NBER WORKING PAPER SERIES

# HOW DOES HOUSEHOLD INCOME AFFECT CHILD PERSONALITY TRAITS AND BEHAVIORS?

Randall Akee
Emilia Simeonova
E. Jane Costello
William Copeland

Working Paper 21562
http://www.nber.org/papers/w21562

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 2015

The work presented here was supported by the National Institute of Mental Health (MH080230, MH63970, MH63671, MH48085, MH075766, MH094605), the National Institute on Drug Abuse (DA/MH11301, DA011301, DA016977, DA011301, DA036523), NARSAD (Early Career Award to WEC), and the William T Grant Foundation. We are grateful to Richard Murnane, Caroline Hoxby, Greg Duncan, Sarah Reber, Manisha Shah, Wesley Yin, Leah Boustan and participants in the NBER Children's Workshop, the Royal Economic Society, the Western Economic Association Society, Midwest Economics Association meetings, UC All California Labor Economics Conference, University of North Dakota Economics Seminar, UC Santa Barbara Center for Demography, UC Irvine Education Seminar, University of Hawaii Economics Seminar. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

How Does Household Income Affect Child Personality Traits and Behaviors?
Randall Akee, Emilia Simeonova, E. Jane Costello, and William Copeland
NBER Working Paper No. 21562
September 2015
JEL No. H24,H3,H31,I14,I3,I38,J24


## ABSTRACT

Existing research has investigated the effect of early childhood educational interventions on the child's later-life outcomes. These studies have found limited impact of supplementary programs on children's cognitive skills, but sustained effects on personality traits. We examine how a positive change in unearned household income affects children's emotional and behavioral health and personality traits. Our results indicate that there are large beneficial effects of improved household financial wellbeing on children's emotional and behavioral health and positive personality trait development. Moreover, we find that these effects are most pronounced for children who are lagging behind their peers in these measures before the intervention. Increasing household incomes reduce differences across adolescents with different levels of initial emotional-behavioral symptoms and personality traits. We also examine potential channels through which the increased household income may contribute to these positive changes. Parenting and relationships within the family appear to be an important mechanism. We also find evidence that a sub-sample of the population moves to census tracts with better income levels and educational attainment.



Randall Akee
Assistant Professor of Public Policy
University of California, Los Angeles
Luskin School of Public Affairs
3250 Public Affairs Building
Los Angeles, California 90095-1656
rakee@ucla.edu

Emilia Simeonova
JHU Carey School of Business
100 International Drive
Baltimore, MD 21202
and NBER
emilia.simeonova@gmail.com

E. Jane Costello
Brightleaf Sq Ste 22
905 W Main St
Durham, NC 27701
elizabeth.costello@duke.edu

William Copeland
905 W Main St, Ste 22
Durham, NC 27701
william.copeland@duke.edu

## I. Introduction

Household income plays an important role in the current and future health and socio-economic outcomes of its members. Social scientists have spent a considerable amount of effort uncovering the theoretical and empirical linkages between household resources and human capital formation in children (Currie and Almond, 2011; Becker and Tomes, 1986; Duncan and Brooks-Gunn, 1997; Cameron and Heckman, 1998; Blau, 1999). The intergenerational transmission of disadvantage is very closely related to factors determined by the family environment. There are well known confounding issues as income is closely linked to parental effort, skills and preferences, which directly affect children's short- and long-term outcomes. Thus, separating out the direct effect of household socio-economic status on children's wellbeing and identifying the channels that enable this link is an important pre-requisite for any policy intended to break the intergenerational transmission of human capital. Recent policy initiatives have thus called for two-generation programs that treat both parents in children in an effort to improve the effectiveness of pre-school interventions aimed at aiding disadvantaged children close the ability gap (Chase-Lansdale and Brooks-Gunn, 2014).

In this study we make two contributions directly relevant for the design of such policies. First, we show that improving household resources can significantly impact children's behavioral and personality outcomes even in the absence of matching child-centered interventions; second, these effects are non-trivial among children first treated in their early teenage years. We also focus on traits and conditions that have been shown to correlate with long-term socio-economic success, but have received less attention in the economics literature mostly because reliable data on these conditions are scarce. According to data from the National Health Interview Survey, in 2005-2006 15% of US children aged 4-17 had parents who had contacted a health professional or school staff to talk about the child's behavioral or emotional difficulties (NCHS Data Brief, no 8, September 2008). Approximately one third of these children (5.1%) were prescribed medication for these difficulties. By 2011, 7.5% of 6-17 year olds were receiving medication for emotional and behavioral difficulties. Among children from families with incomes below the poverty line, this proportion is even higher at 9.2% (NCHS Data Brief No 148, April 2014).

This study is links two related, but separate branches of the literature – research on human capital formation, personality traits and long-term economic success; and studies on mental health and family socio-economic status. Most of the existing research has focused on establishing a

causal link between parental resources and children's educational attainment, social outcomes or physical health in childhood and adulthood (see for instance Duncan et al, 1994; Duncan et al, 1998; Shea, 2000; Plug and Vijverberg, 2003; Milligan and Stabile, 2011; Duncan et al 2011; Aizer et al, 2014) At the same time, studies have demonstrated that the formation of positive personality traits and cognitive skills is crucial in determining long-term socio-economic wellbeing and may have strong effects on long-term health (see Campbell et al, 2014; Cunha and Heckman (2008); Cunha, Heckman, and Schennach (2010)). A growing and related branch of the literature has shown that mental health conditions, such as attention deficit hyperactivity disorder and developmental delays are more likely to affect poorer children (Currie and Lin, 2007). Indeed, low SES might work as an early-life stressor that determines part or all of the relationship between low parental income and children's mental health problems (see Lundberg, 1997; McLeod and Shanahan, 1993). A separate strand of the literature links childhood and adolescent cognitive and personality traits to long-run economic outcomes. Students who display anti-social behavior have a lower probability of completing high school (Duncan and Magnusson, 2010). Related research by Moffitt et al (2011) reports that self-control in childhood predicts health outcomes and overall socioeconomic status later in life.

In the current analysis, we examine how positive changes in unearned household income affect children's behavioral disorders, emotional disorders and personality traits in their teenage years. Prior research has shown that human capital interventions have a short-lived effect on cognitive abilities except at very early ages (Heckman, Pinto and Savelyev et al, 2013). However, we also know that personality traits may still be malleable at older ages (Van den Akker, A. L., Dekovic´, M., Asscher, J., & Prinzie, P., 2014; Terracciano, A., McCrae, R. R., & Costa, P. T. Jr., 2006; Klimstra, T. A., Bleidorn, W., Asendorpf, J. B., van Aken, M. A. G., & Denissen, J. J. A., 2013; Denissen, J. J. A., van Aken, M. A. G., & Roberts, B. W.,2011; Kawamoto, Tetsuya and Toshihiko Endo. 2015; Carneiro and Heckman, 2003; Heckman and Stixud, 2006; Meghir, Palme and Simeonova, 2013). Our study finds that exogenous changes in unearned household income have large effects on child personality traits and symptoms of emotional and behavioral distress as measured at age 16. Furthermore, we find that the gains are largest for the children with the most (pre-intervention) negative personality traits and had the most behavioral and emotional problems. To our knowledge, this is the first study to examine the direct effect of changes in unearned household income on personality traits and mental health in a quasi-experimental framework (see

review by Duncan, Magnuson and Votruba-Drzal, 2014).

We use two separate, but related measures in our analysis.[1] The first set of variables is based on diagnoses from parent-reported symptoms of behavioral or emotional disorders as defined by the DSM-IV. Using a slightly different sub-set of measures from the survey, we construct index measures for three of the Big 5 Personality traits. Our results, using either measure, accord with one another and indicate that there is a marked improvement for the treated cohort of children over time with regard to personality traits and emotional and behavioral disorders.

The detailed nature of our survey data allow us to also examine some of the potential mechanisms through which improved household income may affect the observed improvement in child personality traits and disorders. Previous research has suggested that parents' emotional and physical well-being are affected by household income (Evans and Garthwaite (2014); Milligan and Stabile (2011); Jones et al (2015)). Using a cohort-level comparison Costello et al (2010) find a negative association between unearned income receipt and substance and alcohol abuse in the population we study here at age 19. Wolfe et al (2012) use casino operations to predict household income for American Indians in the Behavioral Risk Factors Surveillance System data. They use this predicted income to explain adult health outcomes and find there is a reduction in adult anxiety, which may also be physiologically related to children's long-term wellbeing. High levels of maternal cortisol, which is closely associated with maternal stress levels during pregnancy, are predictive of children's school performance ten years after birth (Aizer et al, 2014).

Behavioral and personality traits development can be understood as the child's response to the perceived environment as signaled by the atmosphere in the family. Coping mechanisms that prepare a child for dealing with a hostile world do not necessarily foster the personality traits and behaviors that promote pro-social behavior, scholastic learning and conscientiousness and may work in the opposite direction. On the positive side, researchers have shown that children who start out in households with below average parenting skills react positively when their parents receive interventions aimed at improving skills. Long run earnings converge to that of non-disadvantaged control groups in the long run (Thompson, 2014).

In our analysis, we examine the effect of exogenous income transfers on parental behaviors,

[1] Appendix Table 1 provides the entire list of variables from the data set used in creating the personality trait measures as well as the components that are used in diagnosing the emotional or behavioral disorders. There are significant overlaps between emotional disorders and neuroticism; behavioral disorders and agreeableness; conscientiousness has some overlap with both emotional and behavioral disorders.

the quality of the relationship between the two parents, and the relationship between parents and children. We find that there is a marked improvement in parental mental health, the relationship with the other spouse and between the parents and children in the treated households. We also explore whether households move residence in response to their increased income levels. A large strand of the literature has examined whether the neighborhood conditions play a role in affecting child outcomes (Kling et al, 2007; Jacob et al, 2014; Chetty and Hendren, 2015). Our analysis finds some suggestive evidence that aligns with this previous research on neighborhood effects; there is some geographic re-location for a sub-set of households in our data due to the increased household incomes and that this may explain some of the improvement in child outcomes.

The next section discusses the existing literature related to changes in educational interventions on cognitive and personality traits for children. In Section 3 we discuss the data used in our analysis. We discuss the conceptual framework for our analysis in Section 4 and provide the empirical framework in Section 5. In Section 6 we provide the empirical results from our analysis and we investigate the mechanisms in Section 7. We conduct several robustness checks in Section 8. In Section 9 we discuss the relationship between age 16 outcomes and long-run labor market outcomes for our sample population. Finally, we conclude in Section 9.

## II. Background and Related Literature

Several different approaches have been utilized to study the impact of extra family income on child outcomes. Blau (1999) in the US and Dooley and Stewart (2004) in Canada examine changes to permanent income in a lifecycle framework and find that they had small effects on child outcomes. However, a series of papers by Duncan et al (1994, 1998) and Hill et al (1987) report that changes in household income are associated with improvements in IQ scores, child achievement, children's long-run wages and a reduction in behavioral problems. In a slightly different setting, Levy et al (2000) uses changes to household income over the life cycle and identifies their impacts using sibling pairs (born at different times) who are sufficiently different in age. Improving household income for one member of the sibling pair relative to the other one had a positive effect on educational attainment.

