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# Diagnosis, Course, and Assessment of Alcohol Abuse and Dependence in Adolescents

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**Abstract.** Risk for the onset of an alcohol use disorder (AUD) peaks during adolescence and the transition to young adulthood, highlighting the public health significance of alcohol use by adolescents. This chapter summarizes recent research on the diagnosis, course, and assessment of adolescent AUDs. This review focuses on developmental considerations in assessment of AUD criteria, the prevalence of DSM-IV AUDs among adolescents, typical alcohol symptom profiles in youth, and limitations of DSM-IV AUD criteria when applied to adolescents. In addition, studies of AUD course in adolescents, as well as factors influencing the course of AUDs are summarized. The chapter also provides an overview of brief alcohol screening instruments and other measures used in more comprehensive assessment of AUDs in adolescents.

## 1. Diagnosis, Course, and Assessment of Alcohol Abuse and Dependence in Adolescents

Adolescence is a period of dramatic change, involving numerous biological, cognitive, and social transitions. These changes have a significant impact on adolescent functioning, including the development of drinking behavior and alcohol-related problems. Therefore, it is important to take a developmental perspective when studying the diagnosis, course, and assessment of adolescent alcohol use disorders (AUDs). When applied to diagnosis, a developmental perspective requires consideration of how AUD symptoms

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manifest differently across the lifespan, reflecting age-related differences in areas such as physical maturation, context of use, and major role obligations (e.g., school vs work). In studies of AUD course, a developmental perspective involves understanding how alcohol use and problems, and maturational and contextual variables unfold and reciprocally influence each other over time. A developmental perspective applied to AUD assessment emphasizes the need to scale measures to an individual's stage of maturation to ensure that the equivalence of a symptom's meaning and clinical significance are maintained across different developmental periods.

In youthful samples, alcohol use and episodic heavy drinking show increasing prevalence with age (Johnston et al., 2003). Adolescents typically engage in a pattern of episodic heavy drinking (Deas et al., 2000), a particularly risky pattern of use that has been associated with the occurrence of alcohol-related problems (Wechsler et al., 1995). A national school-based survey indicated that consumption of five or more drinks in a row in the past two weeks was reported by 12% of eighth graders, 22% of 10th graders, and 29% of high school seniors (Johnston et al., 2003). In this context, risk for the onset of an AUD peaks between the ages of 15 to 20 (Kessler et al., 1994; Helzer et al., 1991). Further, some data suggest an increasing prevalence of adolescent-onset AUDs in recent years (e.g., Nelson et al., 1998). These findings highlight the public health significance of adolescent alcohol use and related problems.

This chapter summarizes recent research on the diagnosis, course, and assessment of AUDs in adolescents. The chapter begins with a review of DSM-IV and ICD-10 criteria for AUDs, developmental considerations in assessment of AUD criteria, the prevalence of DSM-IV AUDs in epidemiologic surveys of adolescents, typical alcohol symptom profiles in youth, and limitations of DSM-IV AUD criteria. Next, studies of predictors and pathways in the course of adolescent AUDs are summarized, including reports on the time course of alcohol symptom development in teens, and the course of AUDs in community and clinical samples of youth. Finally, the section on assessment reviews instruments commonly used in screening for alcohol problems, and more comprehensive methods of evaluating AUDs in adolescents.

## **2. Diagnosis of AUDs in Adolescents**

### **2.1. *DSM-IV and ICD-10 Alcohol Diagnoses***

Valid diagnosis is essential to advancing treatment and research on the etiology and course of mental disorders. Diagnostic categories represent evolving constructs that organize and describe a cluster of associated symptoms and behaviors. Ideally, the features that define a diagnostic category occur as a result of shared underlying core pathological processes, and thus show a distinctive course (Millon, 1991). Psychiatric diagnoses serve multiple functions, such as facilitating communication among clinicians and researchers, identify-

ing cases for clinical intervention, increasing homogeneity of research samples, providing phenotypes for genetics research, and conveying information about prognosis (Robins & Barrett, 1989; McGue, 1999). Although alcohol problems appear to define a continuum of severity (e.g., Heath et al., 1994), diagnostic categories complement dimensional approaches by providing categorical groupings that are ultimately necessary to guide research and treatment.

DSM-IV (APA, 2000) includes two AUDs, alcohol abuse and alcohol dependence, which are defined by non-overlapping criterion sets (Table 1). DSM-IV abuse focuses on negative psychosocial consequences resulting from alcohol use, as well as hazardous use, and requires the presence of at least 1 of 4 criteria. Abuse is generally considered a milder AUD relative to dependence due to its one symptom threshold for diagnosis (APA, 2000). DSM-IV dependence, based in part on the Alcohol Dependence Syndrome concept (Edwards & Gross, 1976), is diagnosed when at least 3 of 7 criteria are met within the same 12-month period. Dependence criteria relate to addiction constructs such as

