

# DRAFT

## Issue Briefing #2

### THE 21 MINIMUM LEGAL DRINKING AGE

**The minimum legal drinking age of 21 (21 MLDA) should be supported and enforced, based on the wealth of evidence that it has reduced a host of alcohol-related problems, saving tens of thousands of lives.**

The overwhelming preponderance of evidence points to the effectiveness of the 21 MLDA, “one of the most thoroughly evaluated social interventions of our time”<sup>1</sup>:

- ♦ The US Task Force on Community Preventive Services – the “gold standard” of evidence-based public health intervention review – “recommends that [the 21 MLDA] be implemented and maintained on the basis of *strong* evidence of effectiveness.”<sup>2</sup>
- ♦ Several other comprehensive reviews and meta-analyses of MLDA studies have determined that the 21 MLDA has been effective in reducing alcohol-related traffic accidents and underage alcohol consumption.<sup>3</sup> By contrast, only a few studies have found the 21 MLDA to be ineffective,<sup>4</sup> and even fewer have found perverse effects, i.e. that the 21 MLDA has actually exacerbated alcohol-related problems.<sup>5</sup>
- ♦ Other research has found that the 21 MLDA has led to decreases in violent injuries in general,<sup>6</sup> homicide,<sup>7</sup> youth suicide,<sup>8</sup> adverse infant birth outcomes,<sup>9</sup> teenage childbearing (among African Americans),<sup>10</sup> and vandalism and disorderly conduct.<sup>11</sup>
- ♦ As a result, every major public health/safety organization supports the 21 MLDA – including the Institute of Medicine (IOM),<sup>12</sup> the National Institute on Alcoholism and Alcohol Abuse (NIAAA),<sup>13</sup> the Centers for Disease Control & Prevention (CDC),<sup>14</sup> and many others.<sup>15</sup>

---

<sup>1</sup> Ross (1992)

<sup>2</sup> Guide to Community Preventive Services (2003). Cf. also Shults, Elder, Sleet, Nichols, Alao, Carande-Kulis, et al. (2001)

<sup>3</sup> Babor, Caetano, Casswell, Edwards, Giesbrecht, Graham, et al. (2003); Wagenaar & Toomey (2002); Grube & Nygaard (2001); Single (1997); Edwards, Anderson, Babor, Casswell, Ferrence, Giesbrecht, et al. (1995); Grossman, Chaloupka, Saffer, & Laixuthai (1995)

<sup>4</sup> E.g. Miron & Tetelbaum (2009); Asch & Levy (1990); Asch & Levy (1987); Males (1986)

<sup>5</sup> E.g., DiNardo & Lemieux (2001)

<sup>6</sup> Jones, Pieper, & Robertson (1992)

<sup>7</sup> Parker & Rebhun (1995)

<sup>8</sup> Birckmayer & Hemenway (1999)

<sup>9</sup> Including low birth weight and premature birth, Fertig & Watson (2009)

<sup>10</sup> Dee (2001)

<sup>11</sup> Joksch & Jones (1993)

<sup>12</sup> Bonnie & O’Connell (2004)

<sup>13</sup> College presidents call for a debate on lowering the drinking age to 18 (2008)

## Objections and Responses<sup>16</sup>

**“Society has deemed 18 to be the age at which a youth becomes an adult.”**

Recent research on adolescent and youth brain development has challenged previous assumptions about cognitive maturity. The prefrontal cortex – the area of the brain responsible for mediating planning of appropriate behavioral outcomes and inhibiting impulsive behavior<sup>17</sup> – is not fully developed in most individuals until about the age of 25.<sup>18</sup> These findings – combined with research indicating that the adolescent brain is more vulnerable than the adult brain to the deleterious effects of alcohol<sup>19</sup> – points to the value of policies and practices that limit youth exposure to alcohol.<sup>20</sup>

Furthermore, the various ages of initiation in American society (driving, jury duty, etc.) are based on varied traditions and historical and economic exigencies rather than on evidence-based rationales.<sup>21</sup> Accordingly, it would be counterproductive to abandon one of the few ages of initiation that is firmly grounded in science: the 21 MLDA.

