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Young Adult Migration from a Northern Plains Indian Reservation: Who Stays and Who Leaves

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Abstract

We evaluated how ambitions, community ties, monetary sufficiency, employment, and alcohol consumption related to whether young American Indian adults had moved from their Northern Plains reservation. Of 518 Northern Plains reservation residents in 1993, we located 472 in 2003–2005 and found that 89 lived more than a four-hour drive from the reservation. Coding the 472 as to whether they had stayed on/near the reservation or moved away, we ran logistic regressions on data they reported in 1996 to determine which demographic and attitudinal variables were associated with having moved. We found ambitions and goals were more associated with moving away than were ties to the community, which in turn were more related than monetary and personal characteristics that promote independence and prosperity. The more importance they placed on getting a good education or carrying on the tribe's traditions, the more likely they were to have moved away. We found too that the odds of moving away decreased with greater alcohol consumption. Tribal council members and college administrators therefore may wish to promote policies that increase opportunities for young adults to achieve higher education goals while remaining on reservation to carry on tribal traditions. Benefits may also come from encouraging and assisting reservation members studying off-reservation to return after completing their education. These findings would argue too for greater investment in alcohol services for reservation-dwelling populations.

Introduction

Cornell and Jorgensen (2007) have pointed out that identifying strategic priorities and concerns is an important step that is all too often skipped by tribal governments as they choose and implement projects. One crucial piece of information for tribal governments in identifying priorities is knowledge about the characteristics of those who leave and those who remain on or near their reservation communities since only 34% of American Indian and Alaska Natives live on reservations or in other governmental-designated Indian areas (Ogunwole 2006). As a complement to analyses that rely primarily on Census data (Geib 2001; Larriviere and Kroncke 2004; Snipp and Sandefur 1988;), here we present our efforts to clarify the importance of non-economic issues, personal goals, and alcohol consumption among young adults in shaping reservation populations. Using data collected in a previous study, we conducted analyses to better understand three points: 1) how well different *types* of issues accounted for young adults moving far from a Northern Plains Indian reservation, 2) how strong the association was between particular personal characteristics and that movement, and 3) the relative importance of alcohol consumption as a correlate of such movement.

Background

We were primarily interested in exploring movement away from the reservation rather than movement within or nearby the reservation, so this study is better seen as a contribution to the literature on migration rather than residential mobility. However, distinctions between residential mobility and migration may not always hold up well in American Indian communities. First, as we note below, people often return to their reservation communities after moving to urban locations (Snipp 1997). Furthermore, several variables argued to be significant in predicting residential mobility also appear to be relevant to understanding decisions to leave the reservation. Thus we begin by examining the forces behind household relocation that are relevant, but not exclusive, to the majority population, which are often discussed as determinants of residential mobility. We then turn to the literature that documents influences that may bear more specifically on movement off the reservation.

Why People Relocate Their Residence

Why people choose to move their residence location has been of broad interest for many years. In the literature on migration, the aggregate movement of people has been associated with variation in social and economic conditions (Greenwood 1985; Judson 1990). Investigators have theorized that decisions to relocate arise from the interplay of neighborhood characteristics, individual and family needs, and resource availability. Much of the theoretical foundation for research on residential mobility can be traced to Wolpert (1965, 1966), though earlier researchers such as Rossi (1955) and Simon (1957) contributed important concepts. Wolpert (1965) proposed that people evaluate their residences by considering benefits and costs, synthesizing their ideas into an overall impression of “place utility.” When the utility of an alternative residence exceeds the place utility of their current one, the individual is likely to move. Wolpert (1966) further suggested that people search for a new residence when their local environment presents stressful stimuli that surpass their tolerance level.

Speare (1974) stated that stress occurs when there is a poor fit between household needs and environmental resources. He developed an explicit model of residential mobility where level of satisfaction with one’s residence was taken to indicate whether the stress threshold had been exceeded (1974 (1975)). According to Speare’s model, residential satisfaction directly affects decisions to move, but household characteristics and social bonds only do so indirectly by influencing level of satisfaction. In his empirical study of Rhode Island residents, home ownership and duration of residence also had significant direct associations with mobility behavior; nevertheless, he concluded that the findings generally supported his satisfaction model. Emphasizing that pressures to move vary across time, and that moves occur when that pressure exceeds resistance to moving, Huff and Clark (1978) proposed a model of the decision to move based on cumulative stress and cumulative inertia. Acknowledging the “practical problems of defining and measuring residential stress and resistance,” (p. 1116) they did not present an empirical validation of their model with real mobility data.

Additional studies have confirmed that satisfaction does not completely mediate influences on household movement. Bach and Smith (1977), Newman and Duncan (1979), and Landale and Guest (1985) all found that background factors such as gender, age, income, length of residence, presence of school-age-children, and crowding had direct associations with actual mobility or migration expectations, apart from satisfaction. Concluding that prior mobility-decision conceptual models could not accommodate the complex patterns observed in empirical mobility research, Lu (1998) proposed a more complex conceptual model, guided by theories of reasoned action and planned behavior. In an empirical evaluation of his model, he found that housing satisfaction and neighborhood satisfaction were statistically significant predictors of moving; home ownership (tenure), length of residence (duration), race, household type, gender, and income also had significant direct associations with mobility.