**Table 1.** DSM-IV Alcohol Abuse and Dependence Criteria

Alcohol Abuse		
Brief Identifier		Abstracted DSM-IV criterion
A1	Role Impairment	Frequent intoxication leading to failure to fulfill obligations at school, work, home
A2	Hazardous Use	Recurrent use when physically hazardous (e.g., drinking and driving)
A3	Legal Problems	Recurrent alcohol-related legal problems
A4	Social Problems	Continued use despite social or interpersonal problems caused or exacerbated by use
Alcohol Dependence		
Brief Identifier		Abstracted DSM-IV criterion
D1	Tolerance	Need to consume more to obtain the same effect; decreased effect at the same dose
D2	Withdrawal	Withdrawal symptoms; drinking to avoid or relieve withdrawal
D3	Larger/Longer	Drinking more or longer than intended
D4	Quit/Cut Down	Persistent desire or repeated unsuccessful attempts to quit or cut down on alcohol use
D5	Much Time	Much time spent obtaining, using, or recovering from the effects of alcohol
D6	Reduced Activities	Reduce or stop important activities in order to drink
D7	Physical/ Psychological Problems	Continued use despite physical or psychological problems caused or exacerbated by use

physical dependence (i.e., tolerance or withdrawal), salience of alcohol use (e.g., lot of time spent drinking), and impaired control over alcohol use (e.g., drinking more or longer than intended). Although no single criterion is necessary or sufficient for a dependence diagnosis, DSM-IV alcohol dependence can be subtyped as with “physiological features,” if criteria for tolerance or withdrawal have been met. A diagnosis of dependence precludes abuse, suggesting a hierarchical relation between the two AUDs. Both DSM-IV AUDs require evidence of clinically significant impairment or subjective distress resulting from alcohol use for diagnosis. DSM-IV criteria for alcohol diagnoses are similar to criteria used to diagnose other drug use disorders, although some important differences exist. Due to the high rate of poly-substance use among youth (e.g., Martin et al., 1996a), both alcohol and other drug use behaviors should be assessed in research and clinical settings.

Other classification systems for AUDs, such as ICD-10 (WHO, 1992), have been less well researched in adolescents compared to DSM-IV. ICD-10, like DSM-IV, includes two AUDs: harmful use and dependence. The harmful use diagnosis is represented by a single criterion that specifies a pattern of alcohol use that is causing damage to physical or psychological health. Dependence in ICD-10 requires that 3 or more of 6 symptoms co-occur within a 12-month period: harmful use, tolerance, withdrawal, strong desire to use, impaired control over alcohol use, and preoccupation with use (e.g., giving up activities to drink instead). As in DSM-IV, an ICD-10 diagnosis of dependence precludes harmful use. However, in contrast to DSM-IV, ICD-10 diagnoses of abuse and dependence have overlapping criterion sets. Diagnostic concordance between DSM-IV and ICD-10 AUDs in adolescent drinkers indicated high agreement for the distinction between dependence and no dependence groups ( $\kappa=.81$ ), but poor agreement for the distinction between abuse/harmful use and no diagnosis groups ( $\kappa=.10$ ) (Pollock et al., 2000). These findings reveal a substantial limitation of the abuse/harmful use diagnosis that results from inconsistency in the definition of the abuse/harmful use category across the DSM-IV and ICD-10 classification systems. Other, alternative AUD classification schemes developed specifically for youth also have been proposed (e.g., Wolraich et al., 1996). However, recent diagnostic research on teens has focused almost exclusively on the application of DSM-IV AUDs.

## ***2.2. Developmental Considerations in AUD Assessment***

Diagnostic criteria for AUDs were derived largely from clinical and research experience with adults, and have been applied to adolescents with no modification of the criteria or diagnostic thresholds. However, numerous developmental differences between adolescents and adults may affect the applicability of AUD criteria to youth. For example, adolescent drinkers have shorter histories of alcohol use compared to adults; and adolescents tend to drink less often, but typically consume a similar quantity per occasion (i.e., heavy episodic drinking) (Bailey et al., 2000; Deas et al., 2000). Developmental

differences in alcohol use patterns emphasize the need to adapt constructs and criteria to make them relevant to and properly scaled for an adolescent's stage of maturation (Brown, 1999). Further, assessment that includes expanded descriptions of symptoms such as "blackout" and "passing out," and specific examples of the phenomenon of interest, can facilitate shared understanding between respondent and interviewer regarding the symptom being queried. Because a construct may manifest differently in adolescents and adults (e.g., role impairment at school vs work), a developmental perspective that takes maturational factors and contextual influences into account is essential for valid assessment of AUDs across the life span.

### *2.3. Prevalence of Adolescent AUDs*

The prevalence of adolescent AUDs increases with age, and is generally higher among males compared to females (Martin & Winters, 1998). Using DSM-III-R criteria, AUD prevalence increased from 3.5% among 14 to 16 year olds to 14.6% of 17 to 20 year olds (Cohen et al., 1993). Among 15 to 18 year olds in the National Comorbidity Survey, 13.5% met criteria for a lifetime DSM-IV AUD (Warner et al., 2001). In addition to teens who meet criteria for an alcohol diagnosis, a substantial proportion of youth have AUD symptoms (i.e., 1–2 dependence symptoms), but do not meet criteria for an alcohol diagnosis. These symptomatic teens without an alcohol diagnosis are known as "diagnostic orphans" (Pollock & Martin, 1999), and account for up to an additional 17% of adolescents in community surveys (Chung et al., 2002).

