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# Adolescent binge drinking

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**COP Public Health Need Paper**

Adolescents are at a period in their lives where they are largely influenced by their peer groups and are forming habits that can positively or negatively affect them when they get older. It is important to inform them about the dangers of substance abuse early on so that they do not become addicted to substances that can forever negatively affect their health. This paper will focus on adolescent use of alcohol with binge drinking, marijuana use, and tobacco product use.

In 2008, 9.5 percent of adolescents aged 12 to 17 years reported that they engaged in binge drinking during the past month.<sup>1</sup> Binge drinking can lead to blacking out and abnormal development of the adolescent brain.<sup>2</sup> In 2008, 6.7 percent of adolescents aged 12 to 17 years reported use of marijuana over the past 30 days.<sup>1</sup> Marijuana is legal in eight states and does not carry a risk/harm perception of use with some adolescents. In 2009, 26.0 percent of adolescents in grades 9 through 12 used cigarettes, chewing tobacco, snuff, or cigars over the past 30 days.<sup>3</sup> Tobacco companies are targeting young smokers with ad campaigns. Healthy People 20/20 aims to decrease substance use by adolescents by 10%.<sup>1</sup>

The target audience for this health education is high school students grades 9-12, a time when individuals are influenced by their environment. In grades 8, 10, and 12 combined, 20% of students reported use of alcohol and 14% reported use of marijuana.<sup>4</sup> Adolescents have a low perceived risk of alcohol and marijuana use even though it has been shown to affect their brain development. Alcohol is the most frequently used substance by adolescents in the United States. In 2016, 33% of 12<sup>th</sup> graders reported use of alcohol within the past 30 days.<sup>2</sup> Although the prevalence of current drinking is declining, the incidence of binge drinking is increasing.<sup>2</sup> Current drinking was defined as  $\geq 1$  alcoholic drinks on  $\geq 1$  day in the past month. Binge

drinking was defined as 5 or more alcoholic drinks in a row on more than 1 day in the past month for men and 4 or more alcoholic drinks in a row on more than 1 day in the past month.<sup>2</sup> In a survey of 10<sup>th</sup> graders in Washington, 18% reported using marijuana at least 1 day in the past month with a third of them using marijuana 10 days or more during the month.<sup>5</sup> Currently eight states and the District of Columbia have legalized the recreational use for persons over 21 years old. In 2016, 81% of 12<sup>th</sup> graders said that they could obtain marijuana easily or fairly easily.<sup>4</sup> Not only is availability a factor in marijuana use, perceived risk of use and disapproval of trying marijuana are declining.

Tobacco is the leading cause of preventable disease and death in the United States. In 2016, 20.2% of high school students reported current use of any tobacco product according to the National Youth Tobacco Survey.<sup>6</sup> Nearly all tobacco use begins during youth and young adulthood. Use of any tobacco products among high school students is decreasing but tobacco companies continue to target this age population. There is increasingly more focus on marketing e-cigarettes as a safe alternative to cigarettes and a viable option for smoking cessation. The tobacco companies however, are marketing to a young population that is not in need of smoking cessation if they are just beginning using tobacco products. Keeping teens from even beginning substance abuse begins with talking to them about the dangers of use and addiction. If they have already experimented with substance use, with early intervention they are more likely to discontinue use. Adverse consequences need to be stated for each drug individually because people will not generalize that the use of all illicit substances is bad.<sup>4</sup>

The adolescent brain is ever changing and binge drinking can affect the parts of the brain that help with cognition, sociability, and IQ. Adolescents are less sensitive to alcohol so they have to drink more to get the effect of being drunk which can lead to binge drinking.<sup>7</sup> Alcohol

can be a gateway to other illicit substances such as marijuana. Adolescents who have friends with a low risk perception of marijuana or alcohol use will be more likely to have a lower risk perception of the dangers of marijuana or alcohol themselves.<sup>8</sup>

Early exposure to alcohol in adolescents increases the risk of to develop alcohol dependence later in life, violence, and injuries. Adolescent brains are less sensitive to ethanol. This can lead to binge drinking and blackouts due to the decreased ethanol sedative-motor responses.<sup>7</sup> In animal studies, adolescent rats are less sensitive to ethanol-induced sedative/hypnotic effects. They are less sensitive to feedback cues to limit alcohol consumption such as social inhibition at high ethanol doses, motor impairment, conditioned taste aversion, and acute ethanol withdrawal.<sup>7</sup> Although the mechanism for decreased alcohol sensitivity in human adolescents is less understood, one possibility is that adolescents have an immature neurotransmitter system which is directly targeted by alcohol, mainly excitatory glutamate, inhibitory GABAergic, and modulatory opioid systems.<sup>7</sup> Adolescent rats have reduced sensitivity to GABA type A receptor-mediated inhibition in the hippocampus.<sup>7</sup> In human and animal studies, adolescents show greater memory impairment and ethanol-induced social facilitation at lower doses of ethanol than adults.<sup>7</sup>

The frontal cortex is still developing in adolescents and studies on adolescent rat brains show that their frontal cortex is sensitive to binge drinking levels of alcohol.<sup>7</sup> There is more frontal cortical brain damage in binge drinking rat adolescent brains than there is in binge drinking rat adult brains. The earlier an adolescent starts drinking, the more likely they will develop alcohol dependence in their lifetime.<sup>7</sup> If they start drinking before age 15, they are four times more likely to develop alcohol dependence than someone who does not start drinking until after age 20.<sup>7</sup> Binge drinking can affect adolescent brain development causing problems with

cognition, memory, and IQ. The earlier one begins drinking the more likely they are to have alcohol dependence. Adolescents should be mindful of their peer group because if their peers are partaking in alcohol use, they are more likely to follow suit and use alcohol too. Adolescents have to drink more alcohol than adults to get an effect from ethanol which can lead to binge drinking and blacking out.<sup>7</sup> Binge drinking can cause someone to be violent, be susceptible to violence, and have unintended injuries especially if a motor vehicle is operated under the influence.

