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An empirical perspective on cigarette use in substance use recovery

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Introduction

Among Americans with substance use disorders (SUDs), polysubstance use is the rule rather than the exception. SUDs are identified by a pattern of problematic behaviors coalescing around a particular substance or substances (APA, 2013) without consideration of quantity or danger in single use. The majority of Americans with an SUD use at least one other substance in addition to their 'primary' drug (Jones & McCance-Katz, 2019; Jones, Mogali, & Comer, 2012; Rowe, Santos, Behar, & Coffin, 2016). Despite widespread tobacco use and co-use with other substances, and tobacco use remaining the leading cause of premature death and disease in the USA (CDC, 2014), tobacco use is rarely factored into national estimates of co-occurring substance use or SUD (Muilenburg, Laschober, Eby, & Moore, 2016) or in clinical settings (Rowe et al., 2016).

This paper explores why tobacco is not considered a 'substance' akin to alcohol and illicit substances in the SUD treatment setting and examines whether this differential consideration may influence SUD treatment outcomes and long-term recovery. To our knowledge, overlooking tobacco as a substance of addiction when considering polysubstance use and disorder is a historical artifact rather than an evidence-based decision. We will provide a historical context for the exclusion of tobacco from the SUD treatment paradigm and systematically examine the prevalence, associated harms, and standard SUD treatment guidelines for alcohol and tobacco co-use *v.* alcohol and cocaine co-use to assess the empirical basis for the disparate approach toward tobacco *v.* other substances. Cocaine was chosen due to the strong socio-cultural relationship that tobacco and cocaine use share with alcohol use, as well as a robust research history. The comparison of alcohol and tobacco co-use *v.* alcohol and cocaine co-use is not meant to provide a comprehensive review of polysubstance treatment paradigms, but to highlight the lack of evidence base for the exclusion of tobacco treatment in SUD treatment settings.

The exclusion of tobacco from SUD treatment

Over 3.7 million individuals over age 12 received substance use treatment for illicit drugs or alcohol in 2018 (SAMHSA). American SUD treatment is guided by the axiom of abstinence from all 'drugs of addiction'. Both the National Association of Addiction Treatment Providers (NAATP) and the American Psychiatric Association (APA) uphold abstinence from addictive substances as a critical component of SUD treatment success (APA, 2006; NAATP, 2019). Alcoholics Anonymous (AA) and related 12-step groups, which are nearly ubiquitous across the SUD treatment landscape, also prioritize abstinence as an essential part of recovery, sobriety, and well-being (Gorski & Miller, 2013; SAMHSA, 2018).

However, the traditional treatment method of abstinence largely does not include abstinence from tobacco use. Cigarette smoking is normalized in member stories within AA's canon 'The Big Book' (W, 1955). This acceptance of tobacco use may be related to the fact that tobacco use is legal for adults and does not cause intoxication/inebriation when used in the absence of other substance use, though arguably it does when used in combination with other substances (e.g. alcohol). It also does not generally lead to immediate life-threatening harm. Historically, smoking cessation has been considered counterproductive to SUD treatment with providers even suggesting that quitting cigarettes may increase risk of relapse to other substance use (Guydish, Passalacqua, Tajima, & Manser, 2007; Patten, Martin, & Owen, 1996). Mental health treatment providers have also long espoused the belief that quitting smoking would exacerbate mental health problems among those in treatment settings, thereby inadvertently or even explicitly discouraging quitting tobacco (Sheals, Tombor, McNeill, & Shahab, 2016). Clinicians may lack adequate training in tobacco cessation counseling as well as face competing treatment demands that, within the current treatment structure, take priority over nicotine dependence (ND) (Rogers & Sherman, 2014; Rogers, Gillespie, Smelson, & Sherman, 2018). As such, unlike alcohol and illicit substance use and

despite nicotine being a highly addictive substance, tobacco use appears currently to be exempt from inclusion in the abstinence paradigm in SUD treatment settings (National Institute on Drug Abuse, 2020).