There are a series of papers that use quasi-experimental methods to examine the effect of changes in household income on child outcomes. The research uses exogenous shocks to parental income such as changes in tax policy, government transfer programs, macroeconomic conditions,

surprise income windfalls and crop failures to identify the direction of causality between family SES and child outcomes. Case (2004) found that an unexpected increase in household income due to pension extension in South Africa improved self-reported health, but also health for the household as a whole. Using the same reform Duflo (2003) finds that there is a positive effect on child height and weight in the treated households. Behrman, et al (2005) report on the long-term results from the conditional cash transfer program in Mexico (known as both Oportunidades and Progressa). They find that children who resided in households that participated in the program for a longer period of time have greater educational attainment, but not necessarily an improvement in test scores. Akee et al (2010) used the Great Smoky Mountain Study data to examine the effect of changes in household income on child educational attainment, arrests and obesity. Increased income has a strong effect on reducing criminality and improving educational attainment for the previously poorest households in a difference-in-difference framework. In Akee et al (2013), we examine the effect of increases in household income on childhood obesity and find that there is a difference in effect depending upon initial household income level.

Displacement of workers or economic shocks have also been used to help identify the impacts of a long-run change in economic conditions at the household level. The obvious difference with pure unearned income shocks such as the one in South Africa is that employment-related economic shocks may have effects on children's outcomes beyond what is attributed to the immediate measurable impact on households income. Further, employment shocks are only related to negative earned income shocks, which may have different propagation mechanisms than positive unearned income shocks. Shea (2000) uses industry and job loss as an instrument for income. His results show no long-run effects on the child's earnings or schooling; however, he reports some effects for children from households with fathers who have less than a high school degree. Oreopolous et al (2008) examine the effect of job displacement due to layoffs on the outcomes of sons from these households. The sons have lower earnings in the future and the results are primarily driven by children at the lowest end of the income distribution. In examining historical data for France in the 19$^{th}$ century, Banerjee et al (2007) found that in young adulthood sons from households residing in wine production areas affected by new grape diseases were shorter than their counterparts in other French provinces.

Finally, changes in government programs and provisions have been used extensively to examine how changes in household income affect long-run household outcomes. Milligan and

Stabile (2011) investigate how positive changes in tax benefits for households with children affected those children in Canada. They find that there is an increase in child test scores, height and health. Interestingly, the incidence of mother's depression also decreases. In recent work in the same setting, Jones et al (2015) examined changes to the Canada Child Tax Benefit on child outcomes and investigated the mechanisms. The research indicates that increases in household income benefits child outcomes via two mechanisms – increased direct expenditures related to health and education and through a general improvement in household environment. A number of studies have used the introduction of the Earned Income Tax Credit as exogenous variation in household incomes. Evans and Garthwaite (2013) report a reduction in maternal stress and an overall improvement in health using biometric measures of mothers' health. Hoynes et al (2015) find a reduction in low birth weight and attribute it primarily to better pre-natal care and reduction in maternal smoking. Dahl and Lochner (2008) show that better financial standing leads to an improvement in achievement test scores for low income children. Similar findings are reported by Morris et al (2004) who examine changes in several welfare to work programs in the US.

Studies have also examined how distributing vouchers earmarked for specific family expenses affect child health and human capital. Kling et al (2007) find in the Moving to Opportunity data that there are strong mental health benefits of the housing voucher program for household mothers and for female children. Additionally, the program found improvement for female children with regard to education and overall health. In a recent paper Jacob et al (2014) examine outcomes for poor households that receive a randomly provided housing voucher in Chicago in the late 1990s. The Chicago housing voucher program may have a large effect on actual household income by serving as a true unearned income shock, which amounted to approximately $12,000 per year. The study fails to find any significant effects of this income intervention on child outcomes. However, the authors note that most households do not relocate and the fact that the neighborhood characteristics do not improve would still be reflected in the quality of schools attended and social environments.

A related literature looks at the effect of educational interventions on cognitive and personality skills and overall health outcomes. Gertler et al (2014) examine the long run results of a health program conducted in Jamaica specifically aimed to improve child cognitive abilities and personality skills. Twenty years later, the treated individuals earned 42 percent more. Heckman, Pinto and Sveleyev (2013) use data on cognitive and personality traits for participants in the Perry

Preschool randomized intervention to analyze the long-run effects of treatment. They find that the treated children have higher levels of education, employment, earnings and health than their untreated counterparts. They attribute this primarily to the large improvements in child personality traits such as a reduction in aggressive and antisocial behaviors. Increasingly researchers are finding evidence that personality traits and social skills matter for labor market outcomes (Deming, 2015).

This study is related to these various literatures, but we examine the effects of an exogenous unearned income transfer rather than participation in educational and social programs. Prior work has also focused on vouchers that can be used only for a pre-defined set of expenses. Our income intervention comes without any conditions on the use of the income. We can also measure the effects of the intervention on both the parents and the children of the affected household. In prior work, we have found a reduction in child psychopathologies using a single differencing strategy (Costello et al, 2003). Our current analysis departs from our previous research by using an individual fixed-effects regression strategy over multiple survey waves to examine behavioral and emotional disorders and personality traits. We also explore the potential mechanisms in this analysis and find that there is strong evidence for changes in parental behavior as well.

## III. Data Description

The Great Smoky Mountains Study of Youth (GSMS) is a longitudinal survey of 1420 children aged 9, 11 and 13 years at the survey intake, who were recruited from 11 counties in western North Carolina. The children were selected from a population of approximately 20,000 school-aged children using an accelerated cohort design.[2] American Indian children from the Eastern Band of Cherokee Indians were over sampled for this data collection effort.[3] Their federal reservation is situated in two of the 11 counties within the study. The initial survey contained 350 Indian children and 1070 non-Indian children. Proportional weights were assigned according to the probability of selection into the study; therefore, the data is representative of the school- aged population of children in this region. Attrition and non-response rates across different survey waves were found to be equal across ethnic and income groups. The survey began in 1993 and has

[2] See Costello E. Jane, Adrian Angold, and Barbara Burns, and Dalene Stangl, and Dan L. Tweed, and Alaatin Erkanli, and Carol M. Worthman (1996) for a thorough description of the original survey methodology.

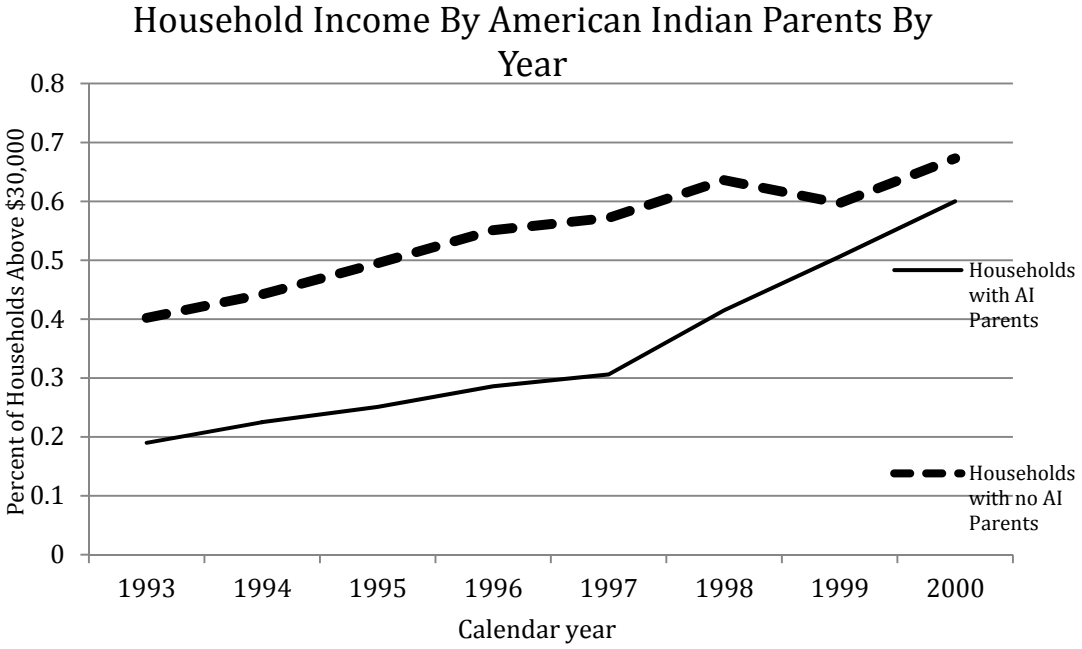
[3] We provide data from the 1990 US Census in Appendix Table 12 which indicates that the percent of adults with a high school degree or more, unemployment rates and per capita incomes are approximately similar for this particular tribe as compared to other American Indian tribes. A comparison with African Americans indicates close similarities with regard to educational attainment and unemployment rates, however, African Americans have slightly higher per capita income.

followed these three cohorts of children annually up to the age of 16 and then re-interviewed them at ages 19 and 21. Both parents and children were interviewed separately up until the child was 16 years old; interviews after that were only conducted with the child alone. Individuals are interviewed regardless of where they are living (whether on their own, in college, or still living with their parents). No child is dropped from the survey simply because they moved out of their parent's home. We find no statistically significant difference due to attrition between the treatment and control groups. American Indians comprise 24% of the sample in the very first survey wave and comprise approximately 27% of the sample at age 21.The interviewers were residents of the study area who received one month of training for the study. They were randomly assigned to families across survey waves. Two of the interviewers were Native Americans and one was Cherokee. Families received $10 to complete the initial wave of the survey (Costello et al, 1997) and the compensation has increased over time.

After the fourth wave of the study, a casino opened on the Eastern Cherokee reservation. The casino is owned by the Eastern Cherokee tribal government. A portion of the profits is distributed on a per capita basis to all adult tribal members. Disbursements from the casino revenues are made on a semi-annual basis to all enrolled tribal citizens.[4] There are no means testing or other requirements other than tribal citizenship in order to receive the payments. Individual tribal members are eligible for the transfer payments whether they reside on or off of the reservation; tribal cash transfers are based on tribal enrollment status only. The transfers amount to approximately $4,000 annually and are disbursed to all adult members of the tribe. This extra income is subject to federal income taxes. This amount is comparable to established government cash assistance programs such as Temporary Assistance for Needy Families (TANF) or the Supplemental Nutrition Assistance Program (SNAP) (French, 2009). In Figure 1 below, we provide the proportion of households with incomes above $30,000 by American Indian status. The trend prior to the opening of the casino was similar across American Indian and non-Indian households. However, there is a sustained upward movement in the proportion of American Indian households that earn more than $30,000 per year. No similar change is noted for the non-Indian households after the introduction of the casino payments.

[4] All adult tribal members received these per capita disbursements. The average annual amount per person has been approximately $4000. If there were any non-compliers (American Indian parents that either did not receive or refused the additional income) then any estimates found here would be an under estimate of the true effects of additional income. All enrolled, American Indian children were eligible for the casino disbursements themselves at age 18 if they completed high school; even if they did not complete high school they would receive the casino transfers at age 21.

Figure 1: Percent of households with annual income greater than $30,000 by ethnicity




As Figure 1 indicates, there was a sharp increase in the proportion of AI households reporting annual incomes in excess of $30,000 that started in the first year of casino operations. The steady increase in household income can be attributed to the fact that the casino payment was increasing over time due to increasing casino revenues. On average, the size of the casino payment was about $4,000 per year per tribal member. In the table below, we regress the household income on whether the household receives the casino transfer payment. The coefficient at 0.79 indicates that the average amount of the change in overall income due to the casino payment over the time period was approximately $3,965 (note that income is measured in bins which are $5,000 in size). The size of the per-capita transfer is non-trivial in absolute and relative terms. The average income of AI households with two adult tribal members in the first four (pre-casino) survey waves was $22,145, so the casino transfers increased household income by almost 20% for these households. Note that the cash transfers are disbursed to adult members of the tribes only, children's cash transfers are banked for them until age 18 so the family receives no money for the children during our study period.

