



Published in final edited form as:

*Child Adolesc Psychiatr Clin N Am.* 2010 July ; 19(3): 493–504. doi:10.1016/j.chc.2010.03.004.

## Development and Vulnerability Factors in Adolescent Alcohol Use

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### Abstract

This article provides an overview of the characteristics of adolescent alcohol use, normative and subgroup variations in drinking behavior, and important factors associated with an increased risk for developing alcohol problems in later adolescence and young adulthood. A parental/family history of alcoholism, temperament traits, conduct problems, cognitive functioning, alcohol expectancies, and peer and other social relations are identified as influencing an adolescent's susceptibility for initiating a variety of alcohol use behaviors. The Deviance Prone Model, proposed by Sher (1991), is presented as an important tool for testing possible relationships among the various risk factors and their sequencing that leads to early adolescent alcohol and drug initiation and use. It is also possible to extend the model to allow for an examination of the complex interplay of risk factors that leads to the development of alcohol use problems in late adolescence and young adults.

### Keywords

Adolescents; alcohol use; vulnerability factors; deviance proneness

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Early adolescence is the key developmental period for the initiation of alcohol use that progresses on to regular use and problem drinking in mid- and later adolescence and young adulthood. This article provides an overview of the characteristics of adolescent alcohol use, normative and subgroup variations in drinking, and the factors associated with increased risk for developing alcohol problems. We present the Deviance Prone Model as a tool for examining the complex interactions between the risk factors reviewed.

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Early adolescence (ages 10–15 years) is associated with first alcohol use. Findings from 3 national surveys point to the 7<sup>th</sup> and 8<sup>th</sup> grades, when students are typically 13–14 years old, as the peak years for the initiation of alcohol use<sup>1</sup>. Late adolescence (ages 16–20 years) is characterized by more risky alcohol use patterns, including binge drinking (i.e., consuming 5+ drinks on a single occasion). Normative rates of youth drinking increase with age, accelerating among older adolescents and leveling off in the twenties at around ages 21–22 years for heavy drinking and 25–26 years for current drinking<sup>2–3</sup>. Figure 1 shows past year rates of drinking based on the 2007 National Survey on Drug Use and Health (NSDUH) for the U.S. population. The highest incidence and prevalence of alcohol abuse and dependence is seen in those drinkers ages 18–23, followed by ages 12–17 years<sup>4</sup>.

## Variations in Adolescent Drinking

Alcohol use behaviors vary by several sociodemographic characteristics, including ethnicity and gender, during adolescence<sup>5</sup>. Table 1 provides estimates of 30-day alcohol use and binge drinking and the age of first use for the three largest U.S. ethnic groups. According to the 2007 NSDUH, the prevalences of 30-day alcohol use and binge drinking were highest for Whites, followed by Hispanics and then Blacks. Relative to Blacks, Hispanics and Whites had somewhat earlier ages of drinking onset. Gender differences in the rate of 30-day alcohol use varies by ethnic group (i.e., White males = White females, Black females < Black males, and Hispanic females > Hispanic males), but binge drinking was more prevalent in males than females for all ethnic groups. Females, particularly Black females, also showed a later age of first alcohol use compared to males.

Regardless, recent research findings suggest that the gender gap in drinking behaviors has narrowed. Several studies have demonstrated secular trends in alcohol use behavior. More recently, Grucza et al.<sup>6</sup> showed an increase in the risk for drinking and alcohol dependence among women born after World War II. These changes were observed for White and Hispanic females, but not Black females, and are attributed to a sharper decrease in the age of onset of drinking for women compared to men born between 1954 and 1983<sup>7</sup>. Consequently, early onset alcohol use is associated with the early development of a variety of alcohol use problems and a more severe course of alcohol dependence<sup>8–10</sup>. Adolescent drinking behaviors appear to dependably predict later drinking and drinking problems in young adulthood<sup>11</sup>.

Different trajectories of alcohol use (i.e., patterns of drinking overtime) have been identified among adolescents once drinking begins. Maggs and Schulenberg<sup>12</sup> summarized several adolescent drinking trajectories into young adulthood, including a stable abstainer/low-risk drinking course, a chronic heavy use course, a late-onset heavy use course, and a developmentally-limited drinking course. Most adolescents drink at low-risk levels or age out of alcohol involvement as they transition toward family and career, but others adolescents do not (i.e., those in the chronic and late-onset heavy use groups). A variety of explanatory factors for to the development of alcohol problems have been proposed. A family history of alcoholism, temperament traits, cognitive functioning, conduct problems, and peer and family relationships are among the factors most frequently cited as being associated with an increased risk for adolescent alcohol use and problem drinking. These are reviewed below.

