PREDICTORS OF RELAPSE FOR AMERICAN INDIAN WOMEN AFTER SUBSTANCE ABUSE TREATMENT

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Abstract: The objective of this study was to describe the predictors of substance use relapse of American Indian (AI) women up to one year following substance abuse treatment. Relapse is defined as any use of alcohol or drugs in the past 30 days at the follow-up points. Data were collected from AI women in a 45-day residential substance abuse treatment program. Predictors include distal (in time) proximal (recent), and intrapersonal factors. Results indicated that intrapersonal factors showed the strongest relationship with relapse, followed by proximal and distal factors. Negative messages about using alcohol or drugs from the client's father while growing up may have had an impact on whether the client used alcohol at 6 months. Conflicts with other people and being in the company of alcohol or drug users were highly predictive of relapse. While craving was highly predictive of substance use at follow up, self-efficacy was highly predictive of no substance use. Knowledge about predictors of relapse among this population should be used as a guide toward individual treatment planning.

American Indians (AIs) have high rates of alcohol-related problems (Indian Health Service, n.d.). In a prevalence study conducted in the mid-1990s with three tribal nations in the Southwest, almost 30% of adult tribal members had a current diagnosable alcohol and/or drug problem (Herman-Stahl & Chong, 2002). Only one-third of these individuals had sought help in the past year, with women equally as likely as men to do so. Between 74 and 94% of these tribally-based individuals who had received help in the past year reported substance use in the

30 days prior to the interview (Chong, Herman-Stahl, & Dye, 1998, unpublished data). Half of AIs who used alcohol in the 30 days before admission into non-tribal treatment facilities in California reported using alcohol 9 months later (Evans, Spear, Huang, & Hser, 2006). There is an urgent need to investigate and address relapse issues in this population. In this study, relapse is operationally identified as any use of alcohol or drugs in the past 30 days following substance abuse treatment.

Factors associated with relapse in AI women include low self-esteem, negative feelings, and negative social factors (e.g., Berkowitz, Peterson, Smith, Taylor, & Brindis, 1998; Chong & Herman-Stahl, 2003). The lives of AI substance-abusing women are rife with stressful circumstances, including domestic violence, child abuse trauma, negative family relationships, and social isolation (Brindis et al., 1995; Gutierres, Russo, & Urbanski, 1994). Thus, when they return home following a residential treatment stay, their immediate environment may not be supportive of their recovery. Those returning to tribal lands may be surrounded by individuals still struggling with substance abuse problems (e.g., partners), or by dysfunctional relationships. These are factors that are strongly related to relapse.

Characteristics that decrease the chances of relapse include positive family relationships and fewer associations with negative peer networks (Broome, Simpson, & Joe, 2002; Ellis, Bernichon, Yu, Roberts, & Herrell, 2004); support specifically related to abstinence (Beattie & Longabaugh, 1999; Bond, Kaskutas, & Weisner, 2003); self-efficacy or confidence in one's own ability to resist using substances (e.g., Walton, Blow, Bingham, & Chermack, 2003; Moos & Moos, 2003); and being able to tolerate stress (Daughters, Lejuez, & Kahler, 2005). AIs with high self-esteem and low negative emotion can maintain abstinence for a relatively long period following an intervention (Hassin, 1998). Within the substance abuse treatment environment, family and friends participating in the treatment milieu (Chong & Lopez, 2005a), and the absence of negative peer influence (Chong & Lopez, 2005b) significantly improved the psychosocial status (e.g., higher self-esteem, lower depression) of AI women at discharge. These findings highlight the potential impact of relationships on AI women's treatment outcomes and raise questions about the environmental factors that contribute to relapse in this population.

In research over the last two decades, studies of relapse have ranged from focusing on a single precipitating factor such as craving (e.g., Breese et al., 2005) to multiple antecedents of relapse, including emotional states (e.g., Hodgins, el-Guebaly, & Armstrong, 1995), proximal

factors such as family and social environment (e.g., Broome et al., 2002), intrapersonal factors such as coping skills and self-efficacy (e.g., Moser, & Annis, 1996), and distal factors such as family history (e.g., Broome et al.). Few quantitative studies of this kind had been carried out to gain an understanding of relapse issues among AI women.

The purpose of the present study was to assess factors associated with relapse in a group of AI women at 6 and 12 months after completion of a 45-day residential treatment at the Guiding Star Residential Program for Women at Native American Connections (NAC), an urban alcohol and drug treatment facility in Phoenix, Arizona. In particular, we were interested in determining the proximal, distal, and intrapersonal factors that are related to alcohol and drug use at the follow-up points. A broader consideration of relapse is important, and this point was emphasized in a 2006 special issue on relapse in the journal *Clinical Psychology Review*, where one of the main conclusions was that the interaction of distant and proximal antecedents of relapse is important such that any one antecedent has to be considered in the context of others (Maisto & Connors, 2006; see also Witkiewitz & Marlatt, 2004).

