Three year outcomes for American Indians/Alaska Natives in the Parent Child Assistance Program in Washington State

Joanne Nelson

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Committee:

Therese Grant

Annette Fitzpatrick

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Abstract

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Joanne Nelson

Chair of the Supervisory Committee:
Therese M. Grant, Ph.D.
Professor, Psychiatry & Behavioral Sciences
Adjunct Associate Professor, Epidemiology

Objectives: The purpose of this study was two-fold: (1) to evaluate the associations between American Indian/Alaska Native (AI/AN) race/ethnicity and risk of a subsequent delivery of an infant prenatally exposed to alcohol/drugs at the conclusion of a three-year evidence-based prospective intervention designed to prevent future alcohol/drug exposed births among high-risk mothers who have substance abuse problems; and (2) to develop models predicting factors associated with increased risk among AI/AN women.

Methods: This study included 795 women who were enrolled in the Parent-Child Assistance Program (PCAP) from 1999 to 2010 at nine PCAP sites in Washington State. Measurements were obtained from pre- and post-test interviews using the Addiction Severity Index and biannual assessment of substance abuse treatment received and alcohol and drug use. Statistical analyses conducted to compare AI/AN women to other racial/ethnic groups included bivariate analyses and logistic regression of various program and

outcome measures. To determine which variables would predict lack of success in three PCAP outcome measures for AI/AN women, a backward stepwise logistic regression of selected factors was carried out.

Results: Analyses compared 147 AI/AN women to 465 White, 101 Black and 62 women of other races. Pre-intervention factors varied somewhat among all racial/ethnic groups (AI/AN, White, Black, and the other races group). Bivariate analyses showed AI/AN women participating in PCAP to be younger than White and Blacks and to have more children and lower education compared to White women. Compared to women of the other racial/ethnic groups, a higher proportion of AI/AN women reported being separated from parents during childhood for two years or more, parental alcohol/drug abuse, and maternal alcohol use during pregnancy with them. Hierarchical logistic regression models comparing Whites to the other racial/ethnic groups indicated that AI/AN women did not have increased odds of "risk of subsequent exposed birth". AI/AN women had increased odds of "not being abstinent from alcohol/drugs for 6 months or more at exit" versus Whites in the unadjusted model and in the model adjusting for demographics. This association was attenuated when additional confounders were added to the models. A comparison of AI/AN women to White women for the outcome "no regular family planning" showed no elevated odds of increased risk in adjusted models. In the stepwise models developed to predict risk of subsequent exposed birth, higher monthly income at exit and a high ratio of service needs met were protective for AI/AN women. Only age predicted not being abstinent from alcohol/drugs > 6 months, while prior inpatient treatment and having service needs met were protective for lack of regular family planning.

Conclusion: In this study AI/AN race was not associated with an increased risk for having a subsequent alcohol/drug exposed birth compared to White women when other confounding factors were considered. Results from models focusing on risk factors for AI/AN women, however, suggest that meeting the service needs of AI/AN women may help prevent subsequent alcohol/drug exposed births among these participants.

Table of Contents

List of Tables

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DEDICATION

I dedicate this work to my parents Charles and Della Nelson. My mother was unable to witness my graduation before her passing. They worked hard to ensure my success in life and I will be forever grateful.

Introduction

A detrimental public health outcome stemming from alcohol abuse and other health disparity issues is the reported elevated prevalence of Fetal Alcohol Spectrum Disorders (FASD) among AI/AN people. FASD is an umbrella term describing conditions involving central nervous system deficits and the range of physical, mental, behavioural, and/or learning disabilities that can occur as a consequence of prenatal alcohol exposure. FASD includes the classifications Fetal Alcohol Syndrome (FAS), Partial FAS, Alcohol-Related Neurodevelopmental Disorder (ARND), and Alcohol Related Birth Defects (ARBD) (Grant, Brown, Graham, & Ernst, 2014). Based on existing studies in Canada and the United States, it is clear that FASD is a serious public health problem associated with tremendous monetary costs (Popova, Stade, Bekmuradov, Lange, & Rehm, 2011). One paper calculated estimates of the total U.S. lifetime cost of each child with FAS ranging between $2,010,000 and $2,909,785 in 2002 adjusted U.S. dollars (Thanh & Jonsson, 2009).

A recent study on FAS prevalence among children 7 to 9 years of age living in Arizona, Colorado, and New York has estimated the prevalence of FAS among American Indian/Alaska Native children at 20 (CI = 14 – 28) per 10,000 children while the prevalence of FAS for non-Hispanic Whites was 3 (2 - 3) per 10,000 children (Fox, et al., 2015). This study used data from various sources and relied on passive reporting and active review of records. Similar methodology used in an earlier study found that AI/AN had a prevalence of 32 per 10,000 children aged 7 to 9 years, while Whites had a prevalence of 2 per 10,000 children aged 7 to 9 years (confidence intervals not reported) (Centers for Disease Control and Prevention, 2002). A significant disparity

between AI/AN and Whites was found in a different study reported in 1988 which was based on birth defect data from the Birth Defects Monitoring Program (Chavez, Cordero, & Becerra, 1988). It found that the rate of FAS among American Indians at birth was 29.9 per 10,000 total births, and the rate ratio was 33.22 (CI = 25.08 - 44.00) compared with Whites (rate of White FAS births not reported). A 1993 report among Alaska Natives (AN) reported that the minimum FAS prevalence rate for ANs was 2.1 per 1000 live births during 1978-1991 (Centers for Disease Control and Prevention, 1993). Potential cases were identified in the state data sources using an FAS check box on birth certificates filed from 1989 through 1990. In a Canadian study (Robinson, Conry, & Conry, 1987), permission was granted to screen for FASD in all of the children in a remote First Nations community aged 18 and younger. The results indicated a diagnosis of FASD for 22 out of the 116 children (19%), indicating that FASD was an important public health concern in this community.

It is evident from these studies that different methodologies are used, case descriptions differ, and racial identification and classification varies. Nonetheless, there appears to be a disproportionate burden of FASD prevalence among the AI/AN population. Regardless of prevalence, it remains that all populations can be affected by FASD and is a public health concern for all.

Reported alcohol use patterns vary widely for AI/AN people depending on area of the country, on/off reservation, and other factors (Beauvais, 1998). For example, a study by May & Gossage (2001) found periods of heavy binge drinking that were isolated over time. A similar pattern was found in a qualitative study that stated

“Individuals reported that tribal members drank until they were intoxicated, passed out, or ran out of money” (Yuan, et al., 2010). This pattern of binge drinking and tribal variability was evident in another study by Beals, et al. (2003) of drinking patterns in Northern Plains and Southwest reservation populations. Beals, et al. (2003) also found that AI/AN may be less likely to use alcohol than are others in the United States, however, more alcohol was consumed per drinking occasion. The Substance Abuse and Mental Health Services Administration (2014) reported that AI/AN had a lower proportion of current alcohol use compared to Whites (37.3% vs. 57.7%), but a similar rate of binge use (23.5% vs 24.0%) A risky pattern of binge drinking was also evident in a study by May, et al. (2004) that included Northern Plains AI/AN women. The study found that 87.3% to 89.7% of the women binge drank prior to pregnancy, and of the women who drank during pregnancy, 68.9% to 89.1% binge drank. Heavy binge drinking among AI/AN women was again shown in another study by May & Gossage (2001) of Plains and Plateau tribes. A study in 2009 analysed alcohol use patterns before and during pregnancy among women in western Washington State, and found that AI/AN women reported more binge drinking in the month prior to pregnancy compared to other racial/ethnic groups over a period spanning three studies (study 1 in 1989-1991; study 2 in 1991-1992; and study 3 in 2002-2004) (Grant, et al., 2009). Authors postulated that drinking patterns in the month prior to pregnancy actually estimated drinking early in pregnancy before the woman realized she was pregnant. Despite higher rates in the month prior to pregnancy, the self-reported binge alcohol use during pregnancy decreased from the first study to the third study (16% to 3%), in a pattern similar to that observed in the other racial/ethnic groups. Authors suggested

that public health messaging and other policy implementations were responsible for this decrease and appeared to be equally effective for AI/AN women and non-AI/AN women.