A review of cross-study consistency in DSM-IV AUD prevalence across 4 community surveys in the United States noted lifetime prevalence estimates ranging widely from 1.0 to 13.5% (Chung et al., 2002). In these 4 surveys, lifetime prevalence of DSM-IV alcohol abuse ranged from 0.4 to 9.6%, while alcohol dependence ranged from 0.6 to 4.3%. Variability in the estimated prevalence of AUDs across surveys may be explained, in part, by differences in factors such as sampling strategy (i.e., household vs school-based survey), sample age range, time frame for diagnosis (e.g., past year vs lifetime), and other methodological factors. However, although absolute proportions of cases with an AUD diagnosis may vary due to methodological factors, the relative prevalence of abuse and dependence diagnoses, that is, the ratio of abuse to dependence diagnoses should be relatively consistent across community surveys. DSM-IV does not specify an expected ratio of abuse to dependence in the general population. In the general population, however, milder cases of illness (i.e., abuse) usually outnumber more severe cases (i.e., dependence) (Skinner, 1986). Across 5 community surveys, the abuse-to-dependence ratio ranged from 0.4:1.0 to 4.5:1.0 with a mean ratio of 2.2:1.0 (Chung et al., 2002). Two of the 5 community surveys reported higher rates of the more severe dependence diagnosis relative to the milder abuse diagnosis, and in both surveys, several alcohol dependence symptoms had higher absolute prevalence than the most frequently assigned abuse symptom. These findings point to a major limitation

of DSM-IV AUDs in adolescents, because if abuse and dependence diagnoses are to provide clinically meaningful information, the diagnostic criteria should produce a consistent ratio of the two diagnoses across community samples. Some problems in the assignment of alcohol diagnoses in teens appear to be due to the prevalence of certain dependence symptoms, such as tolerance and drinking more or longer than intended (Chung et al., 2001; Chung & Martin, 2002), emphasizing the importance of valid symptom assessment in youth.

Certain adolescent populations, such as homeless youth, teens involved in the juvenile justice system, and youth seen in psychiatric and some medical settings, have elevated rates of AUD. In a convenience sample of homeless youth, 45% met criteria for alcohol dependence in the past year, 22% for abuse, and 13% were alcohol orphans (Baer et al., 2003). Overall, the majority (80%) of homeless youth in that study reported at least one AUD symptom. Among teens involved with the juvenile justice system, almost one-third (32%) are estimated to meet criteria for an AUD, although the prevalence of AUDs in this high-risk population is largely unknown (Bilchik, 1998). Among adolescent psychiatric inpatients, one study found that 41% met criteria for a current DSM-III-R AUD (Grilo et al., 1996). In an adolescent emergency department sample, 18% of 14 to 19 year olds presenting for treatment of a non-alcohol related injury met criteria for a current DSM-IV AUD (Chung et al., 2000). The high rate of AUDs in certain adolescent populations indicates the utility of alcohol screening among at-risk teens to efficiently identify those who may benefit from alcohol treatment.

Little is known about cross-cultural differences in adolescent AUD prevalence. The literature indicates higher AUD prevalence among teens in the United States compared to Puerto Rico (Warner et al., 2001), and slightly higher AUD prevalence among German youth (Nelson & Wittchen, 1998) compared to teens in the National Comorbidity Survey.

#### ***2.4. Alcohol Symptom Profiles in Youth***

A review of the relative prevalence of DSM-IV AUD symptoms in 5 community and 4 clinical samples of adolescents found only a modest level of agreement (mean Spearman  $\rho=0.47$ ) across studies (Chung et al., 2002). The AUD symptoms assigned to teens most often were two dependence criteria: tolerance and drinking more or longer than intended. Importantly, cross-study variation in the high prevalence of these two common dependence symptoms strongly affect the ratio of abuse to dependence diagnoses, the prevalence of the physiological dependence subtype, and the proportion of subthreshold cases of dependence.

Another method of characterizing adolescents' alcohol symptom profiles, latent class analysis (LCA), assumes that a small number of mutually exclusive latent classes or subtypes can be used to represent the symptom profiles of individuals in a sample. LCA of adolescents' alcohol symptoms does not support the distinct categories of abuse and dependence defined by DSM-IV (Bucholz et al., 2000; Chung & Martin, 2001). Instead, LCA suggests that DSM-IV alcohol

symptoms represent classes arranged along a gradient of illness severity that represent milder and more severe problems, such that the total number of symptoms, rather than type of symptom (i.e., abuse or dependence) distinguishes the classes (Chung & Martin, 2001). In the milder severity class, alcohol-related social problems, an abuse symptom, and tolerance, a dependence symptom had high probability of endorsement. The more severe class was characterized by symptoms that were elevated in the mild class, as well as by higher rates of endorsement for symptoms of alcohol-related role impairment, drinking more or longer than intended, and much time spent drinking. Across all classes, withdrawal was endorsed least often. Some research suggests that withdrawal, in addition to its relatively low prevalence in youth (Langenbucher et al., 2000), may manifest differently in teens compared to adults (Stewart & Brown, 1995). Although LCA produces severity-based profiles of alcohol symptoms in both adolescent and adult samples (e.g., Heath et al., 1994), important developmental differences have been identified with regard to rate of progression from use to problems, severity of alcohol problems and dependence, and the types of alcohol-related problems most likely to be experienced (Deas et al., 2000).