Native American Connections has a number of tribal, Federal (e.g., Indian Health Service, pre-trial, probation) and state (e.g., regional behavioral authorities. Arizona Medicaid) contracts to serve both AIs and non-AIs. A continuum of services is available for male and female adults with substance abuse problems, from residential and outpatient treatment programs to transitional and low-income housing. Intervention programs are culturally based, with a philosophy that reflects AI values of family, community, and spirituality. Cultural practices available to all NAC clients include sweat lodge ceremonies, drumming, and traditional healing. The treatment milieu is respectful, providing clients with an environment that engenders respect, cooperation, and kindness.

Methods

AI adult female clients entering residential treatment services at NAC were recruited within three days of entry to participate in a research follow-up study as part of a Treatment Capacity Expansion grant funded by the Center for Substance Abuse Treatment (CSAT). The recruitment period was between February 2002 and May 2004. Out of the 381 women approached, 346 were interviewed for baseline measures. Individuals who refused (9%) included those who did not want to be involved in follow-up interviews or had no interest in participating in a study.

Data collection points were at intake, and at 6 and 12 months post-intake. The follow-up window was 2 months before, and 1 month following the due date. Out of the 346 women interviewed at baseline, 186 (53.8%) were followed up at 6 months, and 167 (48.3%) were interviewed at 12 months post-intake. About two-thirds of the women (66%) interviewed at the 6-month follow up were interviewed at the 12-month follow up. Attempts to reach the participants at each follow-up point were made until the last date of the follow-up window. A number were in jail or prison (22 women at the 6-month follow up and 13 women at the 12-month follow up), and three women were deceased. Intakes were conducted in person, whereas follow-up interviews were done both in person and by telephone since some of the women remained in the Phoenix area while others returned to their reservations, or were in prison or jail.

Questionnaires used for this study include the Addiction Severity Index Native American Version (ASI-NAV; Carise, Wicks, McLellan, & Olton, 1998), a modified Alcohol Abstinence Self-Efficacy Scale (AASE; DiClemente, Carbonari, Montgomery, & Hughes, 1994), and items from the Intake Questionnaire of the Texas Christian University's (TCU) Criminal Justice Program (TCU-IBR; Institute of Behavioral Research, 2005). The AASE was modified to include drugs.

The ASI-NAV was adapted from the Addiction Severity Index to accommodate AI cultural practices (Carise et al., 1998). The composite scores are derived in the same manner as those for the Addiction Severity Index. The ASI has good reliability and validity among different populations (Grissom & Bragg, 1991; Kosten, Rounsaville, & Kleber, 1983). The composite scores indicate the problem severity of six domains (medical, employment/support, substance use, legal, family/social, and psychiatric) and range between 0 and 1, with 1 denoting the most severe problem. The AASE measures self-efficacy and contains two sets of 20 items representing cues related to drinking or drug use. The respondent is asked to respond how "tempted" she is to use alcohol or drugs or how "confident" she is that she will not use alcohol or drugs in each situation on a 5-point scale (1 = *not at all* to 5 = *extremely*). Scores are summed separately for temptation and self-efficacy. The scale has been shown to have high internal consistency ($r = 0.95$), and relationships with other instruments indicate construct validity of the subscales (DiClemente et al., 1994). The TCU-IBR Intake Questionnaire has been used by the Drug Abuse Treatment for AIDS-Risk Reduction (DATAR) Project since the late 1980s (Simpson, 1992). The Intake Questionnaire has been used and adapted in various forms in all IBR programs for males and

females of all ethnicities. Several questions from this instrument were used – specifically, the client's response when asked to rate whether her mother or father figure "warned you about drug or alcohol problems" (0 = *never* to 4 = *almost always*).

For the purposes of this paper, relapse is operationalized as whether the individual used alcohol and/or drugs in the 30 days prior to the interview at the 6- or 12-month follow up. To determine the factors associated with relapse, we used measures that had been suggested by the literature to be related positively or negatively to relapse as predictors. These measures were categorized into three groups: distal, proximal, and intrapersonal.