In terms of alcohol and drug treatment outcomes, a case-control study (Evans, Spear, Huang, & Hse, 2006) hypothesized that American Indians, when compared to non-American Indians, would have less favorable treatment outcomes, present with more severe problems, and leave treatment earlier. The study included 368 American Indians and a matched sample of 368 non–American Indians, who were assessed at multiple time points. This study found that the pre-treatment factors among the AI group were similar to those among the non-AI group. Although study data indicated that the AI group received fewer needed services than the non-AI group, among almost all indicators measured, outcomes of American Indians were similar to those among non-American Indians. In fact, American Indians had fewer "public nuisance" indicators after treatment than non-American Indians. This study demonstrated that AI clients do respond favorably to alcohol and drug treatment programs.

FASD can be prevented by helping women avoid drinking alcohol during pregnancy, or by helping women who drink alcohol avoid becoming pregnant. In order to prevent FASD births, programs that address alcohol use and/or family planning are important.

The Parent-Child Assistance Program (PCAP) began in 1991 at the University of Washington as a federally funded research demonstration project designed to test the effectiveness of intensive, 3-year case management/advocacy program with high-risk mothers who abuse alcohol/drugs heavily during pregnancy. The primary aims of

PCAP are to help mothers succeed in substance abuse treatment, stay in recovery, and prevent future births of children exposed prenatally to alcohol and/or drugs. Studies have described the effectiveness of PCAP among participants taken as a group but not by AI/AN race/ethnicity (Ernst, 1999) (Grant T., Ernst, Streissguth, & Stark, 2005) (Grant, Graham, Ernst, Peavy, & Brown, 2014). A Canadian study (Rasmussen, et al., 2012) conducted on the First Steps program (based on the PCAP model), reported that approximately half of the 70 participants in the study were Aboriginal. However, results were not reported by ethnicity. In addition, results specific to alcohol and drug treatment received during the intervention were not reported. However, the study did demonstrate that there was a significant increase in birth control use, many participants were abstinent from alcohol and/or drugs at exit and the majority did not experience a subsequent pregnancy. It can be inferred, then, that the Aboriginal women in this study responded positively to the intervention and can reduce their risk for delivering a subsequent alcohol/drug exposed baby.

A comprehensive review (Montage, Clapp, Calac, Gorman, & Chambers, 2012) suggests that community involvement in design and implementation, having well-trained Native staff, and including cultural components are keys to success in reducing problem drinking in Native women. PCAP, however, does not have components specific to Native culture. Rather, each woman is viewed as an individual with her own needs that are addressed with assistance from the PCAP case manager. In addition, the program model was developed by a research team that did not include members of the Native American community. PCAP staff members represent various races, including AI/AN, and case managers are not necessarily matched with participants of the same race.

FASD has been identified as an area of public health interest for AI/AN, therefore, research regarding the effectiveness of FASD prevention programs for AI/AN women are warranted.

Purpose of this Research

The purpose of this study was two-fold: (1) to evaluate the associations between American Indian/Alaska Native (AI/AN) race/ethnicity and risk of a subsequent delivery of an infant prenatally exposed to alcohol/drugs at the conclusion of a three-year evidence-based prospective intervention designed to prevent future alcohol/drug exposed births among high-risk mothers who have substance abuse problems; and (2) to develop models predicting factors associated with increased risk among AI/AN women. The main outcome of interest is "risk of subsequent exposed birth" and is determined by measuring two components at exit: whether or not the woman has been abstinent from alcohol/drugs for 6 months or more at exit, or whether or not the woman is using effective family planning on a regular basis. In addition, this study aims to determine which variables predict failure for the outcome "risk of subsequent exposed birth" and the two components described above for AI/AN women. The results of this study will contribute to the research regarding the effectiveness of intervention programs for AI/AN mothers who abuse alcohol/drugs.

Research Questions

1. Among women who have had an alcohol/drug exposed baby, is AI/AN race/ethnicity associated with an increased risk for having a subsequent alcohol/drug exposed baby at the conclusion of a three year

evidencebased intervention designed to prevent future alcohol/drug exposed births?

2. What are the predictors associated with an increased risk of a subsequent alcohol/drug exposed births among the AI/AN women?

Participants and Methods

Participants

This cohort study included 795 women who were enrolled in PCAP from 1999 to 2010 at nine PCAP sites in Washington State (King, Pierce, Yakima, Spokane, Grant, Cowlitz, Skagit, Clallam, and Kitsap counties). All participants provided consent for data to be used for research purposes. Institutional Review Board approval was obtained from Washington State IRB and exemption was obtained from the University of Washington Human Subjects Division.

Participants were referred to the PCAP intervention by hospitals, local social service agencies, and community members. Eligibility criteria included women who:

a. were pregnant or postpartum; and

b. self-reported heavy alcohol or illicit drug use during pregnancy; and

c. were ineffectively or not engaged with community social services.

Data Collection

After eligibility criteria were met, women enrolled in PCAP completed an intake interview which includes the Addiction Severity Index (ASI) 5th edition (McLellan, et al., 1992, University of Washington, 2015). The ASI is a semi-structured interview that gives the supervisor information on seven domains that may be negatively affected by the participant's addictions. ASI reliability and validity have been reported in several studies

(as cited in Samet, 2007) and range from good to excellent. In 1997, PCAP researchers developed supplemental questions for pregnant and postpartum women regarding childhood history of risk factors and maltreatment, alcohol and drug use during an index pregnancy, and service utilization.

Every six months throughout the PCAP intervention, case managers completed a Biannual Documentation of Client Progress form which included checklists for various alcohol and drug treatment services received, abstinence from alcohol and drugs, family planning use and services received (University of Washington, 2015). In an earlier report (Grant, et al., 2011), a comparison was made of clients' ASI reports of past 30day substance use at program exit with the case manager checklist response on the 36month assessment. In only 5.8% of the cases did the case manager report client substance use when the client had not reported it.

At the conclusion of the three year PCAP intervention, an independent research assistant conducted an exit interview using the Addiction Severity Index (University of Washington, 2015). All data used in this study were collected from the Addiction Severity Index Intake and Exit interviews and Biannual Documentation of Client Progress form as per PCAP protocols. All interviewers used detailed instruction manuals and were trained to reliability standards to insure consistent interview procedures.

The Intervention

PCAP aims to reduce the risk that a parenting alcohol/drug abusing woman will give birth to a subsequent alcohol/drug exposed baby. As described above, for this

intervention, “risk of subsequent exposed birth” is determined by measuring two key outcomes at exit: whether or not the woman has been abstinent from alcohol/drugs for 6 months or more at exit, or whether or not the woman is using effective family planning on a regular basis. For the purposes of this intervention, regular effective family planning includes tubal ligation, IUD, regular hormonal implants, regular use of birth control pills and regular use of condoms (every time, every partner).

Women enrolled in PCAP were assigned by the clinical supervisor to a highly trained and closely supervised case manager, who works with the woman for a period of three years. The intervention is described fully in several articles (Ernst, 1999) (Grant, Ernst, & Streissguth, 1999) (Grant T. , Ernst, Streissguth, & Stark, 2005) (Grant, et al., 2011). The participant and case manager then set goals that reflected the woman’s personal ambitions, and were at the same time consistent with the program’s goals, and they made a plan of action to work towards those goals. Case managers helped the participant to more effectively engage with available community services by working with her and her service providers to formulate a realistic plan of action and by helping to reduce barriers to services that the participant may have needed. Case managers encouraged the participant to obtain substance abuse treatment and to seek help for the other problems, such as housing and domestic violence, that affected the stability of the family unit.

Data Analysis

Participants were categorized into one of the following race/ethnicity groups based on self-identification: American Indian/Alaska Native (AI/AN), Black, White, or All

Other races (which includes Hispanic, Asian and Pacific Islander) as derived from self-report on the initial intake interview.

