

# Complex Factors Drive Underage Alcohol Use

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A complex mixture of biologic, psychological, and social evidence suggests that alcohol consumption in children and adolescents is a developmental issue, based on data from several studies published in a supplement in the journal *Pediatrics*.

The supplement, sponsored by the National Institute on Alcohol Abuse and Alcoholism, is intended as a clinicians' reference for current research on the developmental factors that may play a role in when and whether children and adolescents use and abuse alcohol. Contributors to the articles include experts in child and adolescent health and development, along with specialists in behavior, prevention research, neuroscience, brain imaging, and genetics.

Studying the developmental components of underage drinking at all developmental stages may help clinicians and public health officials intervene with children, families, and communities to prevent and treat alcohol problems in children and reduce the risk of long-term problems, wrote Ann S. Masten, Ph.D., of the University of Minnesota, Minneapolis, and her colleagues in an article that introduced the concept of a developmental framework for underage drinking (*Pediatrics* 2008;121:S235-51).

Data from animal studies show that adolescence is a time of particular sensitivity to alcohol, and chronic exposure to alcohol during adolescence promotes cell death and may have negative effects that last into adulthood. Similarly, limited studies in human adolescents suggest that severe alcohol use disorders may be associated with a reduced hippocampal volume, although the results are not definitive, the investigators noted.

Developmental changes throughout childhood and adolescence include changes in form, function, organization, and context, they wrote. Several studies presented in the supplement highlight the connections between these changes and alcohol use and abuse at different developmental stages. Developmental pathways that can steer children toward or away from alcohol appear when they are younger than 10 years old, based on data reported by Robert A. Zucker, Ph.D., of the University of Michigan, Ann Arbor, and his colleagues.

Many factors that have an impact on alcohol use and abuse by children and teens are not specific to alcohol, the investigators noted. Instead, the development of both internalizing and externalizing behaviors can become either risk factors or protective factors with regard to a child's early experiences with alcohol. The nonspecific risk factors are as important as the alcohol-specific factors in affecting how a child responds to alcohol, they explained.

Findings from studies of infants have shown that some infants respond more quickly than others to stimuli. Their abilities to focus on an object or shift focus in response to new stimuli reflect the beginnings of self-regulation and control systems that will ultimately affect how well the individual can plan, reflect, and decide whether to proceed with a particular action. In addition, data from longitudinal studies of young children suggest that externalizing behaviors including aggression, impulsivity, and lack of control, as well as internalizing behaviors including anxiety, sadness, and depression, not only appear in early childhood but predict an increased risk of substance abuse problems. These traits tend to persist throughout childhood and adolescence, Dr. Zucker and his associates noted.

"Despite the preponderance of evidence, it is still rare for clinicians to recognize that drinking problems of youths have their beginnings well before alcohol use is initiated," they said.

More research is needed to understand the factors that influence initial alcohol use in children, and the data are not conclusive as to whether children who first experiment with drinking when they are younger than age 12 years are at greater risk than those who initiate alcohol use at age 13-14 years. Social contexts, including drinking habits in the child's home and the child's exposure to

alcohol through mass media, contribute to children's attitudes toward alcohol and expectations of its effects.

Children in alcoholic families are at increased risk for developing alcohol-related problems. Based on data from the National Longitudinal Alcohol Epidemiologic Survey published in 2000, 15% of children aged 17 years and younger in the United States were living with at least one adult who met criteria for alcohol abuse or dependence within a year of the survey. Although alcohol use at a young age is a problem, some parents opt to introduce children to responsible drinking patterns within a family context, and any public or school-based alcohol abuse prevention programs must take family and cultural con-



**Chronic exposure to alcohol during adolescence may have negative effects that last into adulthood.**

siderations into account in order to be effective, Dr. Zucker and his associates said.

Changes in family and peer relationships, as well as developmental and cognitive changes related to puberty, have an impact on the onset and escalation of alcohol use in youth between 10 and 15 years of age, according to a report by Michael Windle, Ph.D., of Emory University, Atlanta, and colleagues (*Pediatrics* 2008;121:S273-89). Early adolescents begin spending less time with parents and families and more time alone or with peers.