Yet, many treatment facilities have begun restricting tobacco smoking in some manner. As of 2017, 57% of surveyed SUD treatment facilities only allowed smoking in designated areas, while 35% had complete smoke-free policies (SAMHSA, 2018). The rationale for these smoking restrictions thus far is primarily due to smoke-free workplace legislation, and not whether tobacco use should be treated because its continued use may impact abstinence, detoxification, and recovery from other substance use problems (Das & Prochaska, 2017; Derefinko, García, & Sumrok, 2018; Muilenburg et al., 2016; Prochaska, Delucchi, & Hall, 2004; Tsoh, Chi, Mertens, & Weisner, 2011).

Despite the inclusion of ND as a discrete disease, beginning with the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition* (DSM-III) and culminating with the DSM-5 when ND was reconfigured and termed tobacco use disorder (TUD) with the diagnostic criteria now identical to other SUDs (Neuman, Bitton, & Glantz, 2005), tobacco use continues to be differentiated from other addictive substances culturally and clinically. Additionally, cigarette smoking is disproportionately common among individuals with non-tobacco SUDs relative to the general US population (Baca & Yahne, 2009). The past-30-day prevalence of cigarette use in 2017 in the USA was approximately 14% (Wang et al., 2018) and past-year prevalence was 66.7% among those with a past-year diagnosis of drug abuse or dependence (Smith, Mazure, & McKee, 2014). Among those who seek treatment for an SUD, cigarette smoking prevalence estimates range from 65% to over 90%, which is in stark contrast to the decline in smoking among the US population (CDC, 2014; Guydish et al., 2011, 2017; Richter, Gibson, Ahluwalia, & Schmelzle, 2001).

Tobacco use among individuals with SUDs is a public health concern that requires further surveillance and consideration (Moeller et al., 2018; Weinberger et al., 2017b). Smoking is associated with longer, more persistent SUDs (Baca & Yahne, 2009; Barrett, Tichauer, Leyton, & Pihl, 2006; Lajtha & Sershen, 2010; Verplaetse & McKee, 2017); worse treatment outcomes (Durazzo, Pennington, Schmidt, & Meyerhoff, 2014; Weinberger et al., 2017b); a higher likelihood of using multiple substances (Attaiaa, Beck, Richard, Marimoutou, & Mayet, 2016; Lai, Lai, Page, & McCoy, 2000; Nicksic & Barnes, 2019; Ren & Lotfipour, 2019; Silveira et al., 2018); relapse to SUDs (Weinberger et al., 2017b; Weinberger, Platt, Jiang, & Goodwin, 2015); and a multiplicative effect on physical health risks when used with other substances (Baca & Yahne, 2009). Increasingly, data suggest that nicotine and cigarette use is also a barrier to long-term abstinence from alcohol, cannabis, and illicit substances (Peters, Budney, & Carroll, 2012; Prochaska et al., 2004). Despite growing evidence of the negative effects of tobacco on the health of those with SUDs, smoking cessation interventions continue to be inconsistently delivered, optional, or not offered at all in SUD treatment settings.

A comparison of alcohol and cocaine *v.* alcohol and tobacco

Prevalence of alcohol and cocaine co-use

Alcohol, either as the primary or secondary substance, is the most frequently reported substance across all SUD treatment admissions at 49% (Center for Behavioral Health Statistics and Quality, 2017). Alcohol and cocaine are the two most frequently co-used substances among individuals seeking SUD treatment (Kedia, Sell, & Relyea, 2007; Liu, Williamson, Setlow, Cottler, & Knackstedt, 2018). Alcohol use disorder (AUD) is typically reported as the primary SUD, while cocaine use disorder (CUD) is commonly reported as a secondary SUD (Center for Behavioral Health Statistics and Quality, 2017). For individuals with primary CUD, secondary AUD is frequently reported, with an estimated 60% of individuals with CUD regardless of treatment status also meeting the criteria for AUD (Heil, Badger, & Higgins, 2001). Alcohol and cocaine use are treated simultaneously in nearly all SUD treatment settings.