Variables collected at baseline or during PCAP follow-up and used in this study include the following (coding for analyses of variables is indicated in brackets):

- Demographic variables:
    - Age at intake (in years, continuous) ○ Number of all living children (continuous) ○ High School Diploma/GED Status (0 = did complete, 1 = did not complete) ○ Monthly income at exit (monthly income in dollars divided by 1,000 in order to obtain more meaningful results in statistical analyses).
- Childhood risk factors:
    - Physically abused as a child (binary) (0=no, 1=yes) ○ Sexually abused as a child (binary) (0=no, 1=yes) ○ Lived with biological parents as a child:
        - Always lived with biological parents
        - Away from biological parents two years or less
        - Away from biological parents more than two years ○ One or both parents abused alcohol/drugs (binary) (0=no, 1=yes) ○ Client's mom drank while pregnant with her (binary) (0=no, 1=yes)
- Adult risk factors:
    - Physical abuse by partner(s) (binary) (0=no, 1=yes) ○ Chronic medical problems (binary) (0=no, 1=yes) ○ Ever jailed (binary)

(0=no, 1=yes) ○ Number of prior inpatient treatment prior to PCAP (continuous) ○ Number of prior outpatient treatment prior to PCAP (continuous)

- Services received any time during PCAP
  - ○ Inpatient treatment status at end of program (binary) (0 = did complete, 1 = did not complete) ○ Outpatient treatment status at end of program (binary) (0 = did complete, 1 = did not complete) ○ Other type alcohol/drug treatment status at end of program (binary) (0 = did complete, 1 = did not complete) ○ Total number services needed (continuous) ○ Total number services received (continuous) ○ Summary service ratio (total number of services received/total number of services needed) (0 to 1 as a ratio)
- Exit outcomes:
  - ○ Not abstinent from alcohol/drugs for 6 months or more ○ Not using regular family planning ○ Combined not abstinent from alcohol/drugs for six months or more at exit AND no regular family planning use ("risk of subsequent exposed birth") ○ Target child does not live with biologic mother

The summary service ratio was calculated based on client report of services needed and services received during the last year of PCAP from among the following: day care, family doctor, mental health service, alcohol/drug support group, domestic violence, public housing, legal services, emergency housing services, and public health

nurse. Summary service ratios were calculated as services received divided by service needs identified for the total number of services as per Grant, et al., 2011.

For the binary categorical variables, failures were coded as 1 and success was coded as 0. For the variable that described childhood living with parents, “always lived with biological parents” was coded as = 0, “away from biological parents two years or less” was coded as = 1, “away from biological parents more than two years” was coded as = 2. Summary service ratio was continuous on a scale of 0 to 1. Therefore in this study, odds ratios greater than 1.0 indicate *risk* and negative odds ratios (less than 1.0) indicate *protective* factors.

Descriptive statistics were completed comparing AI/AN women to women of White, Black and the Other racial/ethnic group. Statistics included number and percent for categorical variables and means and standard deviations for continuous variables. Tests of differences by racial/ethnic group were calculated using one-way ANOVA (for continuous variables) or *Pearson Chi-square* tests (for categorical variables) for the above listed variables. All tests were two-tailed, with Alpha of $p < 0.05$ considered to be significant.

To compare exit outcomes among all racial/ethnic groups for PCAP outcomes “no regular family planning at exit”, “not abstinent from alcohol/drugs for six months or more at exit” and the combined group “at risk for subsequent exposed birth”, multivariate logistic regression was conducted for each outcome. To observe the effect of potential confounding, each outcome was adjusted hierarchically in five steps (referred to as “blocks” in subsequent tables). Odds ratios (OR), 95% confidence

intervals (CI), and p-values were calculated. The reference category was the White racial/ethnic group, therefore the OR indicates other racial/ethnic groups compared to the White racial/ethnic group.

The models (blocks) contain the variables as follows:

1. The unadjusted model evaluating non-White race/ethnicity and risk of “no regular family planning at exit”, “not abstinent from alcohol/drugs for six months or more at exit” and the group “not abstinent from alcohol/drugs for six months or more at exit AND no regular family planning use at exit.
2. Models adjusted for demographics (age, number of all living children, high school diploma completion and monthly income at exit).
3. Models adjusted for demographics (described above) and childhood risk factors (physically abused as a child, sexually abused as a child, lived with biological parents as a child, one or both parents abused alcohol/drugs, client's mom drank while pregnant with her).
4. Models adjusted for demographics, childhood risk factors (described above) and adult risk factors (physical abuse by partner(s), chronic medical problems, ever jailed, prior inpatient treatment, and prior outpatient treatment).
5. Models adjusted for demographics, childhood risk factors, adult risk factors (described above) and services received during PCAP (inpatient treatment completed, outpatient treatment completed, other type alcohol/drug treatment completed, and summary service ratio).

To determine which variables predict lack of success in the three PCAP outcomes measured in AI/AN women, a backward stepwise logistic regression was carried out that included all the variables in the final model above (block 5). Selection was based on likelihood-ratio tests involving "in" criterion of $p < 0.05$ and an "out" criterion of $p > 0.10$. Odds ratios (OR), 95% confidence intervals (CI) and p-values were calculated. All analyses were carried out using IBM© SPSS© 19.0 Statistics software (V. 19 Student Edition).

Results

Characteristics at Intake into PCAP

Table 1 summarizes the intake characteristics of the 795 participants included in this study. Among all participants, the mean age was 27.2 years (SD 6.1), they had an average of 2.9 children (SD 1.7), half (50%) had a high school diploma, and the mean monthly income at exit was approximately $800. The AI/AN women (mean age 25.8, SD=5.8) were younger than Whites and Blacks, had more children (mean 3.1, SD 1.8) than Whites, and fewer children than the Black women. A lower proportion of AI/AN women reported having a high school diploma compared to White women (45% vs 56%, $p = 0.03$). The monthly income of AI/AN women (mean=$700, SD=52) was lower than that for the Black group (mean=$900, SD=81, p = 0 .01).

Childhood and Adult Risk factors

Childhood and adult risk factors are summarized in Table 1 as well. All groups experienced childhood physical and sexual abuse in fairly equal proportions with a range of 46% to 64% with no statistically significant differences between the racial/ethnic groups. Compared to other groups, a significantly higher proportion of

AI/AN women reported living away from their biological parents for two or more years as children (54%, $p < 0.001$); having parents who abused alcohol or drugs (99%, $p = 0.01$); and reporting that their mother drank during pregnancy with them (50%, $p < 0.001$).

With regard to adult risk factors, all groups experienced problems nearly equally: physical abuse by partner(s) (73% to 81%); chronic medical problems (33% to 37%); and ever jailed (76% to 85%). AI/AN women attended inpatient treatment programs prior to PCAP an average of 2.0 times (SD 1.9), which was higher than that for Whites and the Other racial/ethnic group. However, for outpatient treatment attendance prior to PCAP, AI/AN women had a mean number of 1.1 (SD 1.3), which was lower than that for Whites and Blacks.

Services Received

Community services received during the PCAP intervention and service ratios are listed in Table 2. All racial/ethnic groups had similar proportions of participants that completed inpatient treatment (approximately 55%). However, fewer AI/AN women completed outpatient treatment compared to Whites (57% vs. 66%, $p = 0.04$), and fewer AI/AN women completed any other type of alcohol and drug treatment compared to Whites (30% vs. 41%, $p = 0.02$) and Blacks (30% vs. 47%, $p = 0.008$). There were no significant differences in summary service ratios by race/ethnicity; among over 80% of women in each group, for every service need expressed, the mother received services.

Exit Outcomes

Table 3 describes key exit outcomes. A higher proportion of AI/AN women were "at risk for subsequent exposed birth" compared to Whites (28% vs. 19%, $p = 0.02$). In examining the components of this variable, a higher proportion of AI/AN women

reported not being abstinent from alcohol/drugs for six months or more compared to Whites (65% vs. 51%, p = 0.003) and the Other racial/ethnic group (65% vs. 48% p = 0.009), and not using family planning on a regular basis compared to Whites (42% vs. 33%, p = 0.05). A higher proportion of AI/AN women were not living with the target child at the conclusion of the intervention compared to Whites (41% vs. 30%, p = 0.01).

Multivariate Logistic Regression

Results of the multivariate logistic regression models of three key outcome measures adjusted for the five blocks of covariates are presented in tables 4 through 6.

Table 4 includes all of the models (blocks) listed above comparing White women (reference category) to the other racial/ethnic groups, for the outcome "at risk for subsequent exposed birth". For block 1, the unadjusted model, none of the racial/ethnic groups, including AI/AN women, had elevated odds compared to Whites. Various variables gained and lost statistical significance in the blocks as more potential confounders were added hierarchically. For all models that compared White women to all other racial/ethnic groups for the outcome "at risk for subsequent exposed birth", AI/AN women did not have any statistically significant elevated odds of increased risk. In Table 5, the outcome "not abstinent from alcohol/drugs for 6 months or more at exit" was evaluated. AI/AN women had increased odds of "not being abstinent from alcohol/drugs for 6 months or more at exit" versus Whites in the unadjusted model and the model adjusting for demographics (blocks 1 and 2) (OR 1.78, CI 1.21 – 2.62 and OR 1.67, CI 1.12 – 2.49, respectively). For the remaining models adjusting for childhood risk factors, adult risk factors, and outcome and service variables (blocks 3 to 5), the odds ratio for AI/AN women were no longer statistically significant.

