, proximal outcomes were associated with avoiding relapse during the first month following treatment. However, among relapsers, commitment to affiliate with AA/NA and belief in a higher power were negatively related to the total number of days drinking (Morgenstern et al. 1996).

Finney et al. (1998) examined during-treatment change on traditional 12-step proximal outcomes (proximal outcomes associated with cognitive-behavioral treatment also were assessed). Patients received treatment in 12-step, cognitive-behavioral, or eclectic VA inpatient substance abuse programs. Patients in all three types of programs significantly improved on most of the proximal outcomes (disease model beliefs,

acceptance of an alcoholic or addict identity, commitment to an abstinence treatment goal, attendance at 12-step group meetings, number of 12-step group friends, reading 12-step materials, and number of steps taken). Patients who stayed in inpatient treatment longer tended to make more change on at least some proximal outcomes, although in most cases those relationships were only modest in magnitude. As expected, 12-step patients improved more than cognitive-behavioral patients on all of the 12-step proximal outcomes, except in number of steps taken. With respect to the proximal outcomes focused on in cognitive-behavioral treatment, however, cognitive-behavioral patients made no greater change, and on three proximal outcomes, made less change, than did 12-step patients.

As a next step, Finney et al. (1999) examined the predictive and cross-sectional relationships of proximal to 1-year outcomes. To be able to focus on more general proximal outcome indices and reduce the number of analyses, they developed composites that combined cognitive or behavioral proximal outcomes associated with 12-step or cognitive-behavioral treatment. The relationships of greatest interest in testing the adequacy of these two treatment models were those between proximal outcomes assessed at treatment discharge and substance use outcomes at 1-year followup. None of the correlations for the 12-step cognition or behavior composites, assessed at discharge, accounted for more than 1 percent of the variance in 1-year abstinence. Overall, the findings were similar to those of prior studies that generally have found weak to modest predictive relationships with substance use outcomes for such proximal outcomes as 12-step involvement.

## **SUMMARY AND CONCLUSION**

This review is not exhaustive. For example, it does not address general group processes in alcoholism treatment (for a review of instruments, see Beutler et al. 1993; see also Moos 1986a; Moos et al. 1993), instruments to assess the quality of work

environments for treatment staff (e.g., Moos 1986b), or treatment costs. Nevertheless, the review points to a few established and a number of promising instruments for assessing treatment and treatment processes in the alcohol field.

Overall, many of the measures reviewed have only minimal psychometric data available and have been used in only a limited number of studies (in some cases, only one). Additional research is needed to more accurately gauge their reliability and validity. For the proximal outcome variable measures that were reviewed, more research is needed to establish their responsiveness to different treatment approaches and their linkage to ultimate outcome variables.

New measures of treatment and treatment processes also should be developed. Better conceptualization of treatment processes should be a precursor to the development of those instruments, so that variables of the greatest relevance are focused upon. For example, disulfiram implants, although not used in the United States, are a treatment modality with more evidence of effectiveness than oral disulfiram (Holder et al. 1991; Finney and Monahan 1996). Disulfiram implants have proved effective even though it has been shown repeatedly in serum assays that an “active ingredient” is not present and they do not produce an effective dosage level (Johnsen et al. 1987). However, the most relevant proximal outcome variable in disulfiram treatment, as well as other antidipsotropics, is a psychological “mechanism of change”—anticipation or expectancy of a negative reaction if alcohol is consumed. Such expectancies (in addition to assays) should be examined to evaluate the full implementation of disulfiram treatment and to explore the process through which disulfiram may exert its effects. Treatment researchers and providers can use various “conceptual heuristics” (McClintock 1990) to develop better models of the treatment processes they are assessing or attempting to influence.

Additional efforts to improve the assessment of alcohol treatment and treatment processes would be well placed. They can help improve the provision

and monitoring of patient care, as well as enhance the ability of research to identify more effective forms of treatment, how they work, and for whom particular types of treatment are indicated.

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# Applied Issues in Treatment Outcome Assessment

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It is an exciting time to conduct alcoholism treatment outcome evaluation. Advancements in statistical software for personal computers, for example, have dramatically increased the type and complexity of techniques available to the evaluator. Although some concern has been raised about how the democratization of the tools of evaluation may precipitate their inappropriate use (e.g., Pedhazur 1982), indirect evidence suggests that increased accessibility has had an overall positive effect in the field. Miller et al. (1995a) found, for example, that the methodological quality of research outcome studies has improved significantly in the past 20 years, much of this due to selection of assessment instruments with known psychometric properties and the appropriate use of multivariate techniques. Software advances for personal computers have also spawned an audience-friendly revolution in how findings are presented, with time-to-event outcomes, hierarchical linear modeling findings, and structural equation modeling findings now presented in an understandable and graphic format.

It is also a critical time for doing rigorous outcome evaluation. In many States evaluation is now legislatively mandated, with future program appropriations tied to demonstration of treatment effectiveness. Programs and jobs can hinge on how well an evaluation report communicates findings to audiences unfamiliar with research methodology and the multifaceted nature of

alcohol treatment outcome(s). Under these conditions the evaluator has a clear responsibility to select assessment tools with demonstrated reliability and validity that are also sensitive to, and theoretically consistent with, treatment program objectives.