Marijuana can affect development including impairment of brain development, and lower intelligence quotient. It can also affect social interaction and emotional development with other mental health effects.<sup>5</sup> Regular marijuana use has neurotoxic effects on brain tissue. Memory, executive function, and cognitive control is associated with tissue maturation. This can cause implications for school performance and risk/reward behaviors.<sup>9</sup> Even when someone stops using marijuana, there are still effects to the brain. Cannabinoid receptors increase in the adolescent brain and alterations of this system during adolescence can result in neurochemical and neurostructural changes which cause poorer cognition and emotional outcomes in adulthood.<sup>9</sup> Regular marijuana use has neurotoxic effects on brain tissue. The degree of impairment related to marijuana use in adolescence remains inconclusive although attention, learning, and memory are effects that appear to be associated with marijuana use.<sup>9</sup> Even though marijuana is legal in Oregon, it is not a benign drug. It affects the growing adolescent brain and can lead to lower IQ, incomplete development, and negative affect on memory. There is no safe amount of marijuana. Using marijuana, tobacco products, and alcohol can lead to the use of other licit and illicit drugs and can cause early life dependence.

Tobacco companies target low income, LGBTQ, and minority communities with their advertising. In 2011, the Advancing Science and Policy in the Retail Environment looked at public schools in 40 states that had a higher proportion of Hispanic and Black residents than the national average. The study found that 77.3% of the schools had at least 1 tobacco outlet within 800 meters of the school.<sup>10</sup> Tobacco companies purposely target minority neighborhoods with advertising. They also target the LGBTQ community. They advertise at Pride and other LGBTQ community events. Twenty-four percent of LGB adults smoke cigarettes versus 16.6% of heterosexual adults.<sup>11</sup> Cigarette smokers are more likely to engage in at risk behaviors such as getting in fights, engaging in high-risk sexual behaviors, carry weapons, attempt suicide and suffer from depression.<sup>12</sup> Tobacco companies try to target adolescents because they want a population of people that they feel are going to start using their product early and live the longest while using it to make more money. They specifically model their marketing around things that are of interest to adolescents and young adults to get the most advertising possible. They try to suggest their product to adolescents and make it look cool, popular and sexy, they can get more customers. The tobacco companies once considered calling one of its marketing efforts to adolescents Kestrel. <sup>13</sup> A Kestrel is a large bird that preys on small rodents. The tobacco companies had a plan to target the gay community which they called project scum.

There are no safe alternative tobacco products. One hour smoking hookah is like smoking 100 cigarettes.<sup>14</sup> Vaping is advertised as a safe alternative to smoking but it has nicotine. Although the nicotine is not derived from tobacco, it is still addictive. Tobacco use can lead to long term cardiovascular disease, lung cancer, oral cancer, emphysema among many other diseases. Smoking is a risk factor for almost all diseases that affect the organs. It is never too late to quit smoking.

When developing education strategies for prevention of binge drinking in adolescents, not only are the characteristics of the person taken into account, but their peer and family environment are needs to be considered. Educational programs can be implemented in schools, extracurricular activities, family strategies, and policy and community. The National Institute on Alcohol Abuse and Alcoholism has suggested key components of strategies to prevent underage drinking.<sup>15</sup> School strategies involve developmentally appropriate information about alcohol and other drugs. They are based on behavioral theory and knowledge of risk. There should be interactive teachings that take place over multiple sessions over multiple years.<sup>15</sup> For extracurricular activities, there should be youth leadership but supervised by positive adult models. It is estimated that 40% of adolescents' waking hours are not involving activities related to school, eating, chores, homework, or working. Adolescents without adult supervision during this time are more likely to participate in negative behaviors.<sup>15</sup> Extracurricular activities help with participation in these behaviors. With family strategies, home based parent-child activities, parent training, and behavioral family therapy can help prevent alcohol abuse. There needs to be consistent discipline and rulemaking.

Lawmakers have implemented policies to reduce the availability. Licensed establishments are monitored for illegal sales to minors. In 1984, the US government passed the Uniform Drinking Age Act to raise all 50 states back to the minimum legal drinking age of 21 from 18. There are also training programs to help servers of alcohol recognize false age identification. Driver's licenses are designed to clearly show a driver under the age of 21. Policy and community strategies also look to involve the media to increase awareness.<sup>15</sup>

The Substance Abuse and Mental Health Services Administration studied the effects of interventions to prevent binge drinking. Multi-component prevention programs showed

reductions in alcohol use even 3 months to 3 years. School prevention curricula with parenting intervention are examples of multi-component prevention programs.<sup>16</sup> Increased taxes on or prices on alcohol showed reduced consumption for underage drinking.<sup>16</sup>

Educating this population about the dangers of substance abuse is important before they develop unhealthy practices. Now is a time in their lives when they are easily influenced by their environment. It is important for them to understand that even though they may not see a problem with occasionally using alcohol, marijuana, or tobacco now, they do not fully understand the risks associated with beginning these habits so young. Their brain is not developed enough to perceive the risks of substance use and substance use can negatively affect their brain development. Forming trusting relationships with adults can help adolescents refrain from beginning engaging in risky behaviors. As a PA who is considering going into pediatrics, I think it is important to form relationships with adolescents in a non-judgmental way to help them navigate their formative years and talk to them about the dangers of substance abuse.

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