



International Journal of Home Science

ISSN: 2395-7476
IJHS 2019; 5(2): 223-227
© 2019 IJHS
www.homesciencejournal.com
Received: 18-03-2018
Accepted: 21-04-2018

Priyanka Shukla
Ph.D. Scholar, Department of
Home Science, Human,
Development, Banasthali,
University, Tonk, Rajasthan,
India

Dr. Indu Bansal
Head of the Department, Home
Science, Human Development,
Banasthali University, Tonk,
Rajasthan, India

Alcohol: Risk factors and Consequences

Priyanka Shukla and Dr. Indu Bansal

Abstract

The term 'adolescent' is an adjective describing a young person in the process of developing from a child into an adult and dates from the late 18th century. It is derived from the Latin verb 'adolescere' which means 'to grow up'. Alcohol use and other risk-taking behaviours such as smoking, substance use and risky sexual behaviour emerge in adolescence and tend to cluster together. Heavy alcohol consumption in late adolescence appears to persist into adulthood and is associated with alcohol problems, including dependence, premature death and diminished work capacity. Early identification of adolescent risk factors may be helpful in preventing and/or attenuating risk. There is a need for high-quality long-term prospective cohort studies to investigate the long-term consequences of adolescent drinking and further work is needed to identify the most effective intervention strategies. This short paper will review patterns of drinking in adolescence and the risk factors that are thought to predispose to the development of alcohol use in this age group.

Keywords: Alcohol, adolescent, risky sexual behaviour, attenuating risk

Introduction

Alcohol use and drunkenness, along with other risk-taking behaviours, tend to emerge during the adolescent years. Indeed, alcohol is one of the most common psychoactive substances used by adolescents. Most young people begin using alcohol between the ages of 12 and 16, an age at which they gain increasing independence and spend more time outside the home Unsupervised. At the same time, the direct influence of parents diminishes and friends become increasingly important. Because of its availability, alcohol is one of the most commonly used drugs for adolescents. Young people use alcohol to fulfill social and personal needs, enhance contact with peers and initiate new relationships. The public health burden of alcohol use, however, is considerable, accounting for approximately 5.1% of the global burden of disease. Adolescent alcohol use has important health consequences. Risky drinking in particular – including early initiation, frequent consumption and drunkenness – is associated with negative psychological, social and physical health consequences. More specifically, drunkenness has been associated with adverse consequences such as fatal and non-fatal injuries, blackouts, suicide attempts, unintended pregnancy, sexually transmitted diseases, academic failure and violence. In addition, use of alcohol is linked to many of the leading causes of death among adolescents, including road-traffic injuries, suicide and unintentional injury. The adolescent brain is particularly vulnerable to the effects of alcohol, with girls at heightened vulnerability for alterations in brain structure and function due to alcohol consumption. Alcohol use in adolescence can increase the probability of having mental health and neurocognitive problems in both the short and long terms. Early initiation of alcohol use among adolescents can increase the risk of alcohol dependence later in life and is associated with more mental health and social problems. Initiation of alcohol use at a young age not only elicits progress into more regular drinking, but also is a strong predictor of other alcohol-related problems. Alcohol consumption during adolescence is connected to various psychophysical modifications, including functional and structural changes in the brain that can persist into adulthood. Recent studies have demonstrated detrimental effects of early drinking on brain development that are associated with, for example, learning abilities. Early adolescent alcohol use has also been linked to harmful social and behavioral functioning throughout adolescence and into adulthood. This includes violent and delinquent behaviours, risky sexual behaviours, suicide attempts, comorbid substance use, and physical and emotional problems.

Correspondence
Priyanka Shukla
Ph. D. Scholar, Department of
Home Science, Human,
Development, Banasthali,
University, Tonk, Rajasthan,
India

Risk factors for drinking in adolescents

The adolescent brain undergoes profound neuro-developmental change, in turn influenced by genetic, environmental and sex hormonal factors Arain *et al.*, (2013)^[1]. Glutamatergic neurotransmission is predominant and the maturation of neural circuits facilitates social-emotional development. At the same time puberty manifests itself in outward bodily change. The risk factors for adolescent AUDs can be divided into environmental, genetic and phenotypic. Genetic-environmental interaction determines individual alcohol use and AUDs.