The purpose of this chapter is to familiarize the reader with a variety of fundamental issues that arise in the conduct of outcome evaluation in alcoholism treatment. The relative merits of specific measures of alcohol consumption (see the chapter by Sobell and Sobell) and biological markers (see the chapter by Allen et al.) are reviewed elsewhere in this *Guide* and will not be reiterated. This chapter begins with a general discussion of the importance of using assessments with strong psychometric properties. Reliability theory is described from an applied perspective, with examples provided using assessment tools reviewed in this *Guide*. The next section briefly addresses the goals of summative and formative alcohol-related outcome evaluation, highlighting the differences between individual and group-based evaluation. This is followed by a section that reviews alternative perspectives of alcoholism, with attention directed to how these definitions of alcoholism suggest relevant measures of change; a section that discusses the measurement of behavior change across time, noting how commonly observed patterns of behavioral change differ across particular domains of functioning;

and a section that introduces the concept of *meaningful* changes in drinking behavior and then offers specific recommendations for clinicians and researchers on how to evaluate the magnitude of behavior changes associated with treatment. The final section outlines some practical considerations in alcohol outcome evaluation, including interviewer role and training, instrument consistency, and data entry.

## THE VALUE OF RELIABLE MEASURES

*Reliability* refers to the extent that a measure is consistent and stable. In this regard, classical psychometric theory states that an observed score (O) is a function of the true score (T) and measurement error (E);  $O = T + E$ . Formally, reliability can be defined as

$$r_{xx} = 1 - (S_e^2 / S_x^2)$$

where  $r_{xx}$  is reliability,  $S_e^2$  is error variance in a group of scores, and  $S_x^2$  is variance in a group of observed scores. Reflection on the general meaning of the reliability formula reveals that a reliability coefficient (possible range 0 to 1.0) represents, in essence, the proportion of “true” score variance measured by a given instrument. Reliability coefficients approaching a value of 1.0 therefore indicate that nearly all variability in responses represents “true” or actual variability (no measurement error), while a reliability coefficient beneath 0.50 indicates that less than half of the variability in observed scores reflects “true” variability in the measured attribute (high measurement error).

To underscore the importance of reliability, imagine that a clinician is interested in the relationship between number of therapy sessions attended and days abstinent in a 60-day period. The question is not trivial for the clinician because of growing pressures to simultaneously enlarge caseloads and provide fewer sessions per client. Assume the reliability of the measure of sessions

attended is good, 0.95, but the reliability of the days abstinent measure is poor, 0.50. Finally, assume the *real* correlation between days in therapy and days abstinent is 0.75. The net result of measurement error in this example is that the observed correlation *cannot* exceed 0.52 ( $0.95 \times 0.50 \times 0.75$ ). Thus, although frequency of therapy accounts for more than half of the *real* variance in posttreatment abstinence ( $0.75^2 = 56$  percent), the use of an unreliable measure in this example would lead the therapist to conclude that the relationship is not strong enough to warrant approval of a greater number of therapy sessions ( $0.52^2 = 27$  percent).

As shown, the net effect of measurement error is to attenuate the magnitude of an observed correlation (Hunter et al. 1982). This is always the case. Unlike our example, however, the actual population correlation is rarely known and, as a result, the exact cost of measurement error is difficult to estimate. Measurement error, or lack of reliability, can therefore mask relationships of interest and, in some cases, may lead evaluators to draw too weak conclusions about treatment efficacy. A key point is that the relative importance of measurement error is inversely proportional to the anticipated magnitude of effect. As such, it is particularly important to use highly reliable measures when small effects are anticipated.

The standard error of measurement is defined as:  $S_e = S_x \sqrt{1 - r_{xx}}$ . This statistic is an invaluable aid for researchers and practitioners for interpretation of individual scores. For example, the 25-item Alcohol Dependence Scale (ADS) is commonly used to screen individuals at risk of alcohol dependence. Generally, a score of 9 or higher (possible range is 0 to 47) is suggestive of DSM alcohol dependence. Skinner and Horn (1984) reported that, as part of a larger test-retest exercise, the 25-item ADS had a reliability coefficient of 0.92, and in a normative sample of problem drinkers ( $N = 225$ ) the ADS had a standard deviation of 11. The standard error of measurement for

the ADS with problematic drinkers is therefore  $S_e = 11 \sqrt{1 - 0.92}$  or 3.11. What does this value of 3.11 mean? Applying the normal curve, we can develop a *band interpretation*, which states that a respondent's "true" score will be  $\pm 3.11$  its observed value 68 percent of the time, and  $2 \times 3.11 = 6.22$  its observed value 95 percent of the time. From this example one can see that to have 68 percent certainty about a "true" ADS score of 9, one must consider potential observed scores that range between 5.89 and 12.11 ( $9 \pm 3.11$ ). In cases where cutoff values are used for screening or diagnostic purposes in alcohol treatment, it is especially important that the standard error of measurement be considered in making clinical decisions.

Three methods for investigating reliability are described in this section: stability, equivalency, and internal item consistency. An example of each method is presented using an assessment tool included in this *Guide*. The presentation is intentionally simplified and limited to those reliability statistics most commonly reported in alcohol-related literature. Readers interested in a more detailed account of these methods or a more comprehensive presentation of approaches to determine instrument reliability should refer to texts dedicated to the topic (e.g., Carmines and Zeller 1979; Aiken 2000).

### Stability

This aspect of reliability refers to the extent that an observed score is consistent between two administrations (test-retest). Clearly, length of delay between administrations is an important consideration when assessing stability of measurement, with too short or too long of an interval introducing potential bias of recall and attribute instability effects, respectively. Ideally, length of delay between the two administrations balances attribute stability, measurement reactivity, and recall. Two of the most popular statistics to char-

acterize the stability of two measurements are the Pearson product moment ( $r$ ) and the intraclass correlations (ICCs). Because of their widespread use in assessing reliability, it is important to highlight how the ICC and the  $r$  coefficient provide different perspectives of stability.