**“18-year-olds can die for their country but not have a beer”**

As with other ages of initiation (discussed above), the minimum age of military service is based on considerations (such as physical maturity) that are not directly related to the prerequisites for low-risk drinking. In fact, young adults (18-25) in the military are far more likely than their civilian counterparts to engage in heavy drinking.<sup>22</sup> This is why the Department of Defense strongly supported the Uniform Drinking Age Act in 1984 and continues to support the 21 MLDA today. This support has paid dividends: “the military's concerted efforts to enforce the 21-year minimum legal drinking age were associated with greater reductions in later alcohol treatment episodes among veterans compared with civilians.”<sup>23</sup>

**“Prohibition doesn't work.”**

“Prohibition” in this context is a trigger word<sup>24</sup> rather than the basis of a coherent argument. Unless one were to suggest that there should be no age limits whatsoever (or limits of any kind) on the purchase and consumption of alcohol, then even the most committed libertarian supports some type of “prohibition.” The question becomes one of which MLDA would be the most appropriate based on public health and neurological research. The current body of research points to 21.

---

<sup>14</sup> Need reference.

<sup>15</sup> Including, but not limited to, the National Highway Traffic Safety Administration (NHTSA); the Insurance Institute for Highway Safety (Lund, 2007); the Governors Highway Safety Association (State Highway Agencies Reject Idea of Lower Drinking Age, 2008); the American Medical Association; the American Public Health Association; the National Association of State Administrators of Drug/Alcohol Abuse Directors (NASADAD, 2008); the National Association of Addiction Treatment Providers (College presidents call for a debate on lowering the drinking age to 18, 2008); and the International Association of Chiefs of Police (Balazik, 2008).

<sup>16</sup> Some of the objections in this section are taken verbatim from those offered by Choose Responsibility at the Opposing Viewpoints website (Should the drinking age be lowered from 21?, n.d.). Cf. also Wagenaar & Toomey (2002) and Rosenfeld (1996).

<sup>17</sup> Pechmann, Levine, Loughlin, & Leslie (2005)

<sup>18</sup> Gogtay, Giedd, Lusk, Hayashi, Greenstein, Vaituzis, et al. (2004)

<sup>19</sup> Acheson, Stein, & Swartzwelder (1998); Brown, Tapert, Granholm, & Delis (2000); Nagel, Schweinsburg, Phan, & Tapert (2005); White & Swartzwelder (2005); Crews, Braun, Hoplight, Switzer, & Knapp (2000); De Bellis, Clark, Beers, Soloff, Boring, Hall, et al. (2000)

<sup>20</sup> Reyna & Farley (2006)

<sup>21</sup> Cf. Rosenfeld (1996), Fell (1985)

<sup>22</sup> Ames & Cunradi (2004/5). Heavy drinking here is defined as “consumption of five or more drinks on the same occasion at least once a week in the past 30 days” (p. 253). Cf. also Williams, Bell, & Amoroso (2002)

<sup>23</sup> Wallace, Wallace, & Weeks (2008), p. 619

<sup>24</sup> A word designed to elicit strong emotion rather than advance debate. Cf. Bovée (2003)

### **“Legal age 21 forces drinking behind closed doors,” “drives drinking underground” etc.**

While advocates for a lower MLDA have often made this claim, it has little (if any) empirical foundation. To wit, one recent study of college drinking found that consequences such as intoxication, fighting, and alcohol-induced sickness were much more likely to occur at bars and clubs than at private parties.<sup>25</sup> Another study determined that “underage students in states with extensive laws restricting underage and high-volume drinking were less likely to drink and binge drink.”<sup>26</sup> Moreover, past experience with lower drinking ages showed that legal alcohol purchases by teenagers tended to be off-premise purchases (due to lower cost) that were consumed in an “uncontrolled” manner “in homes, in cars, in parks, wherever.”<sup>27</sup>

### **“Legal age 21 does not allow young people to learn how to drink responsibly”**

The contention that somehow adolescents and youth can be inoculated by controlled exposure to alcohol – a hypothesis known as the “sociocultural” perspective<sup>28</sup> – has been advanced by the alcohol industry.<sup>29</sup> The sociocultural perspective “has been discredited on both theoretical and empirical grounds”<sup>30</sup> and recent neuroscience.<sup>31</sup> In reality, an earlier age of drinking onset is associated with a variety of alcohol problems, including not only alcohol use disorders,<sup>32</sup> but violence,<sup>33</sup> motor vehicle crashes,<sup>34</sup> and unintentional injuries.<sup>35</sup>

### **“Legal age 21 erodes respect for law”**

The organization Choose Responsibility has argued that the 21 MLDA “breeds disrespect for law and causes ethical compromises.”<sup>36</sup> Following the same line of reasoning, traffic speed limits should be abolished, since they are so routinely violated.<sup>37</sup> The same could be said for tax laws<sup>38</sup> and the Equal Pay Act.<sup>39</sup> Conversely, a body of research suggests that the problem lies with lax enforcement of the 21 MLDA.<sup>40</sup>