Table 1: Casino payments and household income

Household Income and Casino Payments

| | (1) |
|---|---|
| VARIABLES | Household Income in $5000 bins |
| Casino Payment? | 0.793*** |
| | (0.275) |
| Number of Children Less than 6 years old in Household | 0.103 |
| | (0.107) |
| Constant | 5.635*** |
| | (0.0940) |
| Observations | 2,386 |
| R-squared | 0.213 |
| Household FEs | Y |
| Number of gsms | 504 |

Note: American Indian-specific linear time trend, Survey Wave (calendar year) Fixed Effects and Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

In the Great Smoky Mountains Study of Youth there are a number of questions asked repeatedly at all survey waves regarding the adolescents' personality and behaviors. Parents and children are surveyed separately up until age 16, subsequently the survey subject is interviewed alone at ages 19 onward. Survey questions were specifically designed to diagnose behavioral emotional disorders. Questions on the survey align with standard definitions for diagnoses and disorders from the DSM-IV.

The GSMS is specifically created to assess mental health and well-being in children.[5] The questions are designed to identify psychiatric, behavioral, and emotional disorders. We use the count of behavioral and emotional disorders as identified in the survey as outcome variables. Behavioral disorders are defined as anxiety or depression diagnosis from the "Any *Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (*DSM-IV*)". The emotional disorder variable is coded as any *DSM-IV* conduct, oppositional, or antisocial personality disorder. These variables are constructed based on two sets of survey questions - parents' reported observed behavior of their children and children's responses to direct questions from the interviewers. The indicators for emotional and behavioral disorders are constructed based on the union of the answers given by parents and children - i.e. if either respondent's answer indicates a symptom, that symptom is considered present. A larger value indicates greater or more frequent instances of the

[5] Appendix Table 13 provides initial psychiatric disorders in the first survey wave. The table is replicated from Costello et al (1997).

outcome variable (higher probability of psychiatric diagnosis, more behavioral problems, more emotional problems). These variables have been standardized with mean zero and unit standard deviation across all individuals by age. We provide the summary statistics for the variables for the first survey wave aggregated across all age cohorts by race in Table 2 below; due to this the mean and standard deviations are not exactly 0 and 1.

For comparability with existing studies on personality traits, we take advantage of the rich information gathered in the interviews. We use several questions contained in the GSMS data that align with the Big Five Measures of Personality. Three dimensions of the Big Five are well-suited to the GSMS survey questions. They are: 1) Conscientiousness -- Tendency to be organized, responsible and hardworking. 2) Agreeableness -- Tendency to act in a cooperative and unselfish manner. 3) Neuroticism -- Chronic level of emotional instability and prone to psychological distress.

Using data from the GSMS survey questionnaires, we found comparable questions which are similar to those used in the determination of these three personality traits.[6] For these sets of questions we only use answers from the parents. The full set of survey questions that were used to determine the three sub-parts of the Big 5 Personality traits are listed in Appendix Table A1. We re-coded the personality trait measures such that a higher score indicates a movement in favor of the Big 5 personality trait (more conscientious, more agreeable, more neurotic). Thus, an improvement in personality traits would be reflected in an increase of the measured level of the trait, while a deterioration in personality traits will be reflected in a decrease in the measured level of the trait. This holds for conscientiousness and agreeableness; however, excessive increases in neuroticism can actually be classified as a pathology and a large increase in this trait is not necessarily a beneficial outcome. Given that there were often multiple variables that could be used to identify these different personality traits, we used a weighted average of the multiple survey variables to create a single index variable. Our weighted average is based on principal component analysis. The variable responsible for the largest amount of variance in the data is given a higher weighting. The linear combination is then used to provide a predicted value that becomes the index variable.

The GSMS survey contains a set of questions that help us construct additional variables

[6] It was difficult to identify questions which relate to the other two dimensions of personality traits (Extraversion and Openness).

measuring the quality of parental relationships and parental behaviors. These variables are measured in categories and increasing values indicate either better outcomes or relationships. Only one parent (the primary caregiver) is asked about the quality of the relationship between the parents. The child is asked whether they enjoy time spent with their mothers. The number of arguments with children question is asked of the primary caregiver only and is a count variable for the past three months. The data includes information regarding parental supervision and relationships with their spouses and children. We describe these variables in Table 2 below.

Table 2: Descriptive statistics of important outcome and control variables

| | American Indian | | Non-Indian | |
|---|---|---|---|---|
| Variable | Mean | Std. Dev. | Mean | Std. Dev. |
| Number of Children Less than 6 years of age | 0.498 | 0.787 | 0.287 | 0.862 |
| Average Household Income in First Three Survey Waves by Category* | 4.429 | 2.857 | 7.092 | 5.350 |
| Biological Parents Married? | 0.431 | 0.497 | 0.570 | 0.743 |
| Behavioral Disorders** | -0.210 | 0.674 | -0.203 | 0.820 |
| Emotional Disorders** | -0.237 | 0.820 | -0.015 | 1.297 |
| Conscientiousness*** | 0.215 | 0.969 | 0.082 | 1.390 |
| Agreeableness*** | 0.038 | 1.343 | -0.165 | 1.606 |
| Neurotic*** | 0.156 | 1.060 | -0.118 | 1.717 |
| Adequate Supervision of Mother**** | 1.971 | 0.227 | 1.973 | 0.271 |
| Enjoyable Activities with mother**** | 1.866 | 0.541 | 1.901 | 0.518 |
| Full Time Employed Mother | 0.582 | 0.541 | 0.586 | 0.792 |
| Poor relationship between parents? | 0.344 | 0.488 | 0.435 | 0.791 |
| Arguments with Parents | 4.691 | 23.213 | 6.401 | 27.506 |

Note: There are 1029 observations of Non-Indians in the data and 327 of American Indians in the first survey wave. Means and Standard Deviations are weighted using sample probability weights.
*in $5000 bins
** Standardized by age across all races. We present only the aggregate results for all age cohorts by race for the first survey wave in this table. *** Predicted values from principal component analysis.
**** On a scale of 0 to 2, higher values indicates more supervision or enjoyable activities.

A study of baseline characteristics measured in the first wave of the survey found no significant differences in mental health problems between the American Indian and white children (Costello et al, 1997). The authors also report that the prevalence of psychiatric disorders in the survey population at baseline was in line with what was found in other epidemiological studies of similarly-aged children in the United States.

## IV. Conceptual Framework

The main question of interest in this study is whether and to what extent the receipt of exogenous unearned household income affects children's emotional wellbeing and behavioral health. While the existing theoretical and empirical literature has studied extensively how policy interventions such as Head Start, Project STAR or the Perry Preschool experiment affect children's short- and long-term outcomes, there is relatively little prior empirical evidence on the effects of shocks to *household* financial wellbeing unrelated to changes in parental employment. Our conceptual framework is most closely related to Becker and Tomes (1979), Heckman and Cunha (2008) and Aizer and Cunha (2012).

In these models, even with some distaste for skill inequality the family may invest more in children with higher levels of human capital. This is because the return on investment in these children is higher and because parents expect or can otherwise devise mechanisms that induce higher-endowment children to share at least some of their future resources with their less-endowed siblings. Families may tolerate some amount of skill inequality if it means that the average payoff to investments in skill level will be higher due to high returns from more gifted children.

The predictions from these models are that, all else equal, changes in children's human capital endowments brought about by external educational interventions will improve educational outcomes the most for those with higher initial endowments. Thus, a relative reduction in the cost of investing in children's human capital will lead to the reinforcement of inequality within a household. Further, these models predict that in equilibrium, families that received a better initial draw of human capital endowment for their children will invest more in these children's human capital than families who received a bad initial draw from the distribution of initial children's endowments.

Our framework differs from this setup because we examine the effects of a permanent increase in household unearned income, rather than exogenous changes in (returns to) child endowments. The standard models cited above predict that this pure income effect would improve parental investments in all children regardless of their initial human capital endowments, as long as children are normal goods. In Appendix Figure 1 we provide the initial distribution of two of our outcome measures by initial household income. The results indicate that conscientiousness varies positively with initial household income for both American Indian and non-Indian children. Emotional disorders vary inversely with initial household income levels prior to the casino intervention. Both of these results indicate that income has a direct relationship with both types of

measures for American Indians and non-Indians prior to the casino operations. The GSMS surveyed only one child per family, which precludes us from analyzing within-family responses to the permanent income shock. However, we can still evaluate how this tribal policy affected inequality at the community level, among children with different initial endowments. Our results are, therefore, informative as to how a change in household income may affect the overall inequality levels of child personality traits and endowments.

Based on these models it is quite straight forward to predict that emotional and personality-related human capital production is (weakly) increasing in parental investment and exhibits decreasing marginal returns to parental inputs. Therefore, similarly-sized changes in household income would predict largest increases in overall skills for those who are at the initially lowest levels of skills. Since household income has increased a similar amount for all individuals (it is a per capita payment), assuming a positive relationship between unearned income and parental investment, an equal-sized increase in income will result in a larger positive change to human capital for individuals who start from initially lower levels of skill investment. If in equilibrium parents rationally invest less in less endowed children, then even among parents with the same initial income levels we would see lower levels of initial investment and thus stronger treatment responses to the income intervention among less endowed children. The prediction would be that the personality trait production function is weakly concave with respect to income. We take these predictions to the data by using the initial levels of child abilities and personality traits in the years prior to the casino operations and payments.

We maintain that the observed effect is being driven primarily via the change in unearned income due to the payments from the casino revenues. Other possibilities such as change in parental employment or endogenous marriage do not appear to be important confounding factors. Appendix Tables A2 and A3 provide information on the change in parental employment and marital status as a result of the start of casino payments. None of the coefficients in these regressions are large in magnitude and they never reach statistical significance at any conventional levels. Additionally, as noted in earlier research, other health or educational programs were likely not driving the observed results for these cohorts of children (Akee et al, 2010). New programs were developed for the American Indian reservation and spending increased dramatically for reservation services. However, the large increases in spending occurred in the early 2000 which is after the youngest age cohort of children had already turned 16 (Johnson et al, 2011, Table 14).

## V. Econometric Framework

We compare outcomes for adolescents who resided in households with extra income (youngest and middle age cohorts of American Indian children) to adolescents who were not exposed to the extra income by age 16 (the oldest age cohort). The two youngest age cohorts (Age 9 and Age 11 at survey intake; ages 13 and 15 at first treatment) function as the "after-treatment" cases and the oldest age cohort (Age 13 at survey intake) is the "before-treatment" case. We focus on the effect of the income transfer on personality traits and mental health at age 16. Therefore, the older age cohort of American Indians serves as one control group and non-tribal members serve as an additional control group.

We examine the effect of changes in unearned income on the outcome variables at all survey waves using an individual panel fixed-effects regression. We use all available data for each individual from ages 9 (11 and 13 respectively) onwards, interviewed every year until age 16. The empirical specification is:

$$Y_{it} = \alpha_i + X'_{it}\beta + \gamma * Transfer_{it} + \tau_t + \theta Age_{it} + \lambda Age_{it} \times Race_i + \varepsilon_{it} \quad (1)$$

Where, $\alpha_i$ is the individual fixed effect, $\tau_t$ is a survey wave fixed-effect, $\theta_{it}$ is a set of age fixed effects, and $\lambda$ is the coefficient on an age by race fixed effect. These fixed effects are necessary to control for other possible mechanisms that could affect the observed changes in our outcome variables. We are able to use an interaction between age and wave fixed effects as we have American Indian and non-Indians from the three different cohorts of children. The age by race fixed effects capture any time variant differences in the mental health and personality development between the two groups of children. In order to identify the treatment effect, it is necessary that the outcome variables follow a common trend prior to the observed intervention. Appendix Figure 2 provides the pre-casino intervention trends for the five outcome variables for American Indian children and Non-Indian children. In most cases, there is a relatively stable relationship between the two groups. Importantly, there is no observed differential movement in the trend for one group or the other in these figures.