1. Environmental factors

As adolescents become more independent so the effect of the peer group becomes more vital and family influences wane Bremner *et al.*, (2011)^[2]. Adolescence sees a clustering of risk-taking behaviours such as smoking, drinking, drug-taking and sexual activity. Peer effects on risk-taking are strong in this age group, and adolescents affiliated with substance-using peers are at greater risk of engaging in similar behaviours themselves Gardner and Steinberg, (2005)^[3]. Peer acceptance is a potent social reward for adolescents Rubin *et al.*, (2006)^[4]; Guyer *et al.*, (2012)^[5] and is associated with high self-esteem and social competence. Having friends who drink increases the likelihood that young people will drink too. Young people are also influenced by how much their friends are drinking. Having older friends and spending more time with drinking friends are likely to promote excessive drinking.

2. Genetic factors

Genetic predisposition accounts for about half of the risk in the development of alcohol dependence. Adolescents with a progressive family history of alcohol problems are at greater risk of developing an alcohol problem, and at a younger age, than their peers with negative family histories. Genetic factors may have more influence on drinking behaviour in late than in earlier adolescence Rose *et al.*, (2001)^[6]. Certain childhood characteristics are thought to increase the risk of adolescent AUDs and early identification of these characteristics can be helpful in preventing or attenuating the risk Thatcher and Clark, (2008)^[7]. For instance childhood psychological dysregulation is a behavioural phenotype that reflects an individual's vulnerability to developing an AUD in adolescence Tarter *et al.*, (2003)^[8]; Thatcher and Clark, (2008)^[7]. Adolescents are able to tolerate higher levels of alcohol than adults and they are also more likely to experience the positive effects of alcohol. This may contribute to the development of binge drinking.

3. Biological Factors

Brain waves elicited in response to specific stimuli (e.g., a light or sound) provide measures of brain activity that predict risk for alcoholism. P300, a wave that occurs about 300 milliseconds after a stimulus, is most frequently used in this research. A low P300 amplitude has been demonstrated in individuals with increased risk for alcoholism, especially sons of alcoholic fathers P300 measures among 36 preadolescent boys were able to predict alcohol and other drug (AOD) use 4 years later, at an average age of 16. Brook *et al.*, (1995)^[9].

4. Childhood Behavior

Children classified as "undercontrolled" (i.e., impulsive, restless, and distractible) at age 3 were twice as likely as those who were "inhibited" or "well-adjusted" to be diagnosed with

alcohol dependence at age 21. Jones and Heaven, (1998)^[10]. Aggressiveness in children as young as ages 5-10 has been found to predict AOD use in adolescence Colder and O'Connor, (2002)^[11]; Moss and Kirisci, (1995)^[12] Childhood antisocial behavior is associated with alcohol-related problems in adolescence Moss and Kirisci, (1995)^[12]; Donovan, (2004)^[13] and alcohol abuse or dependence in adulthood. Tapert and Schweinsburg, (2005);^[14] Begleiter *et al.*, (1984)^[15].

5. Psychiatric Disorders

Among 12- to 16-year-olds, regular alcohol use has been significantly associated with conduct disorder; in one study, adolescents who reported higher levels of drinking were more likely to have conduct disorder Hill and Steinhauer, (1993);^[16] Dahi *et al.*, (2003)^[17]. Six-year-old to seventeen-year-old boys with attention deficit hyperactivity disorder (ADHD) who were also found to have weak social relationships had significantly higher rates of alcohol abuse and dependence 4 years later, compared with ADHD boys without social deficiencies and boys without ADHD. Hill *et al.*, (2001)^[18] Whether anxiety and depression lead to or are consequences of alcohol abuse is unresolved. In a study of college freshmen, a DSM-III Schweinsburg *et al.*, (2004)^[19] diagnosis of alcohol abuse or dependence was twice as likely among those with anxiety disorder as those without this disorder. Bauer and Hesselbrock, (1999)^[20] a In another study, college students diagnosed with alcohol abuse were almost four times as likely as students without alcohol abuse to have a major depressive disorder. Bauer and Hesselbrock (1999)^[20] b, In most of these cases, depression preceded alcohol abuse. In a study of adolescents in residential treatment for AOD dependence, 25 percent met the DSM-III-R criteria for depression, three times the rate reported for controls. In 43 percent of these cases, the onset of AOD dependence preceded the depression; in 35 percent, the depression occurred first; and in 22 percent, the disorders occurred simultaneously Schuckit, (1998)^[21].