### **“America is out of step with most of the rest of the world”**

It might be better phrased that America is a step ahead of most of the rest of the world. Comparison of 2007 European School Survey Project on Alcohol and Other Drugs (ESPAD) data and Monitoring the Future data reveals that the prevalence rates of last year and last 30 day alcohol use among US youth are considerably lower than the rates of all European counties except for Armenia and Iceland<sup>41</sup> (although it should be noted that prevalence of intoxication is roughly similar to the unweighted European average).<sup>42</sup> Additionally, the rates for liver cirrhosis are much higher for countries such as France, Spain, and Italy than for the United States,<sup>43</sup> belying the notion that healthier drinking patterns in these nations are inculcated at an early age.

---

<sup>25</sup> Clapp, Reed, Holmes, Lange, & Voas (2006), p. 280

<sup>26</sup> Wechsler, Lee, Nelson, & Kuo (2002), p. 223

<sup>27</sup> Fell (1985), p. 8

<sup>28</sup> Cf. Wilkinson (1970); Chafetz (1970)

<sup>29</sup> Most notably August Busch III (Chapman, 2006) and Pete Coors (JoinTogether, 2004)

<sup>30</sup> Single (1994), p.

<sup>31</sup> Reyna & Farley (2006), p. 36

<sup>32</sup> Hingson & Zha (2009); Pitkänen, Kokko, Lyyra, & Pulkkinen (2008);

<sup>33</sup> Hingson, Edwards, Heeren, & Rosenbloom (2009); Hingson, Heeren, & Zakocs (2001)

<sup>34</sup> Hingson, Heeren, Levenson, Jamanka, & Voas (2002); Hingson, Edwards, Heeren, & Rosenbloom (2009)

<sup>35</sup> Hingson, Edwards, Heeren, & Rosenbloom (2009)

<sup>36</sup> Choose Responsibility (n.d.)

<sup>37</sup> Raymond (2002)

<sup>38</sup> Ibid.

<sup>39</sup> Alkadry & Tower (2006)

<sup>40</sup> Toomey, Komro, Oakes, & Lenk (2008); Wagenaar & Wolfson (1994); Wagenaar & Wolfson (1995); Forster, Murray, Wolfson, et al. (1995); O’Leary, Gorman, & Speer (1994)

<sup>41</sup> ESPAD (2009), p. 66

<sup>42</sup> Ibid, p. 307

<sup>43</sup> Ramstedt (2001); Norstrom & Ramstedt (2005); Israel, Orrego, Schmidt, Popham, Escartin, Ishii, et al. (1991)

## References:

- Acheson, S.K., Stein, R.M., & Swartzwelder, H.S. (1998). Impairment of semantic and figural memory by acute ethanol: Age-dependent effects. *Alcoholism: Clinical and Experimental Research*, 22(7), 1437-1442.
- Alkadry, M., & Tower, L. (2006). Unequal pay: The role of gender. *Public Administration Review*, 66(6), 888-898.
- Ames, G. & Cunradi, C. (2004/2005). Alcohol use and preventing alcohol-related problems among young adults in the military. *Alcohol Research & Health*, 28(4), 252-257.
- Asch, P. & Levy, D.T. (1990). Young driver fatalities: The roles of drinking age and drinking experience. *Southern Economic Journal*, 57(2), 512-520.
- Asch, P. & Levy, D.T. (1987). Does the minimum drinking age affect traffic fatalities? *Journal of Policy Analysis and Management*, 6(2), 180-192.
- Babor, T.F., Caetano, R., Casswell, S., Edwards, G., Giesbrecht, N., Graham, K., et al. (2003). *Alcohol: No ordinary commodity: Research and public policy*. Oxford: Oxford University Press.
- Balazik, W. (2008). The IACP strongly opposes lowering national drinking age to 18 [press release]. Retrieved on April 13, 2009, from <http://www.theiacp.org/About/PressCenter/tabid/81/Default.aspx?id=973&v=1>.
- Benjamin, K.L., Bell, N.S., & Hollander, I.E. (2007). Alcohol abuse trends in army and civilian populations. *Military Medicine*, 172(9), 950-955.
- Birckmayer, J., & Hemenway, D. (1999). Minimum-age drinking laws and youth suicide, 1970-1990. *American Journal of Public Health*, 89(9), 1365-1368.
- Bonnie, R.J., & O'Connell, M.E., eds. (2004). *Reducing underage drinking: A collective responsibility*. Washington, DC: The National Academies Press.
- Bovée, C.L. (2003). *Contemporary public speaking*. 2nd ed. Lanham, MD: Rowman & Littlefield.
- Brown, S.A., Tapert, S.F., Granholm, E. & Delis, D.C. (2000). Neurocognitive functioning of adolescents: Effects of protracted alcohol use. *Alcoholism: Clinical and Experimental Research*, 24(2), 164-171.
- Carpenter, C. & Dobkin, C. (2009). The effect of alcohol consumption on mortality: Regression discontinuity evidence from the minimum drinking age. *American Economic Journal: Applied Economics*, 1(1), 164-182.