## Risk Factors for Problem Drinking

### Family History of Alcoholism

A variety of family pedigree, twin, and adoption studies have provided significant evidence of an increased risk for developing alcohol problems when a biological parent is affected.

The nature of the risk due to a family history of alcoholism has been decomposed into genetic and environmental factors<sup>10, 13</sup>. Although the proportion of the risk for developing alcohol dependence determined by either environmental or genetic factors has not been conclusively determined, it appears that genetic factors account for about 50% of the variance<sup>13</sup>. Twin, sibling pair, family (e.g., Collaborative Study on the Genetics of Alcoholism (COGA)) and case-control studies are currently ongoing to identify candidate genes related to susceptibility for developing alcoholism. Among others, *GABRA2*, *CHRM2*, and *ADH4* are associated with alcohol dependence for adults in the COGA study, findings that have been replicated by other researchers in other samples<sup>14–15</sup>.

High risk environments may also interact with genetic vulnerability to increase an individual's risk of alcohol dependence. Stressful life events, childhood maltreatment, family violence and poor social support combined with genetic vulnerability are associated with increased risk for alcoholism, depressive symptoms and conduct problems<sup>16</sup>. Dick et al.<sup>17–18</sup> showed that genetic influences on adolescent substance use were enhanced in environments characterized by lower parental monitoring and substance-using friends. Genetic influences appear to have larger effects on the development of drinking frequency and alcohol dependence, while the onset of drinking is largely impacted by environmental factors<sup>19–20</sup>.

### Temperament Traits

Temperament has been identified as an important contributor to several theoretical formulations related to the development of alcohol use behaviors, including problem drinking<sup>21–22</sup>. While prior research has shown that the vulnerability for the development of alcoholism lies, in part, in an individual's genetic makeup, several studies suggest that this genetic propensity may be partially expressed through the individual's temperament. Temperament is a set of behavioral and emotional reactions that varies among individuals, has moderate temporal and situational stability, and appears early in childhood<sup>23</sup>. In particular, behavioral undercontrol and negative affectivity, as temperament traits, have been linked to the development of alcohol use problems.

Behavioral undercontrol is often conceived as including a wide range of traits, e.g., aggressiveness, delinquency, impulsivity, risk-taking, sensation seeking and disinhibition<sup>11</sup>. Further, the propensity to be disinhibited or easily bored may encourage the expression of externalizing behaviors i.e., conduct problems, alcohol and drug use;<sup>24, 25–26</sup>. For example, a negative association between age of first drink and disinhibitory behavior, including oppositionality, impulsiveness, and inattention assessed at age 11 to predict alcohol use at age 14 was reported by McGue and colleagues<sup>27</sup>. Similarly, higher levels of disinhibition, risk taking and boredom susceptibility also predict an earlier age of regular alcohol use, earlier marijuana use, and more frequent drinking<sup>28</sup>. Behavior undercontrol may affect alcohol involvement and an earlier onset of adolescent substance use by increasing conduct problems and positive expectancies for alcohol consumption<sup>29–30</sup>.

Negative affectivity (i.e., the tendency toward depression and neuroticism; internalizing behaviors) has been found to be over represented in samples of offspring of alcoholics and individuals who later become alcoholic<sup>31</sup>. Some individuals may use drugs and alcohol to cope with and relieve the unpleasant symptoms of negative affect<sup>32–33</sup>. However, the evidence supporting the role of negative affectivity as a contributor to the development of alcohol and drug involvement is inconsistent<sup>11</sup>. Ohannessian and Hesselbrock<sup>29, 34</sup> found no effect of negative affect in predicting substance use in high risk adolescents, while conduct problems and risk taking did play significant roles. Negative affectivity did not predict the age of onset of alcohol use, but predicted conduct problems and the quantity and frequency of drinking once drinking behavior and problems were established among

adolescents<sup>35</sup>. Further, different components of negative affect (i.e., sadness, fear, guilt, and hostility) appear to differentially affect substance use in adolescents, with higher levels of hostility and lower levels of guilt associated with earlier marijuana use initiation in adolescents<sup>36</sup>.