The  $r$  coefficient expresses the degree to which paired values have similar rank orderings within their respective distributions. Absolute differences between paired values, however, are not considered in the computation of  $r$ . Thus, although the *relative* ranking of paired scores may be very similar, *absolute* values of the paired scores may be dissimilar. The ICC corrects for this limitation by indexing the absolute difference in agreement between paired scores as well as enabling partitioning of the variance of interest into several components. Standards to assess the reliability of instruments based on  $r$  are available and generally accepted. There is less agreement, however, about interpretation of ICCs. Cicchetti (1994) has recommended the following ranges to interpret the reliability of clinical instruments when ICCs are evaluated: below 0.40 = poor, 0.40 to 0.59 = fair, 0.60 to 0.74 = good, and 0.75 to 1.00 = excellent.

One example of the computational and interpretive differences arising between  $r$  and ICC was provided by Tonigan and colleagues (1997) in their evaluation of the test-retest reliability of Form 90. A test-retest study was conducted to investigate the reliability of primary measures used in Project MATCH, a large multisite study of client-treatment matching (Project MATCH Research Group 1997, 1998). A 2-day interval separated administration of the Form 90 interview conducted by different interviewers from different clinical sites ( $N = 70$  pairs). The Pearson product moment correlation between test-retest counts of the frequency of days in which Alcoholics Anonymous (AA) was attended (90 days before the interview) was  $r = 0.87$ . This generally would be regarded as demonstrating good to excellent stability. In contrast, the ICC for frequency of AA days was  $ICC = 0.53$ , which



according to Cicchetti (1994) should be considered fair reliability. The important point is that the ICC will always yield a more conservative estimate of reliability relative to  $r$ .

### **Equivalency**

This aspect of reliability examines the extent to which two different forms of the same test yield a consistent observed score. This kind of reliability also investigates equivalency among group means and the variance of two administrations of parallel tests. Theoretically, the split-half method of determining the internal item consistency of a test (discussed below) is a specialized aspect of equivalency testing. Statistics used to determine the equivalency of two parallel tests include the Pearson product moment and ICC coefficients. A unique advantage of a parallel test is that, in pre-post applications, the potential biasing effect of recall is minimized. In prevention research where knowledge gains following a school-based intervention are to be measured, the use of parallel tests with high reliability is worthy of consideration.

Babor (1996) offered an interesting variation in applying the equivalency approach to demonstrating instrument reliability. In the Project MATCH reliability study described earlier, two measures of alcohol dependence were collected, one a semi-structured interview based on DSM-III-R criteria (American Psychiatric Association 1987) and the other a 16-item self-report questionnaire (the Ethanol Dependence Syndrome [EDS] Scale) designed to parallel DSM-III-R criteria. Whereas the reliability of the semi-structured interview had received substantial attention, the 16-item “parallel” form had not. It is worth noting that the alternative forms also crossed method of data collection, that is, interview versus self-report. Pearson product moment correlations indicated that the two approaches yielded relatively consistent findings (range of  $r$ 's was 0.67 to 0.88)

between the two assessments, with the EDS scale costing substantially less to administer.

### **Internal Item Consistency**

Sometimes it is not possible to administer a test twice in a pre-post format to obtain reliability estimates, and for other reasons it may not be feasible or desirable to create parallel tests as is done in equivalency studies. It is still possible, nevertheless, to loosely assess the reliability of an assessment (using a single administration). Coefficients of internal item consistency, for example, identify the extent of item homogeneity in an assessment, which can inform one about the extent to which item content forms single or multiple *predicted* domains. As an example, the Drinker Inventory of Consequences (DrInC) (Miller et al. 1995b) was designed to measure adverse consequences associated with alcohol use. Miller and colleagues reasoned that such consequences could be grouped into discrete categories, including legal, health-related, interpersonal consequences, and the like. To this end, they developed an item pool representing each domain, had experts in the field review the items, and then administered the total pool of items to a sample of treatment-seeking clients (with items within each domain scattered in order). Logically, item responses within a domain ought to form a more homogeneous set than items combined across domains (or all items combined). Cronbach alpha is the most commonly reported statistic to reflect item homogeneity, which technically reflects the averaged extent to which each item correlates with its total set of items.

### **Summary**

Measurement is the cornerstone of outcome evaluation. At least three benefits will accrue from struggling through the formulas, examples, and conceptual issues framed in this section. Foremost, knowledge of measurement reliability is necessary to be an educated consumer of the alcohol-related

assessment tools contained in this *Guide*. Second, understanding that “reliability” is a continuum in which instruments can be described as having less or more (as opposed to being inconsistent or consistent) is important for avoiding the pitfall of reifying measurements. Even measures considered as having “good” reliability (e.g.,  $r_{xx} = 0.80$ ), for example, do not fully account for, or precisely reflect, an individual’s “true” score (e.g., 20 percent error in measurement). The third benefit is one of omission, having the knowledge *not* to follow the conventional practice of developing study-specific or clinician-derived assessment tools without any demonstrated reliability. Lack of reliability attenuates relationships of interest, whether they are investigated with correlational, analysis of variance (ANOVA)-based, or advanced statistical techniques such as multigroup structural equation modeling. Despite the argument that the need for content-specific assessments justifies “home-grown” assessments, meeting this need rarely compensates for the loss in measurement reliability.