Distal measures pertain to the individual's lifetime experience as well as experiences that were further removed from the follow-up periods, such as measures recorded at intake. The latter measures are used as indicators of the client's characteristics. For example, having family or social conflicts in the 30 days before intake may suggest that a client does not have good family relationships, does not have social skills, or does not have social support. Proximal measures are those that had occurred within the past 30 days of the interview, but that do not pertain to intrapersonal factors. These include events that may or may not be under the client's control, such as experiencing positive events, having conflicts with others, or attending aftercare sessions. Intrapersonal factors include mood and other attributes such as confidence in not using alcohol or drugs (self-efficacy) or craving. These measures are analyzed separately to determine broadly the predictors of substance use in this group of AI women. All the items used for the analyses are included in Appendix A.

Logistic regression models were developed for both follow-up time points separately for alcohol relapse and for drug relapse. The outcome variables, alcohol relapse and drug relapse (i.e., use in the last 30 days), are dichotomized with 0 representing no use and 1 representing use. Dichotomous outcomes have been shown to be as predictable as continuous variables (Miller, Westerberg, Harris, & Tonigan, 1996). Positive coefficients indicate a positive relationship with using alcohol or drugs within the last 30 days. Further, odds ratios higher than 1 indicate that individuals who used within the last 30 days were more likely to have that trait or circumstance. Marginal analyses (crosstabulations and correlations between potential predictors and the dependent variables) were conducted and all variables that were significant at the 0.20 level were considered for inclusion as possible predictors. Final predictors were determined using the backward stepwise likelihood ratio approach

($p \leq 0.05$ for inclusion; $p \geq 0.1$ for exclusion). Significant predictors are those showing $p \leq 0.05$. Measures used are presented in Appendix A. All analyses were conducted using SPSS for Windows 12.0.

Results

Study Population

Of the 346 women who participated in the study, over 99% were enrolled tribal members and 227 (65.6%) were from local Arizona tribes. Most (90%) had lived on a reservation at some point in their lives (including during the current study). The mean age of the women was 31.8 (7.6 sd); half were between the ages of 25 and 34. The majority of the women (55.1%) had less than a high school education, with 23.3% completing high school, and 21.6% completing at least some college. Most had never married (59.8%); only 16.8% were currently married. Most of the participants had used both alcohol and drugs. No significant differences in baseline characteristics were found between those interviewed at baseline and at each of the follow-up time periods (see Table 1).

Only a small number of the variables from the study were found to contribute to the best fit logistic models of alcohol and drug use at follow up. One variable in particular suggested by the literature but not included in the final models is marital status. Almost all of the women who were married or had a partner at the time of the interview did not report using drugs at the follow-up periods (100% at 6-month follow up; 96% at 12-month follow up). As a result, this variable was not included in the final models.

Table 1
Characteristics of Study Population who Provided Responses at Baseline, and at the 6- and 12-month Follow Ups

	Baseline (n = 346)		6-month Follow Up (n = 186)		12-month Follow Up (n = 167)	
Ever used alcohol	93.4%		93.0%		93.5%	
Ever used drugs	78.9%		78.0%		69.6%	
Ever binged %	71.6%		72.0%		71.3%	
Previous Alcohol treatment, mean (SD)	1.4	(2.0)	1.4	(2.1)	1.45	(2.1)
Age, yr, mean (SD)	31.8	(7.6)	32.1	(7.5)	31.8	(7.5)
Years of drinking alcohol to intoxication, mean (SD)	6.5	(6.1)	6.8	(6.5)	6.4	(6.0)
Years of using drugs (without alcohol), mean (SD)	3.2	(5.3)	3.2	(5.1)	2.7	(4.7)
Years using more than one drug (may include alcohol), mean (SD)	3.6	(5.4)	3.3	(5.2)	3.1	(5.0)
Number of days of Alcohol use in past 30 days, mean (SD)	8.6	(9.3)	8.0	(9.4)	8.0	(9.1)
Number of days of Drug use in the past 30 days, mean (SD)	3.5	(7.9)	4.0	(8.3)	3.1	(7.6)

6-Month Predictors of Relapse

A total of six models were constructed to assess predictors of relapse at the 6-month follow-up period. Table 2 shows the variables included in the best-fit logistic model (using the maximum likelihood method) for each variable type (distal, proximal, and interpersonal) for alcohol use, and Table 3 shows the models for drug use. All models were statistically significant at the 0.05 level, although some individual variables have significance values larger than 0.05 (as a result of the exclusion criterion $p \geq 0.1$). B is the coefficient for each variable in the model used for predicting the independent variable. Time periods in parentheses indicate whether the factor pertains to lifetime, at intake, or at the 6-month follow up.