### Conduct Problems

Both cross-sectional<sup>37–38</sup> and longitudinal investigations have found that childhood conduct problems predict alcohol use and alcohol-related problems among adolescents and young adults<sup>39–42</sup>. Typically, both boys and girls with conduct problems have an early onset of alcohol and substance use problems and often manifest a more chronic and severe course of the disorder that continues well into middle age<sup>35, 43–45</sup>. Further, when childhood and adolescent conduct problems lead to adult Antisocial Personality Disorder (ASPD), the effects of ASPD on both the course and consequences of alcoholism are independent and additive to the effects of a family history of alcoholism<sup>43, 46–47</sup>.

Childhood conduct disorder, like alcoholism, may not be a homogeneous disorder. A study of conduct problems among a community sample of girls found group differences in relation to symptom severity. Minimal or mild symptoms among girls typically show a developmental trajectory with possible dissipation of symptoms during adolescence and young adulthood. Girls having more severe symptoms in childhood continued to display disruptive behaviors well into adolescence and were at increased risk for developing DSM-III-R conduct disorder<sup>48</sup>. Further, for both adult men and women, the more severe the subtype of conduct or antisocial behavior, the earlier the onset of alcohol/drug use and the more severe the substance dependence problems<sup>49–50</sup>. The relationship of childhood conduct problems to adolescent drinking behaviors may also vary by ethnic group. Increased childhood conduct problems predicted an earlier age of regular drinking onset for Blacks, but not for Whites and Hispanics<sup>51</sup>. In general, studies of both clinical and non-clinical samples have found a positive association between frequency of childhood conduct problems and an early onset of alcohol/drug use. Clearly, though, not all persons with childhood conduct problems go on to develop alcohol use problems.

### Cognitive Functioning

Neuropsychological deficiencies (e.g., impulsivity, inability to use language to cognitively regulate behavior, and poor foresight) may influence the development of alcohol problems by compromising educational attainment and impairing psychosocial development among high risk individuals. Differences in cognitive functioning as measured by electroencephalographic and event-related potential (EEG/ERP) methods have been reported among children and adolescents at risk for developing alcoholism prior to the onset of heavy drinking<sup>52–53</sup>. The age of first drink was associated with a reduced P300 ERP amplitude in 17 year old twins<sup>27</sup>. Similarly, a reduced P300 amplitude and deficits in reading achievement predicted an early onset of drinking, separate from the contribution of familial density for alcoholism<sup>54</sup>. Differences in EEG and ERP brainwave patterns are typically found in the frontal brain region<sup>55</sup>, an area thought to be responsible for the cognitive skills of attention, planning and foresight. Tests of frontal and temporal lobe functioning among high risk young adult males were predictive of the age of first drink initiation and the frequency of drinking to intoxication<sup>56–57</sup>. However, some studies have failed to find an association between poor cognitive skills and alcohol use. For example, Sher et al.<sup>30</sup> showed that cognitive functioning as measured by verbal ability did not predict alcohol involvement in college students with a family history of alcoholism.

## Alcohol Expectancies

The role of expectancies has been demonstrated in the production of a variety of behaviors, including the affect of certain positive and negative expectations of the effects of alcohol on alcohol use<sup>58–59</sup>. Social Learning theory suggests that expectancies about alcohol's effects on sexual enhancement, physical and social pleasure, increased social assertiveness, and relaxation<sup>60</sup> likely reflect not only a person's own experience with alcohol, but also result from exposure to beverage alcohol advertising and from observing the behavior of others when they are drinking. Repeated exposure to these events can begin even in childhood. For example, the positive expectancies of alcohol's effects among elementary school children have been found to increase across the first through fifth grades, most notably among 8–10 year olds<sup>61</sup>. Shifts in alcohol expectancies occurring later in childhood typically reflect the changes in alcohol involvement observed across age groups. Positive alcohol expectancies increase during adolescence, but decrease in early adulthood<sup>62</sup>. Similarly, positive alcohol expectancy appears to be a better predictor of drinking among individuals prior to 35 years of age, while negative alcohol expectancy better predicts drinking status for most individuals over 35 years<sup>63</sup>.

