Drug and Alcohol Dependence 113 (2011) 118–124

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Associations between abstinence in adolescence and economic and educational outcomes seven years later among high-risk youth☆

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ARTICLE INFO

Article history:
Received 8 November 2009
Received in revised form 1 July 2010
Accepted 3 July 2010
Available online 24 August 2010

Keywords:
Abstinence
Substance abuse
Treatment
Income
Education
Propensity scores

ABSTRACT

Aim: In this study, we investigated the relationship between abstinence and long-term educational and economic outcomes among a sample of high-risk youth.
Methods: Multivariable regression models were used to estimate associations between abstinence and outcomes among a sample of 13–17 year-olds referred to group homes in Los Angeles in 1999–2000 and followed for 87 months afterwards. Abstinence was measured during the first year of the study. We considered differential effects based on the duration of abstinence (12 vs. 6 months) and type of abstinence (all substances vs. use of alcohol and/or marijuana) on three 87-month outcomes: having received a high-school diploma or equivalent by age 20, institutionalization in the past 90 days, and total legitimate income for the past 90 days.
Results: Abstinence from all substances for 12 months was associated with positive long-term educational and economic outcomes relative to using any drug during the same time interval. Abstaining from all substances for 12 months was also associated with an increased likelihood of being a legitimate wage earner and decreased likelihood of being institutionalized relative to using only alcohol and/or marijuana during that time interval. No effect on long-term outcomes was seen among youth who abstained for only 6 months relative to those who used drugs during this interval, or for youth who used only alcohol and/or marijuana over 12 months vs. those who used other drugs during this interval.
Conclusions: The results presented here justify continued and expanded efforts to promote long periods of abstinence from all drugs for high-risk youth.

1. Introduction

Individuals who misuse alcohol and other drugs during adolescence are at increased risk for adverse educational and economic outcomes in young adulthood, including high-school dropout (Bray et al., 2000; Ellickson et al., 1999; Krohn et al., 1997; Lynskey and Hall, 2000; Tanner et al., 1999), low levels of occupational attainment (MacDonald and Pudney, 2000; Schuster et al., 2001), reduced wages (Kaestner, 1991, 1993; Register and Williams, 1991; Ringel et al., 2006), and work in jobs with poor benefits or limited opportunities (e.g., jobs that do not offer access to health insurance) (Ringel et al., 2007). When considered alongside the adverse physical and psychological consequences of adolescent substance misuse (Ellickson et al., 2004; Kandel et al., 1986; Newcomb and Bentler, 1988), this makes preventing adolescent substance use and misuse a recognized public health priority (Healthy People 2010 and U.S. Dept. of Health and Human Services, 2000). As a result, there are a number of initiatives in the United States focused on preventing substance use among youth, some with documented success (Botvin et al., 1995; Ellickson et al., 2003; Flay et al., 2001; Skara and Sussman, 2003; Spoth et al., 2008). This focus on prevention, however, must be complemented with high-quality treatment programs for adolescents who do misuse substances to minimize the adverse consequences associated with such misuse.

Since substance misuse in adolescence is associated with adverse educational and economic outcomes in young adulthood, one of the long-term goals of substance abuse treatment for adolescents could be to improve outcomes in these domains, and there is some evidence that treatment produces just such benefits for academic outcomes (Engberg and Morral, 2006; Liddle et al., 2009). However, most substance abuse treatment providers that serve

☆ A table showing results from the propensity score weighted regression models is available with the online version of this article at doi:10.1016/j.drugalcdep.2010.07.014.

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doi:10.1016/j.drugalcdep.2010.07.014

adolescents focus on short-term goals, and primary among these is having their clients achieve sustained abstinence beginning from the time they enter the program and continuing for extended periods from when they complete or discontinue the treatment or are discharged from or leave a treatment facility (Winters, 1999). What is still unclear, however, is whether young clients who demonstrate short-term successes such as sustained abstinence are really less likely than their counterparts who do not exhibit such short-term gains to go on to experience the adverse long-term educational and economic outcomes that are usually associated with adolescent substance misuse.