Prevalence of alcohol and tobacco co-use

Tobacco products and alcohol are, commonly co-used; individuals who meet the criteria for both AUD and TUD represent 34.0% of all AUD cases and 22.8% of all TUD cases (Grant, Hasin, Chou, Stinson, & Dawson, 2004). The prevalence of co-occurrence among individuals seeking SUD treatment is unknown as this information is not routinely collected at intake or discharge. The link between TUD and AUD seems persistent regardless of interest in quitting cigarettes; individuals with SUD experience significantly lower quit rates and more rapid relapse than individuals without SUDs (Weinberger, Gbedemah, & Goodwin, 2017a; Weinberger et al., 2017b, 2020). This is potentially due to a variety of barriers to effective cessation interventions in this population (Schroeder & Morris, 2010), as well as changes to the brain reward pathway in those who co-use (Bandiera et al., 2020; Lajtha & Sershen, 2010). Overall, the lack of emphasis on tobacco treatment in the SUD treatment setting does not appear attributable to low prevalence of co-use or lack of evidence-based treatments, as these are more plentiful for TUD than any other SUD (Thurgood, McNeill, Clark-Carter, & Brose, 2016). Lack of assessment and diagnosis of TUD, especially as primary diagnosis, and insufficient third-party payer reimbursement for TUD treatment effectively prohibit comprehensive treatment of SUDs by leaving TUD untreated (Williams, Steinberg, Kenefake, & Burke, 2016).

The physical and psychiatric harms of co-use

The harms of alcohol and cocaine

The physical, psychiatric, and social ramifications of AUD and CUD, individually and in combination, are well documented (Hedden, Malcolm, & Latimer, 2009). AUD increases the risk of physical injury, hastens the development of chronic health conditions, and provokes and worsens mental health (CDC, 2018; WHO, 2010). CUD is implicated in unpredictable or aberrant behavior, gastrointestinal damage, cardiovascular complications, and impaired cognitive functioning (NIDA, 2016; WHO, 2010). Alcohol and cocaine co-use is also associated with increased risk of cardiovascular disease, mental health problems, and interpersonal difficulties, over and above the risk for each individually (Hedden et al., 2009). The significant and well-documented health risks associated with alcohol and cocaine used alone or together make AUD and CUD priorities in SUD screening, assessment, and intervention.

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The harms of alcohol and tobacco

As discussed earlier, AUD negatively impacts an individual's health in a myriad of ways, including harming cardiovascular, cognitive, mental, and interpersonal well-being. The physical health risks of tobacco use are well-known and extensive, including but not limited to respiratory infections, high blood pressure, diabetes, pregnancy complications, and lung cancer (WHO, 2010). In addition, cigarette use increases the number of mentally unhealthy days (Plurphanswat, Kaestner, & Rodu, 2017), and is associated with higher risk of recurrence of major depressive disorder (Bakhshaie, Zvolensky, & Goodwin, 2015). Co-use of alcohol and tobacco is associated with greater physical health risks relative to the use of either alone (Schroeder, 2017), and is associated with mental health problems (Cohn et al., 2018). Among individuals in long-term recovery for AUD, cigarette smoking-related health conditions are the most common cause of death (Alcoholism: Clinical & Experimental Research, 2008). As such, the rationale for excluding tobacco use from the treatment setting does appear to be based on the lack of potential harm.