The final set of logistic regressions for this section evaluated the outcome “no regular family planning” and results are presented in table 6. The AI/AN women did not have elevated odds compared to White women for any of the models. The only models with statistically significant variables were models 4 and 5 in which physical abuse by partner(s) was a risk factor (OR 2.53, CI 1.48 - 4.32 and OR 2.51, CI 1.47 - 4.31, respectively). Therefore, physical abuse by partner(s) is associated with elevated odds of “no regular family planning” at exit.

Stepwise Logistic Regression Models

Tables 7 through 9 show the results of the stepwise logistic regression models that predicted lack of success in the three key outcomes described above for AI/AN women.

As can be seen in Table 7, the variables that best predict “at risk for subsequent exposed birth” were total monthly income at exit, number of prior inpatient treatments, inpatient treatment not completed during PCAP, and summary service ratio. However, the only two variables that were statistically significant were total monthly income at exit (OR 0.25, CI 0.07 – 0.95) and summary service ratio (OR 0.07, CI 0.01 – 0.68). This model indicated that increasing income and having more expressed needs met protected AI/AN women from being “at risk for subsequent exposed birth”.

For AI/AN women in this study, increasing age protected against being “not abstinent from alcohol/drugs for 6 months or more at exit” at a statistically significant level (OR 0.91, CI 0.84 – 0.99) (Table 8). No other predictors reached statistical significance.

"Not using regular family planning at exit" was best predicted by four variables for AI/AN women: sexually abused as a child, chronic medical problems, number of prior inpatient treatment (OR 0.76, CI 0.58-0.98), and summary service ratio (OR 0.09, CI 0.01-0.80), with the latter two being statistically significant.

Discussion

This study contributes to the existing literature regarding outcomes of the Parent-Child Assistance Program by analyzing data by racial/ethnic group, and specifically comparing AI/AN to other racial/ethnic groups (Whites, Blacks and Others). In addition, this study contributes to an understanding of factors associated with future risk of births exposed prenatally to alcohol and drugs among AI/AN women of child-bearing age.

In terms of childhood risk factors, study data indicate that AI/AN women had the highest proportion reporting that they had "lived away from parents for two years or more". A source of high apprehension of AI/AN children from AI/AN parents can be traced back to patriarchal practices of removing AI/AN children from their families to attend boarding school, a practice attributed to the Federal Indian policy that continued into the 1960's (National Indian Child Welfare Association, 2014). Unfortunately, current disproportionate child welfare apprehensions among AI/AN families have been documented in child welfare literature (Magruder & Shaw, 2008) (Scannapieco & Iannone, 2012) (Derezotes, Richardson, King, Kleinschmit-Rembert, & Pratt, 2008). This is also evident in our study as we can see in Table 3, AI/AN women have a lower proportion that were living with the target child at the conclusion of the intervention than White women. As a matter of fact, due to the high number of Native American children being removed from their homes and placed in non-Native American homes or off their

reservations, the Indian Child Welfare Act (ICWA) (RL. 95-608) was passed in 1978 (Scannapieco & Iannone, 2012). Therefore the results in this study are consistent with what would be expected for these women reporting having lived away from their parents.

This study found that a higher proportion of AI/AN women reported that their mothers' drank while pregnant with them (50%) compared to the other racial/ethnic groups, and. This is consistent with a study by the Indian Health Service which found that between "47% and 56% of patients reported drinking alcohol during their pregnancies".

The violent history of the American treatment of AI/AN people and resultant intergenerational trauma manifests itself in many ways in Indian Country. For example, nearly all of the AI/AN women in this study (99%) reported parental substance abuse. Although the other race groups also reported high rates of parental substance abuse (from 89% for Whites to 94% for Other races), suggesting that addiction is an intergenerational problem among all races, the proportion among AI/AN women was significantly higher. It is difficult to accurately quantify the historical rates of substance abuse for AI/AN populations to determine whether or not the results from this study are consistent with what is to be expected. A review by Szlemko, Wood, & Thurman (2006), discusses some of the factors that make it challenging to accurately quantify alcohol abuse among AI/AN. The AI/AN population are difficult to track due to frequent movement between on/off reservation, movement between reservations resulting in over or under estimates due to missing population. The AI/AN population is also quite

diverse with substance abuse rates varying by geographic location. In addition, the authors state:

> **"Perhaps one of the largest barriers to estimates of alcohol use is Native American mistrust of researchers and the U.S. government. Environmental contamination, unethical use of research data, exploitation of land, and centuries of government policies designed to move, eliminate, or assimilate Native Americans all have contributed to their mistrust of government services and of many researchers."**

Rates of substance abuse have also been found to vary by the degree to which AI/AN people identify with non-Native culture or are bi-cultural with the "lowest rates of use occurred among individuals who were bicultural, that is, they were equally comfortable with Native and non-Native American values" (Szlemko, Wood, & Thurman, 2006). However, in another review, by Whitesell, Beals, Big Crow, Mitchell, & Novins (2012), findings linking cultural identity to risk for substance use and disorder are somewhat mixed. The women in this study, as mentioned previously, were from nine counties in Washington State. Specific details regarding Tribal affiliation and on/off reservation status (current and previous) were not collected. Therefore, it is difficult to estimate alcohol use patterns for this group of AI/AN women and their parents.

Prior to entry into PCAP, a lower proportion AI/AN women participated in outpatient treatment than White women. Similarly, during PCAP, a lower proportion of AI/AN women completed outpatient treatment compared to White women. Perhaps for these AI/AN women, outpatient treatment and other types of alcohol/drug treatment may not be suitable for various reasons. Many may be dealing with the effects of FASD since they had reported that their mothers drank while pregnant with them. In fact, a

previous study of women in PCAP, including all racial/ethnic groups (n = 549) (Grant, Brown, Graham, & Ernst, 2014) found that among women with prenatal alcohol exposure (PAE), twice as many completed inpatient treatment versus outpatient treatment. The authors postulate that for women with PAE, inpatient treatment offers needed structure to compensate for brain-based impairments they may have. In a case study of a PCAP participant with PAE (Sparrow, Grant, Connor, & Whitney, 2013) the case manager reported that the intensive outpatient treatment program was not meeting the subject's needs since it the lacked structure, focus and routine that she needed. Other barriers may exist as well. Since data on the cultural appropriateness of available outpatient services was not collected, it is difficult to determine whether or not this had a factor in AI/AN women not using them. A recent qualitative study (Legha, RaleighCohn, Fickenscher, & Novins, 2014) provided an excellent insight into outpatient treatment service use:

> **"Participants cited AI/AN communities' socioeconomic challenges as a primary obstacle to pursuing treatment. "There are so many survival needs that come first—housing, a job, food," one provider explained, adding, "Things like outpatient treatment are probably last on the list". . . "**

A recent study on the PCAP cohort of women (Shaw, et al., 2015) showed that rural women were less likely to complete outpatient substance abuse treatment than urban women. However, the Shaw et al. study (2015) also showed that the AI/AN women were mostly urban and not rural. A myriad of factors could contribute to the results here for AI/AN women, ranging from difficulties due to PAE, cultural inappropriateness of services, and socioeconomic challenges.

Despite the extra burden of childhood challenges and intergenerational trauma described above, AI/AN women in this program were able to access, participate in, and complete inpatient treatment at a proportion equal to women in other racial/ethnic groups. The services being offered as inpatient treatment appear to not present a barrier to the AI/AN women.