## GOALS OF OUTCOME EVALUATION

The basic question in outcome evaluation is whether, and as the result of alcohol treatment exposure, a behavioral change has occurred. This change often refers to a reduction or cessation of alcohol consumption, although “harm reduction” models may place equal importance on changes in alcohol-related problems and high-risk-related behaviors. *Summative* evaluation addresses the question of programmatic value or the relative effectiveness of treatments; *formative* evaluation focuses on collection of information to improve existing treatment services. Generally, the unit of analysis in summative evaluation is aggregated, group-based data, whereas formative evaluation may include both individual-based and group-based information. This distinction is not firm,

however, as summative evaluation may include case studies to illustrate group-based findings.

In defining the unit of analysis in evaluation, the core issue is to whom (or what) findings are to be generalized—to clients or to types of treatments. Typically, clinicians are concerned with the posttreatment functioning of *individuals*. Here, followup assessment identifies whether additional alcohol treatment may be indicated, whether an aftercare program is sufficiently meeting client needs, and/or if alternative or additional interventions may be indicated for non-substance abuse problems. Further, clinicians can evaluate client impressions of the therapeutic experience, noting how these services may be improved. These examples illustrate the major purposes of individual-based outcome evaluation, namely (1) therapeutic feedback to the client or therapist and/or (2) feedback to improve delivery of services.

Evaluation can also involve the examination of the relative changes in *groups* of individuals who have received alcohol treatment. Individuals’ responses at followup are still recorded, with the important distinction that responses are aggregated to make decisions about the relative efficacy of treatment(s). In clinical settings, group-based evaluation generally is conducted to ascertain the extent of programmatic outcome evaluation of a single type of treatment, whereas in research settings programmatic outcome is conducted to determine the relative efficacy of different types of treatment. Several excellent texts are available that cover the topics of experimental and quasi-experimental design and potential threats to validity of findings (e.g., Cook and Campbell 1979).

## RELEVANT MEASURES OF CHANGE

There is a historical appreciation of the importance of alcohol consumption as a criterion for judging treatment outcome, and most would regard assessment of outcome without such a measure as inade-

quate. There is less agreement, however, about the need to assess nondrinking domains to define outcome, and even less consensus about which domains may be particularly relevant. The recent attention to harm reduction models for evaluating outcome, which emphasize not the reduction of alcohol consumption per se but instead decreases in alcohol-related problems and risk-taking behaviors, has led to renewed interest in the issue of life functioning outcomes more generally.

Babor et al. (1988) summarized how differences in definition of outcome reflect two competing paradigms describing the phenomenon of alcoholism. One model views alcoholism as a *unitary* syndrome with abstinence as the sole marker of treatment response, or success. In this model, psychosocial functioning, employment, use of illicit drugs, and an array of other domains, although seen as important, are regarded as being so strongly associated with alcohol use that they can be inferred directly from changes in alcohol consumption; thus, they tend not to be considered extremely relevant for change measurement. On the other hand, a *multidimensional* model views alcoholism as a cluster of somewhat independent dimensions, with reductions in drinking as an important but not sole determinant (and indicator) of treatment efficacy. Because life functioning domains, such as physical health and social adjustment, are considered to fluctuate largely independently of one another, and because they also predict future alcohol consumption, proponents of the multidimensional model assert that outcome should be defined broadly, taking into account an array of domains (Longabaugh et al. 1994). It is important to note that, despite these differences between unitary and multidimensional models of alcoholism, the models intersect on the importance of measuring alcohol use using multiple measures that reflect various aspects of drinking (e.g., frequency and intensity).

The simplest analytical strategy to determine the viability of these two competing definitions of

outcome is to correlate alcohol consumption with broader-based life functioning domain measures. Larger positive correlations would tend to support the unitary model, whereas modest to negligible correlations would support the multidimensional view of alcoholism. Table 1 summarizes the bivariate correlations between three measures of alcohol use for the 6-month period after alcohol treatment and five measures of client functioning also collected 6 months after treatment. The two samples in table 1 were recruited for Project MATCH, a study with high internal validity using only assessments with demonstrated reliability by highly trained and certified interviewers.

A basic conclusion to be drawn in surveying the magnitude of the correlations in table 1 is that, with the exception of alcohol-related problems, none of the correlations provide sufficient support for the unitary definition of alcoholism. To be sure, lack of instrument reliability attenuates the correlations of interest. It seems unlikely, however, that correction for attenuation would increase the magnitude of the correlations to the point of being supportive of the unitary concept of alcoholism. These findings do not agree with Emrick's (1974) recommendation that abstinence is sufficient to indicate posttreatment improvement in broader psychosocial domains. It is therefore recommended that psychosocial functioning be measured directly rather than inferred by changes in alcohol consumption.

Table 1 also facilitates comparison of the magnitude (hence stability) of relationships between drinking and psychosocial functioning by severity of alcohol-related problems. Can a stronger case be made for the unitary view of alcoholism among more or less severely impaired individuals? Relative to the outpatient sample in Project MATCH, for instance, the aftercare sample reported at recruitment significantly more frequent and intense drinking, a greater number of alcohol-related consequences, higher number of prior treatment experiences, and less social stability. The values in

**TABLE 1.—Correlations between three measures of alcohol use and five measures of general functioning: Project MATCH aftercare (*N* = 772) and outpatient (*N* = 952) samples**