Importantly, though, positive expectancies of alcohol's effects do predict the initiation of drinking, intention to drink, and drinking rates among both middle school<sup>64</sup> and college students<sup>65</sup>. Previous studies of college-aged offspring of an alcoholic parent have identified alcohol expectancies as a key mediator for a family history of alcoholism and behavioral undercontrol in predicting alcohol involvement, relationships that hold equally for males and females<sup>30</sup>. Differences by race and grade, but not by gender, have been reported in the relationships between alcohol expectancies and alcohol use in children from 6<sup>th</sup>, 8<sup>th</sup>, and 11<sup>th</sup> grades<sup>66</sup>. Positive alcohol expectancies showed a stronger positive association in predicting alcohol use initiation for older compared to younger adolescents, and for White and Hispanic adolescents in predicting alcohol initiation, drinking and binge-drinking. Chartier et al.<sup>51</sup> similarly reported a stronger association for White and Hispanic adolescents compared to Black adolescents in the relationship of alcohol expectancies to age of regular drinking onset.

## Peer and Other Social Relations

Those to whom one can turn in times of trouble and to whom a person can confidently expect caring, valuing and love can be defined as a social network. A strong social network has been reported to decrease the vulnerability to both mental and physical health problems, help moderate the need for medication, and help an individual recover more quickly following an illness<sup>67–68</sup>. Conversely, an increase in health problems has been reported in the context of high life stresses in the absence of social support<sup>67</sup>. The role of social support both from family<sup>69–70</sup> and from friends<sup>70–72</sup> has been examined in relation to the initiation of alcohol use, maintenance of drinking behavior, and onset of alcohol-related problem behaviors among both alcoholics and adolescents susceptible to developing alcoholism. The relationship of family and peer social support to alcohol and drug use in adolescents has been examined<sup>73</sup>. Adolescents reporting heavy marijuana and tobacco use perceived lower social support from friends and family compared to light users, while heavy alcohol users compared to light drinkers reported higher social support from friends. The connection between social relationships with peers and adolescent alcohol use is complex, as a certain level of alcohol involvement may indicate greater social success while non-use may be associated with less social success with peers<sup>11</sup>.

Three forms of peer influence have been suggested as contributing to the risk for adolescent alcohol use and problems: 1) the direct modeling or encouragement of alcohol use, 2) a self-sustaining affiliation with like-minded peers, and 3) the overestimation by adolescents of the

prevalence of their peers' drinking<sup>74</sup>. Older siblings and parents may similarly influence adolescent alcohol and drug use through modeling, approval of drinking and also provide access to alcohol<sup>74–75</sup>. Further, family relationships, parenting styles and other family-related factors may affect adolescent alcohol initiation, use and the development of problems. Adolescent at-risk children living apart from their biological father were shown to fare worse than those living with him in terms of increased conduct problems and an earlier onset of alcohol and drug use<sup>76</sup>. Kramer et al.<sup>77</sup> similarly identified an adolescent's relationship with his/her father as an important predictor of alcohol symptoms in young adults; a negative relationship with the father predicted increased alcohol symptoms in adulthood. Poor family management, inconsistent discipline, and inadequate supervision and monitoring among parents with an alcohol use disorder are also associated with increased problem behaviors in children<sup>78</sup>.

## The Deviance Prone Model

A single vulnerability factor may be insufficient to precipitate problematic alcohol involvement in an adolescent. More likely, multiple factors act synergistically to increase the probability of an adolescent developing alcohol problems. A variety of different theoretical models, using the risk factors cited above, have been proposed over time to explain the initiation and development of alcohol use and problems in adolescence. Typically these models include a parental history of alcoholism, peer influences, externalizing behaviors, internalizing behaviors, and environmental and biological factors as risk factors<sup>11, 21, 35, 78–79</sup>. One of the more frequently cited models uses early childhood conduct problems or the propensity for deviant behavior as a major explanatory variable. The “Deviance Prone” Model (see Figure 2) examines the complex interactions between a family history of alcoholism and mediating factors in predicting alcohol use problems. Sher<sup>32</sup> originally proposed the model as a heuristic device to examine the development of pathological alcohol use. Many elements of the model have also been widely cited in the literature as predictors of both an early onset and early regular use of alcohol and other drug use among adolescents.