6. Suicidal Behavior

Alcohol use among adolescents has been associated with considering, planning, attempting, and completing suicide. Schuckit and Smith, (1997);^[22] Reich *et al.* (1998)^[23] In one study, 37 percent of eighth-grade females who drank heavily reported attempting suicide, compared with 11 percent who did not drink. Long *et al.* (1998)^[24]. Research does not indicate whether drinking causes suicidal behavior, only that the two behaviors are correlated.

Psychosocial Risk Factors

1. Parenting, Family Environment, and Peers

Parents' drinking behavior and favorable attitudes about drinking have been positively associated with adolescents' initiating and continuing drinking. Foroud *et al.*, (2000);^[25] Ederbery and Kranzler, (2005)^[26] Early initiation of drinking has been identified as an important risk factor for later alcohol-related problems. Children who were warned about alcohol by their parents and children who reported being closer to their parents were less likely to start drinking. Ederbery and Kranzler, (2005);^[27] Halpern *et al.*, (2004);^[28] Castillo *et al.*, (1999)^[20]. Lack of parental support, monitoring, and communication have been significantly related to frequency of drinking, Austin and Knau, (2000)^[30a] heavy drinking, and drunkenness among adolescents. White *et al.*, (2002)^[31] Harsh, inconsistent discipline and hostility or

rejection toward children have also been found to significantly predict adolescent drinking and alcohol-related problems. Austin and Knaus, (2000) ^[30b] Peer drinking and peer acceptance of drinking have been associated with adolescent drinking. Clark *et al.*, (2001); ^[32] Strauss *et al.*, (2000) ^[33] While both peer influences and parental influences are important, their relative impact on adolescent drinking is unclear.

2. Expectancies

Positive alcohol-related expectancies have been identified as risk factors for adolescent drinking. Positive expectancies about alcohol have been found to increase with age Mauras *et al.*, (1996) ^[34] and to predict the onset of drinking and problem drinking among adolescents. Dees *et al.*, (2001); ^[35] Greenough *et al.* (1984) ^[36].

3. Trauma

Child abuse and other traumas have been proposed as risk factors for subsequent alcohol problems. Adolescents in treatment for alcohol abuse or dependence reported higher rates of physical abuse, sexual abuse, violent victimization, witnessing violence, and other traumas compared with controls. Masten *et al.*, (2004) ^[37] The adolescents in treatment were at least 6 times more likely than controls to have ever been abused physically and at least 18 times more likely to have ever been abused sexually. In most cases, the physical or sexual abuse preceded the alcohol use. Thirteen percent of the alcohol dependent adolescents had experienced posttraumatic stress disorder, compared with 10 percent of those who abused alcohol and 1 percent of controls.

4. Advertising

Research on the effects of alcohol advertising on adolescent alcohol-related beliefs and behaviors has been limited. Steinman *et al.*, (2003) ^[37] While earlier studies measured the effects of exposure to advertising, Schulenberg *et al.*, (1996) ^[38] more recent research has assessed the effects of alcohol advertising awareness on intentions to drink. In a study of fifth- and sixth-grade students' awareness, measured by the ability to identify products in commercials with the product name blocked out, awareness had a small but statistically significant relationship to positive expectancies about alcohol and to intention to drink as adults Leung Steinman *et al.*, (2003); ^[39a] Phelps, (1993) ^[40]. This suggests that alcohol advertising may influence adolescents to be more favorably predisposed to drinking. Leung and Steinman *et al.*, (2003) ^[39b].

Consequences of Adolescent Alcohol Use

- 1. Drinking and Driving:** Of the nearly 8,000 drivers ages 15-20 involved in fatal crashes in 1995, 20 percent had blood alcohol concentrations above zero Kenkel and Manning, (1996) ^[41]. For more information about young drivers' increased crash risk and the factors that contribute to this risk, see Alcohol Alert No. 31: Drinking and Driving Chaloupka *et al.*, (1998) ^[42].
- 2. Sexual Behavior:** Surveys of adolescents suggest that alcohol use is associated with risky sexual behavior and increased vulnerability to coercive sexual activity. Among adolescents surveyed in New Zealand, alcohol misuse was significantly associated with unprotected intercourse and sexual activity before age 16. Cook *et al.* (2002) ^[43]. Forty-four percent of sexually active Massachusetts teenagers said they were more likely to

have sexual intercourse if they had been drinking, and 17 percent said they were less likely to use condoms after drinking Wagenaar and Toomey, (2002) ^[44].