### *2.5. Limitations of DSM-IV AUDs in Adolescents*

Although DSM-IV AUDs have shown some validity when used with adolescents in that teens classified as having alcohol dependence, abuse, and no diagnosis differ on external measures of alcohol involvement (e.g., Lewinsohn et al., 1996; Winters et al., 1999), DSM-IV AUDs have limitations, some of which are particularly evident when the criteria are applied to teens. In particular, the abuse and dependence criterion sets are not well distinguished conceptually, and research does not support the distinction between the two criterion sets in severity, age of symptom onset, or symptom profiles identified by latent class analysis or factor analysis. Specific limitations of the abuse diagnosis include its low concordance across different diagnostic systems (Pollock et al., 2000; Mikulich et al., 2001). Abuse criteria also appear to cover problems that are more severe compared to some dependence criteria (Bailey, 1999; Pollock & Martin, 1999). Further, because abuse is generally considered a milder illness category than dependence, the onset of abuse is expected to precede dependence, however, dependence symptoms of tolerance and drinking more or longer than intended typically precede the onset of most abuse symptoms (Martin et al., 1996b; Wagner et al., 2002). In addition, some community surveys report higher prevalence of the more severe dependence diagnosis relative to the milder abuse diagnosis (Chung et al., 2002), a situation that does not conform to most disorders in medicine in which milder conditions are more prevalent than severe conditions. Another limitation of DSM-IV AUDs more generally is the existence of “diagnostic orphans” (i.e., those who have 1–2 dependence symptoms, but do not meet criteria for a DSM-IV AUD). Orphans receive no alcohol diagnosis, but do not differ from those with DSM-IV alcohol abuse on various external validators and outcomes (Pollock & Martin, 1999).

At the criterion level, certain symptoms (e.g., withdrawal) tend to occur only after years of heavy drinking, and have low prevalence and limited utility when applied to teens. In contrast, many adolescents who engage in relatively low levels of alcohol use meet criteria for an abuse diagnosis merely due to alcohol-related arguments with family members, and may be considered to constitute a group termed “diagnostic impostors” (Martin, 1999). Other DSM-IV AUD symptoms appear to be more relevant to specific adolescent subgroups. For example, hazardous use and legal problems have been associated with male gender, increased age, ethnic background, and presence of conduct disorder symptoms in teens (Langenbucher & Martin, 1996; Wagner et al., 2002). Ethnicity and gender have been found to influence whether and when certain DSM-IV AUD symptoms tend to occur in teen drinkers (Wagner et al., 2002).

In addition, some symptoms appear to be poorly defined or scaled for the developmental period of adolescence (Martin & Winters, 1998; Winters et al., 1999). Specifically, symptoms with high prevalence among adolescent drinkers, such as tolerance and drinking more or longer than intended, tend to identify a substantial proportion of adolescents with relatively low levels of consumption and problem severity. For example, because some level of tolerance may occur as a normative developmental phenomenon, better guidelines regarding the identification of a clinically significant level of tolerance need to be developed for use with adolescents. Research has demonstrated limitations of DSM’s tolerance criterion when operationally defined as a “marked increase to obtain the same effect” by pointing out how large individual differences in initial quantity to become intoxicated affect whether or not the tolerance symptom is assigned (Chung et al., 2001). Using DSM’s change-based definition of tolerance (i.e., a marked increase in quantity), individuals who report low initial quantities to become intoxicated are more likely to report larger increases to obtain the same effect (e.g., increase from 2 drinks to 8), while those with high initial quantities tend to report smaller increases to obtain the same effect (e.g. increase from 6 drinks to 8). Thus, in rating the presence of tolerance based on a “marked increase” as defined by DSM, the tolerance symptom may be overassigned to those who report low initial quantities and underassigned to those who report high initial quantities. To improve validity of symptom assessment in youth, developmentally appropriate operational definitions of AUD criteria, such as tolerance, need to be developed and tested.

Another limitation regarding symptom assessment in adolescents is that some AUD criteria may be interpreted differently or have different meaning when used with adolescents. Specifically, the high prevalence symptom of drinking more or longer than intended may be susceptible to false positive assignments in youth (i.e., assignment of the symptom in the true absence of the phenomenon). Despite some evidence for the concurrent validity of the symptom in adolescent drinkers (Chung & Martin, 2002), “drinking more than intended” may occur in teens due to poor judgment, inexperience with alcohol’s effects, or social pressures to drink, rather than a compulsive pattern of



alcohol use. Development of more specific interview probes that query contextual factors, such as adolescents' motivations for drinking, reasons for limiting alcohol use, and perceived ability to control alcohol use within a drinking episode is needed to better identify the clinical phenomenon of impaired control over alcohol use in adolescents.

### 3. Course of Adolescent AUDs

Clinical course refers to changes and trends in the manifestation of disorders and associated functioning over time (Brown, 1993). Studies of the course of adolescent AUDs are critical to understanding prognosis and etiology, and determining the predictive validity of diagnostic categories. Whereas some adolescent alcohol use may reflect experimentation that occurs as a normative developmental transition (Kandel, 1975), early initiation of drinking (i.e., before age 20) has been associated with greater risk for alcohol problems in adulthood (Nelson & Wittchen, 1998; Rhode et al., 2001). Many adolescent drinkers, particularly those with less severe alcohol problems, tend to mature out of problem drinking (Labouvie, 1996; Maisto et al., 2001), while others show a more chronic course through adulthood (Abrantes et al., 2002). Multiple developmental trajectories of adolescent-onset alcohol use and problems exist (e.g., Schulenberg et al., 2001), and have been characterized as developmentally-limited or persistent, with problems that may be relatively continuous or intermittent (Zucker et al., 1994). Developmental changes in areas such as co-occurring psychopathology and other drug use, social relationships, and role transitions have been found to affect AUD course in adolescents.