Table 2
Regression Models to Predict Alcohol Use at the 6-month Follow Up

Month 6 Alcohol Use	B	Sig.	Odds Ratio	95.0% CI for Odds Ratio	
DISTAL (lifetime or at intake) Adj. R^2 = 0.319				Lower	Upper
Use drugs with family (lifetime)	-0.55	0.01	0.58	0.37	0.89
Number of drug treatment episodes (lifetime)	-0.46	0.02	0.63	0.44	0.92
Father warned about alcohol and drugs when growing up	-0.38	0.02	0.68	0.49	0.94
During the past 30 days before you came to (treatment center) have you had problems with craving other drugs? (baseline level)	0.61	0.00	1.84	1.36	2.50
Number of alcohol treatment episodes (lifetime)	0.64	0.00	1.90	1.31	2.77
Constant	-1.60	0.00	0.20		
PROXIMAL (past 30 days at month 6) Adj. R^2 = 0.322					
Rating of physical health (month 6)	-0.35	0.04	0.71	0.50	0.99
Number of days in the past 30 have conflicts with family	-0.06	0.06	0.94	0.89	1.00
Number of days in the past 30 have conflicts with other people	0.06	0.08	1.07	0.99	1.14
During the past 30 days, have you had problems with being around others who use alcohol or other drugs?	0.86	0.00	2.36	1.66	3.36
Constant	-1.45	0.01	0.23		
INTRAPERSONAL (past 30 days at month 6) Adj. R^2 = 0.522					
During the past 30 days have you had problems with being stressed?	0.37	0.10	1.46	0.93	2.23
During the past 30 days, have you had problems with craving alcohol?	0.47	0.02	2.14	1.07	2.40
Abstinence self-efficacy score	-1.32	0.00	0.27	0.16	.044
Constant	3.39	0.11	29.63		

Table 3
Regression Models to Predict Drug Use at the 6-month Follow Up

Month 6 Drug Use	B	Sig.	Odds Ratio	95.0% CI for Odds Ratio	
DISTAL (lifetime or at intake) Adj. R^2 = 0.176				Lower	Upper
Number of days in past 30 have conflicts with other people (intake)	0.05	0.04	1.05	1.00	1.10
Number of years using more than 1 drug a day (not including alcohol) (lifetime)	0.15	0.00	1.16	1.07	1.26
Constant	-2.63	0.00	0.07		
PROXIMAL (past 30 days at month 6) Adj. R^2 = 0.407					
Positive events happened to you in the past 30 days	-0.34	0.10	0.71	0.48	1.06
Number of days in the past 30 have conflicts with other people	0.12	0.00	1.13	1.04	1.22
During the past 30 days, have you had problems with being around others who use alcohol or other drugs?	1.07	0.00	2.91	1.90	4.46
Constant	-3.12	0.00	0.04		
INTRAPERSONAL (past 30 days at month 6) Adj. R^2 = 0.503					
Felt calm and peaceful in the past month	-0.34	0.06	0.71	0.50	1.02
During the past 30 days have you had problems with craving drugs?	.98	0.00	2.67	1.75	4.08
Abstinence self-efficacy score	-0.63	0.05	0.53	0.34	0.83
Constant	0.95	0.38	2.57		

Predictors for alcohol use at the 6-month follow up included prior alcohol treatment experience, being around others who use alcohol or drugs, craving alcohol, and craving drugs at intake. Variables that are less likely to be related to alcohol use at the 6-month follow up (i.e. negative coefficients with odds ratios less than 1), include being a drug user (with family; drug treatment), having a father who had warned the client about alcohol and drug problems when she was growing up, having a positive rating in perceived physical health, and having a higher abstinence self-efficacy score.

In contrast, drug use in the past 30 days at the 6-month follow up was predicted by conflicts with other people at intake and within the proximal timeframe, the number of years that the client had used more than one drug regularly (not including alcohol), being around others using alcohol or drugs, and craving drugs. In contrast, those with high abstinence self-efficacy scores were less likely to report drug use. The model fit for the distal variables is much lower than that for the

proximal and intrapersonal models, as seen by the adjusted R-squared which indicates the proportion of variance that can be predicted by the predictors, adjusted for the number of predictors used.

12-Month Predictors of Relapse

As with the models at 6 months, a total of 6 models were constructed to determine the predictors of relapse at the 12-month follow-up period. Tables 4 and 5 show the variables included in the best-fit logistic model for alcohol use and drug use at 12 months, respectively.