Chafetz, M. (1970). The prevention of alcoholism. *International Journal of Psychiatry*, 9, 329-348.

Chapman, S. (2005, August 28). Time to lower drinking age? Decoding our 'epidemic' of drunkenness. *Chicago Tribune*.

Choose Responsibility (n.d.). Breeds disrespect for law and causes ethical compromises. Retrieved on June 15, 2009, from <http://www.chooseresponsibility.org/article/view/15541/1/2642/>.

Clapp, J.D., Reed, M.B., Holmes, M.R., Lange, J.E., & Voas, R.B. (2006). Drunk in public, drunk in private: The relationship between college students, drinking environments and alcohol consumption. *American Journal of Drug & Alcohol Abuse*, 32(2), 275-285.

College presidents call for a debate on lowering the drinking age to 18. (2008). *Alcoholism & Drug Abuse Weekly*, 20(34), 1-3.

Crews, F.T., Braun, C.J., Hoplight, B., Switzer, R.C. 3<sup>rd</sup>, & Knapp, D.J. (2000). Binge ethanol consumption causes differential brain damage in young adolescent rats compared with adult rats. *Alcoholism: Clinical and Experimental Research*, 24(11), 1712-1723.

De Bellis, M.D., Clark, D.B., Beers, S.R., Soloff, P.H., Boring, A.M., Hall, J., et al. (2000). Hippocampal volume in adolescent-onset alcohol use disorders. *American Journal of Psychiatry*, 157(5), 737-744.

Dee, T. (2001). The effects of minimum legal drinking ages on teen childbearing. *Journal of Human Resources*, 36(4), 823-838.

DiNardo, J. & Lemieux, T. (2001). Alcohol, marijuana, and American youth: the unintended consequences of government regulation. *Journal of Health Economics*, 20(6), 991-1010

Edwards, G., Anderson, P., Babor, T.F., Casswell, S., Ferrence, R., Giesbrecht, N., et al. (1995). *Alcohol policy and the public good*. Oxford: Oxford University Press.

Fell, J.C. (1985). *Drinking age 21: Facts, myths and fictions*. Report DOT-HS-806-704. Washington, DC: National Highway Traffic Safety Administration.

Fell, J.C., Fisher, D.A., Voas, R.B., Blackman, K., & Tippetts, A.S. (2007). The relationship of 16 underage drinking laws to reductions in underage drinking drivers in fatal crashes in the United States. *Annual Proceedings of the Association for the Advancement of Automotive Medicine*, 51, 537-557.

Fertig, A.R. & Watson, T.J (2009). Minimum drinking age laws and infant health outcomes. *Journal of Health Economics*, 28(3), 737-747.