‘Proneness’ is defined as the likelihood of occurrence of a normative transgression or problem behavior<sup>80</sup>. Early and regular adolescent drinking are problem behaviors that frequently co-occur with other problem behaviors, including tobacco and marijuana use, sexual behavior and delinquency. Donovan and Jessor<sup>81</sup> suggest that ‘unconventionality’, a common factor, underlies these problem behaviors. ‘Unconventionality’ is defined by placing a lower value on academic achievement, a greater tolerance of deviance, having a greater orientation toward friends versus family, and perceiving parental and friends' approval of problem behavior. The major features of the Deviance Prone Model (i.e., parental history of alcoholism, certain temperament traits, childhood conduct problems, cognitive difficulties, alcohol expectancies, and social relations) correspond with these and other characteristics of ‘unconventionality’ and theoretically link the liability of familial alcoholism to the development of alcohol-related problems.

## Summary

This review of adolescent drinking demonstrates that alcohol use typically starts in early adolescence and increases with age into late adolescence and young adulthood. Ethnic and gender differences and different trajectories of alcohol use have been observed in large national epidemiological samples. However, most adolescents drink at low-risk levels and typically “mature out” of risky drinking patterns during their mid-twenties. Several putative susceptibility factors (i.e., family/parental alcoholism, behavioral undercontrol, childhood conduct problems, neuropsychological problems, alcohol expectancies, and peer and family

relations) singly and in combination contribute to the initiation and frequency of alcohol use and to the development of alcohol use behavior, including pathological alcohol involvement. Further, some studies have found that other putative risk factors such as negative affectivity did not consistently contribute to youth drinking, but may be quite important in predicting continued heavy alcohol use or alcohol problem behavior in adulthood. Multiple risk factors likely interact with themselves, the environment and possibly genetic factors to increase the probability for alcohol problems developing in adolescence. The Deviance Prone Model provides an important tool for testing possible relationships and the sequencing of vulnerability factors for adolescent alcohol and drug use, and allows for an examination of the complex interplay of risk factors that lead to the development of alcoholism and related alcohol problems.

## Acknowledgments

This work was supported by NIAAA Grant No. P60AA03510.

