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Reducing Binge Drinking Among Adolescents – A Brighter Future

The negative impact of binge drinking reaches much further than the individual. There are social, occupational, legal, and financial consequences that affect individual's families, friends, and communities at large. Alcohol abuse and binge drinking remain a concern for Americans of all ages, including students in middle school, students in high school, and adults ages 18 years and older. This paper focuses specifically on the Healthy People 2020 goal for Substance Abuse, that aims to “Reduce the proportion of persons engaging in binge drinking during the past month —adolescents aged 12 to 17 years.”¹ At baseline (i.e. 2008), 9.5% of 12-17 year-old adolescents reported binge drinking in the past month.¹ The Healthy People 2020 goal is a 10% reduction in binge drinking, with the ultimate target goal of 8.6%.¹ The survey used to collect data for this objective is called the National Survey on Drug Use and Health (NSDUH), and defines “binge drinking” as “having five or more drinks (for males) or four or more drinks (for females) at the same time or within a couple of hours of each other during the 30 days prior to the survey.”¹ This definition attempts to account for the different size and weight between men and women. It is in line with the definition binge drinking released by the National Institute of Alcohol Abuse and Alcoholism (NIAAA) in 2004.² The motivation for establishing this HP2020 goal, recent statistics pertaining to this goal, target population, adverse outcomes of binge drinking, and proposed interventions will be discussed in this paper.

Even with the legal drinking age of 21-years-old, alcohol is the most commonly used and abused drug among youth in the United States.³ In 2015, about 9.6% of 12 to 17-year-olds in the U.S. were current alcohol users with 5.8% participating in binge

drinking behavior.⁴ Within Oregon, the percentage of binge drinking among youth in has declined since 2007, however the percentage is still above the national mean.⁵ Between 2011 and 2014, 8.9% of Oregon adolescents between 12 and 17-years-old reported binge drinking compared to the national mean of 7.3%.¹ Although binge-drinking rates are currently under the Healthy People 2020 target goal of 8.6%, interventions should continue to target youth.

Education regarding the negative effects of alcohol cannot be emphasized enough in younger populations. Alcohol use and binge drinking increase significantly in high school. Among adolescents aged 12–17 in Oregon from 2010 to 2014, an annual average of 9.0% used alcohol for the first time within the year prior to being surveyed – a higher average than initiation of marijuana, cigarettes, and psychotherapeutics, at 6.2%, 5.4%, & 3.5%, respectively.⁵ Among high school students, trends of binge drinking vary by many factors, including ethnicity, socioeconomic status, and gender (among other factors). Historically, increased rates of binge drinking have been associated with white male students of higher socioeconomic status.⁶ However, the rates between males and females have been converging due to an increased rate of decline among males in comparison to females.⁷ Although specific to the NSDUH, female adolescents have consistently reported higher rates of binge drinking in comparison to males for the past 4 years, with 7% and 6.4%, reported in 2014, respectively.¹ Females are vulnerable to specific adverse outcomes associated with drinking, such as teenage pregnancy, sexual assault, STIs, and infertility.⁸ In addition, women are especially susceptible to a quick onset of dependence, a concerning phenomenon is known as “telescoping.”⁹ Based on this information, Lincoln High School, a public high school in the urban center of Portland, OR, is an

appropriate target audience. The students at Lincoln High School, being of equal gender distribution, predominantly white, and of higher SES, are at higher risk for binge drinking and are considered a vulnerable population.¹⁰

Knowledge is one of the key factors in preventing binge drinking behavior in adolescents. This includes knowing the basic definitions related to drinking alcohol. Intoxication occurs as a result of the liver not metabolizing alcohol as fast as it is entering the bloodstream. Since alcohol can cross the blood-brain-barrier, cognition is impacted.¹¹ “Blackouts” are episodes of memory loss that occur when one drinks too much alcohol. Typically, it may take an adolescent male 9 drinks, and an adolescent female 5 drinks to blackout.¹¹ This level of disinhibition that is more common in adolescents further increases their risk of poor decision-making and negative outcomes. Many adolescents are often deceived by how much alcohol they are actually drinking. A standard drink is defined as one that contains 0.6 ounces of pure alcohol.¹² This is equivalent to 12 ounces of beer (5% alcohol), 5 ounces of wine (12% alcohol), or 1.5 ounces of liquor (~40% alcohol).¹² However, not all beverages list the alcohol content and drinks come in containers of all shapes and sizes. This makes it difficult to determine how much one is actually imbibing. Based on the definition of a standard drink, binge drinking, as defined by the NIAAA, is “a pattern of drinking that brings blood alcohol concentration (BAC) levels to 0.08 g/dL. This typically occurs after 4 drinks for women and 5 drinks for men—in about 2 hours.”² Unfortunately, this definition of binge drinking is not consistent with the decreased weight and size of adolescents, resulting in increased risk and poorer outcomes. Adolescents should acknowledge that their upper limit is likely below the 4 or 5 drinks of the traditional definition.

As discussed above, binge drinking is a common issue in the United States. High school is an important time to curtail activity promoting this behavior, as adolescents who initiate alcohol use before 15 years of age are 4 times more likely to develop alcohol dependence than those who start drinking after 20 years of age.¹¹ Adolescents are innately at higher risk for initiation and long-term abuse of alcohol. This is in part due to the negative effect alcohol has on brain development. Myelination and neurocircuitry continue to develop during adolescence.¹³ These changes mainly occur in the frontal lobe (impacting cognitive processing) and the limbic system (impacting self-control, risk-taking behavior, and emotions).¹³ The pathophysiology of the developing brain helps explain why, in addition to their external influences and genetics; adolescents are more likely to participate in risk-taking and drug-seeking behavior (e.g. binge drinking behavior). Evidence has shown a correlation in early alcohol abuse and memory, attention, and executive function deficits,¹³ that helps explain the increased likelihood of alcohol dependence.

