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Changes in tobacco use patterns among adolescents in substance abuse treatment

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ABSTRACT

The purpose of this study was to determine tobacco use and dependence patterns over the course of 12 months among an adolescent population entering substance abuse treatment. The sample consisted of intake and 3-, 6-, and 12-month post-intake tobacco use data from 1062 adolescents within 34 substance abuse treatment facilities across the United States. Data were pooled across sites and analyzed utilizing descriptive statistics; repeated measures analyses; multiple regression models; three-level hierarchical linear models; and hierarchical generalized linear modeling. The majority of the sample reported at least weekly tobacco use at intake. Over time, participants increased their total tobacco consumption and days of use while reporting less desire for help with cessation. Race/ethnicity was a factor in differing tobacco use patterns. Tobacco dependence rates remained stable from intake to 3 months post-intake, decreased at 6 months post-intake, and rose to its highest levels at 12 months post-intake. Participants attended one smoking cessation class on average in each 90 day time period. Results suggest that adolescents entering substance use treatment may benefit from integrated tobacco cessation interventions that are intensive and occur early in treatment.

1. Introduction

Tobacco use is almost always initiated and established in adolescence, and more than 90% of adult smokers begin smoking before 18 years of age (U.S. Department of Health and Human Services [USDHHS], 2012; Substance Abuse and Mental Health Services Administration [SAMHSA], 2009). Youth are sensitive to nicotine and can feel dependent earlier than adults, suggesting a need for early intervention (USDHHS, 2012). Though the rate of past month tobacco use among 12 to 17 year olds in the general population declined from 15.2% in 2002 to 10.7% in 2010 (SAMHSA, 2011), declines in the use of tobacco have slowed for cigarette smoking and stalled for smokeless tobacco use in recent years (USDHHS, 2012). Tobacco use, and specifically cigarette use which makes up the majority of adolescent tobacco use, among adolescent substance users is a particularly worthy area of exploration given reports that this subpopulation may have smoking rates up to four times that of the general population (Baca & Yahne, 2009; De Dios, Vaughan, Stanton, & Niaura, 2009; Kalman, 1998; Myers & Kelly, 2006).

Substance users tend to start smoking at a younger age, continue smoking for longer periods of time, have greater health problems associated with smoking, are heavier smokers, nicotine dependent, and experience greater difficulty with quitting (e.g., Breslau, Peterson, Schultz, Andreski, & Chilcoat, 1996; De Dios et al., 2009; Myers & Kelly, 2006; Novy, Hughes, & Callas, 2001; Orlando, Tucker, Ellickson, & Klein, 2005; Richter, Ahluwalia, Mosier, Nazir, & Ahluwalia, 2002). Indeed, the use of tobacco accounts for greater morbidity than alcohol and all other drugs combined (USDHHS, 2000), yet tobacco cessation interventions have not traditionally been incorporated within substance use treatment due to the misperception that it may undermine the treatment for alcohol or other drugs (De Dios et al., 2009; Kurst-Swanger & Stockweather, 2003).

Few studies have examined cigarette smoking intervention among substance-using adolescents, and those which have are limited by small sample size. Myers, Brown, and Kelly (2000) demonstrated the feasibility of providing a tobacco-focused intervention in the context of treatment for AOD use disorders, but their sample was limited to 35 adolescents. A controlled outcome follow-up study by the same group (Myers & Brown, 2005) had a sample size of 54 adolescents recruited from substance use treatment programs.

Though extant research has provided initial evidence of the need for and feasibility of tobacco cessation interventions in adolescent substance abuse research, we are not aware of any studies with large sample size examining the long-term tobacco use patterns and levels of dependence among adolescents following currently-available substance use treatment. In this study, we will determine not only frequency of smoking, but also intensity of smoking over time. The goal of the proposed research is therefore to examine tobacco dependence and tobacco use patterns at intake, 3-, 6-, and 12-months post-intake to determine changes in use patterns (i.e., days of tobacco

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use; weekly tobacco use; how many times smoked each day; total tobacco used) over time, with an eye towards identifying factors that could potentially mitigate these patterns. One such factor worth examining is race/ethnicity, as there is evidence of difference in smoking prevalence by race/ethnicity in the general population. White adolescents (9.8%) reported higher levels of smoking in 2010 than Hispanic and African American adolescents, who reported smoking prevalence rates of 8.0 and 4.5%, respectively (SAMHSA, 2011). Though African Americans smoke on average fewer cigarettes per day (CPD) compared to non-Hispanic White smokers (Benowitz, Bernert, Caraballo, Holiday, & Wang, 2009), it has been reported in the adult literature that they have a higher level of dependence than White smokers (Luo et al., 2008; Okuyemi, Faseru, Sanderson Cox, Bronars, & Ahluwalia, 2007). Tobacco dependence among adolescent substance users by race/ethnicity has not yet been studied, and we hope to address this gap in the literature. We chose to examine use patterns such as days of use and number of times smoked each day as outcomes in addition to tobacco dependence because a reduction in cigarette consumption can be an "intermediate stage" before complete cessation and may increase the motivation to quit (Schane, Ling, & Glantz, 2010). We hypothesize that tobacco use and dependence will be lower at 3 months post-intake than at intake for all adolescents in our sample, given that substance treatment will likely have just ended, but will increase at each subsequent time point. Further, we hypothesize that African-American and Hispanic adolescents will have lower use and higher dependence than Caucasian adolescents at all time points.