- 3. Risky Behavior and Victimization:** Survey results from a nationally representative sample of 8th and 10th graders indicated that alcohol use was significantly associated with both risky behavior and victimization and that this relationship was strongest among the 8th-grade males, compared with other students Kypri *et al.*, (2006) ^[45].
- 4. Puberty and Bone Growth:** High doses of alcohol have been found to delay puberty in female Hingson *et al.* (1994) ^[46]. and male rats (Jones *et al.* (2001) ^[47] and large quantities of alcohol consumed by young rats can slow bone growth and result in weaker bones Preusser *et al.*, (1994) ^[48]. However, the implications of these findings for young people are not clear.

Health Risks

Whatever it is that leads adolescents to begin drinking, once they start they face a number of potential health risks. Although the severe health problems associated with harmful alcohol use are not as common in adolescents as they are in adults, studies show that young people who drink heavily may put themselves at risk for a range of potential health problems.

- 1. Brain Effects:** Scientists currently are examining just how alcohol affects the developing brain, but it's a difficult task. Subtle changes in the brain may be difficult to detect but still have a significant impact on long-term thinking and memory skills. Add to this the fact that adolescent brains are still maturing, and the study of alcohol's effects becomes even more complex. Research has shown that animals fed alcohol during this critical developmental stage continue to show long-lasting impairment from alcohol as they age. It's simply not known how alcohol will affect the long-term memory and learning skills of people who began drinking heavily as adolescents.
- 2. Liver Effects:** Elevated liver enzymes, indicating some degree of liver damage, have been found in some adolescents who drink alcohol. Young drinkers who are overweight or obese showed elevated liver enzymes even with only moderate levels of drinking.
- 3. Growth and Endocrine Effects:** In both males and females, puberty is a period associated with marked hormonal changes, including increases in the sex hormones, estrogen and testosterone. These hormones, in turn, increase production of other hormones and growth factors, which are vital for normal organ development. Drinking alcohol during this period of rapid growth and development (i.e., prior to or during puberty) may upset the critical hormonal balance necessary for normal development of organs, muscles, and bones. Studies in animals also show that consuming alcohol during puberty adversely affects the maturation of the reproductive system.

Conclusion

The study above shows the effects of alcohol on youth and effect on them its also discuss the causes or conditions under which the alcohol.

- This is no certain age of start consuming alcohol.
- The youth now a day have started consuming alcohol in a large numbers.
- The quantities of alcohol consumption by individual have increased in big ration.

- The social environment is also responsible for pushing the people for consumption alcohol.
- The social media and the modern trends have worked as a catalyst for alcohol intake.
- The family member's alcohol consumption also pushes the individual towards its intake.
- High level of stress in the work and pressure to succeed also leads him or her in this direction.

In above points we try to discuss the condition under which an individual is inclined to start consuming alcohol.