The variable X controls for the presence of children younger than six in the household. The variable *Transfer* measures whether the child resides in a household that receives the unearned income transfers due to the casino revenues. The variable is always zero for households that do not

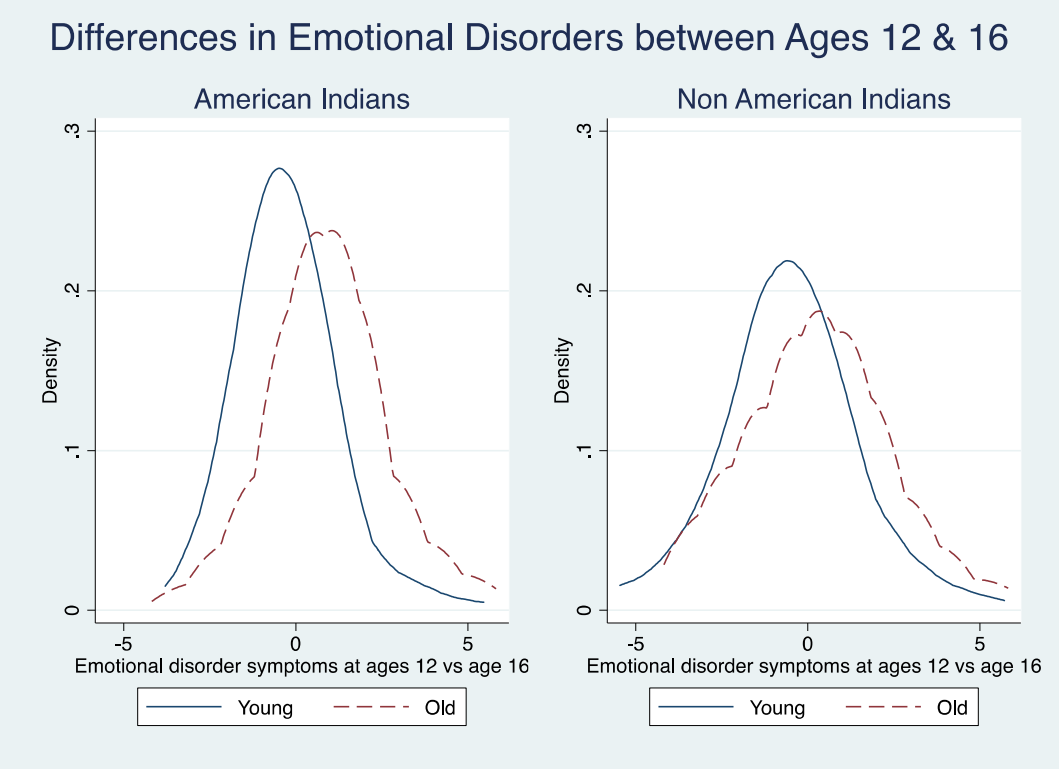
receive the casino transfers. For households that do receive the casino transfers, the variable is zero for the first four survey waves and then increases to one for all years thereafter. We cluster standard errors for the individual fixed-effects panel regressions at the individual level (Stock and Watson, 2008).

Our analysis examines differences in individual changes between the youngest and oldest cohorts of children across American Indians and non-Indians in the data set. In the figures below, we provide some evidence of the change in emotional disorders and agreeableness by American Indian ethnicity and by age cohort. In Panel A of Figure 2, we difference the level of emotional disorders for the same individual at ages 12 and 16. Then we plot the distribution of these individual differences by age cohort and American Indian status. We have demeaned the results by the average cohort change for each age cohort for both panels. In the first plot the results indicate that, without controlling for other covariates, the youngest age cohort of American Indian children experienced a leftward shift of their level of emotional disorders relative to the older cohort of American Indian children. This represents a decrease in their level of emotional disorders. For non-Indians, whose distributions are shown in the second plot of the figure, there is leftward shift for a portion of the distribution of the youngest age cohort relative to the oldest age cohort of non American Indians. Specifically, this provides some evidence that the biggest gains are made for those American Indians in the youngest age cohort who start out with the initially highest level of emotional disorders.

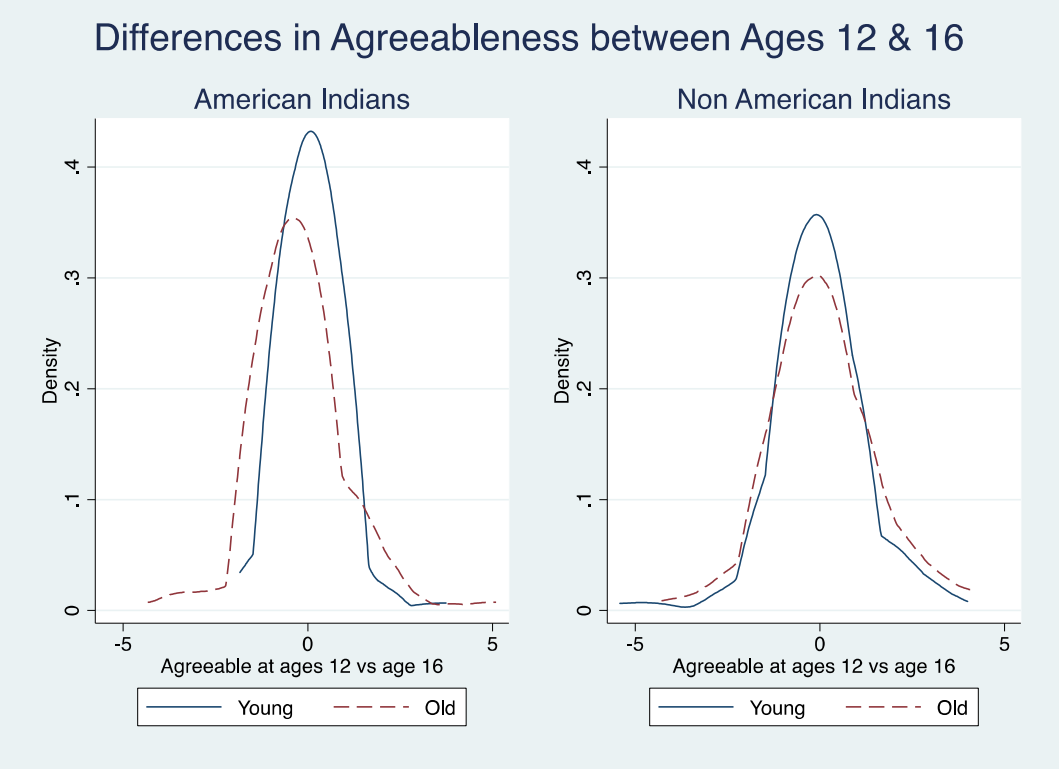
In Panel B, we provide a look at the effect on agreeableness. The results for American Indians indicate that the change in agreeableness over time increases for all individuals in the youngest age cohort. There is little or no change across the two non-American Indian cohorts over time. The rightward shift of the distribution for the youngest cohort of American Indians relative to the older cohort indicates that there has been an increase of agreeableness. These results preview our findings in the regression tables to follow.

Figure 2: Evolution of Emotional Disorders and Agreeableness across ethnicity and age cohorts.

**Panel A**




**Panel B**




## VI. Results

In the table below we provide the results from the panel fixed-effects regressions described by equation 2 above. The five outcome variables are: behavioral disorder symptoms, emotional disorder symptoms, conscientiousness, agreeableness and neuroticism. The first two columns report the estimated effects of the casino transfers on the presence and severity of behavioral disorder symptoms observed in the child. The outcome variables are normalized to mean zero and standard deviation of one across all individuals by age. If we interpret the coefficients relative only to the American Indian population (see Table 2), the coefficients imply a reduction in the number of behavioral disorder symptoms by 26.7 percent of a standard deviation. The coefficient on casino payment in the second column indicates that the casino payment reduces the incidence of emotional disorder symptoms for treated children by 35.6 percent of a standard deviation.

The last three columns provide results using personality traits as outcome variables. These three personality traits take on both positive and negative values as they have been standardized by age to mean zero and unit standard deviation. The variables have been coded so that positive values indicate more of the respective personality traits indicated. The coefficient on casino payment in

columns 3 and 4 indicate that the increase in household income has a positive effect on child personality traits. The casino payment increases the conscientiousness of treated children by 42.8% of a standard deviation while it increases agreeableness by 30.6 % of a standard deviation. There is a positive effect on neuroticism, however, it is not statistically significant.[7]

Table 3: The effect of casino transfers on children's emotional and behavioral traits and disorders

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Behavioral Disorder Symptoms | Emotional Disorder Symptoms | Conscientiousness | Agreeableness | Neuroticism |
| Casino Payment? | -0.180* | -0.292** | 0.304** | 0.412** | 0.267 |
| | (0.109) | (0.137) | (0.144) | (0.178) | (0.207) |
| Number of Children < 6 | 0.0554 | 0.0275 | -0.0655 | -0.0204 | -0.121* |
| Years in Household | (0.0338) | (0.0353) | (0.0430) | (0.0404) | (0.0635) |
| Constant | 0.0446 | 0.179** | -0.462*** | -0.776*** | -0.749*** |
| | (0.0657) | (0.0695) | (0.0853) | (0.102) | (0.119) |
| Child fixed effects | Y | Y | Y | Y | Y |
| Observations | 6,050 | 6,050 | 5,893 | 5,695 | 5,880 |
| R-squared | 0.019 | 0.019 | 0.045 | 0.077 | 0.052 |
| Number of gsms | 1,405 | 1,405 | 1,402 | 1,396 | 1,400 |

Note: American Indian Trend and Age Fixed Effects. Standard errors clustered at the individual level provided in parentheses. ; *** p<0.01, ** p<0.05, * p<0.1

We next test for potential heterogeneities in these effects across children with different initial (pre-transfer) endowments. The coefficients on the interaction variables of the casino transfer dummy with initial levels of the measured outcomes indicate whether there were any differential effects of extra income across different children. The results suggest that the casino payments had the largest effects for those individuals who start off with the lowest initial endowments. Our empirical results align with the prediction that the personality traits production function is concave with respect to family income.

Table 4: Heterogeneous effects of casino transfer by initial conditions of the child

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Behavioral Disorder Symptoms | Emotional Disorder Symptoms | Conscientiousness | Agreeableness | Neuroticism |
| Casino Payment? | -0.223* | -0.349** | 0.415** | 0.517*** | 0.432** |

[7] A placebo regression which restricts the observations to the four survey waves prior to the casino operations and artificially treats the first two cohorts of American Indian children is provided in Appendix Table A4. The results indicate that there is little to no evidence of the effects found in Table 3 in this placebo test.

| | | | | | |
|---|---|---|---|---|---|
| | (0.131) | (0.152) | (0.163) | (0.199) | (0.215) |
| Interaction of Pre-Casino Behavioral Disorder Symptoms Average x Casino Payment | -0.197 | | | | |
| | (0.235) | | | | |
| Interaction of Pre-Casino Emotional Disorder Symptoms Average x Casino Payment | | -0.270 | | | |
| | | (0.172) | | | |
| Interaction of Pre-Casino Conscientiousness Average x Casino Payment | | | -0.350** | | |
| | | | (0.149) | | |
| Interaction of Pre-Casino Agreeableness Average x Casino Payment | | | | -0.351** | |
| | | | | (0.148) | |
| Interaction of Pre-Casino Neuroticism Average x Casino Payment | | | | | -0.631*** |
| | | | | | (0.143) |
| Number of Children Less than 6 years old in Household | 0.0546 | 0.0261 | -0.0619 | -0.0218 | -0.113* |
| | (0.0334) | (0.0352) | (0.0422) | (0.0397) | (0.0636) |
| Constant | 0.0421 | 0.177** | -0.466*** | -0.776*** | -0.752*** |
| | (0.0656) | (0.0695) | (0.0852) | (0.102) | (0.120) |
| Child fixed effect | Y | Y | Y | Y | Y |
| Observations | 6,050 | 6,050 | 5,886 | 5,692 | 5,879 |
| R-squared | 0.021 | 0.021 | 0.048 | 0.080 | 0.054 |
| Number of gsms | 1,405 | 1,405 | 1,399 | 1,394 | 1,399 |

Note: American Indian Age Trend and Age Fixed Effects. Standard errors clustered at the individual level provided in parentheses.; *** p<0.01, ** p<0.05, * p<0.1

In interpreting the interaction coefficients it is important to remember that the standardized measures of personality traits take both positive and negative values and are standardized with mean zero. Thus, a negative interaction coefficient coupled with a negative initial value implies a positive overall effect of the treatment. In columns 1 and 2, individuals with initially higher levels of behavioral or emotional symptoms are most likely to experience a reduction in their symptoms after the start of casino payments. The estimated coefficients are negative but not statistically significant in either column. In comparison, the interaction coefficients of initial levels of behavioral traits with casino payments are negative and statistically significant in all cases.