Measures of general functioning	Measures of alcohol use 6 months posttreatment		
	PDA	DDD	First drink
<b>Aftercare Sample</b>			
BDI	−0.31 (0.34)	0.34 (0.07)	−0.27 (0.01)
Purpose in life	0.29 (0.11)	−0.32 (0.26)	0.24 (0.28)
PFI	0.20 (0.35)	−0.28 (0.27)	0.25 (0.01)
Alcohol-related problems	−0.55 (0.15)	0.67 (0.03)	−0.45 (0.01)
Illicit drug use	−0.13 (0.28)	0.13 (0.04)	−0.12 (0.42)
<b>Outpatient Sample</b>			
BDI	−0.29	0.27	−0.16
Purpose in life	0.23	−0.29	0.21
PFI	0.22	−0.25	0.13
Alcohol-related problems	−0.51	0.61	−0.31
Illicit drug use	−0.16	0.22	−0.11

Note: For measures of alcohol use, PDA = percent days abstinent for the 6 months after treatment (months 4–9); DDD = drinks per drinking day for the 6 months after treatment (months 4–9); first drink = the number of days between first therapy session and the first reported use of any alcohol. For measures of general functioning, BDI = Beck Depression Inventory; PFI = Psychosocial Functioning Inventory.

parentheses in table 1 show the probability values associated with contrasting parallel correlations between the two samples. For example, the correlation between percent days abstinent (PDA) and the Beck Depression Inventory (Beck et al. 1961) score was −0.31 for the aftercare sample and −0.29 for the outpatient sample. The question posed by statistically contrasting these two correlations is whether the observed difference in their magnitude reflects simple sampling and measurement error or “true” differences in the strength of the relationship between abstinence and depression. The probability value of 0.34 indicates that the magnitude of the two correlations is relatively equivalent (e.g., stable) between the aftercare and outpatient samples.

No between-sample differences were found in the magnitude of relationships between PDA and the five measures of client functioning. In contrast, in the aftercare sample there was a significantly stronger relationship between drinks per drinking day (DDD) and alcohol-related consequences rela-

tive to outpatient clients, whereas outpatient clients reported a significantly stronger and positive relationship between DDD and illicit drug use relative to the aftercare sample. Finally, somewhat consistent sample differences (three of five tests) were found using the number-of-days-to-first-drink measure. Significantly stronger negative correlations between days to relapse and increased alcohol-related consequences and depression were reported in the aftercare sample relative to the outpatient sample.

### CONCEPTUAL CONSIDERATIONS IN MEASURING BEHAVIOR CHANGE OVER TIME

The decision of what to measure followed by the selection of a reliable instrument are important steps in conducting outcome evaluation. This section addresses the equally salient topic of determining when to administer an assessment,

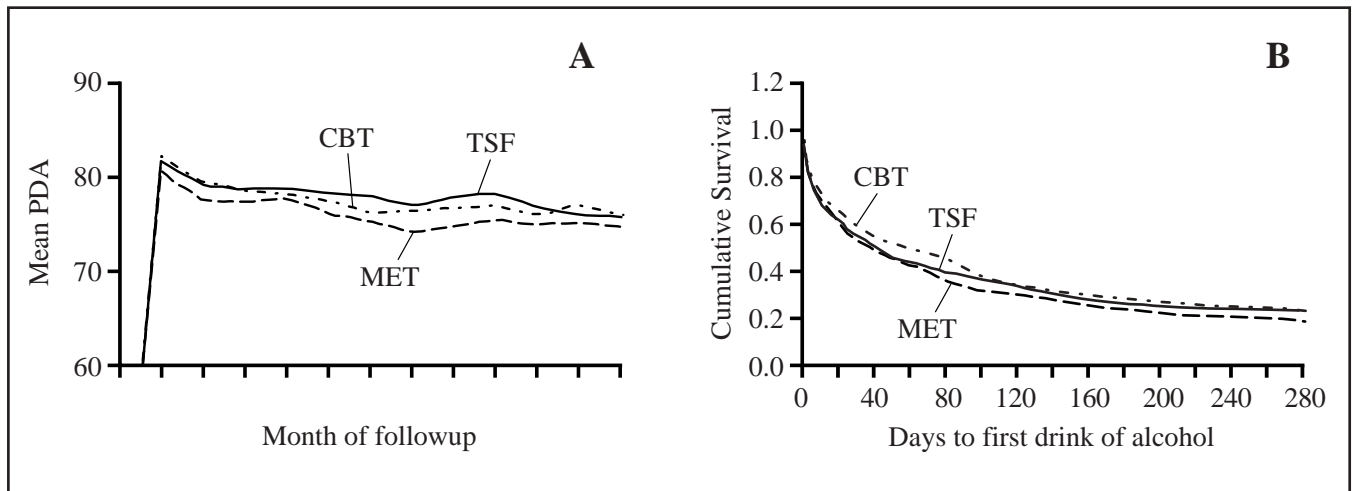
taking into account that changes in domains of individual functioning tend to occur at different rates after treatment (and with different patterns). The discussion that follows is based on findings of many studies of alcohol treatment-seeking adults, and it is important to emphasize that the measurement patterns described here may differ somewhat or a great deal from other populations of alcohol users, such as adolescents, treatment-resistant persons, and persons in natural recovery. With this caveat, a relatively common pattern of treatment outcomes across three domains of functioning can be described. First, typically the largest reduction in severity of alcohol-related problems will occur in the first 3 months after recruitment, a time during the delivery of the intervention. Only modest group changes in severity of alcohol problems, however, tend to be observed after this initial improvement. Counterintuitively, severity of medical problems tends to increase with reductions in alcohol severity and then begin to decline at the 6-month assessment (positively quadratic relationship). Legal problems, on the other hand, tend to be the most severe at baseline, decline to the 6-month assessment, and then begin to rise again (negative quadratic relationship).