The risk of binge drinking greatly differs between individuals due to the interplay between genetic, internal, and external factors. In other words, genes, hormonal changes, and personality traits interact with external factors such as peers, school, extracurricular activities, and cultural norms.³ Hormonal changes associated with puberty and differing social contexts may lead to increased stress, which is linked to increased alcohol intake.³ Depression, anxiety, and specific mental disorders are known risk factors for alcohol and drug abuse.³ This is especially concerning for women, as females who abuse alcohol are most likely to have co-occurring psychiatric disorders and are more likely to drink in response to stress and negative emotions.⁹ High school also represents a transitional time

when adolescents begin to spend more time at school, with their peers, and in extracurricular activities, and less time with their families. This transition can have positive and negative influences on drinking behaviors. Parental monitoring and quality time spent with adolescents continues to be one of the most protective factors against alcohol abuse, especially for adolescents who are higher-risk-takers.¹⁴ In contrast, studies have consistently shown that peer use is one of the strongest predictors for alcohol use.^{6,15} However, it is hard to distinguish whether peers influence the individual or the individual seeks friends that have similar interest in risk-seeking behavior. Other external factors, such as school bonding and interest, exercise, and religion tend to have a protective effect against binge drinking, while negative performance in school and participation in team sports tend to be positively correlated with binge drinking.⁶ Lastly, adolescents with a family history of alcohol abuse are at increased risk. Research has shown that genetic factors account for about half of the risk of alcohol dependence, with environmental factors accounting for the other half.¹¹ Whereas environmental factors have been found to influence initiation of alcohol use, genetics play a large role in developing alcohol dependence.¹¹ Certain genes have been found to influence binge-drinking behavior as well. One gene of interest is *SLC6A4*, which codes for the serotonin transporter protein (5-HTT). 5-HTT is a protein that recycles serotonin from synaptic spaces.¹⁶ The serotonin transporter-linked polymorphic region (5-HTTLPR) of *SLC6A4* has been associated with binge drinking. Individuals can be homozygous for the short (SS) allele, long (LL) allele, or heterozygous (SL). Research has shown that SS individuals are at increased risk for binge drinking than LL individuals. This is due to a decreased sensitivity to the effects of alcohol.¹⁶ Research on binge drinking and genetics is still relatively new and more studies

are needed before drawing concrete conclusions. However, these findings do support the need for tailored interventions, keeping in mind that all adolescents present with different risk factors and susceptibilities to the effects of alcohol.

Once an adolescent is aware of how their own internal, external, and genetic factors can influence their use of alcohol, they are more likely to make informed decisions. Similarly, knowing the short and long-term effects of alcohol may help dissuade them from initiating, using, and abusing alcohol. Adolescents are often naïve to the myriad of potential negative consequences of alcohol, such as increased risk of injury, legal consequences, risky sexual behavior, physical and sexual assault, alcohol poisoning, a negative impact on the developing adolescent brain, addiction, and death.^{3,11} In the long term, alcohol dependence may develop and lead to chronic medical conditions such as liver disease, cancer, and heart disease.¹¹ In addition; adolescents are at higher risk for brain atrophy, cognitive impairment and disruption in forming new long-term memories. This is due to alcohol disrupting and/or damaging the hippocampus, frontal lobe, and other structures of the brain.^{17,18} It is important to emphasize that alcohol has long lasting effects, many of which cannot be reversed.

As with many other medical conditions, it is more effective to prevent binge drinking than to treat this type of behavior and its potential adverse outcomes. Community wide approaches, including restricting sales, prohibiting sales to minors, national campaigns, screening, anticipatory guidance, and school-based interventions have all led to a continual decline in rates of binge drinking among adolescents.^{1,11} (Nationally, the percentage of 12-17 year-old binge drinkers has been decreasing each year, with a total of 5.8% in 2015, down from 6.7% the previous year.)⁴ A literature

review completed by the NIAAA showed that the most successful interventions use the social-influences model, which helps adolescents to recognize social influences to use alcohol.¹⁹ Such interventions also help address social norms around alcohol (e.g., it is not normal for adolescents to abuse alcohol) and help youth to build skills to resist influences to use alcohol.¹⁹ Interactive techniques such as role-playing have been successful as well.¹⁹ Studies have shown that an increased negative perception of the consequences of alcohol use have resulted in a reduction in use among students. The goal is to empower students with the appropriate knowledge.²⁰ The audience should know that they could have fun, relieve stress, and establish maturity without alcohol or binge drinking.²⁰ For my presentation, I plan on following the social-influences model. Rather than presenting information solely with a PowerPoint, I plan on using interactive activities such as Kahoot, role-playing, and small group discussions. Hopefully, sharing this information will correct some of the perceptions adolescents have about alcohol and help them make more informed decisions when faced with social situations where alcohol is being used.

I chose to research and present on binge drinking for personal and professional reasons. On a personal level, I saw alcohol abuse occur as early as middle school and have continued to see it affect the lives of friends and family. As a woman I am especially concerned for young adolescent females who participate in underage drinking, for reasons discussed in this paper. As a future provider, I want to be a positive role model and be prepared to educate my patients about alcohol abuse as well as treat them for addiction. This is a topic that I will be involved in regardless of what medical specialty I end up in.

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