References

1. Arain M, Haque M, Johal L, Mathur P, Nel W, Rais A, Sandhu R *et al.* Maturation of the adolescent brain. *Neuropsychiatric disease and treatment.* 2013; 9:449.
2. Bremner RH, Koole SL, Bushman BJ. Pray for those who mistreat you: Effects of prayer on anger and aggression. *Personality and Social Psychology Bulletin.* 2011; 37(6):830-7.
3. Gardner M, Steinberg L. Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: an experimental study. *Developmental psychology.* 2005; 41(4):625.
4. Rubin LL, de Sauvage FJ. Targeting the Hedgehog pathway in cancer. *Nature reviews Drug discovery.* 2006; 5(12):1026.
5. Guyer AE, Choate VR, Detloff A, Benson B, Nelson EE, Perez-Edgar K *et al.* Striatal functional alteration during incentive anticipation in pediatric anxiety disorders. *American Journal of Psychiatry.* 2012; 169(2):205-12.
6. Rose EA, Gelijns AC, Moskowitz AJ, Heitjan DF, Stevenson LW, Dembitsky W *et al.* Long-term use of a left ventricular assist device for end-stage heart failure. *New England Journal of Medicine.* 2001; 345(20):1435-43.
7. Thatcher DL, Clark DB. Adolescents at risk for substance use disorders: Role of psychological dysregulation, endophenotypes, and environmental influences. *Alcohol Research & Health.* 2008; 31(2):168.
8. Tarter RE, Kirisci L, Mezzich A, Cornelius JR, Pajer K, Vanyukov M *et al.* Neurobehavioral disinhibition in childhood predicts early age at onset of substance use disorder. *American Journal of Psychiatry.* 2003; 160(6):1078-85.
9. Brook JS, Whiteman M, Finch S, Cohen P. Aggression, intrapsychic distress, and drug use: Antecedent and intervening processes. *Journal of the American Academy of Child & Adolescent Psychiatry.* 1995; 34(8):1076-84.
10. Jones SP, Heaven PC. Psychosocial correlates of adolescent drug-taking behaviour. *Journal of adolescence.* 1998; 21(2):127-34.
11. Colder CR, O'Connor R. Attention bias and disinhibited behavior as predictors of alcohol use and enhancement reasons for drinking. *Psychology of Addictive Behaviors.* 2002; 16(4):325.
12. Moss HB, Kirisci L. Aggressivity in adolescent alcohol abusers: Relationship with conduct disorder. *Alcoholism: Clinical and Experimental Research.* 1995; 19(3):642-6.
13. Donovan JE. Adolescent alcohol initiation: A review of psychosocial risk factors. *Journal of adolescent health.* 2004; 35(6):529-e7.
14. Tapert SF, Schweinsburg AD. The human adolescent brain and alcohol use disorders. In *Recent developments in alcoholism.* Springer, Boston, MA, 2005, 177-197.
15. Begleiter H, Porjesz B, Bihari B, Kissin B. Event-related brain potentials in boys at risk for alcoholism. *Science.* 1984; 28; 225(4669):1493-6.
16. Hill SY, Steinhauer SR. Assessment of prepubertal and post pubertal boys and girls at risk for developing alcoholism with P300 from a visual discrimination task. *Journal of Studies on Alcohol.* 1993; 54(3):350-8.
17. Dahl RE, Williamson DE, Bertocci MA, Stolz MV, Ryan ND, Ehlers CL. Spectral analyses of sleep EEG in depressed offspring of fathers with or without a positive history of alcohol abuse or dependence: a pilot study. *Alcohol.* 2003; 30(3):193-200.
18. Hill SY, De Bellis MD, Keshavan MS, Lowers L, Shen S, Hall J *et al.* Right amygdala volume in adolescent and young adult offspring from families at high risk for developing alcoholism. *Biological psychiatry.* 2001; 49(11):894-905.
19. Schweinsburg AD, Paulus MP, Barlett VC, Killeen LA, Caldwell LC, Pulido C *et al.* An FMRI study of response inhibition in youths with a family history of alcoholism. *Annals of the New York Academy of Sciences.* 2004; 1021(1):391-4.
20. A-Bauer LO, Hesselbrock VM. P300 decrements in teenagers with conduct problems: implications for substance abuse risk and brain development. *Biological Psychiatry.* 1999; 46(2):263-72.
21. Schuckit MA. Biological, psychological and environmental predictors of the alcoholism risk: a longitudinal study. *Journal of studies on alcohol.* 1998; 59(5):485-94.
22. Schuckit MA, Smith TL. Assessing the risk for alcoholism among sons of alcoholics. *Journal of studies on alcohol.* 1997; 58(2):141-5.
23. Reich T, Edenberg HJ, Goate A, Williams JT, Rice JP, Van Eerdewegh P *et al.* Genome- wide search for genes affecting the risk for alcohol dependence. *American journal of medical genetics.* 1998; 81(3):207-15.
24. Long JC, Knowler WC, Hanson RL, Robin RW, Urbanek M, Moore E *et al.* Evidence for genetic linkage to alcohol dependence on chromosomes 4 and 11 from an autosome- wide scan in an American Indian population. *American journal of medical genetics.* 1998; 81(3):216-21.
25. Foroud T, Edenberg HJ, Goate A, Rice J, Flury L, Koller DL *et al.* Alcoholism susceptibility loci: confirmation studies in a replicate sample and further mapping. *Alcoholism: Clinical and Experimental Research.* 2000; 24(7):933-45.
26. Edenberg HJ, Kranzler HR. The contribution of genetics to addiction therapy approaches. *Pharmacology & therapeutics.* 2005; 108(1):86-93.
27. Rose RJ, Dick DM, Viken RJ, Kaprio J. Gene- environment interaction in patterns of adolescent drinking: regional residency moderates longitudinal influences on alcohol use. *Alcoholism: Clinical and Experimental Research.* 2001; 25(5):637-43.
28. Bonnie RJ, O'Connell ME, National Research Council. *Developmental and environmental influences on underage drinking: A general overview.* In *Reducing underage drinking: A collective responsibility.* National Academies Press (US), 2004.
29. Castillo Mezzich, Peter Giancola R, Sandy Lu Y, Susan Parks M, Gary Ratica M, Marija Dunn A. Adolescent females with a substance use disorder: Affiliations with adult male sexual partners. *American Journal on*