Clinical treatment processes

Considering the negative health consequences that can result from dependence on alcohol, cocaine, and tobacco, there is a clear need for screening and provision of comprehensive evidence-based tobacco treatment on par with other SUD treatments (Apollonio, Philipps, & Bero, 2016; Das & Prochaska, 2017; Derefinko et al., 2018; Thurgood et al., 2016). Screening for AUD and CUD occurs in various contexts, including emergency departments, primary care clinics, and community mental health settings. SUD treatment referrals are generally governed by the American Society of Addiction Medicine (ASAM) Criteria – a multidimensional tool used to assess appropriate treatment services (individual counseling, inpatient, etc.) that match the intensity of need (ASAM, 2019). As of 2006, the ASAM Criteria were required by more than 30 states when making SUD treatment referrals (ASAM, 2019; Kolsky, 2006). These criteria account for the specific SUD diagnosis and the individual's unique circumstances when determining the appropriate level of care (Williams et al., 2016). Patients with more severe SUDs (i.e. those with high risk of death in the early stages of abstinence and withdrawal) and/or more challenging circumstances (e.g. those with poor health) are more often referred to inpatient treatment. Of note, TUD is not included as part of the ASAM assessment. This lack of data collection along with the lack of insurance coverage of inpatient or outpatient admissions for TUD (Williams et al., 2016) – and therefore omission of diagnosis or downgrade to secondary diagnosis – leave a substantial gap in substance use research and treatment. Although the Agency for Healthcare Research & Quality (AHRQ) recommends that healthcare providers 'ask', 'advise', 'assess', 'assist', and 'arrange' for assistance for (5 A's) all patients who identify as smokers (AHRQ, 2012), only 6.1% of adult smokers reported receiving all 5 A's and 6.3% reported arrangements for follow-up regarding smoking cessation in the 2009–2010 National Adult Tobacco Survey (Kruger, O'Halloran, Rosenthal, Babb, & Fiore, 2016). Furthermore, the 'assist' step only recommends brief counseling and medication (CDC). As a result, the current approach is not sufficiently potent to treat TUD. When tobacco use is assessed in clinical settings, which is not a universal practice (SAMHSA, 2018), the information is not generally collected for diagnostic purposes. Paradoxically, there is more evidence to support the effectiveness of tobacco treatments than for other SUD treatments (Thurgood et al., 2016), but comprehensive tobacco treatments such as counseling and pharmacotherapy are neither routinely accessible nor reimbursed (Williams et al., 2016).

A paucity of treatment guidelines for co-occurring SUDs

Alcohol and cocaine co-use treatment

Co-occurring alcohol and cocaine SUDs, compared with either alone, produce additional challenges for successful treatment. These challenges include intertwined cues, modified and enhanced intoxication effects, and increased use of both substances. Individuals who become accustomed to cocaine use after consuming alcohol find themselves 'craving' cocaine when confronted with the conditioned cue (i.e. alcohol). When two or more substances have reciprocal cues, they are 'intertwined'. This poses significant difficulties for those who have a combined cocaine and alcohol polysubstance disorder, as they require complete abstinence from both substances to avoid eliciting a compounding desire for one substance or the other (Marks, Pike, Stoops, & Rush, 2015).

Cocaine and alcohol can also modulate user experiences to amplify positive effects and mitigate negative consequences (Perez-Reyes, 1994). When consumed together, alcohol and cocaine create cocaethylene, a metabolite with additional psychoactive effects. Individuals who co-use cocaine and alcohol experience increased euphoria compared with the use of either substance alone (Farre et al., 1997; Liu et al., 2018; McCance-Katz, Kosten, & Jatlow, 1998). Furthermore, cocaine may be used to strategically counteract alcohol's depressant effects, and alcohol may likewise be used to mitigate cocaine's withdrawal symptoms (Margolin, Avants, & Kosten, 1996). Likely related to many of the reasons above, research indicates that alcohol and cocaine co-use is associated with increased frequency of use of both substances (Gossop, Manning, & Ridge, 2006; Heil et al., 2001). Given that alcohol and cocaine cessation is required upon treatment entry, SUD interventions and programs acknowledge how alcohol and cocaine use are often inextricably entangled.

Evidence-based interventions for different SUDs usually follow similar intervention methods, such as pharmacotherapy, behavioral therapy, and addressing comorbidities, with slight substance-specific differences and differences unique to the individual. While alcohol and cocaine use are strongly associated in populations receiving treatment (Pennings, Leccese, & Wolff, 2002), there are no nationally mandated evidence-based clinical guidelines for treating co-occurring AUD and CUD. The APA recommends incorporating evidence-based practices for each SUD into an individualized plan for the patient (APA, 2006). Similarly, some local AA groups incorporate support for both alcohol and cocaine and recommend that individuals with co-occurring SUDs attend other 12-step groups (e.g. Narcotics Anonymous, Cocaine Anonymous) (W, 2017). Successful CUD treatment outcomes are predicted by lower alcohol consumption after CUD treatment, while research specific to the effect of cocaine use on AUD treatment success is sparse. However, data suggest that co-morbid CUD causes an increased early treatment drop-out effect due to the difficult nature of initial cocaine abstinence, likely leading to significant difficulties in obtaining alcohol abstinence (Kampman et al., 2004).