Table 4
Regression Models to Predict Alcohol Use at the 12-month Follow Up

Month 12 Alcohol Use	B	Sig.	Odds Ratio	95.0% CI for Odds Ratio	
DISTAL (lifetime or at intake) Adj. R^2 = 0.093				Lower	Upper
Age at Intake	-0.05	0.06	0.95	0.90	1.00
Family conflicts – days in the past 30 (intake)	0.04	0.04	1.04	1.00	1.08
Constant	0.77	0.39	2.15		
PROXIMAL (past 30 days at month 12) Adj. R^2 = 0.545					
Positive events happened in the past 30 days	-0.54	0.01	0.58	0.38	0.90
How many days have you been to self-help groups for alcohol or drugs in the past 30 days?	-0.20	0.02	0.82	0.70	0.96
Negative events happened in the past 30 days	0.63	0.00	1.88	1.26	2.79
Problems with being around others who use alcohol or other drugs?	0.85	0.00	2.34	1.51	3.63
Constant	-1.23	0.05	0.29		
INTRAPERSONAL (past 30 days at month 12) Adj. R^2 = 0.656					
During the past 30 days, have you had problems with being bored?	0.39	0.08	1.47	0.95	2.28
During the past 30 days, have you had problems with craving alcohol?	0.75	0.01	2.11	1.24	3.60
Abstinence self-efficacy score	-1.14	0.00	0.32	0.20	0.50
Constant	2.20	0.05	9.06		

Table 5
Regression Models to Predict Drug Use at the 12-month Follow Up

Month 12 Drug Use	B	Sig.	Odds Ratio	95.0% CI for Odds Ratio	
DISTAL (lifetime or at intake) Adj. R^2 = 0.447				Lower	Upper
Number of alcohol treatment episodes (lifetime)	-0.66	0.04	0.52	0.28	0.98
Use drugs with family (lifetime)	-0.56	0.07	0.57	0.31	1.04
Age at Intake	-0.14	0.00	0.87	0.79	0.96
Family conflicts – days in the past 30 (intake)	0.08	0.01	1.08	1.02	1.14
Number of years using more than one drug a day (not including alcohol) (lifetime)	0.22	0.00	1.24	1.10	1.40
Constant	2.29	0.13	9.91		
PROXIMAL (past 30 days at month 12) Adj. R^2 = 0.322					
Number of days in the past 30 have conflicts with other people	0.09	0.01	1.10	1.02	1.18
Are you in an environment that is supportive of your recovery?	0.80	0.10	2.22	0.85	5.79
Problems with being around others who use alcohol or other drugs?	0.88	0.00	2.42	1.51	3.89
Constant	-4.01	0.00	0.02		
INTRAPERSONAL (past 30 days at month 12)					
During the past 30 days, have you had problems with craving drugs?	1.65	0.00	5.20	2.79	9.68
Abstinence self-efficacy score	-0.72	0.00	0.49	0.33	0.72
Constant	-0.58	0.43	0.56		

Predictors of alcohol use at the 12-month follow up include having poor family relations at intake, experiencing negative life events, being around others who use alcohol or drugs, and craving alcohol. Being older, having current positive events, attending more self-help groups in the past month, and having a high abstinence self-efficacy score were associated with a lower likelihood of alcohol use at 12 months. The model for distal variables has a very poor fit, in contrast to the fit for the other two models.

Having conflicts with family at intake, poly-drug use, being around others who use alcohol or drugs, and craving drugs were significant predictors of whether the client used drugs at the 12-month follow up. Having alcohol as a major problem as indicated by prior alcohol

treatment experience, being older, and having a high self-efficacy for abstinence score were associated with a lower likelihood of drug use at the 12-month follow up.

Discussion

The purpose of this study was to determine predictors of relapse for AI women up to 12 months following entry into residential treatment. In the short term (6 months), being with other people who use alcohol or drugs (proximal factors) and craving alcohol or drugs (intrapersonal factors) were significantly associated with relapse. In the longer term (12 months), common factors for alcohol and drug use were reported family conflicts at intake (distal), being around alcohol or drug users (proximal), and craving alcohol or drugs (intrapersonal). There was no common distal factor for alcohol and drug use at the 6-month follow-up point.

Factors that were associated with a reduced probability of alcohol use at 6 months included using drugs with family members, having drug treatment experience, having a father who had warned about alcohol and drugs, rating one's physical health well, and having a high self-efficacy score. In the longer term, no alcohol use was associated with being older, experiencing positive events in the past month, and attending self-help groups.

There were no significant predictors for the lack of drug use at 6 months. At the 12-month follow up, the only factor significantly associated with a reduced risk of using drugs was being older.