The next three columns provide the corresponding results for the Big 5 Personality Traits. The measures of personality traits range in value from negative to positive values with higher values indicating higher levels of that particular personality trait. As a result, individuals with initially low levels of conscientiousness will have negative values which, combined with a negative interaction term coefficient, imply a positive overall effect on the outcome measure due to the casino transfer. For instance, the total effect of casino payments for an individual who starts off with a level of conscientiousness of -0.10 is an increase of 0.415 + -0.10 x -0.35 = 0.415+0.035=

0.45 in conscientiousness, which is approximately an increase of 46% of a standard deviation. The same reasoning holds for the last two columns. Another way to interpret these results is that the extra cash transfers improve emotional and behavioral health for all children, however the improvements are much more pronounced for those who had pre-treatment values below the mean of the estimated outcome. In Appendix Table A5 we present the estimates from models comparing transfer effects across individuals - excluding individual fixed effects and including initial levels of outcome variables (averages of the outcome variable taken over the first three survey waves) and their interaction with the casino payment. Unsurprisingly, the initial levels are highly predictive of the outcomes at age 16. The important take-away from this exercise is that the interaction terms are similar in magnitude and have the same signs as the estimates in the regressions including person fixed effects. This reassures us that the observed results can be attributed to the heterogeneous effect of casino payments; there is no evidence for a "regression to the mean" result.

Previous research has found that parents invest resources in children with the highest initial endowments. The reason is that the returns to parental investment are highest in these cases. Our results do not necessarily contradict those results as the intervention here does not alter child endowments, but instead relaxes the parent's budget constraint. Further, we do not observe more than one child per household so we cannot draw conclusions on the intra-household distribution of resources as a function of initial child endowments. Our findings are particularly helpful if we are interested in the effect of transfer payments on community-level inequality in adolescent personality traits and behaviors.

## VII. Mechanisms

The overall effect of an increase in unearned household income is an improvement in child personality traits by age 16. The results also indicate that there is a reduction in behavioral and emotional disorders. In this section, we explore several channels through which the increase in unearned income may affect child outcomes.[8]

### A. Parental Behaviors

[8] Our data do not contain information on consumption or expenditures, therefore it is not possible to examine whether the unearned income was spent on additional educational inputs. Jones et al (2015) have found some evidence in Canada that increased incomes affect child outcomes via both increased expenditures and on an improvement in parental and household behaviors.

We first investigate the effect of changes in household income on parental behaviors and relationships as a potential mechanism that may contribute to improved child wellbeing. Increasingly, there is convincing evidence that parents' mental and physical health are affected by changes in household income (Milligan and Stabile, 2011; Jones et al, 2015). For example, Evans and Garthwaite, (2014) find that there is a statistically significant reduction in maternal stress levels and stress-related hormones in households where mothers qualify for more generous EITC. In related research, Mani et al (2013) find that individuals with lower stress have better overall cognitive functioning. Paxson and Walfogel (2002) show that there is a strong relationship between poverty and child maltreatment. In the psychology literature, there is mounting evidence for the Family Stress model which posits that economic hardships lead to increased emotional distress and ultimately marital strife (Conger et al, 1999). In other work, authors have found that the resulting marital stress (due to economic hardship) has led to poorer parenting and more difficulty in adolescent boys' emotional development (Conger et al, 1992). Examining only African-American families, Conger et al (2002) find that there is a reduction in good parenting behaviors at the onset of economic hardships which also play a role in measures of child adjustment.

The change in parental behaviors and relationships triggered by income transfers may be one of the mechanisms through which increased household income affects children. Table 5 provides results examining four variables that capture parental relationships contained in the GSMS data set. In column 1, there is evidence that the casino payment increases the level of parental supervision of their child (as reported by the parent). The magnitude of the coefficient is approximately 50% of a standard deviation of the observed variable for American Indians (see Table 2). The effect of the casino payment on whether the child has an enjoyable relationship with the parent (as reported by the child) is approximately 39.7% of a standard deviation for American Indians. Overall the effect of having additional household income is that there is an improvement in parental supervision of their children and relationships with their children (columns 1 and 2). Of note, these two outcomes are reported by separate respondents so that we can conclude that the estimated effects are not just a result of improved general outlook on life among parents receiving the transfers. We have previously noted these findings in earlier research and they are repeated here for completeness (Akee et al 2010).

In column 3, we test whether the relationships between parents improve as a result of the transfers. The increase in income due to the casino payment decreases the likelihood that a parent

characterizes their relationship with their spouse or partner as poor. The coefficient on the casino payment variable is approximately 25.2% of a standard deviation of the average in the first three survey waves for American Indians. The fourth column indicates that there has been a reduction in the number of arguments with parents after the casino payments began. The coefficient on this variable is 32.7% of a standard deviation of the arguments with parent variable for American Indians. Overall, we find convincing evidence that the casino transfers resulted in a large improvement in parental relationships with children and with spouses.

Table 5: Effects of casino transfer on Parental Behaviors and Relationships

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Adequate Parental Supervision? | Enjoyable Relationship with Parent? | Poor relationship between parents? | Arguments with Parent |
| Casino Payment? | 0.104** | 0.158** | -0.120* | -7.591*** |
| | (0.0516) | (0.0787) | (0.0676) | (2.819) |
| Number of Children Less than 6 years old in Household | -0.00585 | -0.0202 | 9.61e-05 | 0.479 |
| | (0.00965) | (0.0137) | (0.0159) | (0.803) |
| Constant | 1.970*** | 1.865*** | 0.548*** | 10.68*** |
| | (0.0225) | (0.0300) | (0.0331) | (1.494) |
| Individual child FE | Y | Y | Y | Y |
| Observations | 5,015 | 5,413 | 5,584 | 6,038 |
| R-squared | 0.013 | 0.008 | 0.035 | 0.010 |
| Number of gsms | 1,265 | 1,327 | 1,389 | 1,405 |

Note: American Indian Trend and Age Fixed Effects. Standard errors clustered at the individual level provided in parentheses..
*** p<0.01, ** p<0.05, * p<0.1

In order to further investigate the channel through which additional household income affects children we include an additional interaction variable into the regressions. In Table 6 below we provide the coefficients from separate regressions corresponding to the models in Table 5, where we include the casino payment variable and an interaction variable with the casino payment and the initial levels of the child's conscientiousness, agreeableness, behavioral disorder symptoms or emotional disorder symptoms.

In panel A, the coefficient on the interaction variable indicates that parents will increase their supervision for children with worse pre-transfer behavioral health. The number of parent-child arguments also decreases more for children with worse initial behavioral symptoms. There appears

to be no statistical relationship between these interactions and the other two outcome variables and the magnitudes are quite small relative to the coefficient on casino payment alone.

In panel B, we find again that the quality of the parent-child relationship improves more among families with children who exhibit worse initial emotional disorder symptoms. Here we also find that the relationship between the two parents improves more for families with children who display worse emotional conditions pre-intervention. In panels C, D and E we show similar differences in effects by initial levels of conscientiousness, agreeableness and neuroticism. Parental supervision increases more for children who have the lowest initial values of these personality traits (coded as negative initial endowments); the relationship between parents and these children improve; and the number of reported parent-child arguments decreases.

The overall take-away is that parents who receive the extra unearned income due to the casino transfers provide investments in their children who have lower than average personality traits and higher than average amounts of behavioral and emotional disorders.

Table 6: Heterogeneous effects of income transfers on parental behaviors by initial level of children's endowments

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Adequate Parental Supervision? | Enjoyable Relationship with Parent? | Poor relationship between parents? | Arguments with Parent |
| Panel A | | | | |
| Casino Payment | 0.122** | 0.156* | -0.126* | -8.861*** |
| | (0.0538) | (0.0805) | (0.0693) | (2.868) |
| Initial Behavioral Diagnosis x Casino Payment | 0.0809** | -0.00845 | -0.0276 | -5.710** |
| | (0.0360) | (0.0434) | (0.0505) | (2.270) |
| Panel B | | | | |
| Casino Payment | 0.108** | 0.174** | -0.144** | -7.757*** |
| | (0.0547) | (0.0800) | (0.0682) | (2.836) |
| Initial Emotional Diagnosis x Casino Payment | 0.0188 | 0.0731** | -0.104** | -0.790 |
| | (0.0510) | (0.0361) | (0.0434) | (1.094) |
| Panel C | | | | |
| Casino Payment | 0.125** | 0.150* | -0.137** | -8.188*** |
| | (0.0544) | (0.0806) | (0.0697) | (2.923) |
| Initial Conscientiousness x Casino Payment | -0.0588** | 0.0254 | 0.0549 | 1.970 |
| | (0.0289) | (0.0347) | (0.0482) | (1.489) |
| Panel D | | | | |
| Casino Payment | 0.119** | 0.165** | -0.129* | -8.863*** |
| | (0.0537) | (0.0794) | (0.0696) | (2.862) |
| Initial Agreeableness x Casino Payment | -0.0610** | -0.0239 | 0.0392 | 4.663*** |
| | (0.0265) | (0.0220) | (0.0390) | (1.216) |
| Panel E | | | | |
| Casino Payment | 0.112** | 0.151* | -0.137** | -8.032*** |

| | | | | |
|---|---|---|---|---|
| | (0.0545) | (0.0804) | (0.0680) | (2.828) |
| Initial Neuroticism x Casino Payment | -0.0299 | 0.0287 | 0.0699 | 1.756 |
| | (0.0346) | (0.0395) | (0.0498) | (1.169) |

Note: Pairs of coefficients are from separate regressions in each column. All regressions include age fixed effects, wave fixed effects, age by race fixed effects and individual fixed effects, number of children less than 6 in the household and a constant. Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

B. Parental Drug and Alcohol Abuse and Own Mental Health Outcomes.

Parents may also change their behavior with regard to their use of drugs and alcohol. Reduction in this usage could be taken as a sign of improved decision-making and self-control. In the following table, we show regression results from linear probability models where regress whether either of the two parents currently use drug and alcohol in the same individual panel model. These measures are reported by the respondent parent and the child respectively. In Table 7 below, the coefficient on casino payment is negative for the parent's own reporting of drug or alcohol use and slightly positive for the child's reporting. However, neither estimated coefficient is statistically significant. The next two regressions provide the drug or alcohol use for parent 2 as reported by parent 1 or the child. The estimated coefficient on casino payment is negative in both cases and it is statistically significant for the report by parent 1 in column 3. These reported reductions in parental drug and alcohol use provide a further indication of an improvement in parental behaviors. In previous research (Akee et al, 2010), we have also shown that parents are less likely to be arrested after they start receiving the casino payments.