Clearly, *when* an outcome is measured can be as important a decision as *what* is measured. In the case of severity of medical problems, for example, evaluation of pre-post changes using intake and 6-month data would lead to the erroneous conclusion that the intervention led to an increase in medical severity. Of course, the clinical interpretation is that with reductions in alcohol use persons begin to attend to acute and long-standing medical problems, both related and unrelated to alcohol use. This behavior appears to peak 6 months after treatment and then subsides.

Demonstration of treatment effectiveness based on drinking reductions over time may appear relatively straightforward. Such is not the case. Measures of alcohol use can offer alternative perspectives of treatment potency over time and,

as such, can lead to conflicting conclusions about the relative effectiveness of treatment. As an example, figure 1 presents Project MATCH client outcome for 12 months after study recruitment using two oppositional measures of alcohol use: (1) mean PDA in monthly intervals (positive outcome) and (2) number of days of abstinence until relapse occurs as defined by taking one or more drinks between the first therapy session and the following 100 days (negative outcome). Panel A shows that significant gains in monthly abstinence rates were obtained in each treatment group, with an overall pre-post change in PDA between recruitment and 6-month followup of more than 100 percent (31 percent vs. 78 percent, effect size = 1.66). In contrast, the time-to-event analysis in panel B suggests that fully 75 percent of all clients had at least one drink of alcohol between the first therapy session and the following 100 days. The Pearson correlation between days to first drink and days to first heavy drinking day (six or more drinks at one time) was 0.81, suggesting that, for the 75 percent of the clients who did consume alcohol, the two events were the same or temporally close in time.

An even more complex and subtle picture arises when judging the relative effectiveness of alcohol treatments over time using alternative measures of alcohol use. Figure 1 shows that the 12-step facilitation therapy (TSF) group reported the highest *mean* rate of abstinence over 12 months, but cognitive-behavioral therapy (CBT) clients reported modestly fewer instances of relapse relative to TSF and motivational enhancement therapy (MET) clients during this same period. Alcohol use measures depicting the virtues of MET have also been identified. The question faced by an evaluator is, Which is the superior alcohol treatment, CBT, MET, or TSF? This dilemma highlights one of the fundamental measurement challenges facing treatment outcome evaluators. By design, treatments are generally qualitatively different, each having a unique orien-

**FIGURE 1.—Project MATCH client outcome for aftercare and outpatient samples.**

Note: (A) Percent days abstinent (PDA) by treatment assignment. (B) Survival analysis by treatment assignment. CBT = cognitive-behavioral therapy; MET = motivational enhancement therapy; TSF = 12-step facilitation therapy.

tation and strategy. While the abstract goal of treatments may be concordant, alcohol use measures are differentially sensitive to the active ingredients of a particular treatment. Such differential sensitivity can reflect, over time, different patterns of treatment outcome. Thus, TSF with its strong emphasis on total abstinence may appear most effective judged by overall, monthly abstinence rates, whereas CBT skill training in stressing recognition of personal “triggers” for alcohol use may differentially offset the initial use of alcohol.

Although consensus has yet to emerge on how to resolve this issue, three strategies are offered, each of which has distinct advantages and limitations:

- Develop a specific and narrow definition of treatment effectiveness, one that all treatments are intended to directly impact. Effectiveness may be determined by a single outcome measure, but qualitative differences among treatment approaches must necessarily be restricted.
- Apply multiple and oppositional measures to determine treatment effectiveness,

acknowledging that, in all likelihood, all-purpose effectiveness cannot be demonstrated. This approach allows for unrestricted qualitative differences among treatments, but at the expense of interpretative clarity

- Characterize treatment effect in multi-dimensional terms, jointly and statistically considering multiple measures of outcome at one time.

### MEANINGFUL CHANGES IN DRINKING BEHAVIOR

Satisfactorily addressing the inherent tension of comparing qualitatively different treatments using the same outcome measure(s), the evaluator then relies on inferential testing to assess the probability that observed treatment differences represent chance fluctuation. The clinician, too, is faced with this question, but does so considering the individual as the unit of analysis. Specific recommendations are made in this section to aid clinicians and researchers in making this determination.

## **Recommendations for Clinicians**

At least three methods can be used to assess whether individuals demonstrate meaningful improvement in alcohol-related problems. The most obvious, of course, is the determination of whether clients achieve and can maintain treatment objectives. To make this determination, it is recommended that posttreatment assessment be done by an independent interviewer, and that the assessment be conducted at least 3 months after the cessation of treatment. Although it may not be feasible to have independent interviewers, such a practice is desired.

A second approach can be followed when assessment tools have published normative data. Clinicians can index individual pre-post scores to a normative sample, noting the extent of change in deciles, quartiles, and the like between pre- and posttest scores. With this approach, meaningful changes can be defined in relative terms (intra-individual) or in terms of a predetermined normative cutoff value (interindividual).

The third method distinguishes nonmeaningful and meaningful change, and its rationale draws on the earlier discussion of standard error of measurement. Pre-post changes in an individual's score that do not exceed the reported standard error of an instrument should be regarded as non-meaningful changes. In this case it is uncertain whether observed pre-post changes reflect actual change in behavior or just error in measurement. In contrast, pre-post score changes that are at least 2 times the standard error of an instrument exceed measurement error substantially and also represent considerable improvement in functioning for an individual (95 percent).