2. Materials and methods

Data analyzed in this study are from 34 substance abuse treatment facilities located across the United States (East Coast $n = 11$; West Coast $n = 8$; South $n = 8$; Midwest $n = 7$). Twenty-eight agencies are sole providers of outpatient (OP) and/or intensive outpatient (IOP) treatment; five provide additional residential services; and one agency provides OP, IOP, and corrections-based treatment services. Clients at all agencies are assumed to have access to smoking cessation classes either in-house or by referral given that all agencies reported having clients at one or more measurement periods who participated in classes/sessions on "how to stop smoking." The Full Global Appraisal of Individual Needs (GAIN; Dennis et al., 2003) was administered to all clients regardless of *level of care* (LOC) at intake, and 3-, 6-, and 12-months post-intake by trained and certified GAIN administrators during one-on-one interviews. The GAIN is a staff-administered, comprehensive biopsychosocial assessment tool widely used in both adult and adolescent substance abuse treatment facilities. It is a progressive and integrated series of measures designed to support a number of treatment practices, including yielding *DSM/ICD* diagnostic impressions and ASAM/other treatment planning information.

All data were collected as part of general clinical practice under each facility's respective voluntary consent procedures and were subsequently de-identified. The 34 facilities collectively contributed records from 1514 adolescent clients ages 12 to 17 with follow-up data at each time period. Two (< 1%) clients were excluded from study for missing data on race/ethnicity and 367 (24%) clients were excluded because they were missing data on tobacco use. Tobacco use questions are considered an optional portion of the GAIN, and, thus, some interviewers chose not to ask these questions as part of the intake and/or follow-up assessments. Due to the suspected artificial constraints residential and within-corrections treatment modalities may impose upon an individual's normative access to and use of tobacco, clients enrolling in these treatment settings were also excluded from analysis ($n = 83$; 5%). The remaining analytic sample consisted of 1062 adolescents ages 12 to 17.

Other demographic and non-tobacco use constructs were integrated into this study due to their potential to contribute unique variance beyond race/ethnicity to longitudinal tobacco use behavior. Demographic covariates of interest included gender, age (12–14, 15–17), LOC (IOP, OP), days in treatment, and intake tobacco use behavior. Non-tobacco use constructs were as follows: time spent with regular social peers who use drugs, self-reported past-month abstinence, weekly use of alcohol or other non-tobacco drugs (AOD), and primary substance of severity. These items were built into the analyses as a means of controlling and accounting for other potential sources of variability on tobacco use trends contributed by baseline characteristics and non-tobacco use behavior.

2.1. Measures

2.1.1. Definitions

Racial/ethnic group categorization was based on adolescents' self-reported responses to the GAIN question, "Which race, ethnicities, nationalities, or tribes best describe you?" An adolescent might say, "Hispanic" and then, "Mexican" to answer the question. For the purpose of our analyses, race/ethnicity was divided into four groups: African American, Caucasian, Hispanic, and other. The latter group was composed largely of multiracial (78%) and Native American/Alaskan adolescents (17%). *Gender* was determined according to client response to the question, "What is your gender?" No clients self-identified as transgender. Clients were identified as adolescents if they responded to the question, "How old are you today?" with an *age* between 12 and 17 years.

Primary substance of severity reflects the primary identified substance that an adolescent is addressing in treatment. It was determined by the sum of 11 questions adapted from the American Psychiatric Association (1994) to identify the recency of substance dependence and abuse. In the event of a tie or when this information was incomplete, primary substance was selected according to the severity of the substance used (amphetamines, opioids, cocaine, alcohol, marijuana, other) and then by a count of days of use ("During the past 90 days, on how many days have you used…?"). For the purpose of our analyses, primary substance of severity was divided into three groups representative of the largest number of clients: alcohol, marijuana, and other (amphetamines, opioids, cocaine, other). Adolescents were categorized as *abstinent from AODs in the past-month* if they reported no use of any substances other than tobacco in the last 30 days in response to the substance-specific question, "When was the last time, if ever, you used…?" Clients were classified as having *used AODs weekly in the past 90 days* if they responded with 0–77 days to the question, "During the past 90 days, on how many days did you go without using any alcohol, marijuana, or other drugs?" Positive endorsement of *time spent with regular social peers who use drugs* was determined if adolescents responded with an answer other than "none" to the question, "Of the people you regularly socialized with, would you say that none, a few, some, most, or all of them used any drugs during the past 90 days?"

2.1.2. Outcome measures

A variety of tobacco use behaviors were investigated as a means of accounting for the diverse ways a client's race/ethnicity may influence tobacco use and dependence longitudinally. Within this study, tobacco use included the use of any tobacco product (e.g., cigarettes, smokeless tobacco) and was assessed by means of six self-report questions about tobacco use behavior in the 90 days prior to intake and each follow-up assessment. Specifically, clients were asked about their *number of days* ("During the past 90 days, on how many days have you smoked or used any kind of tobacco?") *and times per day* ("On those days, how many times per day did you usually smoke or use any kind of tobacco?") *of use* and their *current desire for and engagement in smoking cessation treatment*. An effort was made to