Distal factors

Relapse prevention plans concentrate on addressing factors that are close in time to the relapse event (proximal factors) and that serve as triggers that precipitate substance use. Two of the more popular models of relapse are aimed at improving overall coping skills to help individuals resist relapse (Marlatt & George, 1984; Gorski, 1989). However, from our results it is clear that distal factors do have a significant predictive value regarding relapse, and this information should be used in the development of the female AI client's treatment plan. For drug users, negative social relationships present at intake should be addressed during treatment because problematic circumstances leading to high-risk relapse situations (e.g., negative social interactions) tend to repeat (Stout, Longabaugh, & Rubin, 1996). This is supported by our results showing that drug relapse at both the 6- and 12-month follow ups was significantly predicted by conflicts at intake.

Alcohol and drug users in our sample appear to be distinct from each other. If they used drugs with their families, craved drugs at intake, or had been poly-drug users for a long period, they were either more likely to have relapsed to using drugs or less likely to have used alcohol by the 6-month follow up. Similarly, if they had a serious alcohol problem (as indicated by the number of alcohol treatment episodes), they were either more likely to relapse to drinking in a relatively short period after treatment (within 6 months), or less likely to use drugs at the 12-month follow up. Other research (with males) has shown that depressed cocaine-dependent individuals used alcohol frequently both before and after treatment (McKay et al., 2002).

An interesting result regarding a distal influence is the lower risk of using alcohol at the 6-month follow up if the client's father had warned her about alcohol and drug use when she was growing up. Much evidence has accumulated showing that positive parental influence during adolescence, including using verbal reasoning, decreases the chances of substance use (e.g., Coombs, Paulson, & Richardson, 1991; Kaplow, Curran, Dodge, & the Conduct Problems Prevention Research Group, 2002), whereas negative familial influences can increase problem behaviors such as lack of behavioral self-regulation (Dawes, Clark, Moss, Kirisci, & Tarter, 1999) and can increase the tendency to substance use (e.g., Bailey, Hill, Oesterle, & Hawkins, 2006; Kaplow et al., 2002; Hodgins, el-Guebaly, & Armstrong, 1995; Mohr et al., 2001). Similarly, more bonding and support from parents during childhood is associated with lower substance use as an adult for both males and females (Galaif, Stein, Newcomb, & Bernstein, 2001). However, the impact of positive parenting during adolescence on adults who have engaged in negative behavior has not been well studied. Our results suggest that positive parenting, or at least targeted anti-substance abuse messages, may eventually have a positive effect, even if they don't always work immediately. Further work is needed to determine if early positive parental influence can be capitalized upon to improve treatment outcomes.

In sum, the predictive value of distal factors can be quite substantial. The factors that were reported here – the tendency of clients to be prone to conflict, the severity of clients' substance abuse problems, and the potential of familial influence to affect clients' treatment outcomes – should be used to create treatment plans that are individualized to each client's needs.

Proximal factors

If clients were in a negative social environment in which they were in contact with individuals who used alcohol or other drugs, they were about two and a half times more likely to relapse to alcohol or drug use at 6 or 12 months, with drug users at greater risk. The difficulty that women face in establishing a non-using network has been reported elsewhere (Falkin & Strauss, 2003; Sun, 2007; Walitzer & Dearing, 2006). This is partly due to the fact that their social networks often comprise individuals who enable their drug use while providing support (Falkin and Strauss, 2003). In one study, over two-thirds of women clients reported taking their first post-treatment drink with others (Rubin, Stout, & Longabaugh, 1996). As also reported by others, conflicts with other people at intake and at the time of follow up were predictive of drug use at follow-up periods (e.g., Ellis et al., 2004; Vannicelli, Gingerich, & Ryback, 1983). Although the impact of social relationships appears clear in this study, having a supportive environment for recovery did not predict treatment outcome significantly. Interestingly, conflicts with family at intake were significant predictors of the use of alcohol or drugs at 12 months – that is, as distal rather than proximal predictors.

Other proximal factors that had significant predictive values pertained to a decreased risk of using alcohol or drugs. In terms of alcohol use at the 6-month follow up, a higher rating of physical health showed an odds ratio of 0.7 for using alcohol. At 12 months, clients were less likely to use alcohol if positive events (such as regaining custody of children, starting school or a new job, having a new relationship, etc.) had occurred in the past 30 days, whereas they were more likely to use alcohol if negative events (e.g., death or loss, miscarriage, being homeless, engaging in prostitution, etc.) occurred. A decreased risk of alcohol use at 12 months was also related to the number of days that the individual attended self-help groups. We have found that almost all of the women who were married or had a partner did not use drugs. This suggests that having a partner may be predictive of a positive treatment outcome and, according to Walter et al. (2006), is more useful and relevant as a predictor than the coping styles that clients employ. No other proximal antecedents were found that significantly predicted a decrease in drug use, either at 6 or 12 months.

