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Partners in Prevention

Missouri's higher education substance misuse consortium

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The Changing Landscape of Nicotine and Tobacco Use

Partners in Prevention (PIP) is Missouri's higher education substance misuse consortium dedicated to creating healthy and safe college campuses. The coalition is comprised of public and private colleges and universities in the state. The campuses in PIP work to prevent high-risk behaviors by implementing evidence-based strategies, including education, social norming campaigns, policy review and enforcement, and more.

Public Health Impacts of Modern Tobacco Use

Smoking combustible cigarettes remains a significant public health concern as it contributes to morbidity, mortality, and health resource utilization[1,2]—in the United States alone, smoking is associated with nearly 200 billion dollars in annual costs. Smoking has remained the leading cause of death and disability for the last 20 years, despite extensive prevention and cessation efforts.[3] Among people who smoke, 2/3 of deaths can be attributed to a smoking-related illness, and life expectancy reduces by more than 10 years, when compared to nonsmoking peers.[4] Despite the majority of people who smoke expressing the desire to quit smoking, cessation remains challenging as 70% return to use within 30 days post quit attempt.[5]

Widespread dissemination of efficacious smoking prevention and cessation interventions ushered in an era of declining smoking rates in the 1960's to early 2000's. However, subsequent spikes in nicotine use rates among youth via e-cigarette use (i.e., vaping) is concerning given the well-established role of early nicotine exposure to long term nicotine use and dependency.[6,7] While preliminary, some studies suggest that youth who vape are 3.6 times more likely to engage in subsequent combustible cigarette smoking.[8] Further, youth may experience heightened vulnerability to nicotine vaping as those who report vaping nicotine report fewer risk factors than peers who smoke combustible cigarettes.[9,10] Thus, nicotine vaping is a focal area of study, including assessing its utility for harm-reduction strategies in the context of smoking cessation.[11]

Oral tobacco use, particularly oral nicotine pouches (often referred to as "zynning"), has rapidly gained popularity with sales tripling over a 3-year period from 2021-2024, particularly among men in emerging adulthood.[12,13] Oral tobacco is often used concurrently with nicotine vaping and/or smoking of combustible cigarettes and therefore may signify heavy nicotine use.[14] Rapid escalation of tobacco use has been suggested as a casual factor in Tobacco Use Disorder (TUD) severity, significantly contributing to the disease burden of tobacco use.[15] Alongside multimodal use of various tobacco products (combustible cigarettes, nicotine vaping, and oral tobacco pouches), electronic nicotine delivery systems (ENDS) allow for increased nicotine potency as compared to combustible cigarettes, possibly signifying an increased intensity of nicotine use.[16]

Core Message One

Despite reduced rates of smoking combustible cigarettes in the 1960's-early 2000's, we are experiencing a modern era of increasing nicotine use and TUD via an uptick of nicotine vaping and oral tobacco use. This phenomenon is thus contributing to increased cigarette usage as well as overall nicotine use severity among young adults.

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Nicotine's Impact on Cognitive and Emotional Functioning: Mental Health Implications

While acute nicotine use is associated with short-term, subjective enhancements in cognitive processes, such as attention and memory, long-term nicotine use and dependence are associated with deficits in cognitive processes including attention, inhibitory and impulse control, working memory, and cognitive flexibility.[17-20] Along with worsened cognitive performance across several domains, nicotine dependence is associated with disrupted emotional processes, including heightened experience of negative emotional states, and deficits in positive emotional states.[21,22] Nicotine dependence is associated with vulnerability to mental health conditions, including depression, schizophrenia, and bipolar disorder, among others.[23] Evidence suggests that smoking may contribute to the experience of negative emotional states in mental health conditions, and smoking cessation is associated with improvements in symptoms of anxiety and depression, as well as improvements in positive emotional states and overall wellbeing.[24]

Core Message Two

Despite short-term, subjective improvements in cognitive processes like attention, long-term nicotine use is associated with worsening cognitive function overall (i.e., worsened negative mood and diminished ability to experience positive emotions), thus contributing to worse mental health symptoms.