In the study of rural populations, “there is growing recognition of the conflict rural youth face between their local residential attachments and their attainment aspirations” (Johnson et al. 2005, p. 100). Indeed Johnson et al.’s research showed that even after controlling for income and perceptions of local job opportunities, educational plans were highly correlated with how far rural Iowa young adults moved from their parents after graduating from high school. It also showed that—contrary to migration theory, which states social ties foster attachments to local areas—participation in local community events was actually positively correlated with how far the young adults moved. Johnson et al. suggested that degree of involvement in school, community, and church likely reflected the youth’s capacities, ambitions, and access to social capital that helped them pursue higher education or employment regardless of location.

Movement of American Indians

American Indians have a long history of movement. Prior to the 1800s, American Indian populations moved largely in pursuit of food or to find more hospitable living environments. However, during the 1800s federal policy led to the forcible removal of eastern tribes to lands west of the Mississippi River, especially Oklahoma. From the 1950s into the 1980s, American Indians also moved from rural areas and reservations to large cities under the Bureau of Indian Affairs Direct Relocation Program (also called the Employment Assistance Program). Readers interested in these historical migrations are referred to Olson and Wilson (1984) and Debo (1940).

American Indian migration may be driven by high unemployment since Census data (U.S. Bureau of the Census 2003) show that American Indians have more than twice the rate of unemployment than the U.S. population as a whole (with some tribes having more than three times the rate), though reports indicate that “American Indians appear to be no less likely than Whites to desire paid employment,” (Tootle 1996, p. 111). Some evidence suggests that opportunities for employment and perceived better income lead American Indians to move away from reservations, facilitated by options to migrate to border towns and support from distant relatives (Pickering 2000). The percentage of American Indians who have moved their residence off reservation is probably high, though we could not find this value in 2000 or later data. Reporting the percentages of persons age 5 and older on reservations who lived in a different house in 1990 than in 1985, Snipp (1997) described the rates as remarkably high and explained why they probably represented movement to and from reservations and not within reservations. He also said there “is substantial anecdotal evidence that American Indians routinely and frequently move between reservations and urban areas” (p. 87).

Analyses of various U.S. Census Bureau Public Use Microdata Samples and the 1990 Integrated Public Use Microdata Series or IPUMS (Ruggles and Sobek 1995) provide some additional insight into who moves away from reservation areas. However the age restrictions in these studies, coupled with limitations to householders/household heads, may have largely excluded young adults from these analyses—a gap we begin to address here. Snipp and Sandefur (1988) found that American Indian/Alaska Native *householders aged 25–54* who moved to metropolitan areas were younger, more educated, more likely to be single, and more likely to be veterans. Larriviere and Kroncke (2004) showed that among American Indian *couples age 25–54*, those where the male had a professional occupation were more likely to have moved to an urban area, as were couples where a member had a work-limiting disability. Couples who used a language at home other than English were less likely to have moved. Investigating *household heads age 16–65*, Geib (2001) found that American Indians who were younger, with only a high school education, and who lived in a reservation area where fewer people spoke a native language were more likely to move to a non-reservation area in a different state.

It is important to note that additional factors may shape movement off reservation by young American Indian men and women, even if these have not been systematically explored in the

literature. These include the availability of resources for higher education (including scholarships), which may facilitate movement away to pursue higher education for those with the interest and ability to do so, and the impact of poverty, which may conversely constrain an individual's ability to move a greater distance. Patterns of migration to urban enclaves may also provide distinct incentives for people to leave the reservation, although the existing literature on urban Indian populations consistently points to an absence of either ethnic enclaves or communities as described by Logan et al. (2002). This absence is partly the legacy of the Bureau of Indian Affairs' relocation program, which was consciously designed to prevent the formation of such aggregations by dispersing relocated families throughout targeted metropolitan areas (Olson and Wilson 1984; Weibel-Orlando 1991). Finally, we questioned whether alcohol use may constrain mobility given its significance in Northern Plains American Indian communities. (See Spicer et al. 2003 for an introduction to the epidemiological literature.) Data on alcohol consumption are not generally available in public use datasets derived from the Census but are available to us in this study. We have included that data in our analysis, since problems with alcohol are likely related to several of the other factors we consider here, e.g., the ability to pursue educational goals or to live independently. Furthermore, alcohol use is of special relevance to this study since our major goal is to contribute to the development of knowledge about the factors shaping reservation populations in order to facilitate planning for tribal governments, including planning for behavioral health services that may be indicated by alcohol use data.

Synthesis of the Literature

The preceding literature shows that numerous elements facilitate and constrain relocation of residence. Building on influences related to age, gender, and other background factors, the determinants of relocation reflect four primary dimensions: 1) satisfaction with dwelling features and environment; 2) important ambitions and goals (educational, work, and cultural); 3) ties to family, community and local culture; and 4) foundations for success (conditions that promote independence and prosperity such as monetary sufficiency, knowledge acquisition, motivation, and actual experience living independently). We hypothesized that all four dimensions affect choices about residence location made by American Indians, just as they do for the larger population. Having no data about dwelling or environmental satisfaction, our research focused on the relative importance of dimensions 2 through 4, adding a consideration of alcohol use given its potential relevance in this context and central role in the planning of health services.