- Addictions. 1999; 8(3):190-200.
30. Weintraub Austin E, Knaus C. Predicting the potential for risky behavior among those too young to drink as the result of appealing advertising. *Journal of health communication*. 2000; 5(1):13-27.
 31. White AM, Jamieson-Drake DW, Swartzwelder HS. Prevalence and correlates of alcohol-induced blackouts among college students: Results of an e-mail survey. *Journal of American College Health*. 2002; 51(3):117-31.
 32. Clark DB, Lynch KG, Donovan JE, Block GD. Health problems in adolescents with alcohol use disorders: self-report, liver injury, and physical examination findings and correlates. *Alcoholism: Clinical and Experimental Research*. 2001; 25(9):1350-9.
 33. Strauss RS, Barlow SE, Dietz WH. Prevalence of abnormal serum aminotransferase values in overweight and obese adolescents. *The Journal of pediatrics*. 2000; 136(6):727-33.
 34. Mauras N, Rogol AD, Haymond MW, Veldhuis JD. Sex steroids, growth hormone, insulin-like growth factor-1: neuroendocrine and metabolic regulation in puberty. *Hormone Research in Paediatrics*. 1996; 45(1-2):74-80.
 35. Les Dees W, Srivastava VK, Hiney JK. Alcohol and Female Puberty. *The Role of Intraovarian Systems*. *Alcohol Research and Health*. 2001; 25(4):271-5.
 36. Greenough WT, Black JE, Wallace CS. Experience and brain development. *Child Development*. 1987; 58:539-559. PMID: 3038480
 37. Masten AS. Regulatory processes, risk, and resilience in adolescent development. *Annals of the New York Academy of Sciences*. 2004; 1021:310-319. PMID: 15251901
 38. Steinman KJ, Schulenberg J. A pattern-centered approach to evaluating substance use prevention programs. *New directions for child and adolescent development*. 2003; 101:87-98.
 39. Schulenberg J, O'Malley PM, Bachman JG, Wadsworth KN, Johnston LD. Getting drunk and growing up: trajectories of frequent binge drinking during the transition to young adulthood. *Journal of studies on alcohol*. 1996; 57(3):289-304.
 40. Leung SF, Phelps CE. My kingdom for a drink? A review of estimates of the price sensitivity of demand for alcoholic beverages. *Economics and the Prevention of Alcohol-Related Problems*. NIAAA Research Monograph. 1993; 25:1-32.
 41. Kenkel D, Manning W. Perspective on Alcohol Taxation. *Alcohol Health and Research World*. 1996; 20(4).
 42. Chaloupka FJ, Grossman M, Saffer H. The effects of price on the consequences of alcohol use and abuse. In *Recent developments in alcoholism* Springer, Boston, MA, 1998, 331-346.
 43. Cook PJ, Moore MJ. The economics of alcohol abuse and alcohol-control policies. *Health affairs*. 2002; 21(2):120-33.
 44. Wagenaar AC, Toomey TL. Effects of minimum drinking age laws: review and analyses of the literature from 1960 to 2000. *Journal of Studies on Alcohol, supplement*. 2002; (14):206-25.
 45. Kypri K, Voas RB, Langley JD, Stephenson SC, Begg DJ, Tippetts AS *et al*. Minimum purchasing age for alcohol and traffic crash injuries among 15-to 19-year-olds in New Zealand. *American Journal of Public Health*. 2006; 96(1):126-31.
 46. Hingson R, Heeren T, Winter M. Lower legal blood alcohol limits for young drivers. *Public health reports*. 1994; 109(6):738.
 47. Jones RK, Lacey JH. Alcohol and highway safety 2001: A review of the state of knowledge. United States. National Highway Traffic Safety Administration. Office of Research and Traffic Records, 2001, 1.
 48. Preusser DF, Williams AF, Weinstein HB. Policing underage alcohol sales. *Journal of safety research*. 1994; 25(3):127-33.