#### 3.1. *Development of Alcohol Symptoms in Youth*

Compared to adults, adolescents tend to show more rapid progression from use to problems (Deas et al., 2000). In one community survey, females had earlier onset of AUD compared to males (14.6 vs 16.1 years old; Lewinsohn et al., 1996). However, males developed alcohol-related problems at a faster rate between the ages of 18–19 (Lewinsohn et al., 1996). Research using survival analysis to examine the sequential emergence of DSM-IV alcohol symptoms in youth suggests that AUD symptoms tend to emerge in three stages: heavy and heedless use, dependence, and withdrawal (Martin et al., 1996b; Wagner et al., 2002). Within the first two years after the start of regular drinking, the first stage of heavy and heedless use tends to emerge, as indicated by the onset of drinking more or longer than intended and interpersonal problems due to drinking. Through the third and fourth years of regular drinking, dependence symptoms of tolerance and much time spent using tend to onset. The third stage, represented by the emergence of alcohol withdrawal, does not occur for most teens. Although several stages of symptom development appear to exist, progression from one stage to another is not inevitable.

### 3.2. *Course in Community and Clinical Samples of Adolescents*

**3.2.1. Community Samples.** Few community studies have described the course of adolescent-onset AUDs. In longitudinal epidemiologic studies, alcohol problems that occur in adolescence and young adulthood are only modestly associated (e.g., Baer et al., 1995; Rohde et al., 2001). The average duration of an AUD was about 52 weeks in community adolescents (Lewinsohn et al., 1996). The alcohol abuse diagnosis appears to be particularly transient, with a high rate of transitions into and out of this category during adolescence (Nelson & Wittchen, 1998). In a school-based sample followed through age 24, the annual rate of AUD recurrence was 8% among those with an AUD at the initial assessment (Rohde et al., 2001). Compared to teens with no AUD symptoms at initial assessment, teens with symptoms but no alcohol diagnosis (i.e., diagnostic orphans) were more likely to have an AUD by age 24 than those with no symptoms (Rohde et al., 2001).

**3.2.2. Clinical Samples.** At least 4 years of follow-up have been recommended to describe the clinical course of AUDs (Nathan & Skinstad, 1987). However, most studies of treated adolescents report outcomes through one year follow-up or less (Catalano & Hawkins, 1990–91; Williams & Chang, 2000). Much of the existing clinical literature on adolescents has focused on the high rates of relapse following treatment, which are similar to those for treated adults, although differences in reasons for initial relapse and continuing alcohol use have been identified, with teens typically reporting social, rather than negative affect, reasons as factors motivating their alcohol use behavior (Brown, 1993; Cornelius et al., 2003). Sustained abstinence from alcohol among treated youth occurs as a relatively rare outcome across studies (Winters, 1999). However, some research suggests that a substantial proportion of treated youth change to moderate drinking without apparent associated problems and show concurrent improvements in psychosocial functioning over follow-up (Maisto et al., 2002). Apparent non-problem drinking among treated youth suggests the need to consider different definitions of relapse and successful treatment outcomes.

Treated adolescents generally show reductions in alcohol use and problems over both short and longer-term follow-up (Chung et al., 2003; Williams & Chang, 2000). In an adolescent clinical sample followed over 3 years, transitions in AUD status suggested particular patterns of diagnosing: dependent adolescents were equally likely to remain dependent or remit to no diagnosis; adolescents with abuse were most likely to remain abusers or remit to no diagnosis; and those with no AUD at baseline had a high likelihood of maintaining this status (Martin et al., 2000a). Transition probabilities were fairly stable across 1- and 3-year follow-ups. Other data also suggest that the longer-term course of adolescent AUDs is highly variable (Brown et al., 2001; Chung et al., 2003). For example, among adolescent inpatients followed over 8 years, 4 alcohol involvement trajectories were identified: abstainers (22%), infrequent users (24%), worse with time (36%), and frequent users (18%) (Abrantes et al., 2002;

Brown et al., 2001). Teens in the low alcohol use trajectories tended to use fewer drugs during follow-up, and had better psychosocial functioning. Changes in different domains of psychosocial functioning occurred at different rates: school functioning improved relatively quickly, but improvements in family functioning only became evident after 2-years (Brown et al., 1994; Abrantes et al., 2002).

Pretreatment, during treatment, and post-treatment variables have been examined as predictors of course in treated teens. *Pretreatment* patient characteristics typically associated with better teen substance use outcomes include lower substance use severity at admission (e.g., Maisto et al., 2001), greater readiness to change (e.g., Kelly et al., 2000), and fewer conduct problems and other co-occurring psychopathology (e.g., Grella et al., 2001; Winters et al., 2000). *During treatment* factors generally found to predict better substance use outcomes include longer length of treatment (e.g., Hser et al., 2001) and family involvement in treatment (Liddle & Dakof, 1995). *Posttreatment* factors consistently associated with better youth outcomes include participation in aftercare (e.g., Winters et al., 2000b), low levels of peer substance use during follow-up (e.g., Winters et al., 2000b), use of substance-coping (Myers et al., 1993), and continued commitment to abstain (Kelly et al., 2000). Overall, posttreatment factors accounted for more of the variance in teens' clinical outcomes through 1-year than pre- and during-treatment factors (e.g., Hsieh et al., 1998). Importantly, the impact of a predictor on course may vary as a function of the length of follow-up, and the predictor itself may change over time. For example, sibling drug use was associated with more frequent drug use in the first 6 months posttreatment, however, as follow-up continued, peer use became a more important predictor of outcome than family environment variables such as sibling substance use (Latimer et al., 2000).