Methods

Multivariate logistic regressions were conducted using previously collected data to examine the strength of relationships between sets of covariates and whether tribal members had moved away from a Northern Plains reservation during a period of 12 years. Logistic regressions were also run to examine how strongly the individual covariates related to moving away.

Sample

Young adults in a Northern Plains Indian reservation who had participated in 1996 in Wave 1 of the Pathways of Choice (CHOICES) study on unintended pregnancy (Mitchell et al. 2005) were contacted in 2003–2005 to determine their willingness to participate in a study investigating early childhood development (SEED study, National Institute of Child Health and Human Development grant HD42760, P. Spicer, PI.). Since community confidentiality can be as important as the confidentiality of individual identity when working with American Indian groups (Norton & Manson 1996), we use the general cultural descriptor of Northern Plains rather than the specific tribal name. All the CHOICES participants had lived on the reservation in 1993 while attending high school.

As part of the SEED recruitment process, we attempted to determine where each CHOICES participant lived in 2003–2005. Participants were designated as “in-area” if they still lived either on the Northern Plains reservation or within a four-hour drive from it; they were designated as “out-of-area” if they lived more than four hours away and had not returned to the reservation at any time during the two-year location effort. Altogether we determined the residence location for 472 (91%) of the 518 original CHOICES participants and found that 89 had moved out-of-area. Sometime in the 12 years between high school in 1993 and the start of SEED in 2005 these 89 had moved away from the reservation. (The CHOICES data reveal that 38 were living far from the reservation in 1996.) These 472 participants constituted the sample for our analyses, and all the data about them analyzed for this paper were collected in the 1996 CHOICES study. Thus the timeline for this study was as follows: 1993 – students identified on reservation, 1996 – data collected on students, 2003–2005 – final locations of residences recorded.

Table 1 shows how the 472 tracked students appeared in 1996 using data from the CHOICES study. At that time they were 16–24 years old (mean = 18.7), and 51.2% of them were either currently attending high school or working on a GED. About half (54.2%) lived in a town or city, and 74.8% said that the place they had lived the longest in the last year was with their family. The weekly income from jobs ranged from \$0 to \$1,944 (mean = \$51), and 12.8% made a living by being on public assistance. Most said they somewhat followed the White or Anglo way of life.¹

To assess the representativeness of this sample, we compared it to a community-based stratified random sample of 467 American Indians also age 16–24 living on or near two Northern Plains reservations. The data for these 467 came from the American Indian Service Utilization, Psychiatric Epidemiology Risk and Protective Factors Project (AI-SUPERPFP) (Beals et al. 2003; Spicer et al. 2003). The AI-SUPERPFP Northern Plains sample was a weighted stratified random sample from the tribal enrollment lists of American Indians age 15–54 in 1997 who lived no more than 20 miles from two Northern Plains reservations (one of which was the same reservation as in this study). We observed that our sample was statistically significantly different at $p < .05$ from the AI-SUPERPFP Northern Plains in a few ways, most notably by being younger (mean age 18.7 vs. 20.2), containing just 12.1% age 21–24 compared to 42.4% in the AI-SUPERPFP Northern Plains group. Though 51.2% of our sample attended high school or were working on their GED, only 28.9% of 16- to 24-year-olds did so in the Northern Plains AI-SUPERPFP sample. The percentages in our sample with high school or higher certificates/degrees (see Table 1) were not significantly different from those in the AI-SUPERPFP Northern Plains sample. Though the mean weekly incomes were virtually identical (\$51 vs. \$50), and the percentages earning more than \$100 per week were not significantly different, our sample more often earned no money from jobs each week (55.7% vs. 40.2%). Despite being more youthful, the percentages for different household types in our sample (Table 1) were not significantly different from the AI-SUPERPFP Northern Plains values. We also note that our sample tended to more closely follow the White or Anglo way of life (mean score 2.94 vs. 2.53 on a four-point scale).

¹Two questions were asked: “1) How much do you now live by or follow the American Indian way of life? 2) The White or Anglo way of life?” Response options for both were 1 = Not at All, 2 = A Little, 3 = Some, 4 = A Lot. These questions were asked because some American Indians view the American Indian way of life as different from that of the population majority: for example, greater family orientation, stronger sense of spirituality, greater respect for life, and following tribal traditions such as participation in ceremonies. The details and importance of these items vary by location of residence, tribal affiliation, family history, and personal preference. Readers interested in the wording of other questions can find the full CHOICES questionnaire at http://aianp.uchsc.edu/ncaianmhr/research/pdf_files/choicsrv.pdf.

Operationalizing the Mobility Dimensions

In the CHOICES data, we found 73 variables that reflected the dimensions from the literature review. Procedures in SAS (2004) were used to multiply impute missing values and analyze the data rather than delete many observations with missing data. Across the 73 variables, 7.3% of all the data values were missing and thus imputed. Proposed by Rubin (1978), multiple imputation replaces missing data with multiple estimated values so that subsequent analysis has less chance of producing biased statistics (compared to listwise deletion of observations) and yields minimal standard errors that are not unrealistically small (Allison 2002; Little and Rubin 2002; Schafer and Graham 2002). Following the recommendations of Croy and Novins (2005), our multiple imputation replaced each missing value with five estimated values that were derived using a diverse set of predictors including variables likely to be correlated with the variables of interest or their probability of having missing values.