In summary, being in contact with negative peers or having conflicts with others increases the likelihood of using alcohol or drugs more than two-fold. Individuals were less likely to use alcohol if they

were engaged in positive behaviors such as starting school or attending aftercare, and if they were healthy physically. However, information is lacking regarding predictors for decreased drug use.

Intrapersonal factors

Self-efficacy (Connors, Longabaugh & Miller, 1996) and being able to tolerate distress (Daughters, Lejuez, & Kahler, 2005) have been shown to decrease the risk for relapse. In our study, self-efficacy was significantly related to alcohol or drug use but not to self-rating of mental health (as an indicator of distress) or self-esteem. Among our group of AI women, confidence in their ability to not use alcohol or drugs was significantly and strongly predictive of no use in the past 30 days. This finding is inconsistent with that reported by Taylor (2000) who found that substance use self-efficacy among AI adults was associated with higher alcohol use. He attributed this finding as showing misperceived feelings of control over use. Our population in this study appear to be cognizant of their abilities as reflected by the congruence in their actions (to use or not to use). Among those who reported craving alcohol or drugs, their ability to withstand those cravings appears to be limited. At the 12-month follow up, those who reported craving drugs had a five-fold increase in risk for using drugs in the previous 30 days. For each of the models, craving alcohol or drugs predicted relapse, whereas having the confidence to withstand high-risk situations predicted abstinence, at least in the 30 days prior to the follow up. The strength of craving decreases monotonically and is extinguished during the first 6 months unless a relapse occurred during that period (Zywiak et al., 2006). The high odds of drug use at the 12-month follow up among those who craved drugs suggest that, for the group of women in this study, those who reported craving were most likely using in the previous 6 months.

In summary, the main predictors of intrapersonal factors were craving and self-efficacy: Craving leads to an increased risk for using alcohol or other drugs whereas self-efficacy is associated with a decreased risk. These two variables have been commonly cited as having high predictive value for the probability of relapse (e.g., Bottlender & Soyka, 2004; Miller et al., 1996; Scott, Foss, & Dennis, 2005 ; Walton et al., 2003;). However, other commonly cited constructs such as negative emotions (Zywiak, Connors, Maisto, & Westerberg, 1996; Moos & Moos, 2003; Miller & Harris, 2000), including stress (Breese et al., 2005; Sinha, 2001) and self-esteem (Hassin, 1998; Sun, 2007), did not contribute significantly to the final models, although most were significantly correlated with

craving drugs or alcohol. Self-efficacy is related to coping strategies, and compared to avoidance, actively addressing the problem is better (Forys, McKellar, & Moos, 2007; Moser & Annis, 1996) – in particular, through the joint use of cognitive and behavioral strategies (Gossop, Stewart, Browne, & Marsden, 2002; Zywiak et al., 1996). This issue was not investigated in our study, but future research should be conducted to determine the strategies that had been successfully used by this population.

Limitations

While most of the findings here support previous findings, some of the results need to be further explored. The large number of variables that were tested for their predictive values may have led to overfitting (Hosmer & Lemeshow, 2000). Our sample size was appropriate for some analyses although, clearly, a larger sample size is needed to increase power to a more acceptable level. Also, as with all interview data, there is the possibility that self-reporting can lead to minimization of the recall of negative events and/or recall bias. Additionally, because the interviews were conducted 6 months apart, there could be a number of different periods within those timeframes in which individuals cycled from using to not using alcohol or other drugs; this information would not be captured.

Conclusion

Comparing the three types of predictors, we found that the best predictors are the intrapersonal factors, followed by the proximal and then the distal factors. Based on their research in this area, Milleret al. (1996) have concluded that it is more sensible in preventing relapse to address current events in the client's life in preventing relapse than to attend to events from a more distant past (in their case, up to 10 months prior to follow up). However, our study suggests an added benefit to being aware of distal factors that are even more distant in time: These factors provide some knowledge of clients' predispositions regarding whether they would or would not relapse to substance use. Further research should be conducted to assess how such predispositions interact with the proximal and intrapersonal factors. In addition, the rather poor fit of the models for distal factors for the 6-month drug use and the 12-month alcohol use should be further studied.

The results of the present study point to a number of consistent factors that will be useful to consider for AI women's treatment plans. Women's confidence levels regarding their ability to resist temptation need to be boosted to ensure high self-efficacy following treatment. This training should include improving coping skills through cognitive and behavioral strategies. Second, women need to be given skills to improve their social relationships. The ability to elicit and receive support is a major factor of recovery (Gordon & Zrull, 1991). Having positive family relationships or fewer associations with negative peer networks decreases the risk of relapse for women (Broome, Simpson, & Joe, 2002; Ellis et al., 2004) and is related to healthy coping behaviors (Forys et al., 2007). The fact that women in this study who were married or had a partner did not use drugs suggests that they may have received abstinence support from their partners. Support can be elicited from families, or from other supportive individuals if families are dysfunctional. Anecdotally, we find that the treatment program can jump-start the mending of relationships between clients and their families (or close supportive individuals) by providing a safe and structured environment within which interactions can occur, even if each party has not seen the other for a long time.