Table 7: Individual Fixed Effects Regression for Parental Alcohol and Drug Use on Casino Payments

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Parent 1 Currently Uses Alcohol or Drugs by Parent 1 | Parent 1 Currently Uses Alcohol or Drugs by Child | Parent 2 Currently Uses Alcohol or Drugs by Parent 1 | Parent 2 Currently Uses Alcohol or Drugs by Child |
| Casino Payment? | -0.0108 | 0.0196 | -0.0918** | -0.0435 |
| | (0.0230) | (0.0272) | (0.0376) | (0.0341) |
| Constant | 0.0287** | 0.0363** | 0.163*** | 0.146*** |
| | (0.0117) | (0.0158) | (0.0248) | (0.0237) |
| Observations | 6,047 | 5,796 | 6,043 | 5,793 |
| R-squared | 0.006 | 0.005 | 0.009 | 0.012 |
| Number of gsms | 1,405 | 1,395 | 1,405 | 1,395 |

Note: American Indian Trend and Age Fixed Effect and Number of Kids Less than 6 Years old and standard errors clustered at the individual level provided in parentheses
*** p<0.01, ** p<0.05, * p<0.1

In the next table we examine a proxy for the parent's own mental health: an indicator of whether the parent ever sought treatment by a mental health professional. The variable is reported by the respondent parent which is typically the mother in the household. The results in Table 8 indicate that receiving casino payments has a negative effect on either parents seeking treatment by a mental health professional. The coefficient is negative in both cases and statistically significant for the second parent which is typically the father. Of course, the results here only indicate that after the casino payments, parents were less likely to report having to seek mental health treatment. This may mean that parents experienced less mental health problems or that they simply avoided treatment more systematically. It is not possible to distinguish between the two possibilities.

Table 8: Individual Fixed Effects Regression for Parental Mental Health on Casino Payments

| | (1) | (2) |
|---|---|---|
| VARIABLES | Ever Treated by Mental Health Professional, Parent 1? | Ever Treated by Mental Health Professional, Parent 2? |
| Casino Payment? | -0.109 | -0.138*** |
| | (0.0793) | (0.0527) |
| Constant | 0.650*** | 0.192*** |
| | (0.0485) | (0.0305) |
| Observations | 6,045 | 6,044 |
| R-squared | 0.063 | 0.016 |
| Number of gsms | 1,405 | 1,405 |

Note: American Indian Trend and Age Fixed Effect and Number of Kids Less than 6 years old; standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

## C. Movements across Census Tracts

As an additional check on potential mechanisms, we examine whether and where individual households move following the change in household income. In Table 9 we use information on the census tract location of the individual households at various survey waves to investigate whether the casino payment increases the likelihood of moving to a different neighborhood. The first

column indicates that there is a positive effect of the casino payment on the probability of moving of about 7%. In column 2, we include an interaction effect between receiving the casino payment and living initially on the reservation. The level effect of the casino payment is still positive and statistically significant, however, the coefficient on the interaction variable is now negative. This indicates that those residing on the reservation are less likely to leave the reservation after the casino payments begin. Therefore, the observed increase in moves must be due to those receiving casino payments who reside off of the reservation.

We investigate this in the next two columns. Receiving the casino payments in column 3 has a small and statistically insignificant negative effect on living on the reservation. However, in column 4 we find that, once we include the interaction variable of casino revenue with initially living on the reservation, those living on the reservation are more likely to still be living on the reservation after the casino payments. The residual difference and any actual movements are due to those residing off of the reservation. There is little evidence that those residing off the reservation are moving to live on the reservation.

Table 9: Census Tract Changes Regressed on Casino Payments

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| VARIABLES | Change Census Tract of Residence (Coded either 0 or 1) | Change Census Tract of Residence (Coded either 0 or 1) | Living on Reservation | Living on Reservation |
| Casino Payment? | 0.0726* | 0.146** | -0.0216 | -0.137** |
| | (0.0430) | (0.0592) | (0.0209) | (0.0565) |
| Casino x Living Initially on Reservation | | -0.104** | | 0.157*** |
| | | (0.0516) | | (0.0576) |
| Number of Children Less than 6 years old in Household | 0.0107 | 0.0116 | 0.00348 | 0.00281 |
| | (0.0134) | (0.0134) | (0.00397) | (0.00400) |
| Constant | -0.0827*** | -0.0525*** | 0.197*** | 0.198*** |
| | (0.0231) | (0.0202) | (0.00711) | (0.00676) |
| Observations | 5,139 | 5,101 | 5,101 | 5,101 |
| R-squared | 0.059 | 0.060 | 0.010 | 0.043 |
| Number of gsms | 1,389 | 1,383 | 1,383 | 1,383 |

Note: American Indian Trend and Age Fixed Effects and Robust Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The next set of regressions in Table 10 investigates the characteristics of the census tracts that the individual households move to as a result of the casino payments. All characteristics are measured in the 1990 Census data, measured before the casino transfers commenced, so that movements across census tracts by transfer recipients are not affecting the tract characteristics. The first four columns use the entire GSMS population (both American Indian and non-Indian observations). The final four columns report the results from a similar analysis on the American Indian population subset alone. In the first set of four regressions, the results suggest that casino payments do not have a statistically significant effect on where individuals move to as a result of the casino payments. The coefficients are relatively small in magnitude and are never statistically significant.

Restricting analysis to the American Indian subset, however, provides different results. We are exploiting the differences in the survey waves across the different age cohorts of American Indian children in these regressions. Results should be interpreted with this caveat in mind. In column 5, the coefficient on casino payment indicates that among American Indians who move, they move to census tracts that have higher median household incomes. The coefficient on casino payment is large and positive for the percent in the labor force but not statistically significant. In the next column the coefficient on casino payments is large and barely misses statistical significance at the 10% level. Taken together, these results qualitatively indicate that those American Indians who are moving as a result of the casino payment are moving to census tracts that have higher levels of educational attainment than those census tracts that they were initially located in. Column 8 indicates that among American Indians who move as a result of the casino payment they are moving to census tracts with lower concentration of American Indian heads of households than in the neighborhoods where they were located previously. Jacob et al (2014) find that few people move out of their communities as a result of the Chicago housing voucher program; our results suggest that this holds for the on-reservation population but not for the off-reservation population. These findings suggest that part of the observed effects may operate through better neighborhoods, at least for the tribal members initially residing off the reservation. This is in line with results from other studies investigating the effects of residential mobility on children's outcomes. The research on Moving to Opportunity (Kling et al, 2007), found a statistically significant effect of the relocation to better neighborhoods on maternal mental health outcomes. Black (1999) has shown that parents are willing to pay a premium to live in school districts which produce higher test

scores. Chetty and Hendren (2015) have found that there is a direct relationship between the amount of time a child resides in a better county in the US (due to family moves) and intergenerational mobility of those children as adults.

Table 10: Census Tract Changes Regressed on Casino Payments for American Indians Alone

| VARIABLES | (1) Median Family Income by Census Tract | (2) Percent in Labor Force by Census Tract | (3) Percent with High School Plus | (4) Percent AI Head of Household by Tract | (5) Median Family Income by Census Tract | (6) Percent in Labor Force by Census Tract | (7) Percent with High School Plus | (8) Percent AI Head of Household by Tract |
|---|---|---|---|---|---|---|---|---|
| Casino Payment? | -321.6 | 0.0847 | -0.162 | -0.901 | 2,086* | 0.625 | 1.223 | -6.587* |
| | (682.9) | (0.306) | (0.432) | (1.656) | (1,182) | (0.614) | (0.777) | (3.878) |
| Number of Children Less than 6 years old in Household | -51.50 | -0.0396 (0.1000) | -0.0539 | 0.688* | -121.4 | 0.0167 | 0.0779 | 1.419* |
| | (195.2) | | (0.154) | (0.370) | (152.3) | (0.103) | (0.127) | (0.749) |
| Constant | 49,561*** | 60.49*** | 68.52*** | 13.53*** | 34,522*** | 59.19*** | 63.17*** | 61.14*** |
| | (535.7) | (0.224) | (0.361) | (0.559) | (1,812) | (1.277) | (1.524) | (7.551) |
| American Indians Alone? | N | N | | N | Y | Y | Y | Y |
| Observations | 5,139 | 5,139 | 5,139 | 5,139 | 1,309 | 1,309 | 1,309 | 1,309 |
| R-squared | 0.006 | 0.004 | 0.008 | 0.022 | 0.018 | 0.017 | 0.017 | 0.037 |
| Number of gsms | 1,389 | 1,389 | 1,389 | 1,389 | 341 | 341 | 341 | 341 |

Note: American Indian Trend and Age Fixed Effects and Robust Standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

D. Community Effects by Census Tract

In this section we investigate the potential role of community and peer effects in determining improved child outcomes for affected households. Using the geographic location of households, we merge in US Census data measures for the percent of household heads in a census tract (in 1990 prior to the casino operations) that are American Indian. The purpose of these regressions is to investigate an additional mechanism that may explain how the introduction of higher per capita income in the community affected child emotional and behavioral outcomes. Specifically, if a particular community has a high proportion of American Indians the resulting increase in incomes due to casino transfer payments would lift incomes for large proportion of the community. As a result, there may be community-level positive externalities which affect child outcomes in addition to any family-specific processes that contribute to child welfare. For example, as incomes increase, all households and parents may monitor not only their own children but those in their community at large.

In Appendix Table A6 we regress the child outcomes on the main set of controls including casino payments as provided in Table 3, but we also include an interaction variable of casino payments with the percent of household heads that are American Indian in the census tract. The interaction coefficient is small and statistically indistinguishable from zero, suggesting that the concentration of individuals receiving the casino transfer in the census tract does not have a strong additional effect on the child behavioral or personality traits. The coefficients on the main effects of casino payments are only slightly changed from our original results presented in Table 3.

The next four sets of regressions in Appendix Table A6 use a different interaction variable. In these regressions we include the standard set of control variables as well as an interaction between casino payments and whether the household resides on the American Indian reservation or not. The results from this analysis are similar to that found in the previous four columns – higher concentration of American Indian households in the census tract does not lead to disproportionately strong effects of the casino transfers.

Finally, in Appendix Table A7 we test the hypothesis that a higher concentration of transfer recipients in the census tract amplifies that effect of casino transfers on parental and parent-child relationships. We regress the parental behavior and relationship outcome variables on the same set of regressors and interaction variables. The results largely mirror the results presented in Table 5

although there is a slight reduction in statistical significance in some regressions for the coefficient on casino payments.

Overall, community-wide effects do not appear to be a strong mechanism in explaining the observed improvement in either child behavior and personality traits or parental behaviors and relationships. Ultimately, this may indicate that the community-wide effects of the additional income did not result in positive externalities that can be measured in our data in this relatively short time period.

## VIII. Robustness Checks and Specification Checks

In this section we explore several potential other confounding factors which may be driving the observed results. In previous research (Akee et al 2010, 2013; and Costello et al 2003) we examined changes primarily by initial household poverty status. The results indicated in those studies that there was significant heterogeneity in program effect across initial household poverty status. Child educational attainment was largest for the initially poor households and reductions in obesity were largest for the initially wealthier households. Comparing across survey respondents, there were larger reductions in child psychopathology for the poorer households. In Table A8 we provide the main analysis from Table 3 by initial household poverty status. The results indicate that the coefficients are of the expected signs for the first four columns in both panels and attain statistical significance in five out of the eight regressions. The coefficient on casino payments for the neuroticism regression has a negative sign for households not initially in poverty, but positive (as expected) and statistically significant at the 10% level for households initially in poverty. Overall, the results show some slight differences, but the results are not as stark as previously found in between-household (child) analysis.