In addition, early adolescents become more aware of societal influences, and they become more like adults in their active consumption of cultural messages from the mass media and their peers. Studies have shown that third-graders tend to associate drinking alcohol with negative outcomes such as acting wild, rude, or silly, the investigators noted. By contrast, by age 10 most children have formed response-outcome expectancies about drinking alcohol that are more positive. Early adolescents are increasingly sensitive to peer behaviors, and the mass media could serve as a "superpeer" in forming their thinking, they said. Movies and television aimed at adolescents often show teenagers drinking and rarely show them suffering any negative consequences.

The biologic effects of puberty also have an impact on alcohol use in early adolescence, although the mechanism of these effects has not been well studied, Dr. Windle and associates noted. But data from multiple studies have shown that the changes that occur in the brain during early and middle adolescence include changes in neurocognitive functions (such as decision making and risk taking) that are linked to alcohol use.

"Family history of alcoholism, parents' drinking levels, perceptions of peer drinking, and prototypes of typical adolescent drinkers all seem to help shape expectancies," the investigators wrote. But learning and personality factors play a role, too. It also must be understood that each human is an active agent in determining developmental pathways and that resilience (resistance to moving down problematic pathways) is as important to understand as

are processes leading to maladaptation and disease," they emphasized.

Alcohol-specific risk factors and protective factors have a significant impact at this age. Data from multiple prediction studies have shown that the number of alcohol-using friends can account for up to 50% of the variance in teen and preteen alcohol use. And parents and older siblings continue to influence adolescent alcohol use and contribute to alcohol expectancies that formed during early childhood. Protective factors that deter early adolescents from alcohol use include an affectionate temperament, high levels of religiosity, and nurturing, supportive parents, based on data from prospective studies.

By late adolescence, aged 16-20 years, alcohol use tends to escalate and youth are increasingly vulnerable to alcohol use problems and alcohol use disorders. The increased vulnerability stems from a combination of the ongoing early adolescent risk factors and the unique neurologic, social, and cognitive changes that occur in late adolescence, wrote Sandra A. Brown, Ph.D., of the University of California, San Diego, and her colleagues (*Pediatrics* 2008;121:S290-310).

"Adolescence is now realized as a period of continued neurologic development, and the adolescent brain may be especially vulnerable to the neurotoxic effects of alcohol, especially given the typical ways in which youths drink," the investigators wrote.

Data from behavioral genetics research show that the genetic factors that can affect adolescent alcohol use appear to have greater impact during the transition from middle to late adolescence. In addition, genetic influences that have an impact on problem drinking appear to overlap with other disinhibited behaviors that are influenced by genetics. But that doesn't mean that genetics alone contribute to the tendency toward alcohol abuse in some adolescents and not others. In fact, more evidence suggests that genetic influences on such complex behaviors as problem drinking result from a mix of environmental and inherited factors, they noted.

Problems with alcohol in late adolescence have proven links not only to problem drinking but also to an increased risk for mental health problems and poor social function in adulthood. Findings from longitudinal studies of alcohol use enhance the developmental picture by showing how individuals and subgroups of adolescents differ in their patterns of alcohol use over time.

The trajectory groups most often used to characterize adolescent drinking patterns include abstainers/light stable moderate drinkers, fling drinkers, decreaseers, chronic heavy drinkers, and late-onset heavy drinkers. The proportion of adolescents who fall within these groups varies among different studies, but in general the abstainers/light drinkers account for 20%-65% of the adolescent population, while stable moderate drinkers account for approximately 30%, fling drinkers and decreaseers each account for approximately 10%, and chronic heavy drinkers and late-onset heavy drinkers each account for less than 10%.

Risk factors and protective factors associated with alcohol use and abuse in late adolescents have been well studied. Risk factors include a family history of alcoholism, history of mental health problems, and history of physical or sexual abuse. Protective factors include long-term educational or job goals and positive family and social relationships. The timing of other life transitions such as getting a job and getting married also can have an impact on alcohol use and abuse in late adolescence.

"It is increasingly clear that the emergence and progression of drinking behavior are influenced by development, that underage drinking has developmental consequences, that alcohol use disorders are developmental in nature, and that efforts to prevent or to reduce underage drinking behavior must be developmentally informed to be strategic, sensitive, and effective," Dr. Masten and colleagues wrote in the introduction.

The authors of the studies in the supplement had no relevant financial relationships to disclose. ■