In pursuing this line of inquiry, it is prudent to consider the type of abstinence that would be required to produce positive long-term outcomes. Definitions of sustained abstinence that have been used to measure the short-term success of substance abuse treatment programs vary, primarily with respect to the duration of time that such abstinence must be "sustained" and the types of drugs from which youth are required to abstain from to be defined as "abstinent." With respect to timing, we have found no research investigating the minimum length of sustained abstinence necessary for beneficial outcomes (Chung and Maisto, 2006). Evaluations of adolescent substance abuse treatment normally present the proportion of clients who are abstinent at differing points following treatment (e.g., beginning at discharge and for anywhere up to 24 months post-enrollment, typically at 3-month intervals) (Godley et al., 2007; Henggeler et al., 1999; Liddle et al., 2008; Williams and Chang, 2000); this is likely a function of resources available to conduct follow-up interviews and not based on any meaningful empirical validation. With respect to the types of drugs, most researchers have required youth to be abstinent from all psychoactive substances (e.g., Brown et al., 1989, 1996; Cady et al., 1996; Lewis et al., 1990; Richter et al., 1991), while others have only required abstinence from certain classes of drugs (e.g., alcohol/other drugs: Feigelman et al., 1988; Hser et al., 2001; Knapp et al., 1991) or from distinct substance types (Brown et al., 2001; Friedman et al., 1989). Clarifying this point may be especially pertinent for clients with a history of using drugs that are particularly damaging (e.g., cocaine, methamphetamine, heroin), because it may be possible for them to have achieved the behavioral changes promoted by drug treatment programs by abstaining from using these more damaging drugs, regardless of whether or not they abstain from drugs more commonly used by all adolescents, such as alcohol and even marijuana (Chung and Maisto, 2006; Johnston and National Institute on Drug Abuse, 2008).

The present study critically examines relationships between short-term successes following intake to substance abuse treatment (defined here as sustained abstinence) with long-term educational and economic outcomes. We examine whether these effects differ when sustained abstinence is measured as lasting for different periods of time (i.e., 6 months vs. 12 months) and for different categories of drug use (i.e., abstinence from all substances vs. use of only alcohol and/or marijuana).

2. Methods

2.1. Sample

The study sample is composed of adolescent offenders in Los Angeles who were adjudicated as delinquent and sent to one of seven residential group homes from February 1999 to May 2000. Extensive details can be found in Morral et al. (2004). Briefly, adolescents were interviewed face-to-face at enrollment and 3, 6, 12, 72, and 87 months post-enrollment. Of the 574 deemed eligible, 125 were excluded because they were sent to the group home before they could be interviewed, they did not sufficiently understand English, or a parent/legal guardian asked that his or her adolescent not be included in the study. As such, the sampling plan was not designed to be representative of all youths with community placement dispositions but is generally representative of the majority of such youths who are sent to the largest group homes in the county (Ramchand et al., 2009).

This study uses data from the baseline, 3, 6, 12, and 87-month follow-ups. There was high retention at each of these waves (90%, 91%, 91%, and 85%, respectively). Our outcomes were measured at the 87-month follow-up, and therefore the total analytic sample consisted of 383 youth, the number interviewed at that assessment. Of the 66 non-responders at 87 months, 12 were dead, 12 refused to participate, 40 were inaccessible, and 2 were unable or too ill. More details on the study appear elsewhere (Ramchand et al., 2009).

2.2. Measures

At each assessment, participants were interviewed using the Global Appraisal of Individual Needs (GAIN). The GAIN is a structured clinical interview that collects information on eight main topic domains (background, substance use, physical health, risk behaviors, mental health, and environment, legal, as well as vocational factors) (Dennis, 1999a).