**3.2.3. Co-occurring Psychopathology and AUD Course.** AUD course needs to be considered in the broader context of co-occurring psychopathology. In a school-based sample, more than 80% of teens with an AUD had a co-occurring lifetime conduct, mood, substance or tobacco use disorder (Rohde et al., 1996). Similarly, the majority of youth (63%) in the Drug Abuse Treatment Outcome Studies for Adolescents had a co-occurring non-substance related mental disorder (Hser et al., 2001). Increased understanding of the temporal relationships between the onset of AUD and other psychopathology has implications for determining the extent to which co-occurring disorders share a common etiologic diathesis (e.g., AUD and disruptive behavior disorders) or reciprocally influence illness course (e.g., AUD and negative affect disorder) (e.g., Sher & Gotham, 1999). With regard to the sequential emergence of disorders over time in youth, other non-substance-related psychopathology often precedes the onset of AUD (Armstrong & Costello, 2002; Clark et al., 1999; Myers et al., 1998). Of particular concern, disruptive behavior disorders have been associated with more rapid progression from use to problems in adolescents (Costello et al., 1999; Rohde et al., 1996). Further, conduct disorder that pre-

cedes AUD onset predicts poorer outcomes among treated adolescents (Myers et al., 1995; Whitmore et al., 1997). Although antisocial behavior may be exacerbated by alcohol and other drug use (e.g., Myers et al., 1998), retrospective research with adults suggests that a developmental trajectory of persistent antisociality and alcohol problems may reflect shared etiologic factors (e.g., Hopfer et al., 2003; Slutske et al., 1998).

#### 4. Assessment of AUDs in Adolescents

Depending on the purpose of the evaluation, the assessment of adolescent alcohol use, associated problems, and AUDs can range from brief alcohol screening to in-depth evaluation that involves multidimensional measures of substance use severity and psychosocial functioning. This section reviews selected measures used to screen adolescents for AUDs; diagnostic interviews used to determine the presence of substance use disorders, along with data on the reliability and validity of diagnostic interviews; and selected questionnaire measures used to assess adolescent alcohol involvement. Review articles and sourcebooks provide more detailed guidelines for the selection of interview and questionnaire measures to meet specific assessment needs (e.g., Allen & Columbus, 1995; Center for Substance Abuse Treatment, 1999; Leccese & Waldron, 1994; Meyers et al., 1999; Winters, 2001).

##### 4.1. *Screening Adolescents for AUDs*

Alcohol screening efficiently identifies youth who may have alcohol problems or an AUD, and who would benefit from more in-depth assessment and possible intervention. The American Medical Association recommends that health care providers routinely screen all adolescents seen in medical settings for AUDs (Elster & Kuznets, 1994). Screening also plays an important role in identifying youth at high-risk for AUDs in settings where assessment time and resources may be limited, such as schools, juvenile justice and psychiatric settings, and homeless shelters. Although screening can quickly identify youth who may have an AUD, screening results need to be interpreted with caution. A score above a screen's designated cut-off does not necessarily indicate the presence of an AUD, only that more in-depth assessment should be conducted to determine the nature and severity of alcohol involvement. Similarly, a score below the screening cut-off does not signify the absence of an AUD, only that its presence is not likely. Research comparing the performance of brief screens (i.e.,  $\leq 10$  items) in identifying AUDs in adolescents suggests the superior utility of two screens: the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1989) and CRAFFT (Knight et al., 2003). Although the CAGE (Ewing, 1984) is used widely with adults, its coverage of later occurring alcohol problems limits its utility when used to screen adolescents (Chung et al., 2000; Knight et al., 2003).

The AUDIT is a 10-item questionnaire developed for use with adults that queries level of consumption (3 items) and alcohol-related problems (7 items). In adolescent medical patients, the AUDIT performed best at a cut-score of 3 (sensitivity=.76, specificity=.97; Knight et al., 2003) or at a cut-score of 4 (sensitivity=.94, specificity=.80; Chung et al., 2000). Of note, suggested scores for use with teens are lower than the recommended cut-score of 8 typically used with adults. A particular strength of the AUDIT is its inclusion of items querying level of alcohol consumption. In one study, a teen's score on the AUDIT's three consumption items, at a cut-score of 3, had similar overall performance compared to the AUDIT total score in identifying youth with an AUD, highlighting the importance of querying level of alcohol consumption when screening youth (Chung et al., 2002). Despite the AUDIT's better performance compared to other screens (e.g., CAGE), its length and relatively complicated scoring limit its use as a screen that a clinician can administer verbally and from memory.