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Alcohol and tobacco co-use treatment

Alcohol and tobacco co-use presents challenges to treatment success not unlike that of alcohol and cocaine co-use: intertwined cues, modified and enhanced intoxication effects, and increased use of both substances. The intertwined cues for individuals with co-occurring AUD and TUD are similar for co-occurring AUD and CUD – those who use both cigarettes and alcohol find themselves wanting to use alcohol while they are smoking cigarettes, or smoke cigarettes while they are consuming alcohol.

Regardless of whether an individual uses alcohol or tobacco first, use of one substance appears to increase craving for the other (Bien & Burge, 1990; Schroeder, 2017; Sharma, Lodhi, Sahota, & Thakkar, 2015). Smoking cigarettes while drinking alcohol may counteract alcohol's depressive effects, increase feelings of intoxication, and allow the individual to continue drinking (Sharma et al., 2015; Verplaetse & McKee, 2017). With increased alcohol consumption, one needs to smoke more to feel the effects of tobacco (Kohut, 2017). Due to the reinforcing nature of alcohol and tobacco co-use, individuals using both substances may experience increased frequency of use and amount of consumption of each substance (Gulliver et al., 1995; Rohsenow et al., 1997; Schroeder, 2017; Verplaetse & McKee, 2017). The degree to which alcohol and tobacco co-use is comparably entangled with that of alcohol and cocaine co-use illustrates the need for integrated treatment that recognizes the role of each substance in perpetuating addiction and how both may be a barrier to recovery.

Akin to the lack of integrated treatment for co-occurring AUD and CUD, there are no established interventions for combined AUD and TUD treatment, though concurrent *v.* delayed smoking cessation is associated with lower alcohol craving and expectations of more negative effects of alcohol use (Cooney et al., 2015). Smoking cessation interventions are inconsistently provided in treatment settings and are generally optional, if available. Data on who receives TUD treatment indicate individualized, situational, and biased allocation. SUD patients experiencing physical and psychological distress receive fewer tobacco cessation services, but patients who ask for cessation services and patients who receive treatment at tobacco-free facilities are more likely to receive assistance (Guydish et al., 2019). In contrast with cocaine use in the context of AUD treatment, abstinence from tobacco is not required or emphasized.

Although the health consequences of tobacco are universally recognized, much debate remains about the role of smoking cessation interventions in SUD treatment. Addiction providers historically believed that smoking cessation during recovery would increase risk of relapse to other substance use and recommended smoking cessation after successful SUD treatment (Guydish et al., 2007; Patten et al., 1996). However, available research indicates that smoking cessation interventions do not compromise SUD treatment outcomes, and instead may facilitate better outcomes when offered with SUD treatment (Baca & Yahne, 2009; Bobo, McIlvain, Lando, Walker, & Leed-Kelly, 1998; Epstein, Marrone, Heishman, Schmittner, & Preston, 2010). In a meta-analysis of 19 randomized controlled trials, smoking interventions concurrent with SUD treatment were associated with a 25% increased chance of long-term substance abstinence (Prochaska et al., 2004). Several studies have suggested that smoking *v.* no smoking is associated with poorer AUD treatment outcomes, including increased risk of relapse (Joseph, Willenbring, Nugent, & Nelson, 2004; Satre, Kohn, & Weisner, 2007; Stuyt, 2015). As such, the omission of tobacco treatment and abstinence from tobacco as a fundamental component of SUD treatment appears to contradict available evidence.

Concluding remarks

Challenges to tobacco cessation in SUD treatment settings

The physical health consequences of tobacco are devastating, with half a million US adults dying from tobacco-related causes annually (Carter et al., 2015; CDC, 2014). Nonetheless, cigarette smoking continues to be regarded as irrelevant or of far lesser importance in SUD treatment settings. There are mixed opinions about this differential treatment among SUD treatment providers. These sentiments may be partially explained by the absence of visible tobacco 'intoxication' when used in the absence of other substances and the empirically unsupported belief that the effects of smoking are limited to physical consequences; numerous studies indicate that tobacco is associated with poorer mental health outcomes (e.g. Bakhshaie et al., 2015; Fluharty, Taylor, Grabski, & Munafò, 2017; Plurphanswat et al., 2017).