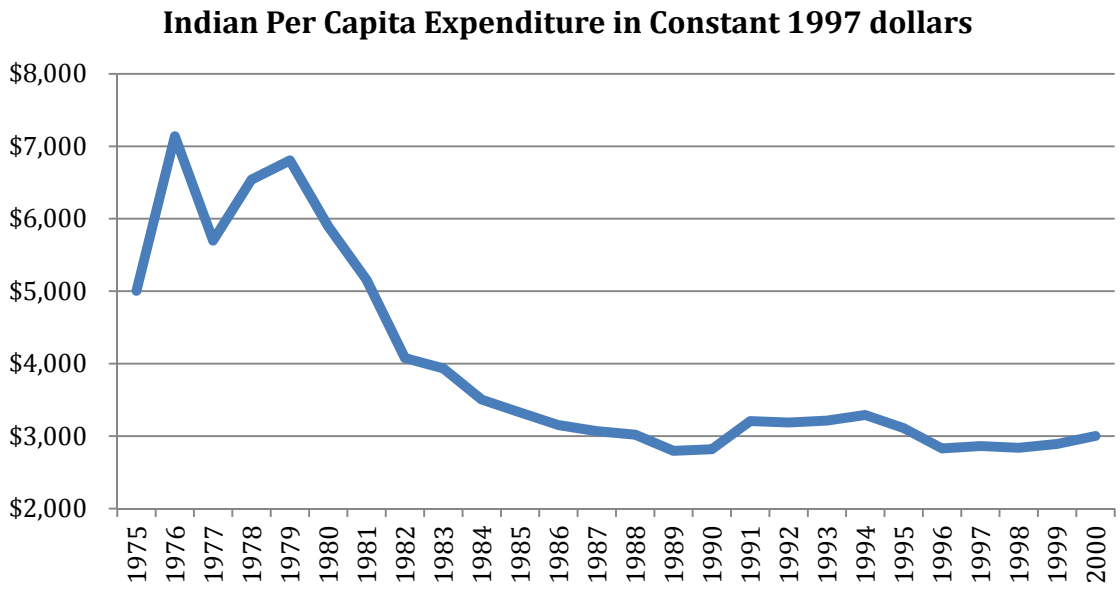
We also examine whether the effect of having a single American Indian parent or two American Indian parents have differential effects on the observed outcomes for our main outcome variables as presented in Table 3. Households with two American Indian parents will receive twice the amount of the per capita disbursements as payments are made to all tribally-enrolled citizens, not by household. In Table A9 we separate out whether the household has one American Indian parent household or two American Indian parents in the household. It appears that observed effects are driven by having at least one American Indian parent in the household. The coefficients on

having a second American Indian parents are similar to those of the first American Indian parent but are smaller in magnitude and never achieve statistical significance.

In Table A10 we separate out the behavioral and emotional disorder reports contained in the survey as to whether they are by the parent alone, child alone or both combined. In our analysis we use the combined reports as is standard in the psychology literature. However, separating out the responses by parent and child indicates that the observed results for a reduction in emotional disorder symptoms is driven by the child's reporting. On the other hand, the reduction in behavioral disorders is driven primarily by the parent's reporting of child behaviors.

Finally, in Table A11 we present our main regression results for households that are headed by a single parent. One potential confounding factor for our analysis is that there might have been other changes occurring at the time of the casino operations in 1996. One dramatic change was the welfare reform that occurred at approximately the same time at the national level. Therefore, in this analysis we include an interaction variable which indicates whether a household was headed by a single parent (which is a necessary condition to be eligible for welfare). The coefficient on this interaction variable is provided in the second row of the table. None of the coefficients attain statistical significance and the main results are qualitatively similar to our main results in Table 3.

The validity of our main results rests on the assumption that there were no unobserved, AI-specific programs or positive economic shocks that commenced at the same time as the casino transfers. One potential source could be an increase in US federal funding for American Indians in particular starting in 1996. Examining data from Walke (2000), we find that there has been a sharp reduction in federal funding for American Indians across the board since the 1980s and a slight drop in 1996 as well. We also checked the US Senate Documents for Bureau of Indian Affairs appropriations and found that there were no new funding allocations for the Eastern Band of Cherokee Indians during this time period.




Source: Walke (2000)

## IX. Discussion of Long-Run Outcomes

Given the longitudinal nature of our data, we can examine the association between the improved personality traits and reduction in emotional and behavioral disorders and that of adult outcomes. In the table below, we identify the association between the levels of age 16 disorders and personality traits and age 25 outcomes such as employment and educational attainment of non-Indians. The non-Indians were not affected by changes in unearned income and thus did not have a subsequent change in disorders or personality traits. We find that measures of emotional and behavioral wellbeing at age 16 are negatively related to labor market outcomes measured at age 25. Higher levels of behavioral and emotional disorders are associated with lower levels of educational attainment and employment probabilities. Conversely, higher levels of the three personality traits (conscientiousness, agreeableness and neuroticism) at age 16 are associated with higher levels of these same age 25 outcomes.

Table 11: Association between Long Run Outcomes (Age 25) for Non American Indians using Age 16 Levels of Disorders and Personality Traits

| VARIABLES | (1) Years of Educational Attainment | (2) Full Time Employed? |
|---|---|---|
| Panel A | | |
| Behavioral Disorder Symptoms at Age 16 | -0.475*** | -0.0734*** |
| | (0.0815) | (0.0165) |

| | | | |
|---|---|---|---|
| Panel B | | | |
| | Emotional Disorder Symptoms at Age 16 | -0.421***<br>(0.114) | -0.0421**<br>(0.0189) |
| Panel C | | | |
| | Conscientiousness Score at Age 16 | 0.517***<br>(0.0876) | 0.0481***<br>(0.0169) |
| Panel D | | | |
| | Agreeableness Score at Age 16 | 0.263***<br>(0.0753) | 0.0412***<br>(0.0147) |
| Panel E | | | |
| | Neuroticism Score at Age 16 | 0.279***<br>(0.0683) | 0.0504***<br>(0.0112) |

Note: Pairs of coefficients are from separate regressions in each column. All regressions include age fixed effects, wave fixed effects, age by race fixed effects and individual fixed effects, number of children less than 6 in the household and a constant. Robust Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

We decompose the changes in age 25 educational attainment and full time employment due to the associated changes in observed increases (by age 16) in conscientiousness and decreases in emotional disorders in the following table. We use the actual changes in child personality traits and emotional wellbeing at age 16 and the respective correlation coefficients from Table 11 to account for the observed increase in overall educational attainment and employment probability at age 25.

In Table 12 below, we present some results for the change in conscientiousness and emotional disorders (we do not present the other measures as they are highly correlated with one another and provide similar results). The total change in educational attainment and fulltime employment (differencing across age cohorts and American Indian status) is given in the first row of the table as almost half a year of education (0.487 for education) and an increase of 22% in fulltime employment (0.224 for full time probability). We compute these measures using a simple difference-in-difference equation with no covariates for the age 25 outcome variables - educational attainment and full time employment probability. The equation is the following:

$$EducationChange = (Education_{Y,AI} - Education_{O,AI}) - (Education_{Y,NonAI} - Education_{O,NonAI})$$

In the equation above the subscripts *Y* and *O* indicate youngest and oldest age cohorts respectively and *A*I and *NonAI* represent American Indian and Non-Indian respectively. The four different variables labeled "Education" are the average educational attainment at age 25 for

each of the four subgroups. A similar calculation is conducted for full time employment probabilities at age 25.

In Panel A, we provide the change in conscientiousness for the youngest age cohort of American Indians in our data (the second row). The coefficient on the third line comes from Table 11 above and the fourth line provides the product of the value in row 2 and 3. We call this the total change in the fourth row. Finally, in the fifth row of Panel A we show the percent of the net change this total change represents, which is calculated as the ratio of row four to row one. The change in conscientiousness is associated with approximately 28% of the difference in educational attainment for this age cohort and about 6% of the difference of fulltime employment. Panel B provides a similar calculation for the reduction in emotional disorders and it is associated with approximately 21% of the change in educational attainment and about 5% of the change in full time employment probability.

It is important to note that these measures are not independent (conscientiousness and emotional disorders) of one another; these results should not be interpreted as additive here. Additionally, it is not possible to fully provide a causal story for these long run (measured at age 25) outcomes and we stress that the results are meant to illustrate potential long-run effects.

Table 12: Explaining Raw Differences in Outcomes by Changes in Age 16 Characteristics

| | Education | Fulltime Employed |
|---|---|---|
| (1) Net Change at Age 25 (Difference in Difference Estimate) | **0.487** | **0.224** |
| Panel A | | |
| (2) Change in Conscientiousness for Age Cohort 1 AI | 0.260 | 0.260 |
| (3) Coefficient on Conscientiousness from Non AI (Table 11) | 0.517 | 0.048 |
| (4) Total Change = row(2) x row(3): | 0.134 | 0.013 |
| (5) Percent of difference explained by increase in conscientiousness = row (4) / row (1) | **0.276** | **0.056** |
| Panel B | | |
| (2) Change in Emotional for Age Cohort 1 AI | -0.238 | -0.238 |
| (3) Coefficient on Emotional from Non AI (Table 11) | -0.421 | -0.042 |
| (4) Total Change = row(2) x row(3): | 0.100 | 0.010 |
| (5) Percent of difference explained by reduction in Emotional = row (4) / row (1) | **0.206** | **0.045** |

## X. Conclusion

Our research investigates the effect of increases in unearned income on personality traits and behavioral and emotional disorders of children up to the age of 16. To our knowledge, this research is the first to examine an unearned income intervention and its resulting effect on child personality traits and behavioral disorders accounting for unobserved fixed individual characteristics in a longitudinal setting. It is also the first to examine potential mechanisms using data on parents of the population of interest.

The results presented here indicate that there are significant positive effects of an increase in unearned household income on the prevalence of behavioral and emotional disorders and on the personality traits of affected children. These effects are robust to individual fixed-effects and are not explained by changes in parental time use, employment, marital status, changes in national welfare reform or other tribal government programmatic changes. The size of the effects is relatively large; the effect reduces behavioral disorders by 26.7 % of a standard deviation and increases conscientiousness by 42.8 % of a standard deviation. We have also shown that the effect is most significant for children who were initially behind their peers in these traits and those who exhibited more symptoms of disorders. This suggests that parents may be reacting to the exogenous cash transfers by compensating for their children who have lower levels of mental health and worse personality traits.

Given the longitudinal nature of our data we are able to investigate several potential mechanisms responsible for the observed change in child outcomes. While there was little to no evidence for changes in parental employment (a proxy for time spent with children), there was significant evidence to suggest that parental relationships with children and with their spouses (partners) improved. Other researchers have shown conclusively that increased incomes have significantly improved parental outlook, mental health and happiness. Therefore, the results here suggest that while parental time with child may not have changed an improvement in interactions alone may have an important impact on child behavior and personality.

Finally, we can trace household geographic mobility at the census tract level over time. Our results suggest that households that received the casino payments and were initially located off the reservation were more likely to move to slightly better (in terms of median household income) census tracts. These results suggest that at least some of the improvement in the child behavioral and personality traits may be explained by better community amenities present in these higher income areas.

One important caveat regarding our research is worth repeating. The increase in unearned income is relatively large and has been effectively a permanent change for our study population. Other income interventions have been shown to be approximately similar in size but not in duration. Additional research for the effect of shorter-term household income changes with a quasi-experimental design would help to establish the relevant threshold necessary to establish an effect on child behavior and personality traits.