To operationalize the dimensions, we selected just the variables whose crude (unadjusted) odds ratios had p values $\leq .25$, as recommended by Hosmer and Lemeshow (2000). Taking each of the 73 candidate variables as the only covariate (predictor) in a model with the dependent variable coded 0 or 1 indicating presence in or out of area, we ran a logistic regression five times, once using each set of imputed values for the predictor. We then used SAS Proc MIAnalyze to compute the average logistic regression coefficient for the predictor and its standard error using formulas developed by Rubin (1987). For each variable, the crude odds ratio used to determine admission into our final models (see below) was computed from the average logistic regression coefficient.

Analysis

Three rounds of multivariate logistic regressions were run on the CHOICES data. *In the first round*, three models were developed to measure how well the sets of variables accounted for moving far from the reservation. All the models had the same dichotomous dependent variable that indicated whether the person had remained in area (coded 0) or had moved out of area (coded 1). Each of the three models contained one set of variables that related either to ambitions, ties to community, or foundations for success. Each model also contained four control variables: gender, age in years, whether the respondent had lived in a town/city or country/rural area at the time of the CHOICES study, and whether the respondent was one of the 38 who lived far from the reservation at the time of CHOICES study. Gender and age were important because these characteristics were frequently associated with moving intentions and mobility in the literature. We included whether the person lived in a town or in a rural environment because the nature of prior residence might shape future residential decisions. Whether a person reported living far away from an Indian reservation in 1996, 3 years into the 12 year tracking period, was included because we thought that living far away could indicate unmeasured personal characteristics that should be adjusted for to prevent confounding effects.

In 1996, 38 of the CHOICES participants reported living far from an Indian reservation. When these 38 were contacted in 2003–2005 at the start of SEED, 12 lived out of area and 26 lived in area. We don't know whether the 12 were actually living out of area at the time of CHOICES, nor do we know whether the 26 had always resided in area or had moved out of area and then returned. Nevertheless, we felt these 38 might have special characteristics. Their early mobility could have come from accompanying parents away from the reservation, an unusual willingness to take risks, greater access to resources to support moving, weaker ties to the reservation community, stronger achievement orientations, or possibly motivations toward goals not represented by the other variables in the models. Consequently we chose to flag these 38 people via a dichotomous control variable to prevent such influences from potentially inflating the impact of the primary variables. As in the data selection process previously

described, the odds ratios for all the covariates in the models were calculated from the average coefficient from five runs of each model using the different sets of imputed values.

Rather than including all variables of interest in a single model, we opted to use multiple models in order to follow the recommendation from Peduzzi et al. (1996) of having at least 10 events per model parameter, thereby avoiding over- and under-estimated variances and inaccurate Wald tests of coefficient significance. Hence, with just 89 events (instances of being out-of-area), an intercept, and four control variables in each model, we felt comfortable including no more than four key variables in any single model, though each might be represented by multiple dummy (1/0) variables.

The importance of each set of covariates in accounting for movement away from the reservation was measured by how well its model fit the data. Model fit was measured by calculating the small sample version of Akaike's information criterion (AIC_c) and the Bayesian information criterion (BIC) (Burnham and Anderson 2004) from the average $-2\log$ -likelihood across the five runs of each model. Both the AIC_c and BIC adjust the $-2\log$ -likelihood for the number of predictors in the model; smaller values of the AIC_c and BIC indicate better fit when comparing models. Kuha (2004) noted that neither the AIC or BIC more consistently points to the best-fitting model; when they do err in identifying the best fitting model, "broadly speaking, AIC tends to favor models that are too large and BIC models that are too small" (Kuha 2004, p. 222). Considering the fallibility of both measures and their opposite biases, we elected to assess model fit in a way that simultaneously incorporated both the AIC_c and BIC values. Our final measure of model fit was the Euclidean distance from a point whose coordinates in an X-Y (Cartesian) plot were the AIC_c and BIC values for the theoretical best-fit model. Thus the model with the smallest Euclidean distance (closest to perfect fit) was the best-fitting model; how much further away the other models were indicated how much worse their fits were.

We considered but rejected other methods to measure fit. Since we wanted to compare the fit of models having different numbers of predictors, simply comparing the magnitudes of the model $-2\log$ -likelihoods would have been inappropriate because the $-2\log$ -likelihood value changes with the number of predictors in a model (Singer and Willet 2003). Indeed the difference between maximized log-likelihoods reflects the fit of two models to data but tends to favor larger models (Kuha 2004). The difference between log-likelihoods can be used, however, to test whether coefficients are significantly different from zero when nested models are compared, because a p value is calculated based on the difference between the models' degrees of freedom. Unfortunately p values are imperfect indicators of effect size (Matthews and Altman 1996; Millis 2003). Because the magnitudes of log-likelihoods vary with the number of model parameters, we also chose not to use McFadden's Likelihood Ratio R^2 (the coefficient of determination for multiple logistic regression preferred by Menard (2000)).