The AI/AN women in this study appeared to experience more challenges remaining abstinent from alcohol/drugs at exit than Whites and the Other Races group, since a smaller proportion of AI/AN reported being currently abstinent for 6 months or more at exit. It would be worthwhile to compare the reasons for relapse among all racial/ethnic groups to determine a cause for this. It may be that AI/AN live in more challenging social situations where it is difficult to maintain a period of sobriety for six months or more. For example, living in the same neighborhood and maintaining the same friendships from drinking days in sobriety may lead to more relapses among the AI/AN group. Some women may also live on reservations in a fairly closed social circle which may make it more challenging to break away from past drinking friends. Also, as the time in the PCAP comes to an end, perhaps AI/AN experience more of a sense of loss of supports and relapse as a result. Additionally, it may be that culturally safe supports are not available in all areas for the AI/AN women. In a study of inpatient and outpatient AI/AN treatment (Spear, Crevecoeur-MacPhail, Denering, Dickerson, & Brecht, 2013), the role of social environments on substance abuse treatment outcomes was analyzed. Results indicated that for both inpatient and outpatient clients, having recovery-oriented social supports were predictive of abstinence. Perhaps compared to the White women, the AI/AN women in PCAP did not have as strong a recoveryoriented

social support system. In addition, as discussed above, more AI/AN women may be living with the effects of PAE, which is associated with challenges remaining abstinent from alcohol/drugs.

The objective of a prospective study by Chong & Lopez (2007) was to describe the predictors of substance abuse relapse of American Indian (AI) women up to one year following substance abuse treatment. In the study, relapse was defined as any alcohol or drug use in the past 30 days at the follow-up points (6 and 12 months). Some of the data were collected using the Addiction Severity Index – Native American Version, which is similar to the ASI used in our study but contains questions relating to AI cultural practices. Relapse at 6 months was predicted by being with other people who use alcohol or drugs and craving alcohol or drugs. Predictors at 12 months were only slightly different and included the additional variable of family conflicts at intake. When looking at alcohol relapse only, a notable predictor of no alcohol use was if client's father had warned her about alcohol and drug use while growing up. Having drug treatment experience, rating one's physical health well, and having a high self-efficacy score were also protective against alcohol use at 6 months. As can be seen from Table 7 in our study, number of prior inpatient treatment was protective for the outcome "not abstinent from alcohol/drugs > 6 months and no regular family planning". Perhaps this inpatient experience provides a long term protective effect in our study beyond what is seen in the Chong & Lopez (2007) results. When comparing the result in the Chong & Lopez (2007) study of "rating one's physical health well" as a protective factor to our results in Table 8 which indicate that a "chronic medical condition" was a protective factor against "not abstinent from alcohol/drugs ≥ 6 months" there appears to

be an inconsistency between the two results. However, the “chronic medical condition” variable was not statistically significant. As well, the two variables are likely not reliably measuring the same thing. The data do not indicate what the “chronic medical condition” could be therefore it is difficult to interpret how it affects lack of abstinence compared to a positive self-rating of health. At 12 months, age was a protective factor against both alcohol and drug use which is consistent with results in our study that indicated age is a protective factor for not being abstinent from alcohol/drugs for 6 months or more at exit. Although PCAP is not itself a drug or alcohol treatment program, perhaps knowledge of the risk and protective factors in the Chong & Lopez (2007) study could be used in PCAP to help promote alcohol and drug abstinence in the last 6 months of the intervention. For example, it may be beneficial to know the relationship that the AI/AN women have with their father and if he had warned her about alcohol and drug use while growing up. Case managers could draw upon this strength of the AI/AN woman while helping the client identify strategies to remain clean and sober. Similarly, encouraging development of positive self-efficacy of the AI/AN women in this program is beneficial and a large part of the theoretic basis of PCAP (University of Washington, 2010).

A primary goal of the PCAP intervention is to prevent future alcohol and drug exposed births, either by helping women achieve abstinence and stay in recovery, or by encouraging women to choose an effective family planning method. For women who decide to expand their families, PCAP’s aim is to help them have healthy, alcohol and drug free pregnancies. Study regression results (Table 6) showed no differences between AI/AN women and other participants with regard to their use of regular family

planning at program exit in unadjusted and adjusted models. Unadjusted descriptive statistics (Table 3) showed that at program exit, more AI/AN women had chosen to use regular family planning (58%) than not (42%), however the proportion not using was significantly higher compared to White women (33%). The topic of birth control can be very sensitive and political for AI/AN women. AI/AN women may come from communities that celebrate large families and resist methods for controlling population (and tribal enrollment) growth. The reproductive rights of AI/AN women have been attacked and controlled in the past by various means in America such as forced sterilization, coercion, harassment, deceit, and unauthorized testing of new contraceptive methods (Urban Indian Health Institute, Seattle Indian Health Board, 2010). These cultural and historical factors may contribute to a higher proportion of the AI/AN women not using family planning compared to White women in this study. Despite this difference, AI/AN race/ethnicity was not independently associated with an elevated odds of not using regular family planning at program exit. More research is warranted to determine why more AI/AN women than White women report “no regular family planning” at the conclusion of the PCAP intervention.

In this study AI/AN race/ethnicity was not associated with an elevated odds for “at risk for subsequent exposed birth”. However, other important factors were found, including two-fold elevated odds of “at risk for subsequent exposed birth” for physical abuse by partner(s) and a nearly two-fold increased risk if the target child was not living with the mother at end of follow-up.

This study assessed the individual components of the primary study outcome. For the outcome “not abstinent from alcohol/drugs for 6 months or more”, AI/AN

race/ethnicity was not independently associated with an elevated odds in the final adjusted model, indicating that there was confounding between race/ethnicity and other covariates in the model that had stronger associations with the study outcome. In addition to the investigating factors related to “risk of subsequent exposed birth”, we also assessed factors associated with the individual components of the primary study definition. In the fully adjusted model, sexual abuse as a child increased the odds of “not being clean/sober for 6 months or more at exit” for women in all racial/ethnic groups by 60 % compared to Whites. This result is consistent with existing research that points to childhood sexual abuse being a significant risk factor for adult substance abuse problems (Center for Substance Abuse Treatment, 2009), (Springer, Sheridan, Kuo, & Carnes, 2003) (Lee, Lyvers, & Edwards, 2008), poor treatment outcomes, and increased relapse rates. In summary, the Center for Substance Abuse Treatment (2009) states that “Many women who are dependent on alcohol or drugs experience difficulty in recovery and relapse if violence and abuse issues are not addressed in treatment. Women may need help understanding the serious long-term effects of violence, sexual abuse, and incest on their functioning and on the risk of relapse”. For the women in this study, it is likely that their experience of childhood sexual abuse contributed to abuse of alcohol and drugs in order to cope with negative emotions, troubling symptoms and painful memories. If childhood sexual abuse issues are not screened for and dealt with effectively during PCAP or the alcohol/drug treatment services offered, the women may be at increased risk for not being able to achieve and maintain clean/sober time. We did find, however, that completion of inpatient and outpatient services and a better ration of services provided to meet needs (summary service ratio) was beneficial in promoting sobriety, a result that

should be considered in future interventions addressing alcohol use in AI/AN communities.

In the fully adjusted final model examining “no regular family planning”, physical abuse by partner(s) increased the odds of “subsequent exposed birth” by 2.5 times. A wide body of research shows a link between intimate partner violence (IPV) and challenges in women’s birth control use for women, which is summarized in a comprehensive review (Miller & Silverman, 2010). Therefore, based on previous research and the results shown here, it is important that PCAP address IPV and associated reproductive coercion in a coordinated and deliberate manner. It is also important that the PCAP case manager ensures that the service providers for family planning are equipped to deal with women experiencing IPV in a non-judgemental manner and are willing to assist the woman in harm reduction methods.

In examining the predictive model for AI/AN women being “at risk for subsequent exposed birth”, monthly income at exit and summary service ratio were protective, significant predictors. Considering that the PCAP case management model strives to ensure that service needs of women are met, it is not surprising that having more service needs met would protect against being “at risk for subsequent exposed birth”. Although PCAP does not include cultural elements specific to AI/AN, and PCAP data do not specifically measure the cultural appropriateness or safety of services provided, it appears that the community services AI/AN women received were culturally safe enough that participants found them to be useful and supportive. Perhaps with the work and assistance of the PCAP case managers in the communities, which includes

reducing barriers to services for all participants, services are more responsive to the needs of all participants, including AI/AN women.

Among the factors that best predicted “not being abstinent from alcohol/drugs for 6 months or more at exit” in logistic regression model for AI/AN women, the only statistically significant variable was increasing age which was a protective factor. It can be postulated that with increasing age, women may have more social supports to draw upon to quit drinking, additionally they may be more emotionally secure than younger women and therefore not seek approval from drinking peers, and they may also be “tired” of the drinking lifestyle. Age as a protective factor is consistent with the results in the study by Chong & Lopez (2007), discussed above. Consistent with this, the May & Gossage (2001) study found that drinking was more prevalent in the younger age groups.