## **Recommendations for Researchers**

Rejection of the null hypothesis is a necessary but not sufficient condition to declare a meaningful effect. Blithely declaring meaningfulness because

of rejection of the null hypothesis ignores the basic fact that as sample size increases the magnitude of effect required to reject the null hypothesis decreases. With large samples, woefully small effects can be reliably detected, but they may have little clinical meaning. In addition, while efforts to control for an inflated type I error rate (rejection of a true null hypothesis) ought to be applauded, these procedures only maintain a nominal alpha level (e.g., 0.05) and do not speak at all to the question of meaningfulness.

Measures of effect size should be routinely computed and reported beside the results of significance tests. They are crucial for a determination of the magnitude of an observed effect, and they can be reported in a variety of forms, such as variance accounted for or magnitude in mean difference. Several excellent texts in the areas of meta-analysis (e.g., Hunter et al. 1982; Hedges and Olkin 1985) and power analysis (e.g., Cohen 1988) are available to assist researchers in the calculation of effect sizes, and many of the major statistical software packages now offer the option to report measures of effect sizes along with inferential tests (e.g., SPSSpc and SAS). Finally, specialized software is now available—free of charge on the Internet—to correct effect sizes for small-sample bias and to assess whether effect size distributions are estimates of a single parameter.

Exact guidelines for what constitutes a large or meaningful effect is specific to an area of study and consideration of the costs involved in producing the effect. Small effect sizes associated with minimal costs, for example, may be considered meaningful from a public policy perspective, while moderate to large effect sizes requiring huge financial expenditures to be produced may be considered less meaningful. The important point regarding this cost-benefit definition of meaningfulness is that scientists have the responsibility to describe benefit in a systematic fashion that facilitates comparison across treatment approaches.

## PRACTICAL CONSIDERATIONS IN MEASURING BEHAVIOR CHANGE OVER TIME

This section reviews some practical aspects of outcome evaluation. In essence, a laundry list of considerations is presented, ranging from the importance of collecting representative baseline data to problems associated with using different versions of the same assessment over the course of a study.

### Representative Baseline

For meaningful analysis of change, it is imperative that comparable pre- and posttreatment measures be collected. In fact, the importance of a detailed account of the effect of client pretreatment characteristics on severity measures cannot be overemphasized. Without such information, judgment of improvement following treatment is, at best, difficult. Detailed pretreatment assessment also allows for the search for prognostic indicators of outcome, some of which may be as powerful predictors of outcome as the treatment experience itself. Description of pretreatment drinking should take into account the nature of consumption of a clinical population and how consumption may vary in proximity to presentation for treatment. Adolescents, for example, tend to drink infrequently but at high intensity levels (e.g., binge). In this case a quantity-frequency (QF) measure may significantly underestimate salient drinking factors and, in the case of a typical 30-day assessment window, fail to characterize the full profile of drinking. In contrast, a QF measure may be appropriate for clinical populations characterized by steady drinking patterns over sustained periods of time. There is some evidence that client drinking immediately before presentation for treatment does not accurately mirror *typical* drinking. It is recommended, therefore, that assessment of pretreatment drinking elicit information for at least the 90 days prior to treatment. The chapter

by Sobell and Sobell in this *Guide* highlights several advantages and disadvantages of particular consumption measures and selection of a pre-post drinking measure.

Client attrition during and after treatment is an unfortunate fact in outcome evaluation. Detailed measurement of alcohol consumption at pretreatment is essential for understanding how, if at all, such attrition may bias study findings. Typically, attrition (yes/no) is crossed with treatment assignment via a chi-square test to assess whether attrition was random or systematically related to the kind of treatment offered. This is an important first step, but it does not address whether *severity* of alcohol-related problems (at intake) was prognostic of attrition, which (if this is the case) can have serious consequences for study internal and external validity. Two analyses can investigate these potential biases, both of which rely on detailed pretreatment measurement of alcohol consumption. Attrition can bias the external validity of a study when more (or less) severe clients systematically drop out, disregarding group assignment. The nature of the sample recruited and the nature of the sample actually available for outcome analyses differ, with the net effect that study findings may not generalize to the intended population. Logistic regression and discriminant function analyses with attrition status as the dependent measure (yes/no) and alcohol severity measures as predictors are two techniques especially well suited to investigate this threat to external validity. In comparative studies, internal validity can be compromised when more (or less) severe clients systematically drop out of one treatment. In this situation, the sheer number of dropouts may (or may not) be relatively equivalent between treatments, but factors predicting attrition differ by treatment condition. Causal statements about the relative effectiveness of the treatments can become problematic under this condition.

Two considerations should guide pretreatment assessment of nondrinking severity characteris-



tics. First, is assessment of this characteristic distorted by recent drinking? Failure to take this type of problem into account may result in erroneous conclusions about client posttreatment improvement. For example, depression (e.g., as measured by the Beck Depression Inventory score) tends to be artificially elevated in conjunction with heavy drinking, whereas measures of cognitive functioning (e.g., as measured by the Trail Making Tests Forms A and B) tend to be underestimated following heavy drinking. Confounded assessment of these domains and subsequent comparison with posttreatment measures may lead to the conclusion that treatment favorably reduced depression and increased cognitive functioning. A second consideration in pretreatment measurement involves selection of an appropriate timeframe for assessment. In cases where an event has a low probability of occurrence, it is important that pretreatment assessment sample a longer period of time. Examples of domains that may require longer timeframes are legal, health care utilization, and employment.

### **Assessment Order Effects**

This section highlights issues raised when assessing multiple domains by integrating individual instruments. Although these concerns more often arise in research assessment lasting several hours, they may also apply to relatively short assessment protocols conducted for the purpose of case management. Described by Connors et al. (1994), care should be exercised in the use and sequencing of assessment batteries to take into account potential assessment order effects.