CRAFFT is an acronym for a 6-item screen that was designed specifically for use with adolescents to detect both alcohol and drug problems. The screen's brevity and ease of verbal administration and scoring provide distinct advantages, and its overall performance in identifying youth with an AUD did not differ significantly from the AUDIT (Knight et al., 2003). CRAFFT cues the following questions: Have you ridden in a Car driven by someone (including yourself) who had been drinking or using drugs? Do you use alcohol or drugs to Relax, feel better about yourself, or fit in? Do you use alcohol or drugs while you are by yourself, Alone? Do you Forget things you did while using alcohol or drugs? Do your family or Friends tell you that you should cut down on your drinking or drug use? Have you gotten into Trouble while using alcohol or drugs? The CRAFFT, which assumes that level of consumption has been queried separately, performed best at a cut-score of 2 (sensitivity=.71, specificity=.94) when used to identify teens with a DSM-IV substance use disorder in a medical clinic setting (Knight et al., 2003).

#### **4.2. Comprehensive AUD Assessment**

Comprehensive substance use assessment is usually conducted in clinical settings to determine need for treatment and appropriate level of care, or for research purposes. In-depth assessment typically reviews a teen's pattern of alcohol and other drug use, reasons for substance use (e.g., social, coping motives), readiness to change substance use behavior, the frequency and persistence of substance-related problems, extent of family and peer substance use, prior episodes of mental health and medical treatment, legal history (e.g., arrests, probation), co-occurring psychopathology, and psychosocial functioning (e.g., school achievement, peer relations). With regard to pattern of use, specific information on age at initiation of alcohol and other drug use, and onset of regular use pattern (i.e., weekly or more frequent use), including changes in level of consumption (i.e., frequency, quantity consumed per occasion, duration at specific use levels) over time, is needed to determine need for

any treatment, and the most appropriate level of care. Determination of ages of symptom onset and offset is useful in tracking illness course, as well as monitoring treatment effects over time.

**4.2.1. Diagnostic Interviews.** To determine the presence of DSM-based alcohol and other substance use disorder diagnoses, a number of structured and semi-structured interviews have been developed that use standardized symptom definitions and question formats (Table 2). Symptom probes and thresholds used to determine the presence of a diagnosis have been designed to correspond directly to DSM criteria. Some interviews were developed specifically to assess level of substance involvement and substance use disorders in adolescents (e.g., Adolescent Diagnostic Interview). Whereas structured interviews require that questions are asked verbatim, semi-structured interviews provide a highly trained interviewer with greater flexibility in asking follow-up questions and determining the clinical significance of reported symptoms. Both types of interview use a decision tree format to determine the nature, persistence, duration, and clinical significance of reported symptoms. Although structured interviews may provide more consistency in results across interviewers, many researchers believe that semi-structured interviews provide for more comprehensive assessment because the interviewer can use follow-up questions to obtain a better understanding of symptom severity and factors influencing its occurrence. Selection of the type of interview to use depends on consideration of the goals of assessment, the setting in which assessment will occur, interviewer training requirements, and time allotted for the assessment.

**4.2.2. Reliability and Validity of Diagnostic Interview Measures.** Studies of interrater and re-test reliability of both structured and semi-structured diagnostic interview measures typically report estimates in the good to excellent range for alcohol diagnoses and criteria (e.g., Winters & Henly, 1993; Brown et al., 1998; Martin et al., 2000b). In some studies, interviewer training required that a minimum level of interrater reliability with an experienced diagnostician (i.e., kappa >.80) be obtained to ensure satisfactory levels of diagnostic reliability (e.g., Lewinsohn et al., 1996).

Certain interview measures also have demonstrated some concurrent validity of DSM-IV AUDs in adolescents. That is, teens diagnosed with DSM-IV alcohol dependence, abuse, and no diagnosis have been found to differ when compared against external validators such as quantity and frequency of alcohol use, and severity of alcohol problems (e.g., ADI: Winters & Henly, 1993; SCID: Baer et al., 2003; Martin et al., 1995; K-SADS: Lewinsohn et al., 1996). Other measures, such as the CDDR, have been shown to discriminate between youth in the general population and those in treatment, and produce results that are consistent with other diagnostic measures (Brown et al., 1998).

**Table 2.** Interviews for Assessing DSM-IV Alcohol Use Disorders in Adolescents

Measure	Abbreviation	Author and Supporting References	Time frame
<b>Semi-Structured Interviews</b>			
Child and Adolescent Psychiatric Assessment	CAPA	Angold et al., 2000	Life/3-mos
Kiddie-Schedule for Affective Disorders and Schizophrenia	K-SADS	Orvaschel et al., 1995	Life/last yr
Child Semi-structured Interview for Genetics of Alcoholism, derived in part from the DICA	C-SSAGA	Bucholz et al., 1994; Kuperman et al., 2001	Life/last yr
Structured Clinical Interview for DSM-IV	SCID	First et al., 1995; Martin et al., 1995, 2000	Life/last yr
Longitudinal Interval Follow-up Evaluation	LIFE	Keller et al., 1987; Lewinsohn et al., 1996	Length of follow-up interval
<b>Structured Interviews</b>			
Diagnostic Interview for Children and Adolescents	DICA	Herjanic et al., 1977; Reich et al., 1992	Life/6-mos
Diagnostic Interview Schedule-Children	DIS-C	Costello et al., 1985; Shaffer et al., 1996	Life/6-mos
Composite International Diagnostic Interview	CIDI	WHO, 1998; Andrews & Peters, 1998; Perkonigg et al., 1999	Life/6-mos
Diagnostic Interview Schedule for DSM-IV	DIS-IV	Robins et al., 2000	Life/6-mos/ 1-mo
<b>Substance Involvement and Substance Use Disorder Interviews</b>			
Adolescent Diagnostic Interview	ADI	Winters & Henly, 1993; Winters et al., 1993	Life/last yr
Customary Drinking and Drug Use Record	CDDR	Brown et al., 1998	Life/past 3 mos
Global Appraisal of Individual Needs	GAIN	Dennis et al., 2000	Life/last yr