Nicotine Worsens other Addictive Behaviors: Alcohol Use and other Substance Use, Problematic Gambling and Gaming, and Binge Eating

Nicotine enhances the incentive salience (i.e., pleasurable and reinforcing properties) of other substances and rewarding behaviors, such as problematic video gaming, and gambling.[25-27] Moreover, nicotine has complex effects on appetite and eating. While nicotine may momentarily reduce appetite, nicotine simultaneously increases motivation for food and eating for pleasure overall, which may contribute to greater rates of smoking among people seeking care for binge eating.[28-30] Similarly, nicotine enhances the pleasurable effects of alcohol, and dual use is associated with increased problematic alcohol use and severe consequences of alcohol use, including alcohol-induced blackouts, binge drinking, and increased odds of physical fights, injuries, arrest/detention, and emergency department visits, among others.[31-34]

Further, nicotine use most commonly presents with other substance use, including cocaine, methamphetamine, and opioid use, and similarly contributes to the addictive properties of these substances.[36] Likewise, using nicotine and cannabis is associated with heavier and more problematic cannabis use.[35] While addictive behaviors have been shown to co-occur in general, the enhancing properties of nicotine distinctly accelerate substance use and other additive behaviors. Nicotine use and dependence may uniquely contribute to the maintenance and severity of other substance use, and problematic gaming, gambling, and eating behavior(s).

Nicotine use increases the rewarding properties of other substances and addictive behaviors like gambling, gaming, and binge eating, contributing to problematic use.

Core Message Three

Implications for Practice: Utilizing Diverse Treatment Modalities

Nicotine use may represent an overlooked contributor to a wide spectrum of addictive behaviors, along with other mental health concerns including depression and anxiety. Efficacious front-line therapies for TUD include Cognitive Behavioral Therapy (CBT) and pharmacotherapies such as Nicotine Replacement Therapy (NRT), including nicotine pouches, gums, inhalers, Varenicline (Chantix), and Bupropion (ZyBan), among others. However, a growing body of evidence suggests that some medication for smoking cessation may be less effective for women.[37,38] Along with front-line therapies, mindfulness based interventions

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(MBIs), neural stimulation, and exercise are evidence-based interventions that support smoking cessation.[39-41] Transcranial magnetic stimulation (TMS) is an FDA-approved treatment for smoking cessation that is covered by many major insurance providers, including Medicaid and Medicare, with 700+ clinics offering TMS in the United States.[42] Recent advances in TMS include repetitive TMS (rTMS) which may represent an accessible option for care as treatment sessions can last as little as 10-15 minutes.[43]

In tandem with front-line therapies, exercise has been shown to quickly provide symptomatic relief for smoking cravings, acute withdraw symptoms, and negative emotions associated with cessation efforts.[44] Studies show that pairing smoking cessation with treatment for other substance use improves overall treatment outcomes for SUDs.[45] Conversely, smoking is associated with increased risk of relapse among those in recovery for other SUDs.[46] Along with improved overall recovery outcomes, including smoking cessation in unified treatment approaches may provide benefits for an individual's cognitive-emotional well-being. A large body of evidence has demonstrated improvement of cognitive and emotional functioning, as well as benefits to overall health following smoking cessation.[47-50]

Core Message Four

There are several front-line medication and behavioral treatments for TUD. While some medications for smoking cessation may be less effective for women, TMS, mindfulness based interventions, and exercise alongside front-line therapies can support smoking cessation and boost overall well-being.

Treatment approaches prioritizing smoking cessation may improve treatment outcomes for other substance use, and provide benefits to cognitive and emotional functioning, supporting overall wellbeing.

Recommendations for Supporting Smoking Cessation in the Context of Modern Tobacco Use

❍ **Beyond smoking:** Nicotine use may present as a combination of oral tobacco use, nicotine vaping, and smoking combustible tobacco cigarettes. Combined use may represent nicotine use that is higher potency, intensity, and dependence severity than smoking combustible cigarettes alone, and nicotine use can have impacts on cognitive and emotional health, contributing to worsening mental health symptoms.

❍ **Nicotine accelerates other substance use and addictive behaviors:** Broadly, nicotine has been shown to worsen other substance use and related consequences, along with exacerbating other addictive behaviors (problematic gaming, gambling, etc.).

❍ **Smoking cessation as a unified treatment objective:** Supporting smoking cessation may have a reciprocal effect on other treatment goals including improved emotional health, and reduction or cessation of other substance use and addictive behaviors.

❍ **Integrated treatment options support inclusive, accessible care:** As some medications for smoking cessation may be less effective for some, holistic treatment approaches pairing exercise, mindfulness, and TMS with front-line therapies (CBT, medication, etc.) can improve treatment outcomes for people with tobacco use disorder.

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