There are many challenges to incorporating tobacco cessation interventions into recovery-oriented settings. While inpatient facilities are quickly adopting smoke-free policies, it is feared that these policies could drive participants who smoke to leave before completing their treatment (Patten et al., 1996). Psychoeducation of providers and patients about the benefits of TUD treatment may be necessary due to the erroneous belief that continued smoking enhances mental health and that cessation would undermine mental health recovery or successful treatment of other substance use problems (Gentry, Craig, Holland, & Notley, 2017; Kelly, Greene, Hoffman, Hoeppner, & Bergman, 2020; Pagano, Tajima, & Guydish, 2016; Wilson et al., 2016). Continued smoking alleviates withdrawal symptoms, which can mimic symptoms of anxiety, depression, and psychosis, yet evidence to the contrary suggests that cessation is associated with improved mental health and sustained SUD remission (Bakhshaie et al., 2015; Bakhshaie, Zvolensky, & Goodwin, 2016; Patkar et al., 2002). Furthermore, smokers with and without mental disorders report similar levels of motivation to quit smoking (Siru, Hulse, & Tait, 2009), and so a focus on making TUD treatment integral within substance use treatment settings, in line with the approach to all other substances, may be more beneficial than assessing whether patients want to or are ready to quit tobacco use. Lack of interest in treatment for TUD would be more effectively addressed with therapeutic rationale, which better aligns with the traditional SUD treatment approach of abstinence from all substances, as well as evidence from the literature on SUD treatment outcomes.

The high prevalence of mental health problems among individuals with SUDs overall may provide additional challenges to successful treatment, but there is no evidence that it presents a disproportionately greater barrier to TUD *v.* CUD or AUD treatment. Furthermore, diagnosis of mental health problems should not preclude requirement for TUD treatment among substance use care settings. Additional challenges exist toward implementation of tobacco cessation services in SUD treatment facilities desiring them, including inadequate cessation resources, high prevalence of smoking among facility staff, and organizational cultures that do not prioritize cessation (Guydish et al., 2007; Knudsen, 2017). Compounding these issues is the proliferation of non-cigarette tobacco products and widespread increase in their use, the increase in polytobacco product use, which is

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associated with lower odds of quitting (Guydish et al., 2016; Wang-Schweig, Jason, Stevens, & Chaparro, 2019), and the increase in use of products that are often used to co-administer tobacco and cannabis (Baldassarri et al., 2019; Dixit, Herbst, & Das, 2021; Guydish et al., 2016; Wang-Schweig et al., 2019). E-cigarettes, for example, are often permitted in SUD treatment facilities where combustible tobacco use is prohibited (Wang-Schweig et al., 2019).

Public health implications

The current paper presents an empirical perspective on the debate over whether to treat TUD in SUD treatment settings. The weight of the available evidence suggests that continued smoking is associated with poorer SUD treatment outcomes and increased risk of relapse during SUD recovery. Available data on treatment outcomes for cocaine and alcohol co-use mirror those of tobacco and alcohol co-use, suggesting a major discrepancy in the perception *v.* the reality of the impact of tobacco and alcohol co-use on SUD recovery.

Additionally, no evidence to date suggests that tobacco use is an effective tool in remaining abstinent from other substance use. Yet, it is possible that offering tobacco treatment services as a follow-up to AUD treatment may be more effective for individuals who do not request simultaneous treatment (Kodl, Fu, & Joseph, 2006). This question has not been explored empirically but warrants thorough investigation given the widespread practice and profound risks of tobacco use. Regardless of provider preferences, philosophies, or the historical background of SUD treatment resources, the data suggest that continued smoking may be undermining SUD treatment efforts. As we continue to develop evidence-based SUD treatment guidelines, it seems illogical to continue with the status quo of sustained or encouraged tobacco use. A change this profound requires resources, time, and attention, as well as input from all key stakeholders, to address and change longstanding culture. As we amass more data, re-classification of cigarette use within the SUD treatment model as part of the problem, rather than inconsequential, has the potential to make a profound impact toward moving the field forward.

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