**4.2.3. Questionnaire Measures of Alcohol Involvement.** Compared to interviews, questionnaires can provide a less threatening means for teens to provide information on the severity of their alcohol and other drug involvement. However, questionnaires are used primarily to gauge level of alcohol involvement, and typically are not administered to determine AUD status because they usually do not provide full coverage of DSM-IV AUD criteria. Questionnaires

range in length, and can bridge the gap between brief alcohol screening and more comprehensive interview assessment, while also providing complementary information about level of use and associated problems when included as part of a comprehensive substance use assessment battery. Questionnaires commonly used to assess adolescent alcohol involvement that have good psychometric properties and that correlate with the presence of AUD diagnoses include, for example, the Adolescent Alcohol Involvement Scale (14 items; Mayer & Filstead, 1979), Rutgers Alcohol Problems Inventory (23 items; White & Labouvie, 1989), Personal Experiences Screening Questionnaire (40 items; Winters, 1992), and Personal Experiences Inventory (PEI, 276 items; Winters & Henly, 1989). Longer measures, such as the PEI, include subscales that assess personal and environmental risk factors, screen for other problem behaviors (e.g., eating disorders), and detect response bias. More information about these measures and others may be obtained in review articles (e.g., Winters, 2001) and sourcebooks (e.g., Allen & Columbus, 1995).

### ***4.3. Validity of Self- and Collateral Reports***

**4.3.1. Validity of Self-Reports.** Self-reports provide the most direct information about a teen's substance use and related problems. However, the validity of teens' self-reports remains controversial. Teen self-reports can be subject to intentional distortion of information (i.e., minimization, exaggeration). Some adolescents also may be delayed in cognitive development, which can affect their perception of problems and their willingness or ability to provide valid reports (Winters, 2001). Further, factors such as inattention, lack of motivation, and misunderstanding of questions can contribute to biased reporting by adolescents (Martin & Winters, 1998). The method of data collection also may affect the teen's willingness to provide sensitive information. Questionnaires may provide a less threatening method of reporting substance use compared to interviews, and often include scales to assess response bias. When using interviews with youth, valid self-reporting can be maximized through development of rapport, use of follow-up questions to clarify responses and inconsistencies, and comparison of self-report data with information from other sources (e.g., urine drug screen, medical record, collateral report) (Maisto et al., 1995). Despite potential challenges in obtaining valid teen self-report of sensitive information, support for the validity of youth self-reports exists (e.g., Brown et al., 1998; Winters et al., 1991). Specifically, a large proportion of youth in treatment disclose histories of substance use and related problems, information provided by the teen tends to agree with reports from other sources (e.g., parents, medical records), and reports of lifetime substance use patterns generally remain consistent over time (Stinchfield, 1997; Winters, 2001).

**4.3.2. Validity of Collateral Informant Reports.** Information provided by the teen's parent or guardian, sibling, and peers have been used to supplement teen self-reports of substance use and problems. Many parents and other



collaterals, however, cannot provide details about their child's substance use, resulting in modest associations between mother and teen reports of the adolescent's alcohol and other drug use (Winters et al., 1996). Mothers tend to underreport the teen's level of substance use compared to the teen (Winters et al., 2000b). Similarly, peers and siblings may have limited information about the teen's actual use patterns. In one study, correlations of reports by parent and sibling informants with teen self-report of substance use were low to moderate (Waldron et al., 2001). Collateral informants may be most useful when providing data on the timing or occurrence of certain types of events, such as substance-related legal problems or episodes of hospitalization and treatment.

## 5. Summary

Assessment of AUDs in adolescents requires a developmental perspective that takes into account maturational and contextual factors that may affect the way in which syndromes and symptoms are manifested, as well as their potential clinical significance. Existing screening and diagnostic interviews show some utility identifying youth with AUDs, and research generally supports the reliability and validity of diagnostic interviews. Much work remains, however, to improve the validity of AUD assessment in youth. Research indicates that certain symptoms, particularly tolerance and drinking more or longer than intended, may not be appropriately scaled or operationally defined for the developmental period of adolescence. Importantly, the high, yet variable, prevalence of these dependence symptoms has had a significant impact on estimates of AUD prevalence in teens. To address the need for a better national estimate of the prevalence of DSM-IV AUDs in teens, the National Comorbidity Survey of Adolescents, which will survey 10,000 youth, was put into the field in 2001. Extending findings from cross-sectional research on adolescent AUD prevalence, longitudinal follow-up of community and clinical adolescents indicates that multiple developmental trajectories of alcohol use and problems exist, refuting the notion of an inevitable progression of alcohol symptoms in youth. A key issue for future research involves increased understanding of the course of AUDs in the context of developmental transitions, and other substance use and co-occurring psychopathology.

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