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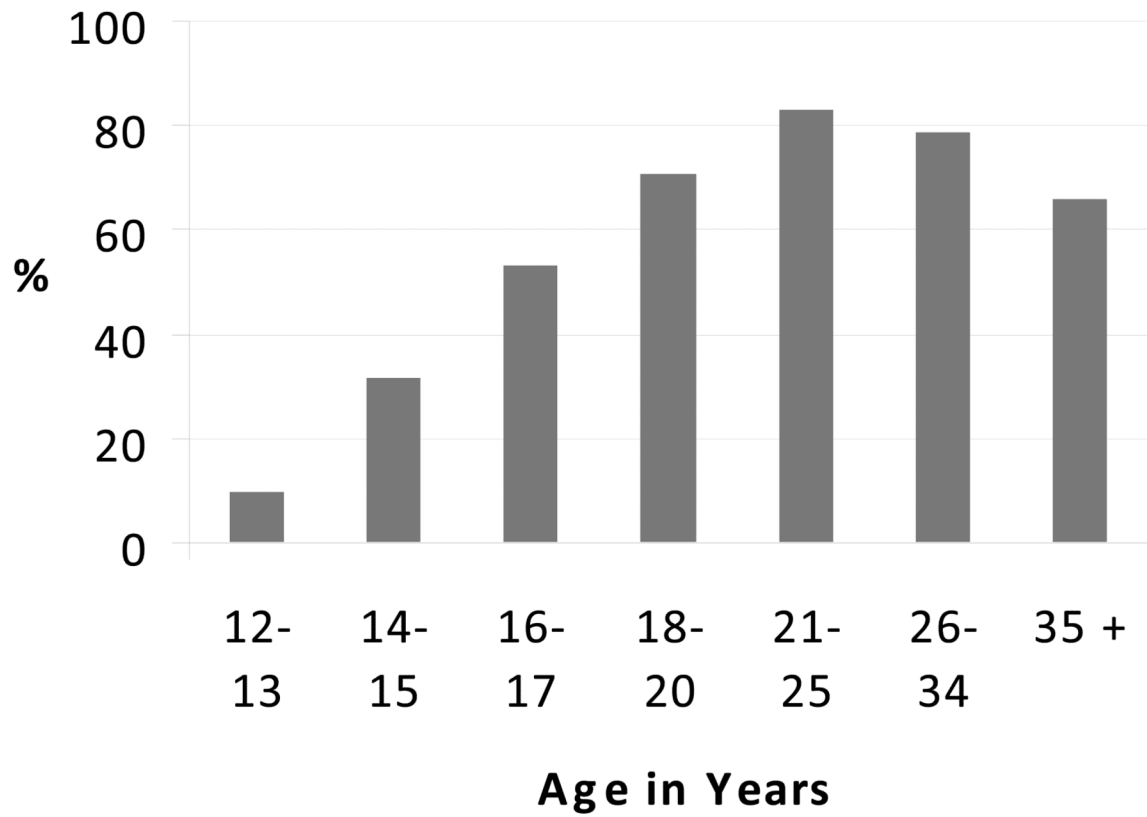
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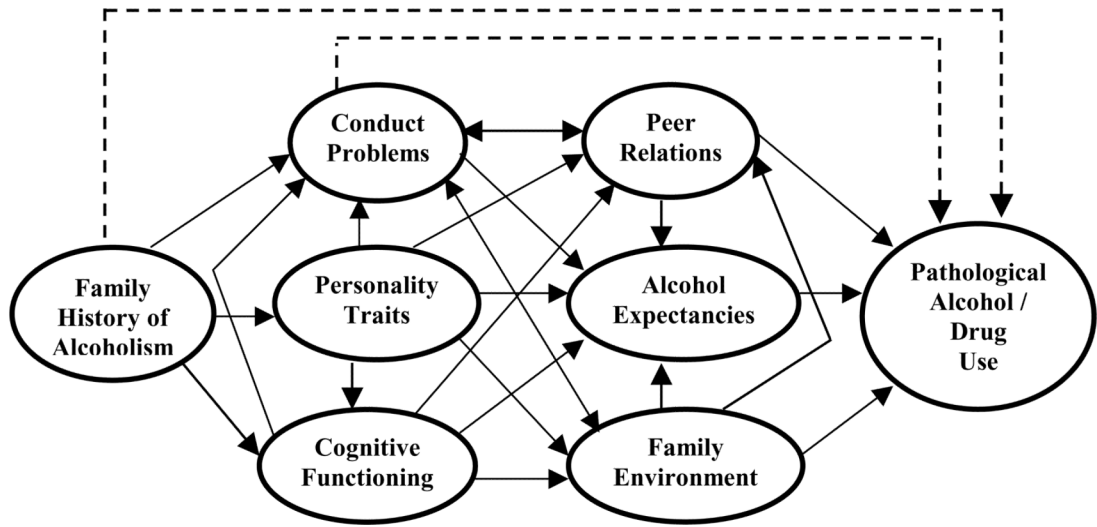
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**Figure 1.**

U.S. prevalence of past year drinking: ages 12 years and older.

*Note.* Source: 2007 National Survey on Drug Use and Health (NSDUH), Substance Abuse and Mental Health Services Administration (SAMHSA), Office of Applied Studies.



**Figure 2.**  
Deviance prone model of vulnerability.

Table 1

U.S. Ethnic Group and Gender Variations in Alcohol Use: Youth Ages 12 to 20 Years

	2007				2005-2007			
	% 30-day Alcohol Use		% 30-day Binge Drinking		Mean Age of 1 <sup>st</sup> Use			
	M	F	M	F	M	F	M	F
White <sup>a</sup>	32.8 (0.9)	31.3 (0.8)	24.8 (0.7)	19.4 (0.7)	13.95 (0.04)	14.10 (0.03)		
Black <sup>a</sup>	17.3 (1.2)	20.2 (1.3)	9.2 (0.9)	7.1 (0.8)	14.22 (0.09)	14.35 (0.10)		
Hispanic	27.5 (1.4)	23.4 (1.1)	19.2 (1.3)	12.3 (1.2)	13.84 (0.10)	14.08 (0.07)		

Note: M = male; F = female;

<sup>a</sup>Non-Hispanic;Estimates are % or Mean (standard error) as specified; Source: Chen, C.M., Yi, H., Williams, G.D., & Faden, V.B. (2009). *Surveillance report #86, trends in underage drinking in the United States, 1991-2007*. Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism.