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Predicting American Indian Adolescent Substance Use Trajectories Following Inpatient Treatment

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Abstract

This study examined the effects of psychopathological, peer, family, and cultural predictors of American Indian adolescents' drug use following inpatient treatment. Data regarding lifetime, 90 days prior to treatment, and 1-year posttreatment substance use were collected using interviews, questionnaires, and observations of 57 American Indian adolescents and their families. Trajectories of days-used measures were subjected to semiparametric trajectory analysis. Trajectories were then compared on baseline measures by using both univariate and multivariate logit regression techniques. The study sought to identify prerelease predictors of membership in post-inpatient treatment substance use trajectory groups. Findings provide insight into the unique and shared risk and protective factors relevant to American Indian adolescents' substance use outcomes. In particular, this study suggests that a combination of family management and American Indian traditional cultural practices in families serves as a potential target for interventions to reduce substance use in adolescence.

Keywords

American Indian adolescents; cultural practices and values; residential treatment; substance use

INTRODUCTION

Across all communities and neighborhoods, adolescent substance use undermines social, physical, and emotional development. Early-heavy and late-moderate adolescent substance use in particular predict an upward trend in continued use (Chassin, Pitts, & Prost, 2002; Maggs & Schulenberg, 2004–2005) and many other problems (Brown, 1993; Dishion & Owen, 2002; Ellickson, Tucker, & Klein, 2003). Early and sustained substance use

contributes to a variety of adolescent difficulties and negative consequences, including poor behavioral control (Chassin et al., 2002), school problems (Brown, Mott, & Stewart, 1992; Newcomb & Bentler, 1988a), family disruption (Brown et al., 1992; Kandel, Davies, Karus, & Yamaguchi, 1986; Newcomb & Bentler 1988b), emotional disruption (Brown, 1993), and continued substance use into adulthood (Chen & Kandel, 1995; Maggs & Schulenberg, 2004=2005). American Indian youth at high risk are particularly vulnerable to developing drug abuse and dependence, as well as multiple negative consequences as they move into adulthood (Schinke, Tepavac, & Cole, 2000; Stiffman, Striley, Brown, Limb, & Ostmann, 2003).

There is considerable reason for concern about substance use among American Indians of all ages and particularly among adolescents. Garrett and Carroll (2000) stated that among the participants in a federal survey of American Indians older than 12 years, 8% were in need of substance abuse treatment. A survey conducted from 1976 to 2000 showed that American Indian seniors had the highest level of alcohol and drug use when compared with that of seniors of other ethnic groups (Wallace et al., 2002; Winters, Latimer, Stinchfield, & Egan, 2004). In addition, American Indian youth living on reservations who were surveyed from 1975 to 2000 had higher levels of use than did non-American Indian youth (Beauvais, Jumper-Thurman, Helm, Plested, & Burnside, 2004). Research has revealed that American Indian children begin substance use at a relatively early age, with a number of youth having already tried substances by age 11 (Kulis, Okamoto, Dixon Rayle, & Sen, 2006; Mail, 1995; Schinke et al., 2000). In a community sample, Mitchell, Beals, Novins, and Spicer (2003) found a 38% to 73% alcohol use rate and a 41% to 60% lifetime use rate for drugs of any kind. Clearly, the high level of substance use documented among American Indian adolescents substantiates an eventual need for residential treatment.

To understand the elevated levels of American Indian adolescent substance use, one must consider together the proximal socialization processes relevant to family and to peers and disruption of community contexts. Strong evidence suggests that both family and peer dynamics contribute to the etiology of early problem behavior and early-onset substance use. An overview of the model describing this research is summarized in Figure 1. The concept of family management is central to this etiological model (Dishion, Capaldi, Spracklen, & Li, 1995; Hawkins & Catalano, 1992; Patterson, Reid, & Dishion, 1992). This concept emerged from the coercion theory of family interaction characterized by emotional reaction as opposed to purposeful parenting. Coercive interactions provide a basis for children and adolescents to learn problem behaviors in the context of the family by means of escape conditioning (Patterson, 1982). This type of child problem behavior in the home allows the child to avoid and escape demands and aversive experiences within the family.

Parental use of family management practices reduces coercive family interactions in that children's problem behavior is "managed" and children learn more appropriate prosocial behavior patterns. Although there are several formulations of family management, a core set of parenting practices are central, including parental monitoring and limit setting. Considerable evidence has shown that parental monitoring and limit setting practices are highly correlated with the extent of adolescent substance use (Chassin, Pillow, Curran, Molina, & Barrera, 1993a, 1993b; Dishion et al., 1995). Hops, Tildesly, Lichtenstein, Ary,

and Sherman (1990) found that coercive interactions observed in videotaped problem-solving tasks were predictive of high levels of alcohol use in adolescence. Family management in general and parental monitoring in particular have been studied in terms of youth substance use across ethnic groups, including American Indian adolescents (Barrera, Castro, & Biglan, 1999); in one study, family management and parental monitoring accounted for ethnicity-based differences in substance use (Catalano, Morrison, Wells, & Gillmore, 1992).

The most compelling evidence for the role of parenting in the etiology of adolescent substance use is the finding that random assignment to family interventions reduces use. Among these findings are that universal interventions targeting parenting practices reduce substance use (Mason, Kosterman, Hawkins, Haggerty, & Spoth, 2003; Spoth, Redmond, Shin, & Azevedo, 2004), as do interventions that target at-risk youth (Connell, Dishion, & Deater-Deckard, 2006; Dishion, Patterson, & Kavanagh, 1992). Moreover, change in the rate of drug use among at-risk youth was mediated by improvements in parental monitoring (Dishion, Nelson, & Kavanagh, 2003). Finally, treatment programs for adolescent substance use have been found to be effective (Liddle & Hogue, 2000).

One of the functions of family management and parental monitoring is to reduce children's movement into a drug-using peer group and unsupervised time spent in such groups. That adolescents' drug use is often a group activity is evidenced by the high rate of covariation found between peer and adolescent use (Oetting & Beauvais, 1987). Other studies have revealed longitudinal evidence of peer and family influence that suggests the two are highly correlated, and that peer deviance and drug use are often the stronger correlate (Chassin, Presson, Sherman, & Curran, 1992; Dishion et al., 1995). Examination of monthly variation in drug use "bursts" revealed the power of peers to change the drug use patterns of young adolescents (Dishion & Medici Skaggs, 2000).

Research on residential substance abuse treatment programs for American Indian adolescents is limited. The few existing studies found that many American Indian adolescents have severe substance abuse problems and a high prevalence of emotional disorders (Boyd-Ball & Dishion, 2006; Husted, Johnson, & Redwing, 1995; Novins, Beals, Shore, & Manson, 1996; Novins, Fickenscher, & Manson, 2006). One American Indian residential treatment study (Novins et al., 2006) confirmed that American Indian adolescents were more likely to be polysubstance users and diagnosed for several substance use disorders. They did not find any considerable diagnostic differences for American Indian adolescents than for non-American Indian adolescents seeking inpatient treatment.

The single largest negative effect on the culture of American Indian communities is the persistent effect of historical trauma. Historical trauma is a collective, unresolved mental injury that has been passed down through generations, originating from massive group violence (Duran & Duran, 1995; Evans-Campbell, Lindhorst, Huang, & Walters, 2006; Whitbeck, Adams, Hoyt, & Chen, 2004; Yellow Horse Brave Heart, 2003) that resulted in major losses. Government policies for American Indian communities produced forced relocation programs, stripped ceremonies and religions, and removed Indian children from their homes and communities. These policies weakened Indian communities, families, clans,

and bands and much was lost. A community builds from the combined strengths of its members, and with the core structures weakened, tribes were vulnerable to attack, disease, abuse, and the like. Unfortunately, American Indian communities have not recovered from these historical traumas and massive losses. Some of the continuing effects associated with historical trauma response are alcohol abuse, poverty that results from dislocation, and increased unemployment rates (Yellow Horse Brave Heart, 2003). Although knowledge about these effects has circulated in American Indian academic circles for years, it has yet to capture mainstream attention. The model in Figure 1 emphasizes the generational connection and inheritance of the original historical trauma.

Studies have confirmed that identity development enables children to make healthy choices on the basis of positive internal values and standards (Garrett & Walking Stick Garrett, 1994; Phinney, 1990). When opportunities for identity development are eradicated, the social and psychological effects accumulate into long-term trauma. Studies of American Indians show drinking norms vary considerably among tribes (Beauvais & Trimble, 1992; Fleming, 1992; Koss et al., 2003; Mitchell et al., 2003; Young, 1992a, 1992b) and may relate to the particular history and disruptions of individual tribes' cultural practices (Weaver, 2001). Variability in the extent to which ceremonies, language, identity, and the indigenous way of life were lost may be a factor in the variability of alcohol use norms and other related historical trauma response behaviors. Beauvais (1992) attributed additional factors to American Indian adolescent substance abuse, including social structure, family socialization, low self-esteem, and peer associates. However, there has yet to be a systematic analysis of the extent to which adolescents' engagement in tribal cultural practices or identification with their tribe affects the development and course of their substance use. In fact, the majority of the research on American Indian youth is conducted with youth who live among large, diverse populations and not in American Indian communities that could be considered sovereign tribal settings.

This study examined the posttreatment period of a group of 57 American Indian youth who had been referred to a 7-week residential program serving tribally enrolled adolescents living primarily in reservation communities. It looked for predictive cultural and social factors associated with rates of use during the 11 months following treatment. Given the heterogeneity of adolescents in residential treatment, we first defined their substance use trajectories and then considered factors that differentiated the substance use trajectories posttreatment (Figure 1). We hypothesized that problem behavior and family, peer, and cultural orientation measures would statistically differentiate substance use trajectories.

METHOD

Participants

Our data source and analysis focused on American Indian adolescents who had been referred to the Western Regional American Indian Treatment (WAIT) Center (WAIT is a fictitious name used in this article to protect the confidentiality of the participating treatment facility and is described in greater detail elsewhere; see Boyd-Ball & Dishion, 2006). The center is a residential substance abuse treatment facility operated by American Indian tribes and located in the Pacific Northwest. WAIT's 7-week treatment protocol promotes abstinence and

emphasizes cultural pride, awareness, and educational engagement. The study participants were adolescents who had been admitted to residential treatment from the western region of the United States: Alaska, Montana, Arizona, Nevada, Washington, Idaho, Oregon, and California. These adolescents were between age 12 and 18 and had been diagnosed with a substance use disorder before entering treatment.

The project's protocols and procedures were reviewed and approved by the University of Oregon, and a Certificate of Confidentiality was granted by the National Institute on Alcohol Abuse and Alcoholism (National Institutes of Health). Confidentiality of adolescents and parents' report of substance use was ensured by means of written and verbal communications between each participant and the recruiter. Approval was granted through the participating treatment facility.

Recruitment Strategies

Recruitment strategies included study participant solicitation during the first and last week of inpatient treatment. Data collection began only after the last week of treatment. After the adolescents were checked in, parents were asked to meet with research staff to learn about a family intervention study. Research staff introduced parents to the program, gave them verbal assurance of confidentiality, and handed them copies of the program description, timeline, and consent forms. Participation was completely voluntary, and the family's decision regarding participation did not affect treatment or posttreatment services. Families were recruited into the study during the 6 weeks of regular treatment; data collection occurred during the seventh week, identified as *family week*. Although we did not collect data specifically about recruitment strategies, we did observe that the major source of recruitment success was word of mouth by other recruits. Interestingly, parents agreed to participate in the study mainly because the adolescents themselves wanted to participate.

Of 104 adolescents and their families who had been informed about the study, 66 agreed to participate (63%). For the remaining 38 adolescents, the most common reason for not participating was lack of a caregiver to provide consent; in addition, several adolescents dropped out of treatment before consent was acquired. Those recruited were distributed across 8 treatment cohorts during a 15-month period (May 2000 to August 2001). Each treatment cohort comprised same-gender adolescents who participated together during the residential treatment program. Of the 66 recruited adolescents, 57 were retained throughout the study (86%).

Exclusion Criteria

Criteria for exclusion from the study included lack of parental consent (lack of an identified caregiver or lack of parental attendance during family week). Of the 9 adolescents who were dropped from the study, 7 had withdrawn from WAIT during the course of inpatient treatment, many of them in the first week of treatment.

Sample Composition

Demographics of the sample are presented in Table 1. At the time of recruitment, adolescents were between age 12 and 18 (mean = 15.9, $SD = 1.4$), with a slightly higher

representation of boys (56%) than of girls (44%). The study participants were American Indian and represented 28 different tribes, with 83% enrolled in a federally recognized tribe. Slightly less than half of the adolescents (45%) had had prior substance abuse treatment and a significant number of arrests in the previous 2 years (mean = 6.5, $SD = 6.5$). Typically, the participants came from large families, with adolescents reporting an average of 4 siblings (mean = 4.1, $SD = 2.5$) ranging from age 0 to 12 years.

Measures

Data were collected in three waves and included sociodemographics, medical and treatment history, family and peer information, and history of alcohol use and drug use for the adolescent and family. The first wave of data was collected over a 5-day period during family week after voluntary parental consent and adolescent assent. These baseline data were obtained through several sources: a family observation task, in-person interviews, computer-generated questions, and a packet of questionnaires. The second wave of data was collected through monthly 20-minute telephone interviews for a period of 11 months posttreatment. The third wave of data was collected at an exit interview 12 months following treatment, during which adolescents and parents filled out a questionnaire packet that had been mailed to them.

Interviewers, all college graduates, were hired and thoroughly trained to conduct the interview in a matter-of-fact style, avoiding extended conversation that might unduly lengthen the telephone interview or bias the responses provided. If families did not have telephones or if their telephones had been disconnected, arrangements were made so they could call the research center at their convenience using calling cards provided by the project. This data collection procedure resulted in an 86% retention of the treatment sample. Table 2 shows the study measures across trajectory groups and the means or percentages “yes” in the case of dichotomous variables.

Adolescent substance use—Information collected about substance use included the number of days alcohol had been used in the 90-day time frame prior to the day the respondent last drank, the number of different drugs used during the respondent's lifetime, and the parents' knowledge of the respondent's alcohol use. These three items were positively correlated with each other (r 's ranging from 0.14 to 0.44), so they were standardized and averaged to create a composite adolescent substance use score.

These measures were obtained from Form 90-DI: A Structured Assessment Interview for Drinking and Related Behaviors (Miller, 1996). Form 90-DI is a subset of Form 90, a series of instruments that generate baseline and follow-up information to assess alcohol consumption and other related problems. Form 90-DI combines structured interviews with a calendar format to record continuous (i.e., daily) alcohol and other drug use. The Form 90-DI test-retest reliability scores were reported for alcohol variables for total consumption ($r = 0.92$ – 0.97), drinks per drinking day ($r = 0.88$ – 0.93), percent days abstinent ($r = 0.96$ – 0.98), and percent heavy-drinking days ($r = 0.92$ – 0.97). Form 90-DI has been found to be a reliable instrument for alcohol treatment assessment research (Tonigan, Miller, & Brown, 1997). Form 90-DI's daily-use data were used to create the primary outcome measure for the

trajectory analyses (described later in this article): number of days used alcohol or cannabis in the month preceding an assessment. These assessments were conducted in the 11 consecutive months following program completion.

Adolescent trauma history—A trauma checklist (Stein, Walker, Hazen, & Forde, 1997), which was administered at baseline, addressed variety and severity of various traumas that study participants may have experienced. The 13 experiences listed included having been beaten, robbed, or sexually abused and having seen someone killed or injured in an accident. Respondents were asked how many times they had experienced each type of event, when the experiences occurred (in their lifetime and in the past year), and the number of these events that still bothered the respondent. Similar to analytic strategies used in the past (Bank, Dishion, Patterson, & Skinner, 1990), these indicators of trauma were considered to be discrete sources of stress that had an accumulative effect. As such, we created a trauma history index by summing the total number of traumatic events experienced by the child in his or her lifetime with the number of events that still bothered the child. Higher scores on this index were designed to indicate greater traumatic stress experienced by the adolescent in his or her life.

Parental substance use—A parental substance use questionnaire was administered to mothers, fathers, or other caregivers at baseline addressing alcohol use and drug use patterns in the year prior to the interview. From this information, we obtained an ordered categorical estimate of the frequency of alcohol use reported by each of the adolescent's parental figures (eight categories ranging from less than once a year to several times per day). The maximum of this frequency was determined concerning all parental figures who participated in baseline data collection ("max parental alcohol frequency").

Family functioning—During the last week of treatment, families participated in videotaped family observation tasks to assess family management practices (Dishion, Burraston, & Li, 2002; Patterson et al., 1992). Relevant to the analyses presented in this study, trained coders rated each family on these scales: monitoring, limit setting, and presence of coercive family interactions, including name calling, threats, criticism, blame, and negative emotionality. Interobserver reliability was assessed for 20% to 25% of the entire study sample. Observers were required to attain a minimum agreement score of 85. Limit setting and coercive family interactions were significantly correlated with each other ($r = -0.49$), so these two items were standardized and averaged to create a composite positive family functioning score. The count of coercive family interactions was recoded beforehand such that higher values on this family function score indicated more positive functioning.

American Indian cultural involvement index—The American Indian Cultural Involvement Index (AICI) is a composite score based on two measures. First, a child ethnic identity score was created on the basis of a self-report index of culturally relevant activities and beliefs; for example, time spent studying one's culture, traditions, and customs; clarity of the role of ethnicity in one's life; and sense of belonging to one's ethnic group ($\alpha = .97$). A second score consisted of the count of traditional values practiced or believed (α

= .79) and was obtained at treatment completion. The two scores, which were significantly correlated with each other ($r = 0.37$), were standardized and averaged to create the AICI score.

Analysis Plan

Trajectories based on the number of days used alcohol or cannabis were subjected to semiparametric trajectory analysis (Nagin, 1999) for 11 1-month periods after treatment cessation. Solutions were compared using the Bayesian information criterion, which is an appropriate comparison of model fit for nonnested models (Muthén et al., 2002; Nagin, 1999) and were subjected to the constraint that the subgroups obtained were large enough to allow statistically meaningful comparison of characteristics. Because our available sample was limited ($N = 57$), we made an a priori decision to consider solutions only when the smallest group contained more than 10 respondents. We examined trajectories described by polynomials of degree 2 or less.

Once a suitable trajectory solution was found using the above-described procedures, we used multivariate logit regression techniques to compare trajectories relevant to the baseline measures (i.e., at or prior to release from treatment) described earlier. The objective was to identify prerelease predictors of trajectory group.

RESULTS

Description of the Adolescents

The sample participants had started substance use at a relatively young age (average age: boys = 11.5 years, girls = 12.9 years). The average number of different drugs tried for lifetime use was 6 ($SD = 1.99$), and the average age of first use for any substance was 12 years ($SD = 1.81$). Lifetime use rates for alcohol and for marijuana were reported to be the same, with subsequent use of tobacco and other drugs. Thirty days prior to treatment, adolescents reported having used tobacco, other drugs, alcohol, and marijuana in descending order of frequency.

Participants reported a lifetime average of 3.5 different experiences of trauma, and indicated that an average of 0.9 experiences still bothered the individual. The study sample appeared to involve rather high levels of prior trauma; for example, a history of some form of sexual abuse was reported by 59% of these adolescents. We were unaware of treatment outcome studies in adolescent populations that assessed prior traumatic experiences that could be used as a basis for comparison.

High levels of familial drug and alcohol problems among these adolescents were also apparent. At least one parent reported moderate to heavy current alcohol or marijuana use. Among the sample, 58% had one or more parents who reported having stopped alcohol use because of problems, and 49% reported having quit use of drugs because of problems.

Identifying Trajectories of Substance Use

This analysis was performed on the days used measure using SAS Proc Traj (Jones, Nagin, & Roeder, 2001). The best-fitting solution of all possible solutions involving three or fewer

groups and degree 2 or lower polynomial change is shown in Figure 2. This solution comprised three trajectory groups, all described by linear trajectories. Group 1, identified as abstainers, was characterized by very low or no use ($n = 19$). Group 2, identified as improvers, started with modest average use levels and declined monotonically ($n = 23$). Group 3, identified as relapsers, started with regular use and increased during the 1-year follow-up to high use ($n = 15$). The Bayesian information criterion score for this solution was $-2,083$; next-best solution was a three-trajectory solution with quadratic change for relapsers and improvers, with a Bayesian information criterion score of $-2,116$. All solutions involving more trajectories gave rise to a smallest trajectory group with less than 10 members. In general, the results of these analyses suggest that only 23% of this adolescent inpatient treatment sample relapsed or deteriorated in the year following treatment, and 77% showed low levels of substance use by the end of the 1-year follow-up.

We used the above-noted measures to compare trajectory groups by including them as predictors in a multinomial logistic regression in which trajectory category was the dependent variable. In the initial regression analysis, adolescent substance use at baseline and trauma history were not associated with the posttreatment trajectory group. Consequently, these two predictors were removed from the model and are not described further. Results from the final model are shown in Table 3. Because there were three trajectory groups, each predictor effect involved two comparisons: abstainers (the reference category) versus relapsers and abstainers versus improvers. Table 3 shows the log-odds ratios ($\exp[\beta]$) associated with a one-unit change in each predictor.

As Table 2 indicates, parental maximum alcohol use frequency predicted membership in the relapsers group versus the abstainers group but did not differentiate between improvers and abstainers. As expected, parental alcohol use was associated with a greater likelihood that the child would be in the relapsers group. Turning to ecological factors, observed family management predicted trajectory group membership for both the relapsers and improvers. For the relapsers group, families were observed engaging in significantly less family management than those in the abstainers group (means [MN] of $-.43$ versus $-.27$). The same pattern was also found between improvers ($MN = .022$) and abstainers, although family management only marginally predicted membership in either of these two groups. Family monitoring also significantly predicted group membership, but only for improvers and abstainers. Interestingly, a higher level of parental monitoring was diagnostic of membership in the improvers group rather than in the abstainers group. Families in the abstainers group were actually coded as engaging in less monitoring behavior ($MN = 4.9$) than those in the improvers group ($MN = 5.6$).

Finally, the composite AICI score was examined for association with trajectory group. As expected, the AICI significantly determined membership in the relapsers group. Adolescents in the relapsers group reported less engagement in traditional cultural practices and identification with their American Indian culture ($MN = -.24$) than did those adolescents classified into the abstainers group ($MN = .17$). This finding is noteworthy given the emphasis placed on American Indian tradition and culture in the inpatient treatment program. Youth who continued or escalated drug use following treatment seemed to have also not responded well to support for American Indian cultural activities.

DISCUSSION

This study had three principal strengths. First, it included American Indian adolescents in residential treatment, a highly understudied population. Second, direct observations of parent–adolescent interactions were used, as were state-of-the-art measures of adolescent substance use. Third, we collected monthly reports of substance use, thereby increasing the reliability of the dependent variable. Thus, the findings from the current study are informative despite the limitations discussed later in this section.

This American Indian sample of adolescents involved in inpatient treatment had some similar patterns of use when compared with other inpatient samples of predominantly European American adolescents (Brown, Myers, Mott, & Vik, 1994). However, the sample was mostly unique. The family sizes were larger, and the level of trauma for the youth involved in treatment was quite high. A substantial number of the youth had arrest records. The majority of the adolescents referred to residential treatment had traveled hundreds of miles to participate in the treatment program. Similarly, their families traveled to participate in family week during the last week of treatment and did so in part because the regional treatment center has a culturally specific program for American Indian adolescents. The families' willingness to travel showed an enormous commitment to their children's well-being.

Although DSM diagnoses were not obtained for our study sample, it appears that these adolescents were not characterized by high levels of psychological distress. Only 14% of respondents in our study had a BSI General Severity Index score of 63 or greater. However, one should bear in mind that this measure was assessed at the approximate time of treatment completion; studies that assess psychiatric symptomology at treatment intake would be expected to report higher levels. For example, one study reported a greater incidence of psychiatric comorbidity in American Indian adolescent substance treatment populations than among other treatment populations (Novins et al., 1996).

Most of the adolescents (abstainers and improvers) were nearly abstinent throughout the entire 1-year follow-up period, which is an impressive result. Improvers achieved a steady decline in any substance use over time. Relapsers, the smallest group, continued to use with a small but steady increase during the 1-year follow-up period. This trajectory group is of great concern because they may be the individuals who continue to go through treatment programs several times before treatment is successful or experience negative trajectories into adulthood. Their motivation for undergoing treatment is unknown, and some may have been avoiding more serious problems (incarceration vs. substance treatment, expulsion from school vs. substance treatment, etc.) rather than deciding independently to enter treatment.

Membership in the relapsers group was partially predictable. As expected, observed family management was lower for the youth in this group, and the frequency of coercive interactions was higher. This finding supports the family-centered focus of many adolescent substance use treatment programs (Liddle, 1999; Waldron & Flicker, 2002). This finding also fits with the coercion model for the development of problem behavior in general (Patterson et al., 1992) and substance use in particular (Dishion, Capaldi, & Yoeger, 1999).

It is also significant that family substance use was prognostic of membership in the relapsers group.

Most important is the finding that even after controlling for prior substance use and family factors, involvement in American Indian cultural practices predicted low substance use following treatment. This finding fits well with previous research on substance use among American Indian adolescents (Boyd-Ball & Dishion, 2006). Note that the residential treatment program strongly emphasized, demonstrated, and reinforced American Indian traditional practices such as “sweats” and several other ceremonies were incorporated into the treatment protocol. Perhaps adolescents returning to the reservation were buttressed by their new abstinence and their appreciation for and engagement in traditional practices, all of which provided a venue for better relationships with tribal members who were abstinent and knowledgeable about their tribe's history and culture.

The findings that reveal fewer sexual abuse reports in the relapsers trajectory group could be associated with several factors. Because this was a self-report measure, it may be that the relapsers trajectory group underreported sexual abuse or it could be that youth who have experienced sexual abuse and abused alcohol and other drugs are referred to other types of treatment facilities, such as ones that treat dual diagnoses. It is not known whether sexual abuse was voluntarily reported by the youth or whether the treatment staff solicited such information. If reported, we do not know how it was treated. If the inpatient treatment program did adequately address sexual abuse, it would be understandable why more of these youth would be in the abstainers or the improvers groups.

Parents' history of substance use could be a potential risk factor for the adolescents' own substance use outcomes. If the parents had stopped using substances without treatment, their own negative behaviors arising from their past substance use could be what we noted in the family observation tasks as coercive engagement processes. In any case, this finding substantiates the need for family management in the higher risk groups.

These findings suggest two directions for future research. First, the cultural context of substance use must be addressed, especially among American Indian adolescents. The massive cultural, spiritual, and physical genocide of nearly all the North American Indian tribes has been ongoing for 500 years. From a perspective of generations, it is only within the past 80 years that the question of the appropriateness of forcing American Indian children into boarding schools has been raised (Reorganization Era, 1928–1945), not to mention the rethinking of governmental policies of assimilation and even termination of tribes (Self-Determination Era, 1961 to present). The fact that American Indian adolescents are often sent out of state to receive substance use treatment (similar to the practice of sending children to boarding schools for educational purposes) is perhaps a product of the boarding school era. Thus, it is likely that some of the variability of the well-being and health of American Indian adolescents is the result of historical factors that impinged on all tribes but to varying degrees. Developmental research in general would benefit from a better understanding of how history plays out over generations, how cultural oppression disrupts and deteriorates family and community structures, and how cultural and spiritual resilience persists and supports health and well-being.

The second direction to consider more systematically is to examine the effectiveness of inculcating adolescent drug use treatment in the cultural context of the family and the community. Surprisingly little research has examined this approach. The data from our study suggest the importance of American Indian adolescent and family involvement in their tribal culture and traditions. It may be generally true that abstinence in adolescents is in part a function of a commitment to a way of life without drugs and of spiritual commitment. Such contexts motivate parent management, reduce coercion, and induce norms against alcohol and drug use. This hypothesis could be tested more systematically by conducting intervention research in the communities in which adolescents reside, measuring daily and weekly involvement in cultural practices and including those activities in intervention models.

The limitations of this study are worth noting. Study findings may be limited to individuals who are willing to complete residential treatment and those who have family members who are actively involved in their treatment and are willing and able to travel a great distance to participate in family week. Most notably, the highest risk adolescents may have left the treatment program early and therefore could not participate in our study. In addition, the study had a small sample size and focused on a single treatment setting. However, the American Indian population in general is very small in comparison with the overall population of the United States and comprises between 0.08% and 1.2% of the total U.S. population (U.S. Census, 2006). It is very difficult to find many studies involving large numbers of American Indians, especially in the Pacific Northwest, where tribes' membership can range from a few hundred to approximately 9,000. However, this population is plagued with overrepresentation of alcoholism, drug addiction, suicide, and health disparities, along with high poverty and high dropout rates. Understanding what is prompting these social ills will require research scientists to develop statistical methods that will adequately fit small populations. Future replications and longitudinal data from this population would be particularly beneficial to the field.

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FIGURE 1.
Conceptual model linking community context to adolescent substance use.

FIGURE 2.
Group substance use trajectories for youth participants.

TABLE 1

Demographics of The Shadow Project Study (Baseline)

Characteristic	Treatment (%)
Gender	
Male	56.10
Female	43.90
Live on/near reservation	70.00
High school dropout	28.80
On target for graduation	59.60
Referred for special education	18.90
Youth age, mean (SD)	15.89 (1.44)
Highest grade completed, mean (SD)	9.68 (1.49)

TABLE 2

Descriptive Statistics of Items Used to Create Composite Predictor Scores

Item	Mean	SD	No.
Count of all traumas, lifetime	12.6	25.2	63
Number of traumas that still “bother you”	0.86	1.5	66
Pretreatment: days drank/used	24.9	24.8	64
Number of different drugs, lifetime	6.1	2.0	64
Parent report child alcohol frequency, past year	70.1	104.5	64
Max parental alcohol frequency	2.9	2.1	59
Family monitoring	5.3	1.3	51
Family limit setting	5.6	1.3	51
Count of coercive family behaviors	14.5	5.9	53
Child ethnic identity	3.0	0.5	57
Count of traditional values practiced/believed	10.0	3.4	53

TABLE 3

Bivariate Multinomial Logistic Regressions; Trajectory Group by Reference Category

Predictor	χ^2	df	p	Exp (β)	
				High vs. low	Medium vs. low
Max. parental alcohol frequency	4.46	2	0.107	0.639 [*]	0.730 [*]
Observed family functioning	10.6	2	0.005	0.142 ^{**}	0.292
Family monitoring	4.64	2	0.098	1.75	2.10
American Indian Cultural	5.17	2	0.075	0.243 ^{**}	0.374
Involvement Index					
Overall Model	χ^2	df	p	r^2	
Goodness-of-fit test					
Pearson	91.02	86	0.34		
Deviance function	84.34	86	0.53		
Cox and Snell				0.33	
Nagelkerke				0.38	

* $P < 0.10$ ** $P < 0.05$.