The predictive model for AI/AN women and the outcome “no regular family planning” had two statistically significant predictors that were also protective factors: number of prior inpatient treatment and summary service ratio. As discussed above, it would be expected that in this program, having more needs met would result in more favorable outcomes. Number of prior inpatient treatment as a protective factor is interesting since it is more distal than proximal. However, perhaps lessons learned during inpatient treatment programs and greater senses of self-efficacy are helpful for the women to negotiate birth control use. The value of distal events such as prior inpatient treatment is evident in the study by Chong & Lopez (2007) discussed above which found that having drug treatment experience was protective against alcohol use at 6 months.

Limitations

This study is subject to several limitations. First, there is a great deal of diversity of AI/AN culture across America. This diversity is also apparent in urban areas, which is where most of the PCAP sites in this study are based. Among this self-identifying group, their connection to and practice of their AI/AN culture was not measured, therefore it may be difficult to attribute the results found for the AI/AN group to their race/ethnicity. In addition, this is self-reported data and is therefore subject to error based on the information provided by the client. It is hoped that as relationships are built with the women in this intervention, they will feel comfortable about answering questions honestly and not feel that there is a power imbalance, however, this may not always be the case. Each participant may also understand the questions differently and therefore the responses will vary among participants. Also, although there were 147 AI/AN women in the study, only 91 were included in the backward stepwise logistic regression models in tables 7 through 9. This is due to the fact that SPSS removes cases list-wise for any case that is missing data for any of the variables. Imputation calculations were not done. Removing this number of cases in a relatively small sample size reduces statistical power.

Summary

In summary, this study contributes to the existing literature evaluating the effectiveness of the PCAP intervention for ethnically diverse women by exploring some key outcome measures for AI/AN women. PCAP appears to be meeting the needs of the AI/AN women despite not having specific cultural adaptations built into the intervention. All women in this program came from similar challenging backgrounds and

the AI/AN women experienced more challenges in certain areas. Despite these extra challenges, the AI/AN women were not at increased risk for a subsequent alcohol/drug exposed birth at the conclusion of the intervention.

Table 1 Intake characteristics of women enrolled in the Parent-Child Assistance Program (PCAP)

	AI/AN	White		Black		All Other		Total	
Variable	**n, % or m, SD**	**n, % or m, SD**	**p- value AI/AN vs White[1]**	**n, % or m, SD**	**p- value AI/AN vs Black**Error! Bookmark not defined.	**n, % or m, SD**	**p- value AI/AN vs All Other**Error! Bookmark not defined.	**n, % or m, SD**	**p- value all races [2]**
N	147	465		101		82		795	
Demographics									
Age	25.8 (5.8)	27.4 (6.2)	**0.05**	29.0 (5.7)	**<0.001**	26.0 (5.7)	0.79	27.2 (6.1)	**<0.001**
Total all living children	3.1 (1.8)	2.7 (1.4)	**0.008**	3.6 (2.5)	**0.03**	3.2 (1.7)	0.60	2.9 (1.7)	**<0.001**
Has high school diploma/GED	66 (45%)	258 (56%)	**0.03**	40 (40%)	0.41	34 (42%)	0.62	398 (50%)	**0.003**
Monthly income at exit[3]	0.70 (0.52)	0.80 (0.71)	0.10	0.90 (0.81)	**0.01**	0.80 (0.90)	0.30	0.80 (0.72)	0.16
Childhood risk factors									
Physically abused as a child	71/146 (49%)	210/460 (46%)	0.53	54/99 (55%)	0.36	40/80 (50%)	0.84	375/785 (48%)	0.42
Sexually abused as a child	92/144 (64%)	262/448 (58%)	0.25	58/100 (58%)	0.35	46/81 (57%)	0.29	458/773 (59%)	0.65
Lived with Biological Parents			**<0.001**		**0.01**		**0.01**		**<0.001**
Always lived with biological parents	52 (35%)	298 (64%)		54 (55%)		44 (54%)		448 (57%)	
Away from parents two years or less	16 (11%)	51 (11%)		9 (9%)		9 (11%)		85 (11%)	
Away from parents more than two years	79 (54%)	144 (25%)		36 (36%)		29 (35%)		258 (33%)	
One or both parents abused alcohol/drugs	139/140 (99%)	385/431 (89%)	**<0.001**	85/90 (94%)	**0.03**	69/74 (93%)	**0.01**	678/735 (92%)	**0.01**

[1] Pearson chi-square or ANOVA P-value for pairwise comparisons of AI/AN vs remaining racial/ethnic group categories

[2] Pearson chi-square or ANOVA P-value for all racial/ethnic groups categories

[3] Monthly income divided by 1,000

	AI/AN	White		Black		All Other		Total	
Variable	**n, % or m, SD**	**n, % or m, SD**	**p- value AI/AN vs White[1]**	**n, % or m, SD**	**p- value AI/AN vs Black**Error! Bookmark not defined.	**n, % or m, SD**	**p- value AI/AN vs All Other**Error! Bookmark not defined.	**n, % or m, SD**	**p- value all races [2]**
Client's mom drank while pregnant	50/100 (50%)	68/321 (21%)	**<0.001**	24/70 (34%)	**0.04**	11/54 (20%)	**<0.001**	153/545 (28%)	**<0.001**
Adult risk factors									
Physical abuse by partner(s)	108/147 (73%)	373/462 (81%)	0.06	72/99 (73%)	1.00	65/82 (79%)	0.34	618/790 (78%)	0.14
Chronic medical problems	48/147 (33%)	173/463 (37%)	0.33	34/99 (34%)	0.79	26/82 (32%)	1.00	281/791 (36%)	0.62
Ever jailed	115/147 (78%)	352/461 (76%)	0.76	83/98 (85%)	0.25	64/82 (78%)	1.00	614/788 (78%)	0.351
Mean # prior inpatient treatment	2.0 (1.9)	1.5(1.6)	**0.004**	2.2 (2.0)	0.46	1.3 (1.5)	**0.009**	1.7 (1.7)	<0.001
Mean # prior outpatient treatment	1.1 (1.3)	1.3 (1.4)	**0.03**	1.4 (1.6)	**0.05**	0.9 (1.1)	0.3	1.3 (1.4)	0.005

Table 2 Community services received during PCAP

	AI/AN	White		Black		All Other		Total	
Variable	**n, % or m, SD**	**n, % or m, SD**	**p- value AI/AN vs White[4]**	**n, % or m, SD**	**p- value AI/AN vs Black[4]**	**n, % or m, SD**	**p- value AI/AN vs All Other[4]**	**n, % or m, SD**	**p- value all races[5]**
N	147	465		101		82		795	
Inpatient treatment completed	87 (59%)	260 (56%)	0.49	59 (58%)	0.90	44 (54%)	0.42	450 (57%)	0.82
Outpatient treatment completed	84 (57%)	308 (66%)	**0.04**	56 (55%)	0.79	51 (62%)	0.46	499 (63%)	0.08
Other type alcohol/drug treatment completed	44 (30%)	190 (41%)	**0.02**	47 (47%)	**0.008**	32 (39%)	0.16	313 (39%)	**0.04**
Total # services needed	4.23 (1.77)	4.00 (1.70)	0.16	4.37 (1.75)	0.55	3.90 (1.56)	0.16	4.08 (1.71)	0.12
Total # services received	3.41 (1.71)	3.31 (1.56)	0.49	3.52 (1.81)	0.63	3.09 (1.50)	0.15	3.33 (1.61)	0.28
Summary service ratio[6]	0.82 (0.23)	0.84 (0.22)	0.25	0.81 (0.25)	0.88	0.81 (0.23)	0.72	0.83 (0.23)	0.37

[4] Pearson chi-square or ANOVA P-value for pairwise comparisons of AI/AN vs remaining racial/ethnic group categories