In the second round of logistic regression, models were built by including each of the covariates from the first round one at a time with the control variables. Again the odds ratios for the covariates in the models were calculated from the average coefficient from five runs of each model using the different sets of imputed values.

In the third round of multiple regressions, two additional models were built. One model contained the control variables and a variable measuring extent of alcohol consumption. Another model contained the control variables and a dichotomous variable that indicated whether the respondent or spouse had lost his/her job or had been unable to find work in the past year. This variable was tested because it was considered an especially important determinant of satisfaction with employment opportunities in the community. Odds ratios for the model covariates were again calculated from the average coefficient from five runs of each model using the different sets of imputed values.

Results

Table 1 describes the sample used in the logistic regression analyses. In this table, none of the differences between the in- and out-of-area residents was statistically significant at $p < .05$.

In the bivariate logistic regressions used to select variables for the final models, several items that the literature suggested could be important had crude odds ratios that were nonsignificant even at the $p < .25$ level: gender ($p = .62$), age ($p = .81$), weekly income ($p = .83$), highest education level completed ($p = .38$), being on public assistance ($p = .31$), importance of becoming self-sufficient ($p = .38$), degree of importance of having an Indian partner ($p = .62$), degree of agreement that it is not worth leaving your community to get a good job ($p = .56$), degree of agreement that people should try and live in their home communities rather than move far away from their families ($p = .98$), whether parents and elders believe that people should live in their home communities rather than moving far away ($p = .91$), whether friends and same-age relatives believe that people should live in their home communities rather than moving far away ($p = .73$).

Table 2 shows how well the models containing sets of covariates representing the dimensions fit the data. The model with covariates relating to ambitions and goals had the smallest Euclidean distance (666.19 units) from the theoretical best-fit model. The model containing variables about ties to community/friends/relatives had an intermediate degree of fit (Euclidean distance = 678.93 units), and the model with covariates relating to foundations for success had the worst fit (Euclidean distance = 685.81).

Table 3 shows the details of the models whose fits were presented in Table 2. The odds ratios in this table are not comparable because the models included different sets of variables. (See Table 4 to directly compare odds ratios.) The odds ratios in Table 3 indicate the association of each variable with being out-of-area after controlling for gender, age, distance of residence from the reservation, urban vs. rural residence, and whatever other covariates of interest were in the model. Only two covariates of interest had odds ratios that were statistically significant at $p < .05$: having lived most of the past year by themselves or with roommates (OR = 3.2) and having lived most of the past year in a school dormitory (OR = 3.1).

Table 4 shows the odds ratios for the key variables of interest after controlling for just gender, age, distance of residence from reservation, and whether residence was urban or rural. Five covariates had odds ratios that were significantly different from 1.0 at $p < .05$. *Ambitions/Goals*: A one-point change of the rated importance of getting a good education changed the odds of being out-of-area by a factor of 3.4, whereas a one-point change in the rated importance of carrying on the tribe's tradition increased the odds by a factor of 1.3. *Foundations for Success*: People who had lived by themselves most of the previous year had odds of being out-of-area that were 3.6 times greater than those who had lived with their parents or grandparents. Similarly, the odds of being out-of-area were 2.6 times greater for people who had lived in a school dormitory most of the previous year compared to the odds for people who had lived with parents or grandparents. *Alcohol Usage*: People whose alcohol usage score was one standard deviation above the mean had an odds of being out-of-area that was 0.7 of that for people who had the mean alcohol usage score. Thus those who consumed more alcohol had reduced odds of being out-of-area.

None of the items relating to ties with community/friends/relatives was significantly associated with being out-of-area at $p < .05$; whether the respondent or partner lost their job or couldn't find work in the past year also was not significantly related to being out-of-area ($p = .252$).

Discussion and Conclusions

We found that the respondents' ambitions and goals were more closely associated with being away from the reservation than were their ties to the community or foundations for success. Table 4 indicates that those who valued a good education were more likely to be away from the reservation, a finding consistent Johnson et al.'s (2005) finding that rural Iowa young adults with low educational ambitions lived closer to their parents after high school. Indeed, writing about contemporary Lakota reservations, Pickering (2000) observed that "the educational system seems designed to attract the best and brightest Lakotas away from the reservation" (p. 25).

People who attached greater importance to carrying on the tribe's traditions also had greater odds of being out-of-area. Ancillary analyses have shown that the importance of carrying on the tribe's traditions was significantly positively correlated with the importance of getting a good education ($r = .15$, $p < .001$) and perhaps correlated with planning to attend college ($OR = 1.28$, $p = .07$) – in both instances after controlling for gender, age, distance of residence from reservation, and whether baseline residence was in a city/town or rural. Though our analyses only showed patterns of covariation, perhaps their interest in carrying on the tribe's traditions may have actually motivated a substantial portion of the young adults to move away from the reservation in pursuit of further education in order to return and work for their people after acquiring other skills.

The set of items relating to ties with community, friends, and relatives had the next strongest association with being out-of-area (Table 2). None of the covariates had statistically significant odds ratios in Table 4 (though school attendance was marginal, with $p = .075$). This nonsignificance, a consequence of large standard errors, is unlikely to have arisen from multicollinearity. The largest Variance Inflation Factor (VIF) computed for any variable in any model in this study was just 1.56 – far below the value of 10 often offered as a rule-of-thumb indication of problematic multicollinearity in multiple regression (Chatterjee and Price 1991; Hair et al. 1995; Kennedy 1992; Mason et al. 1989; Neter et al. 1989), and even below the more stringent value of 5 that corresponds to the tolerance of 0.20 mentioned by Menard (1995).