Assessment order effect refers to the influence that answering one set of questions has on answers to the next set of questions. Frequently, the effect of answering the first set of questions is referred to as *priming*. To illustrate these carryover effects, imagine that a clinician is interested in the relationship between posttreatment drinking (QF) and

involvement in self-help programs (e.g., AA). Three months after cessation of treatment he or she contacts clients and routinely administers first the self-help and then the QF questions. It seems likely that those clients invested in AA but who are also drinking may underreport drinking. One method to eliminate potential order effects is to rotate the sequence of assessment instruments. The advantage of controlling for order effects, however, should be balanced with the need—at times—for an integrated assessment process wherein one assessment naturally leads to subsequent questions.

### **Interviewer Role and Training**

This section addresses who ought to conduct followup interviews and what skills are important for collecting reliable and valid measurements. The recommendation of who ought to conduct followup interviews hinges, in part, on the purpose of evaluation. When followup is conducted in the formative context with the assumption that followup assessment has therapeutic benefit, a strong case can be made that either the client's therapist or a trained interviewer can collect reliable and valid data. In the case of summative evaluation, however, there are compelling reasons for therapists not to conduct followup interviews. Interviewers in summative evaluation should be blind to the type of treatment clients received so that the measures are not unintentionally biased.

Given appropriate matching of organizational role and purpose of evaluation, the importance of adequate interviewer training cannot be overemphasized. In the case of structured interviews (e.g., Addiction Severity Index, Alcohol Timeline Followback, and Form 90), interviewer training should consist of several modules that sequentially train to a predetermined standard of accuracy and then monitor for interviewer "drift" across the course of the evaluation. As an example of the training sequence, initial training may consist of observing a videotape of an interview. Standard probes to

ambiguous client responses are modeled, and trainees can be debriefed about the intent of the interview. Again using videotape, trainees can then observe and code the instrument as a model interview is conducted. Comparisons can be made among the trainees to discern why trainees may have scored a particular item differently. This procedure facilitates standardization in scoring among interviewers. When trainees can confidently master these steps, they perform a videotaped interview. Along with the hard-copy assessment instrument, this tape is reviewed and approved by the trainer before the trainee is certified to conduct actual followup assessments. Periodically, the trainer may choose to observe interviewers to ensure that the protocol is maintained or, when feasible, review videotaped interviews with interviewers to highlight strengths and weaknesses in an assessment.

A final reason for adequate training of interviewers is personnel turnover during the progress of an outcome evaluation. Research assistants and therapists tend to migrate to other jobs. Ironically, such turnover is often used as justification not to invest in training when, in fact, training should be even more intensive to maintain the integrity of assessment. It is acknowledged that the training sequence described is an ideal and may be difficult to follow with limited resources in field settings. Approximations to this ideal, however, will enhance the reliability of assessment significantly and thus increase the sensitivity of the outcome evaluation to detect relationships of interest.

### **Instrument Consistency**

There are several possible explanations for the use of different versions of the same assessment instrument in a single evaluation study: changes in item content in copyrighted instruments during the course of the trial (items under test development get dropped and new items are included), duplication errors in photocopying, and miscommunication among interviewers about which version is to be

used (this is especially likely when assessment is conducted at multiple sites). Regardless of the reason for lack of consistency in instrument use, the result, unfortunately, is that valuable information is lost or never collected for some clients.

When feasible, this problem can be minimized by preparing all client followup assessment packets in advance. Advance packaging enables rotation of self-assessment instruments to minimize systematic order effects, as well as ensuring identical assessments for all clients.

### **Data Entry**

It is unfortunate that so little attention is given to the integrity of data entry procedures. In addiction research, it is not uncommon to hear of data entry keystroke errors in the range of 5 to 8 percent. In such cases, keystroke error may account for more error variance than interviewers. It is highly recommended that all data, and especially data pertaining to the central outcome measures, be double entered and verified. Many software packages are specifically designed for data entry (e.g., SAS and SPSSx). These packages have the advantage of defining out-of-range values in advance as well as defining Boolean functions to eliminate inconsistent responses across items. Although direct entry of data into spreadsheets for analyses or entry into word processing packages to be ASCII filed for later use in a statistical software package may be necessary because of limited resources, these practices are discouraged.

## **SUMMARY**

This chapter reviewed selected theoretical and applied issues in conducting alcohol treatment outcome evaluation. A strong case was made for the use of measures with demonstrated reliability, and examples of commonly reported reliability statistics were provided to assist readers in the evaluation and selection of assessments included

in this *Guide*. A general theme in the chapter was that the effectiveness of a treatment ought not be judged on the basis of a single measure of drinking collected at an arbitrary point after alcohol treatment. Different measures of alcohol use provide alternative perspectives of treatment effectiveness, and measures of general functioning may not correlate highly with changes in drinking. Illustrations were offered to show that the issue is made more complex because the topography of change across time differs between domains of interest. One of the most challenging aspects of outcome evaluation is the communication of findings to policymakers, treatment providers, and the scientific community. Here, the meaningfulness of findings becomes a primary consideration, and several strategies were presented to aid the clinician and evaluator in making this determination.

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*Samples of the actual instruments are not included in this online version.  
For printed copies, please contact the source listed on each fact sheet.*

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# Appendix

## Instrument Fact Sheets

This appendix contains detailed information about the instruments listed in the Quick-Reference Instrument Guide. The fact sheets are in alphabetical order by full name of the instruments.

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***Copies of actual sample instruments are not included in this online version.  
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