Results from this study show the influence of intrapersonal, proximal, and distal factors on relapse within one year of treatment for AI women. While distal factors cannot be changed, treatment can address those events so that their impact can be minimized. Results highlight the similarities of relapse predictors among this population with those reported for non-AI women. By looking at the risks for relapse associated with the predictors, characteristics that can be built up (e.g., positive events such as going to school) or mitigated (such as conflicts) can be integrated into the treatment plan. Family relationships, for example, are an important factor among this population. Treatment programs must consider providing the opportunity for clients to improve family relationships, or teach them skills to develop relationships that provide support.

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Appendix A
Measures

The items used to obtain distal measures were as follows:	
Age	Age at intake
Binge	Have you ever gone on binges where you kept drinking for a couple of days without sobering up? [0 - No, 1 - Yes]
Alcohol treatment	How many times in your life have you been treated for alcohol abuse?
Drug Treatment	How many times in your life have you been treated for drug abuse?
Alcohol and/or drug years	How many years have you used more than one drug a day (including alcohol)?
More than 1 drug years	How many years have you used more than one drug a day (NOT including alcohol)?
Drinking family	What was it usually like when you spend time together with your family? How often did you get drunk together? [0 - Never, 1 - Rarely, 2 - Sometimes, 3 - Often, 4 - Almost Always]
Drugging family	How often did you use other drugs together?
Mother warned	Tell me what your mother figure was like while you were growing up: warned you about alcohol or drug problems.
Father warned	Tell me what your father figure was like while you were growing up: warned you about alcohol or drug problems.
Alcohol days	How many days in the past 30 did you use alcohol?

Appendix A, continued

Physical health	Overall, in the past 30 days before you came to Native American Connections, has your physical health been 4 - Excellent, 3 - Very good, 2 - Good, 1 - Fair or 0 - Poor?
Mental health	Overall, in the past 30 days before you came to Native American Connections, has your mental health been 4 - Excellent, 3 - Very good, 2 - Good, 1 - Fair or 0 - Poor?
Others using	During the past 30 days before you came to Native American Connections, have you had problems with being around others who use alcohol or drugs? [0 No, 1 Yes]
Craving alcohol	During the past 30 days before you came to Native American Connections, have you had problems with craving alcohol? [0 - No, 1 - Yes]
Craving drug	During the past 30 days before you came to Native American Connections, have you had problems with craving drugs? [0 - No, 1 - Yes]
Family conflicts	How many days in the past 30 days have you had serious conflicts with your family?
Social conflicts	How many days in the past 30 days have you had serious conflicts with other people (excluding family)?

The items used to obtain proximal measures are listed below.
For the 6-month follow up, the time frame was the 30 days prior to the 6-month interview; for the 12-month follow up, it was the 30 days prior to the 12-month interview.

Supportive environment	Are you in an environment that is supportive of your recovery? [0 - No, 1 - Yes]
Community services	Are you in an environment that offers community services to help you in your recovery? [0 - No, 1 - Yes]
Family conflicts	How many days in the past 30 days have you had serious conflicts with your family?
Social conflicts	How many days in the past 30 days have you had serious conflicts with other people (excluding family)?
Physical health	Overall, in the past 30 days, has your physical health been 4 - Excellent, 3 - Very good, 2 - Good, 1 - Fair or 0 - Poor?
Others using	During the past 30 days, have you had problems with being around others who use alcohol or drugs? [0 - No, 1 - Yes]
Single	Single, never married
Employed	Are you currently employed? [Employed full time or part time]
Positive events	Has any of the following events happened to you during the past 30 days: regained custody of child/children; entered school/training; started a new job; started a new relationship with a partner; found a new place to live; made new friends; spending more quality time with children; got married. [0 - No, 1 - Yes]
Negative events	Has any of the following events happened to you during the past 30 days: death of a close friend/relative; loss of old friends; miscarriage/abortion; couldn't take care of your kids; purposely started a fight with someone; neglected yourself; got arrested for a crime; had sex for money; homeless for a period of time; got beaten, hurt, or taken advantage of. [0 - No, 1 - Yes]
Self-help	How many days have you been to self-help groups for alcohol or drugs in the past 30 days?

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