As a set, the items relating to foundations for success were least related to being out-of-area. Nevertheless, Table 4 shows that, after controlling for whether they had lived close or far from the reservation, those who had lived by themselves or in a dormitory room in 1996 were more likely to reside away from the reservation in 2003–2005. Thus the young adults who had moved away also demonstrated the skills and resources requisite for autonomy and pursuit of higher education. These capabilities agree well with Johnson et al.'s (2005) conclusion, based on earlier works (Rieger 1972; Rudkin et al. 1994), that "migration tends to be selective of more able or skilled young people". We leave it to readers to decide whether the statistically nonsignificant relationship in Table 4 between being self-employed/having a job and moving out-of-area ($OR = 1.6$, $p = .06$) shows capability facilitating migration.

Table 4 also shows that the odds of moving away from the reservation decreased as alcohol consumption increased. Being out-of-area was less strongly associated with alcohol use than with educational goals and demonstrations of independent living. With an odds ratio of 0.7, equivalent in size of association to an odds ratio of 1.4 (the reciprocal of 0.7), alcohol usage had about the same degree of association with being out-of-area as did the importance of carrying on the tribe's traditions ($OR = 1.3$). We cannot say whether alcohol consumption directly reduced the desire or ability to leave the reservation, was a mediator of other influences, or both. But this finding does suggest that alcohol use may well be more of a problem for those who remain on the reservation than for those who have left.

The lack of significance of some covariates may indirectly reflect the culture of our study population in addition to its youthful age. Our findings that age and income by themselves were unrelated to being out-of-area appears counter to previous research (McHugh et al. 1990; Lu 1998) showing that, over the long run, demographic characteristics were more important than attitudes in shaping mobility decisions. We believe that the range of ages in this study was too narrow to show a correlation with mobility and that personal income was less important because of the support these young adults received from relatives and friends. The importance of social networks and generosity toward extended kin in Northern Plains reservation life has been well documented (Pickering 2000). Such support may have also lessened the importance of becoming self-sufficient, thereby partially explaining why the attitude about self-sufficiency was not a significant predictor of moving away from the reservation. Of course this finding, as well as the lack of significance for the attitudes of elders and friends about moving away, could merely reflect the temporary influence of attitudes on mobility behavior (Lu 1998).

We recognize that our conclusions are limited in several ways. First, because we did not reinterview the people that we tracked, we cannot speak about their relocation decision-making processes. We cannot address how housing and job opportunities at specific alternative migration destinations factored into their decisions to move. Perhaps of greater importance, we have no information about whether major events during the elapsed 12 years may have triggered their moves. For example, Rossi (1955) discussed how specific events in the life cycle, such as marriage, change the probability of moving. However we suspect that marriage or having children may not provide the impetus to relocate that they provide elsewhere. Indeed, the availability of extended family who can support these relatively young parents may provide incentives for young families with children to remain on (or even return to) the reservation, even in the absence of employment opportunities.

Our analyses were also limited by the availability of suitable data from the CHOICES study. We could not include length of residence and home ownership in our models since these data were not collected in relevant form in the CHOICES study. Both have been found to influence residential mobility (Landale and Guest 1985; Lu 1998). Contrary to common belief, however, greater duration of stay at a residence does not necessarily result in a declining probability of moving (Huff and Clark 1978). We also question whether personal home ownership was important here: our respondents were all young and few young residents on the Northern Plains reservation own their homes because of the extreme shortage of adequate housing stock.

Undoubtedly these findings reflect the special population studied. Considering the young ages of the people we followed, these findings may say little about the characteristics that distinguish older American Indians who leave reservations. Furthermore, since our study tracked only American Indians who lived on or near a particular Northern Plains reservation, American Indians who depart other reservations may be differentiated by other characteristics, especially in those communities that are closer to major metropolitan areas.

Despite these limitations, this research constitutes the most complete exploration of the determinants of moving off-reservation by American Indians ever reported in the literature. We suggest that it has important implications not only for other American Indian communities, but also for other indigenous communities in such remote and residentially segregated settings worldwide, for whom urban migration has been characterized as one of the most pressing issues (Trujano 2008). Specifically, these results suggest that, in the American Indian context, young adults with more ambitions, either toward education or tribal traditions, are more likely to leave the reservation, presumably in the pursuit of their goals for themselves and their people. Probably not unrelated to this is our finding that those who remained on the reservation were heavier drinkers in their late teens and early 20s. We cannot, of course, know how many of

those who left will ultimately return to the reservation, nor can we know how many of those who remained will ultimately leave. However, the results of this study suggest that the reservation population aged 20–30 is likely characterized by people with lower levels of educational and cultural ambitions and higher levels of alcohol use. Depending on the long-term residential decisions of those who have left, policies that promote increased opportunities for young adults to achieve higher education goals while remaining on-reservation to carry on tribal traditions may be beneficial. These findings would argue too for increased investment in alcohol services for reservation-dwelling populations.