[5] Pearson chi-square or ANOVA p-value for all racial/ethnic groups categories

[6] Summary service ratio = services received/service needs identified

Table 3 Participant outcomes of interest at the conclusion of PCAP

	AI/AN	White		Black		All Other		Total	
Variable	**n, % or m, SD**	**n, % or m, SD**	**p- value AI/AN vs White[a]**	**n, % or m, SD**	**p- value AI/AN vs Black[a]**	**n, % or m,SD**	**p- value AI/AN vs All Other[a]**	**n, % or m,SD**	**p- value all races[b]**
N	147	465		101		82		795	
Not abstinent from alcohol/drugs ≤6 months and no regular family planning	41 (28%)	87 (19%)	**0.02**	22 (22%)	0.28	19 (23%)	0.44	169 (21%)	0.12
Not abstinent from alcohol/drugs ≥ six months	96 (65%)	239 (51%)	**0.003**	56 (55%)	0.12	39 (48%)	**0.009**	430 (54%)	**0.02**
No regular family planning use	61 (42%)	152 (33%)	**0.05**	32 (32%)	0.12	38 (46%)	0.48	283 (36%)	**0.03**
Target child does not live with mother	60 (41%)	138 (30%)	**0.01**	38 (38%)	0.61	35 (43%)	0.78	271 (34%)	**0.02**

[a] Chi-square or ANOVA P-value for pairwise comparisons of AI/AN vs other racial/ethnic group categories

[b] Chi-square or ANOVA P-value for all racial/ethnic groups categories

Table 4. Logistic regression models comparing Whites to other racial/ethnic groups for Risk for Subsequent Exposed Birth

Risk for Subsequent Exposed Birth	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Race										
White = ref		0.17		0.30		0.36		0.28		0.36
AI/AN	1.61 (0.92 - 2.83)	0.10	1.48 (0.85- 2.56)	0.23	1.23 (0.66 - 2.28)	0.51	1.37 (0.73 - 2.58)	0.32	1.27 (0.66 - 2.43)	0.48
Black	1.21 (0.71 - 2.05)	0.48	1.56 (1.00- 2.43)	0.41	1.25 (0.59 - 2.64)	0.56	1.35 (0.63 - 2.90)	0.45	1.05 (0.47 - 2.35)	0.90
All Other	1.31 (0.75 - 2.30)	0.35	1.26 (0.70- 2.25)	0.09	1.93 (0.93 - 4.03)	0.08	2.04 (0.96 - 4.34)	0.06	2.00 (0.92 - 4.37)	0.08
Demographics										
Age			0.95 (0.91 - 1.00)	0.06	0.95 (0.91 - 1.00)	0.06	0.94 (0.90 - 0.99)	**0.03**	0.96 (0.91 - 1.01)	0.10
NO high school diploma/GED			1.30 (0.80 - 2.10)	0.29	1.31 (0.80 - 2.13)	0.28	1.32 (0.81 - 2.17)	0.27	1.43 (0.85 - 2.39)	0.17
Total monthly income at exit[6]			0.48 (0.30 - 0.76)	**< 0.001**	0.47 (0.29 - 0.76)	**<0.001**	0.47 (0.29 - 0.75)	**<0.001**	0.66 (0.41 - 1.06)	0.08

[1] Block 1=unadjusted model

[2] Block 2=adjusted for demographics

[3] Block 3=adjusted for demographics and childhood risk factors

[4] Block 4 =adjusted for demographics, childhood risk factors, adult risk factors

[5] Block 5=adjusted for demographics, childhood risk factors, adult risk factors and service variables and target child/mother living arrangement at exit

[6]Monthly income divided by 1,000

Risk for Subsequent Exposed Birth	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Total living children			0.93 (0.78 - 1.11)	0.40	0.90 (0.75 - 1.08)	0.26	0.88 (0.73 - 1.06)	0.17	0.87 (0.72 - 1.06)	0.17
Childhood Risk factors										
Physically abused as a child					1.08 (0.65 - 1.81)	0.77	0.93 (0.54 - 1.58)	0.78	0.88 (0.51 - 1.54)	0.66
Sexually abused as a child					1.04 (0.63 - 1.73)	0.87	0.88 (0.52 - 1.49)	0.63	0.88 (0.50 - 1.53)	0.65
Always lived with biological parents						0.23		0.20		0.29
Away from parents two years or less					0.54 (0.21 - 1.41)	0.21	0.51 (0.19 - 1.34)	0.17	0.57 (0.21 - 1.57)	0.28
Away from parents more than two years					1.26 (0.70 - 2.24)	0.44	1.26 (0.70 - 2.25)	0.44	1.28 (0.70 - 2.33)	0.42
One or both parents abused alcohol/drugs					0.83 (0.35 - 1.98)	0.68	0.96 (0.40 - 2.34)	0.93	0.88 (0.35 - 2.26)	0.80
Client's mom drank while pregnant					1.50 (0.85 - 2.63)	0.16	1.53 (0.87 - 2.70)	0.14	1.53 (0.85 - 2.75)	0.16
Adult Risk factors										

Risk for Subsequent Exposed Birth	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Physical abuse by partner(s)							2.39 (1.23 - 4.62)	**0.01**	2.17 (1.10 - 4.27)	0.03
Chronic medical problems							1.39 (0.84 - 2.28)	0.20	1.25 (0.74 - 2.12)	0.40
Ever jailed							0.98 (0.55 - 1.76)	0.95	1.02 (0.56 - 1.88)	0.95
# Prior inpatient treatment							0.96 (0.82 - 1.12)	0.61	0.94 (0.80 - 1.11)	0.46
# Prior outpatient treatment							1.04 (0.86 - 1.25)	0.71	1.03 (0.84 - 1.26)	0.77
Service variables and target child/mother living arrangement at exit										
Inpatient treatment status									2.03 (1.20 - 3.45)	**0.01**
Outpatient treatment status									2.25 (1.32 - 3.84)	**<0.001**

Risk for Subsequent Exposed Birth	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Other type alcohol/drug status									0.66 (0.38 - 1.15)	0.15
Summary service ratio[7]									0.56 (0.19 - 1.63)	0.28
Target child does NOT live with mother at exit									1.93 (1.09 - 3.41)	**0.02**

[7] Summary service ratio = services received/service needs identified

Table 5. Logistic regression models comparing Whites to remaining racial/ethnic groups for program outcome "not abstinent from alcohol/drugs 6 months or more"

Program outcome not abstinent from alcohol/drugs 6 months or more	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Race										
White = ref		**0.02**		0.03		0.44		0.57		0.77
Black	1.18 (0.76 - 1.81)	0.46	1.39 (0.89-2.19)	0.15	1.25 (0.69-2.26)	0.47	1.17 (0.64-2.13)	0.60	0.91(0.47-1.76)	0.77
AI/AN	1.78 (1.21 - 2.62)	**0.003**	1.67 (1.12-2.49)	**0.01**	1.54 (0.90-2.63)	0.12	1.46 (0.85-2.53)	0.17	1.32(0.73-2.38)	0.35
All Other	0.86 (0.54 - 1.37)	0.52	0.83 (0.51-1.34)	0.44	1.24 (0.65-2.38)	0.52	1.24 (0.65-2.40)	0.51	1.10(0.55-2.20)	0.79
Demographics										
Age			0.96 (0.94-0.99)	**0.01**	0.97 (0.94-1.01)	0.10	0.97 (0.93-1.00)	0.08	0.98(0.95-1.03)	0.45

[1] Block 1=unadjusted model
[2] Block 2=adjusted for demographics
[3] Block 3=adjusted for demographics and childhood risk factors
[4] Block 4 =adjusted for demographics, childhood risk factors, adult risk factors
[5] Block 5=adjusted for demographics, childhood risk factors, adult risk factors and service variables and target child/mother living arrangement at exit

Program outcome not abstinent from alcohol/drugs 6 months or more	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
No high school diploma/GED			0.91 (0.67-1.24)	0.55	1.04 (0.70-1.54)	0.86	1.02 (0.69-1.52)	0.92	1.00 (0.65-1.53)	0.99
Total monthly income at exit[6]			0.62 (0.49-0.78)	**< 0.001**	0.59 (0.44-0.79)	0.00	0.59 (0.44-0.79)	0.00	0.79 (0.59-1.07)	0.13
Total living children			0.96 (0.87-1.05)	0.38	0.89 (0.78-1.02)	0.10	0.89 (0.78-1.02)	0.09	0.86 (0.74-1.00)	0.05
Childhood Risk factors										
Physically abused as a child					0.70 (0.46-1.06)	0.09	0.72 (0.47-1.11)	0.14	0.74 (0.46-1.17)	0.19
Sexually abused as a child					1.58 (1.05-2.37)	0.03	1.54 (1.01-2.35)	0.04	1.58 (1.00-2.50)	0.05
Always lived with biological parents						0.24		0.24		0.20
Away from parents two years or less					1.46 (0.71-3.00)	0.30	1.46 (0.71-2.99)	0.31	1.68 (0.77-3.68)	0.19