- Ford, J. (2007). Alcohol use among college students: A comparison of athletes and nonathletes. *Substance Use & Misuse*, 42(9), 1367-1377.
- Forster, J. L., Murray, D. M., Wolfson, M., & Wagenaar, A.C. (1995). Commercial availability of alcohol to young people: Results of alcohol purchase attempts. *Preventive Medicine*, 24(4), 342-347.
- Gogtay, N., Giedd, J.N., Lusk, L., Hayashi, K.M., Greenstein, D., Vaituzis, A.C., et al. (2004). Dynamic mapping of human cortical development during childhood through early adulthood. *Proceedings of the National Academy of Sciences of the USA*, 101(21), 8174-8179.
- Grossman, M., Chaloupka, F. J., Saffer, H. & Laixuthai, A. (1994) Effects of alcohol price on youth: A summary of economic research. *Journal of Research on Adolescence*, 4(2), 347-364.
- Guide to Community Preventive Services (2003). Reducing alcohol-impaired driving: Maintaining current Minimum Legal Drinking Age (MLDA) laws. Retrieved on June 11, 2009, from <http://www.thecommunityguide.org/mvoi/AID/mlda-laws.html>.
- Hibell, B., Guttormsson, U., Ahlström, S., Balakireva, O, Bjarnason, T., Kokkevi, A., et al. (2009). The 2007 ESPAD Report: Substance use among students in 35 European countries. Stockholm: Swedish Council for Information on Alcohol and other Drugs. Retrieved on June 10, 2009, from [http://www.espad.org/documents/Espad/ESPAD\\_reports/2007/The\\_2007\\_ESPAD\\_Report-FULL\\_090325.pdf](http://www.espad.org/documents/Espad/ESPAD_reports/2007/The_2007_ESPAD_Report-FULL_090325.pdf)
- Hingson, R., Edwards, E.M., Heeren, T., & Rosenbloom, D.M. (2009). Age of drinking onset and injuries, motor vehicle crashes, and physical fights after drinking and when not drinking. *Alcoholism: Clinical and Experimental Research*, 33(5), 783-790.
- Hingson, R., Heeren, T., Levenson, S., Jamanka, A., & Voas, R. (2002). Age of drinking onset, driving after drinking, and involvement in alcohol related motor-vehicle crashes. *Accident Analysis & Prevention*, 34(1), 85-92.
- Hingson, R., Heeren, T., & Zakocs, R. (2001). Age of drinking onset and involvement in physical fights after drinking. *Pediatrics*, 108(4), 872-877.
- Hingson, R.W. & Zha, W. (2009). Age of drinking onset, alcohol use disorders, frequent heavy drinking, and unintentionally injuring oneself and others after drinking. *Pediatrics*, 123(6), 1477-1484.
- Israel, Y., Orrego, H., Schmidt, W., Popham, R.E., Escartin, P., Ishii, H., et al. (1991). Trauma in cirrhosis: An indicator of the pattern of alcohol abuse in different societies. *Alcoholism: Clinical and Experimental Research*, 15(3), 433-437.

JoinTogether (2004, June 28). Coors head, seeking senate, calls for lower drinking age [news summary]. Retrieved on June 15, 2009, from <http://www.jointogether.org/news/headlines/inthenews/2004/coors-head-seeking-senate-for.html>

Joksch, H.C., & Jones, R.K. (1993). Changes in the drinking age and crime. *Journal of Criminal Justice*, 21(3), 209-221.

Jones, N.E., Pieper, C.E., & Robertson, L.S. (1992). The effect of legal drinking age on fatal injuries of adolescents and young adults. *American Journal of Public Health*, 82(1), 112-115.

Lund, A. (2007). Protecting teens from the dangers of alcohol use and abuse: Wishful thinking versus science. Retrieved on April 13, 2009, from [http://www.iihs.org/research/topics/min\\_drinking\\_age/default.html](http://www.iihs.org/research/topics/min_drinking_age/default.html).

Males, M.A. (1986). The minimum purchase age for alcohol and young-driver fatal crashes: A long-term view. *Journal of Legal Studies*, 15(1), 181-211.

Miron, J.A. & Tetelbaum, E. (2009). Does the minimum legal drinking age save lives? *Economic Inquiry*, 47(2), 317-336.

Nagel, B.J., Schweinsburg, A.D., Phan, V., & Tapert, S.F. (2005). Reduced hippocampal volume among adolescents with alcohol use disorders without psychiatric comorbidity. *Psychiatric Research*, 139(3), 181-190.

NASADAD (2008). Statement by the National Association of State Alcohol and Drug Abuse Directors (NASADAD), National Prevention Network (NPN), and National Treatment Network (NTN) regarding a dialogue on underage drinking [press release]. Retrieved on April 13, 2009, from [http://www.nasadad.org/resource.php?doc\\_id=1470](http://www.nasadad.org/resource.php?doc_id=1470).

Norström, T., & Ramstedt, M. (2005). Mortality and population drinking: a review of the literature. *Drug & Alcohol Review*, 24(6), 537-547.

O'Leary, D., Gorman, D. M., & Speer, P. W. (1994). The sale of alcoholic beverages to minors. *Public Health Reports*, 109(6), 816-818.

Parker, R.N. & Rebhun, L.-A. (1995). *Alcohol and homicide: A deadly combination of two American traditions*. Albany, NY: State Univ. of New York Press.