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Table 1

Description of Sample in 1996 From CHOICES data.

	Total Sample N = 472	In-Area N = 383	Out-of-Area1 N = 89^I
Male (%)	46.0	45.4	48.3
Age			
minimum	16	16	16
maximum	24	24	23
mean	18.7	18.7	18.7
age 16–17 (%)	21.8	22.7	18.0
age 18–20 (%)	66.1	64.8	71.9
age 21+ (%)	12.1	12.5	10.1
Education (%)			
currently attending highschool or working on GED	51.2	53.2	42.0
not currently attending highschool or working on GED, and			
highest degree was less than high school	10.5	10.4	11.3
highest degree was from high high school	35.3	33.4	43.2
highest degree was from vocational/technical school	2.6	2.7	2.4
highest degree was from junior/community college	0.2	0.3	0
highest degree was from 4-yr college	0.0	0.0	0
highest degree was from graduate or professional school	0.2	0.0	1.1
Location of residence (%)			
in town or city	54.2	52.7	60.7
far away from an Indian reservation	8.0	6.8	13.5
Household type (%)			
not living with spouse or partner and had no children	60.6	60.4	61.8
not living with spouse or partner and had children	7.1	7.1	6.9
living with spouse or partner and had no children	17.4	16.4	21.6
living with spouse or partner and had children	14.9	16.1	9.7
Where lived the longest last year (%)			
with my family	74.8	76.4	68.2
with partner's family	9.6	10.7	4.9
with partner	6.5	6.1	8.3
by myself	4.1	2.9	9.2
in a school dormitory	5.0	3.9	9.4
Respondent currently working, including self-employment (%)	31.4	29.5	39.6

	Total Sample N = 472	In-Area N = 383	Out-of-Area ¹ N = 89 ¹
Respondent had a job (excludes self-employment)	26.5	25.8	29.5
Respondent's estimated weekly income from jobs²			
minimum	\$0	\$0	0
maximum	\$1,944	\$1,944	\$502
mean	\$51	\$51	\$53
\$0 (%)	55.7	55.8	54.6
\$1–\$50 (%)	18.7	18.7	18.9
\$51–\$100 (%)	4.7	4.5	5.8
\$101–\$200 (%)	13.8	14.0	13.0
\$201–\$300 (%)	5.1	5.1	5.2
>\$300 (%)	2.0	1.9	2.5
Respondent made a living by being on public assistance (%)	12.8	13.5	9.5
Respondent or partner lost or could not find a job last year (%)	43.2	41.9	48.9
How often respondent did not have enough money last year for food, clothing, or housing (1 = never, 4 = often)			
mean score	1.69	1.71	1.58
Alcohol usage quantity/frequency scale score			
mean score	0.24	0.29	0.06
How much respondent lived or followed the White or Anglo way of life (1 = not at all, 4 = a lot)			
mean score	2.94	2.91	3.07

¹ Difference between In- and Out-of-Area values tested for statistical significance by checking whether their 95% confidence intervals overlapped. All confidence intervals overlapped, therefore **no differences between In- and Out-of-Area values were significant at $p < .05$** . All standard errors computed using Rubin's rules for deriving standard errors from multiply imputed data, thereby taking into account the variance added by the imputation (Schafer and Graham, 2002).

² computed as number of average hours worked per week x hourly wage

Table 2

Fits of Models Including Different Sets of Key Covariates.

Type of Key Covariates In Model ^{1,2}	Number of parameters in model	Avg of -2LogL Across 5 Runs	AIC _c Calculated From Avg -2LogL at Left ³	BIC Calculated From Avg -2LogL at Left ⁴	Euclidian Distance From Point Representing Theoretical Best Possible Fitting Model ⁵	Distance Behind Best Fitting Group of Covariates	Ranking Based on Euclidean Distance (1= best fit, 3 = worst fit)
Ambitions/Goals	9	437.96	456.35	493.37	666.19	0.00	1
Ties to Community/Friends/Relatives	10	442.78	463.25	504.35	678.93	12.74	2
Foundations For Success	14	430.73	459.65	516.93	685.81	19.62	3

¹ All covariates describe the respondent at the time he/she completed the CHOICES questionnaire

² The following covariates were also included in all models:

-gender (0 = female, 1 = male)

-age in years

-distance of residence from Indian reservation: 0 = lives on or near reservation, 1 = lives far from reservation

-urban vs rural residence: 0 = lives in country or in rural area, 1 = lives in town or city

³ AIC_c calculated from Burnham and Anderson, 2004, p. 270

⁴ BIC calculated from Singer and Willet, 2003, p. 121

⁵ Euclidian distance of point defined by coordinates (AIC_c, BIC) from point whose coordinates are the smallest theoretically possible AIC and BIC values (AIC_c = 2.008511, BIC = 6.156979 for model with DF = 1, N= 472)

Table 3

Details of Models Including Different Sets of Key Covariates.