[6] Monthly income divided by 1,000

Program outcome not abstinent from alcohol/drugs 6 months or more	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Away from parents more than two years					1.50 (0.91-2.47)	0.12	1.50 (0.91-2.48)	0.12	1.53 (0.89-2.65)	0.13
One or both parents abused alcohol/drugs					0.92 (0.49-1.74)	0.80	0.91 (0.48-1.72)	0.76	0.80 (0.40-1.60)	0.53
Client's mom drank while pregnant with her					1.11 (0.68-1.79)	0.68	1.08 (0.66-1.76)	0.75	1.02 (0.60-1.75)	0.93
Adult Risk factors										
Physical abuse by partner(s)							0.95 (0.59-1.53)	0.82	0.83 (0.50-1.37)	0.46
Chronic medical problems							0.95 (0.64-1.41)	0.79	0.87 (0.57-1.35)	0.54
Ever jailed							1.19 (0.74-1.90)	0.47	1.25 (0.76-2.07)	0.38
# Prior inpatient treatment							1.10 (0.97-1.24)	0.15	1.10 (0.95-1.26)	0.21
# Prior outpatient treatment							0.95 (0.82-1.10)	0.49	0.94 (0.80-1.11)	0.45

Program outcome not abstinent from alcohol/drugs 6 months or more	**Block 1[1]**		**Block 2[2]**		**Block 3[3]**		**Block 4[4]**		**Block 5[5]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Service variables and target child/mother living arrangement at exit										
Inpatient treatment completed									1.65 (1.06-2.57)	**0.03**
Outpatient treatment completed									2.91 (1.83-4.64)	**<0.001**
Other type alcohol/drug treatment completed									0.84 (0.54-1.31)	0.44
Summary service ratio[7]									0.21 (0.07-0.60)	**<0.001**
Target child does NOT live with mother at exit									2.21 (1.33-3.68)	**0.002**

[7] Summary service ratio = services received/service needs identified

Table 6. Logistic regression models comparing Whites to remaining racial/ethnic groups for no regular family planning

No regular family planning	Block 1[a]		Block 2[b]		Block 3[c]		Block 4[d]		Block 5[e]	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Race										
White = ref		0.35		0.42		0.39		0.25		0.28
Black	1.35 (0.83 - 2.21)	0.23	1.31 (0.80 - 2.17)	0.29	1.28 (0.75 - 2.17)	0.36	1.43 (0.83 - 2.47)	0.20	1.39 (0.80 - 2.41)	0.25
AI/AN	1.03 (0.57 - 1.86)	0.92	1.14 (0.62 - 2.09)	0.68	1.09 (0.59 - 2.03)	0.78	1.21 (0.64 - 2.28)	0.56	1.14 (0.60 - 2.16)	0.70
AllOther	1.62 (0.88 - 3.01)	0.12	1.63 (0.87 - 3.06)	0.13	1.71 (0.90 - 3.23)	0.10	1.83 (0.95 - 3.53)	0.07	1.85 (0.95 - 3.59)	0.07
Demographics										
Age			0.97 (0.94 - 1.01)	0.17	0.97 (0.94 - 1.01)	0.18	0.96 (0.93 - 1.00)	0.07	0.97 (0.93 - 1.01)	0.14
High school diploma			0.97 (0.65 - 1.44)	0.86	1.00 (0.67 - 1.49)	0.99	1.02 (0.67 - 1.53)	0.94	1.01 (0.67 - 1.54)	0.95
Total monthly income at exit[f]			0.89 (0.67 - 1.19)	0.43	0.89 (0.67 - 1.18)	0.41	0.89 (0.67 - 1.19)	0.44	0.93 (0.69 - 1.26)	0.64

[a] Block 1=unadjusted model
[b] Block 2=adjusted for demographics
[c] Block 3=adjusted for demographics and childhood risk factors
[d] Block 4 =adjusted for demographics, childhood risk factors, adult risk factors
[e] Block 5=adjusted for demographics, childhood risk factors, adult risk factors and service variables and target child/mother living arrangement at exit
[f] Monthly income divided by 1,000

No regular family planning	**Block 1[a]**		**Block 2[b]**		**Block 3[c]**		**Block 4[d]**		**Block 5[e]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Total living children			0.95 (0.83 - 1.09)	0.46	0.93 (0.81 - 1.07)	0.31	0.91 (0.78 - 1.05)	0.18	0.91 (0.79 - 1.06)	0.23
Childhood Risk factors										
Physically abused as a child					0.96 (0.63 - 1.47)	0.86	0.82 (0.53 - 1.27)	0.37	0.81 (0.52 - 1.27)	0.36
Sexually abused as a child					0.91 (0.60 - 1.38)	0.66	0.76 (0.49 - 1.18)	0.22	0.79 (0.51 - 1.23)	0.29
Always lived with biological parents						0.29		0.24		0.30
Away from parents two years or less					0.56 (0.25 - 1.22)	0.14	0.53 (0.24 - 1.17)	0.12	0.55 (0.24 - 1.24)	0.15
Away from parents more than two years					1.04 (0.63 - 1.72)	0.87	1.05 (0.63 - 1.74)	0.86	1.03 (0.62 - 1.73)	0.90
One or both parents abused alcohol/drugs					0.67 (0.35 - 1.28)	0.22	0.75 (0.38 - 1.47)	0.40	0.69 (0.35 - 1.36)	0.28
Client's mom drank while pregnant					1.40 (0.86 - 2.29)	0.17	1.41 (0.86 - 2.32)	0.18	1.37 (0.83 - 2.26)	0.22
Adult Risk factors										
Physical abuse by partner(s)							2.53 (1.48 - 4.32)	**0.001**	2.51 (1.47 - 4.31)	**0.001**

No regular family planning	**Block 1[a]**		**Block 2[b]**		**Block 3[c]**		**Block 4[d]**		**Block 5[e]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Chronic medical problems							1.34 (0.88 - 2.03)	0.17	1.28 (0.84 - 1.95)	0.26
Ever jailed							0.81 (0.50 - 1.31)	0.39	0.83 (0.51 - 1.36)	0.47
# Prior inpatient treatment							0.94 (0.83 - 1.07)	0.37	0.95 (0.83 - 1.09)	0.45
# Prior outpatient treatment							1.08 (0.92 - 1.26)	0.34	1.07 (0.92 - 1.26)	0.39
Service variables and target child/mother living arrangement at exit										
Inpatient treatment status									1.32 (0.86 - 2.02)	0.20
Outpatient treatment status									1.41 (0.91 - 2.19)	0.12
Other type alcohol/drug status									1.14 (0.74 - 1.77)	0.55

No regular family planning	**Block 1[a]**		**Block 2[b]**		**Block 3[c]**		**Block 4[d]**		**Block 5[e]**	
Factor	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***	**OR (95% CI)**	***P-value***
Summary service ratio[g]									1.27 (0.49 - 3.30)	0.62
Target child does NOT live with mother at exit									1.14 (0.71 - 1.84)	0.60

[g] Summary service ratio = services received/service needs identified

Table 7. Predictive model for AI/AN women: Not abstinent from alcohol/drugs ≥ 6 months and no regular family planning

	OR (95% CI)	*p-value*
Total monthly income at exit[a]	0.25 (0.07-0.95)	**0.04**
# Prior inpatient treatment	0.61 (0.36-1.03)	0.06
Inpatient treatment not completed	2.62 (0.89-7.73)	0.08
Summary service ratio[b]	0.07 (0.01-0.68)	**0.02**

Table 8. Predictive model for AI/AN women: Not abstinent from alcohol/drugs ≥ 6 months

	OR (95% CI)	*p-value*
Age	0.91 (0.84-0.99)	**0.03**
Chronic medical problems	0.41 (0.16-1.05)	0.06
Ever jailed	2.46 (0.85-7.11)	0.10

Table 9. Predictive model for AI/AN women: No regular family planning use

	OR (95% CI)	*P-value*
Sexually abused as a child	0.39 (0.14-1.06)	0.07
Chronic medical problems	2.65 (0.91-7.68)	0.07
# Prior inpatient treatment	0.76 (0.58-0.98)	**0.04**
Summary service ratio[b]	0.09 (0.01-0.80)	**0.03**

[a] Monthly income divided by 1,000

[b] Summary service ratio = services received/service needs identified

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