2.2.1. Sustained abstinence. At the 3, 6, and 12-month assessments, all respondents were asked about the last time they used each of 13 types of drugs: alcohol, marijuana or other forms of THC, crack or free base cocaine, other forms of cocaine, inhalants, heroin, pain killers, PCP or angel dust, "Acid" or other hallucinogens, anti-anxiety drugs or tranquilizers, stimulants, sedatives, and other. From these measures, we constructed three different definitions of sustained abstinence. *6 months of sustained abstinence from all drugs* was defined as reporting no substance use in the past 3 months at both the 3 and 6-month assessments. *12 months of sustained abstinence from all drugs* was defined as meeting the criteria for 6 months of sustained abstinence in addition to reporting at the 12-month assessment either never having used or having used any substance more than 1 year ago. *12 months of only alcohol and/or marijuana use* was defined similarly as 12 months of sustained abstinence from all drugs though in this instance the use of alcohol and marijuana or other forms of THC was permitted.

Youth missing either 3 or 6-month assessments were excluded from analyses of the effects of 6 months of abstinence, though they were included in our analyses on the effects of 12-month abstinence (i.e., the additional constraint of having achieved abstinence at 6 months was waived) as long as they had 12-month assessment data stating that they had not used drugs in the past year. Due to missing data on one or more of the 13 questions on recency of drug use, 12-month abstinence could only be calculated for 355 youth (93% of the 87-month sample), and 6 months of abstinence could only be calculated for 319 youth (83% of the 87-month sample). In general, the excluded youth at baseline were slightly older, had fewer withdrawal symptoms and health problems, had less stable social support systems, had fewer recent employment episodes, and had more often been in institutionalized settings. They were also slightly more likely to need treatment specifically for marijuana use (results available upon request).

2.2.2. Outcomes. We examined three outcomes in our analyses: (1) educational attainment by the age of 20, (2) total legitimate income in the past 90 days, and (3) institutionalization in the past 90 days. All outcomes were measured at the 87-month follow-up.

Educational attainment was measured using an indicator of whether or not the study participant reported having received his/her GED or high school diploma by the age of 20. *Total legitimate income* was measured using respondents' responses to the question: "During the past 90 days, about how much money did you receive from wages or salary from a legitimate job or business?" *Institutionalization* was defined as having spent one or more of the past 90 days in any of several types of controlled environments in which drug use and liberty were substantially constrained for the whole day (e.g., jail, inpatient treatment, group homes, or probation camps). Two participants were excluded from the analysis of total legitimate income in the 90 days prior to the 87-month follow-up, one due to missing outcome data, and one due to having an outlying value of income over $100,000; all cases were included in analyses of the other two outcomes.

2.2.3. Control variables. For each outcome, we fit a Generalized Boosted Model (GBM) that included 80 baseline variables related to adolescent substance abuse patient placement criteria (Mee-Lee and American Society of Addiction Medicine, 2001) that have been used in previous investigations examining the effectiveness of adolescent drug treatment (McCaffrey et al., 2004; Morral et al., 2004). GBM is a flexible, non-parametric estimation technique that can account for a large number of covariates and that adaptively captures the functional form of the relationship between the covariates and an outcome with less bias than traditional approaches (McCaffrey et al., 2004). From this analysis, we selected for our final multivariable models only those baseline variables that explained at least 1% of the variation in at least one of the outcomes. Missingness on the 80 pre-treatment variables was low (mean = 2.3% and max = 20%) and thus a regression model hot-deck imputation procedure was employed to fill in missing values (Little and Rubin, 1987). Specifically, for a given variable with missing values, we modeled the expected value of the variable as a function of demographic characteristics, drug use history, psychological status, treatment history, legal history, and other variables from the GAIN (53 or more items in all) and used the observed data to fit the model. Records were stratified into 10 sets by the percentiles of the predicted scores from this fitted model. For each observation with a missing value, a "donor" value was drawn at random