Key Covariates in Model ^{1,2}	P-value for Multivariate F Test that ORs for all Key Covariates = 1	Odds Ratio	P value for OR
Model 1. Covariates related to ambitions/goals	0.040		
Importance of getting a good education ³		2.6	0.075
Currently attending or plans to attend college ⁴		1.7	0.120
Importance of getting a good job ³		1.4	0.497
Importance of carrying on tribe's traditions ³		1.2	0.230
Model 2. Covariates related to ties to community/friends/relatives	0.154		
Extent to which follows Anglo way of life ⁵		1.2	0.176
Whether is attending any type of school ⁴		0.6	0.082
Household membership			
no spouse/partner & no children at home ^{4,6}		1.0	--
no spouse/partner & has children at home ⁴		1.0	0.933
spouse/partner & no children at home ⁴		1.2	0.520
spouse/partner & has children at home ⁴		0.5	0.138
Model 3. Covariates related to foundations for success	0.036		
Where lived longest in past year			
with my parents or grandparents ^{4,6}		1.0	--
with partner, on our own ⁴		1.5	0.398
with partner's parents or grandparents ⁴		0.6	0.268
by myself or with roommates (not with my partner) ⁴		3.2	0.034
in school dormitory ⁴		3.1	0.018
Is self-employed or has a job ⁴		1.6	0.063
How often in past year did not have enough money for food, clothing, or housing ⁷		0.8	0.253
Grades typically received in middle and high school			
mostly As ⁴		1.4	0.338
mostly Bs ⁴		0.8	0.361
mostly Cs ^{4,6}		1.0	--
mostly Ds or lower ⁴		0.3	0.250

¹ All covariates describe the respondent at the time he/she completed the CHOICES questionnaire

² The following covariates were also included in all models. Since our interest was merely in controlling for these covariates, their coefficients are not reported.

-gender (0 = female, 1 = male)

-age in years

-distance of residence from Indian reservation: 0 = lives on or near reservation, 1 = lives far from reservation

- urban vs rural residence: 0 = lives in country or in rural area, 1 = lives in town or city

³ 4-point scale: 1 = not at all important, 2 = not very important, 3 = somewhat important, 4 = very important

⁴ dichotomous: 0 = negative/no, 1 = positive/yes

⁵ 4-point scale: 1 = not at all, 2 = a little, 3 = some, 4 = a lot

⁶ reference group for this set of dummy variables

⁷ 4-point scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = often

Table 4

Odds Ratios for Individual Key Covariates Controlling ONLY for Gender, Age, Residence Distance From Reservation, and Living in City/Rural Area.

Key Covariate in Model ^{1,2}	OR	P value	99% CI on OR	
Ambitions/goals				
Model 1. Importance of getting a good education	3.4	0.015	0.933	12.234
Model 2. Plan to attend college	1.9	0.060	0.785	4.719
Model 3. Importance of getting a good job	2.0	0.115	0.639	6.473
Model 4. Importance of carrying on tribe's traditions	1.3	0.046	0.916	1.988
Ties to community/friends/relatives				
Model 5. Degree to which follows Anglo way of life	1.2	0.165	0.848	1.724
Model 6. Whether respondent attends any type of school	0.6	0.075	0.334	1.222
Model 7. No partner but has child vs no partner and no child	0.9	0.918	0.234	3.478
Model 7. With partner but no child vs no partner and no child	1.3	0.472	0.552	2.870
Model 7. With partner and with child vs no partner and no child	0.6	0.168	0.202	1.622
Foundations for success				
Model 8. Lived with partner last year vs lived with family	1.5	0.403	0.434	5.134
Model 8. Lived with partner's family last year vs lived with family	0.6	0.251	0.149	2.078
Model 8. Lived by myself last year vs lived with family	3.6	0.016	0.918	13.790
Model 8. Lived in dorm last year vs lived with family	2.6	0.040	0.786	8.621
Model 9. Self-employed or has a job	1.6	0.060	0.840	3.083
Model 10. How often didn't have enough money last yr	0.8	0.217	0.569	1.219
Model 11. Typically made As in school vs typically made Cs	1.6	0.219	0.607	4.107
Model 11. Typically made Bs in school vs typically made Cs	0.9	0.568	0.439	1.689
Model 11. Typically made Ds in school vs typically made Cs	0.3	0.230	0.018	4.275
Model 12. Alcohol usage quantity/frequency scale score ³	0.7	0.020	0.471	1.037
Model 13. Respondent or partner lost job or couldn't find work last year ⁴	1.3	0.252	0.707	2.468

¹ All covariates describe the respondent at the time he/she completed the CHOICES questionnaire

² The following covariates were also included in all models. Since our interest was merely in controlling for these covariates, their coefficients are not reported.

-gender (0 = female, 1 = male)

-age in years

-distance of residence from Indian reservation: 0 = lives on or near reservation, 1 = lives far from reservation

-urban vs rural residence: 0 = lives in country or in rural area, 1 = lives in town or city

³ Continuous variable, the mean z score of the following 7 items:

- number of days drank alcohol in the past month

- usual number of drinks on days that respondent drank in the past month

- maximum number of drinks in any one day in past month

- number of times got drunk in past month

- number of times in past month that respondent blacked out or couldn't remember events because of drinking
- usual extent of intoxication when drinking (4-point scale)
- whether respondent ever stayed drunk for two whole days in past year: 1 = yes, 0 = no

⁴ dichotomous: 0 = no, 1 = yes