Pechmann, C., Levine, L., Loughlin, S., & Leslie, F. (2005). Impulsive and self-conscious: Adolescents' vulnerability to advertising and promotion. *Journal of Public Policy & Marketing*, 24(2), 202-221.

Pitkänen, T., Kokko, K., Lyyra, A., & Pulkkinen, L. (2008). A developmental approach to alcohol drinking behaviour in adulthood: a follow-up study from age 8 to age 42. *Addiction*, 103(S1), 48-68.

Preusser, D. F., & Williams, A. F. (1992). Sales of alcohol to underage purchasers in three New York counties and Washington, DC. *Journal of Public Health Policy*, 13(3), 306-317.

Ramstedt, M. (2001). Per capita alcohol consumption and liver cirrhosis mortality in 14 European countries. *Addiction*, 96(S1), S19-S33.

Raymond, M. (2002). Penumbral crimes. *American Criminal Law Review*, 39(4), 1395-1439.

Reyna, V., & Farley, F. (2006). Risk and rationality in adolescent decision making: Implications for theory, practice, and public policy. *Psychological Science in the Public Interest*, 7(1), 1-44.

Ross, H.L. (1992). *Confronting drunk driving: Social policy for saving lives*. New Haven, CT: Yale University Press.

Should the drinking age be lowered from 21? (n.d.) Retrieved on June 10, 2009, from <http://www.opposingviews.com/questions/should-the-drinking-age-be-lowered-from-21>

Shults, R.A., Elder, R.W., Sleet, D.A., Nichols, J.L., Alao, M.O., Carande-Kulis, V.G., et al. (2001). Reviews of evidence regarding interventions to reduce alcohol-impaired driving. *American Journal of Preventive Medicine*, 21(4S), 66-88.

Single, E. (1997). Public drinking, problems and prevention measures in twelve countries, results of the WHO project on public drinking. *Contemporary Drug Problems*, 24(3), 425-448.

Single, E. (1994). The impact of social and regulatory policy on drinking behavior. In R. Zucker, G. Boyd, & J. Howard (Eds.), *The development of alcohol problems: Exploring the biopsychosocial matrix of risk* (pp. 209-248). NIAAA Research Monograph 26. NIH Publication No. 94-3495. Rockville, MD: U.S. Department of Health and Human Services.

Smart, R., & Schmidt, W. (1975). Drinking and problems from drinking after a reduction in the minimum drinking age. *British Journal of Addiction*, 70(4), 347-358.

State Highway Agencies Reject Idea of Lower Drinking Age (2008). *Professional Safety*, 53(11), 16.

Toomey, T.L., Komro, K.A., Oakes, J.M., & Lenk, K.M. (2008). Propensity for illegal alcohol sales to underage youth in Chicago. *Journal of Community Health*, 33(3), 134-138.

Wagenaar, A.C. & Toomey, T.L. (2002). Effects of minimum drinking age laws: Review and analyses of the literature from 1960 to 2000. *Journal of Studies on Alcohol*, S14, 206-225.

Wagenaar, A.C. & Wolfson, M. (1994). Enforcement of the legal minimum drinking age in the United States. *Journal of Public Health Policy*, 15(1), 37-53.

Wagenaar, A.C. & Wolfson, M. (1995). Deterring sales and provision of alcohol to minors: A study of enforcement in 295 counties in four states. *Public Health Reports*, 110(4), 419-427.

Wallace, A.E., Wallace, A., & Weeks, W. B. (2008). The U.S. military as a natural experiment: Changes in drinking age, military environment, and later alcohol treatment episodes among veterans. *Military Medicine*, 173(7), 619-625.

Wechsler, H., Lee, J.E., Nelson, T.F., & Kuo, M. (2002). Underage college students' drinking behavior, access to alcohol, and the influence of deterrence policies: Findings from the Harvard School of Public Health College Alcohol Study. *Journal of American College Health*, 50(5), 223-236.

White, A.M. & Swartzwelder, H.S. (2005). Age-related effects of alcohol on memory and memory-related brain function in adolescents and adults. In M. Galanter (Ed.), *Recent developments in alcoholism: Volume 17: Alcohol problems in adolescents and young adults* (pp. 161-176). New York: Kluwer Academic/Plenum Publishers.

Wilkinson, R. (1970). *The Prevention of Drinking Problems*. New York: Oxford University Press.

Williams, J., Bell, N., & Amoroso, P. (2002). Drinking and other risk taking behaviors of enlisted male soldiers in the US Army. *Work*, 18(2), 141-150.