## XI. References


Aizer, Anna and Flavio Cunha (2012). The Production of Human Capital: Endowments, Investments and Fertility. NBER Working Paper 18429, September.

Anna Aizer, Laura Stroud, Stephen Buka. 2012 “Maternal Stress and Child Outcomes: Evidence from Siblings.” NBER Working Paper No. 18422.

Aizer, Anna and Shari Eli, Joseph Ferrie and Adriana Lleras-Muney. 2014. “The Long Term Impact of Cash Transfers to Poor Families.” NBER Working Paper No. 20103.

Akee, Randall and J. Costello, W. Copeland, G. Keeler and A. Angold . “Parent’s Incomes and Children’s Outcomes: A Quasi-Experiment with Casinos on American Indian Reservations,” *American Economics Journal: Applied Economics, Volume 2, No. 1, January 2010, pp. 86-115.*

Akee, Randall and Emilia Simeonova, E. J. Costello, W. Copeland, G. Keeler and A. Angold . “Young Adult Obesity and Household Income: Effects of Unconditional Cash Transfers.”, April 2013 in *American Economics Journal: Applied Economics.*

Banarjee, Abhijit V., Esther Duflo, Gilles Postel-Vinay, and Timothy Watts. 2007. “Long-Run Health Impacts of Income Shocks: Wine and Phylloxera in 19th Century France.” NBER Working Paper No. 12895.

Becker, G. and Tomes, N. (1979) 'An equilibrium theory of the distribution of income and intergenerational mobility', *Journal of Political Economy,* 87.6:1153-1189.

Becker, G. and Tomes, N. 1986. “Human Capital and the Rise and Fall of Families.” Journal of Labor Economics, Volume 4, No 3, pt 2.

Behrman, Jere R., Susan W. Parker, and Petra E. Todd. 2005. “Long-Term Impacts of the Oportunidades Conditional Cash Transfer Program on Rural Youth in Mexico.” Ibero-America Institute for Economic Research Discussion Paper 122.

Belloni, A., Chernozhukov, V. and C. Hansen. 2014. "Inference on Treatment Effects After Selection Amongst High-Dimensional Controls (with an Application to Abortion and Crime)," *The Review of Economic Studies*. Volume 81, No 2. Pp. 608-650.

Black, Sandra E. 1999. “Do Better Schools Matter? Parental Valuation of Elementary Education.” Quarterly Journal of Economics, V. 114 (2): 577-599.

Blau, David M. 1999. The effect of income on child development. *Review of Economics and Statistics* 81, no. 2 (May): 261–76.

Bleidorn, W. (2012). Hitting the road to adulthood: Short-term personality development during a

major life transition. Personality and Social Psychology Bulletin, 38, 1594–1608. http://dx.doi.org/10.1177/0146167212456707.

Campbell, Frances and Conti, Gabriella, J.J. Heckman, S. Moon, R. Pinto, E. Pungello and P. Yi. 2014. "Early Childhood Investments Substantially Boost Adult Health" Science, Vol. 343 no. 6178, pp. 1478-1485.

Cameron, S. and Heckman, J.J. (1998).Life cycle schooling and dynamic selection bias: models and evidence for five cohorts of American males. Journal of Political Economy, vol. 106, pp. 263–333.

Carneiro, P., & Heckman, J. J. (2002). The evidence on credit constraints in post -secondary schooling. Economic Journal, 112(482), 705–734.

Case, Anne. 2004. "Does Money Protect Health Status? Evidence from South African Pensions." In *Perspectives on the Economics of Aging*, ed. David Wise, Chicago: University of Chicago Press, 287- 311.

Chase-Lansdale, P.L., and J. Brooks-Gunn. 2014. Helping parents, helping children: Two-generation mechanisms. *The Future of Children* 24(1): 13–39.

Chetty, Raj, and Nathaniel Hendren. 2015. "The Impacts of Neighborhoods on Intergenerational Mobility: Childhood Exposure Effects and County-Level Estimates". Unpublished Manuscript.

Conger, Rand and Katherine Conger, Glen Elder and Frederick Lorenz, Ronald Simons and Les Whitbeck. 1992. "A Family Process Model of Economic Hardship and Adjustment of Early Adolescent Boys." Child Development. Volume 63, No. 3, pp. 526-541.

Conger, Rand and Martha Rueter and Glen Elder. 1999. "Couple Resilience to Economic Pressure." Journal of Personality and Social Psychology. Volume 76, No. 1, pp. 54-71.

Conger, Rand and Lora Ebert Wallace, Yumei Sun, and Ronald L. Simons, Vonnie C. McLoyd, Gene H. Brody. 2002. "Economic Pressure in African American Families: A Replication and Extension of the Family Stress Model." Developmental Psychology. Volume 38, No. 2, pp. 179-193.

Costello, E. Jane, Adrian Angold, Barbara J. Burns, Dalene K. Stangl, Dan L. Tweed, Alaattin Erkanli, and Carol M. Worthman. 1996. "The Great Smoky Mountains Study of Youth: Goals, Design, Methods, and the Prevalence of DSM-III-R Disorders." *Archives of General Psychiatry*, 53(12): 1129–36.

Costello, E. Jane, Elizabeth Farmer, Adrian Angold, Barbara Burns and Alaattin Erkanli. 1997. "Psychiatric Disorders among American Indian and White Youth in Appalachia: The Great Smoky Mountains Study." American Journal of Public Health. Volume 87, No. 5, pp. 827-832.

Costello, E. Jane, Scott N. Compton, Gordon Keeler, and Adrian Angold. 2003. "Relationships

Between Poverty and Psychopathology: A Natural Experiment." *Journal of the American Medical Association*, 290(15): 2023–29.

Costello, E. Jane, Alaattin Erkanli, William Copeland and Adrian Angold. 2010. "Association of Family Income Supplements in Adolescence with Development of Psychiatric and Substance Use Disorders in Adulthood Among an American Indian Population." Journal of the American Medical Association. Volume 303, No. 19, pp. 1954-1960.

Cunha, F., & Heckman, J. J. (2008). Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation. Journal of Human Resources, 43(4), 738–782.

Cunha, Flavio, James Heckman, and Susanne Schennach (2010): Estimating the Technology of Cognitive and Non-Cognitive Skill Formation, Econometrica, 78(3):883-931.

Currie, Janet and Wanchuan Lin. 2007. "Chipping Away at Health: More on the Relationship Between Income and Child Health," *Health Affairs*, 26 #2, Mar/Apr , pp. 331-344.

Currie, Janet and Douglass Almond. 2011. "Human capital development before age five." Chapter 15 in Handbook of Labor Economics, Volume 4, Part B, pp. 1315-1486.

***Diagnostic and Statistical Manual of Mental Disorders* (Fourth Edition) (*DSM-IV*)".**

Dahl, Gordon B. and Lance Lochner. 2012. The Impact of Family Income on Child Achievement: Evidence from the Earned Income Tax Credit. *American Economic Review* 102:5, 1927-1956.

Deming, David J. 2015. "The Growing Importance of Social Skills in the Labor Market." Unpublished Manuscript.

Denissen, J. J. A., van Aken, M. A. G., & Roberts, B. W. (2011). Personality development across the life span. In T. Chamorro-Premuzic, S. von Stumm, & A. Furnham (Eds.), *Handbook of Individual Differences.* Wiley-Blackwell; Oxford (pp. 75-100).

Dooley, Martin, and Jennifer Stewart. 2004. "Family Income and Child Outcomes in Canada." *Canadian Journal of Economics*, 37(4): 898–917.

Duflo, Esther. 2003. "Grandmothers and Granddaughters: Old-Age Pensions and Intrahousehold Allocation in South Africa." *World Bank Economic Review*, 17(1): 1–25.

Duncan, Greg J., Jeanne Brooks-Gunn, and Pamela Kato Klebanov, ''Economic Deprivation and Early Childhood Development,'' *Child Development* 65 (1994), 296–318.

Duncan, Greg J., Jean Yeung, Jeanne Brooks-Gunn, and Judith Smith. 1998. How much does childhood poverty affect the life chances of children? *American Sociological Review* 63 (June): 406–23.

Duncan, Greg J. and Pamela A. Morris, and Chris Rodrigues. 2011. Does Money Really Matter? Estimating Impacts of Family Income on Young Children's Achievement With Data From

Random-Assignment Experiments. Development Psychology. September ; 47(5): 1263–1279.

Duncan, G. J., & Brooks-Gunn, J. (1997). Income effects across the life span: Integration and interpretation. In G. Duncan, & J. Brooks-Gunn (Eds.), Consequences of Growing Up Poor. New York: Russell Sage Foundation, pp. 596–610.

Duncan, Greg and K. Magnuson and E. Votruba-Drzal. 2014. "Boosting family income to promote child development." Future Child. Spring, Volume, No. 1, pp. 99-120.

Duckworth, Angela and Martin Seligman. (2005). "Self-Discipline Outdoes IQ in Predicting Academic Perfornmance of Adolescents." Psychological Science. Volume 16, No 12.

Evans, William N and Craig L Garthwaite. 2014. Giving Mom a Break: The Impact of Higher EITC Payments on Maternal Health. *American Economic Journal: Economic Policy, 6(2): 258–290*.

French, Jack. 2009. "TANF: Failing America's Poorest Children" Athens County Department of Job and Family Services report. Athens, GA, October 2009 (http://jfs.athenscountygovernment.com)

Gertler, Paul and James Heckman, Rodrigo Pinto, Arianna Zanolini, Christel Vermeersch, Susan Walker, Suan Change , Sally Grantham-McGregor. 2014. "Labor Market Returns To Early Childhood Stimulation in Jamaica." Science, May, Vol. 344 no. 6187 pp. 998-1001.

Heckman, James and Rodrigo Pinto and Peter Savelyev. 2013. "Understanding the Mechanisms through Which an Influential Early Childhood Program Boosted Adult Outcomes,"). American Economic Review, 103(6): 2052–2086.

Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. Journal of Labor Economics, 24(3), 411–482.

Heckman, James J. and S.H. Moon, R. Pinto, P. Savelyev, and A. Yavitz (2010) "A New Cost-Benefit and Rate of Return Analysis for the Perry Preschool Program: A Summary," In Arthur Reynolds, Arthur Rolnick, Michelle Englund, and Judy A. Temple, (eds.) Cost-Effective Programs in Children's First Decade: A Human Capital Integration. New York: Cambridge University Press. pp. 366-380.

Hill, Martha, and Greg Duncan. 1987. Parental family income and the socioeconomic attainment of children. *Social Science Research* 16:37–73.

Hoynes, Hillary and Doug Miller and David Simon. 2015. "Income, The Earned Income Tax Credit, and Infant Health." American Economic Journal: Economic Policy. Volume 7, No. 1, pp. 172-211.

Israel, Salomon and Terrie E. Moffitt, Daniel W. Belsky, Robert J. Hancox, Richie Poulton, Brent Roberts, W. Murray Thomson, Avshalom Caspi . 2014. "Translating Personality Psychology to Help Personalize Preventive Medicine for Young Adult Patients." Journal of Personality

and Social Psychology. Volume 106, No. 3, pp. 484-498.

Jacob, Brian A. and Max Kapustin and Jens Ludwig. 2014. Human capital effects of anti-poverty programs: evidence from a randomized housing voucher lottery. NBER WP 20164.

Johnson, James H. Jr and John D. Kasarda and Stephen J. Appold. 2011. "Assessing the Economic and Non-Economic Impacts of Harrah's Cherokee Casino, North Carolina". Frank Hawkins Kenan Institute of Private Enterprise, Kenan-Flagler Business School, University of North Carolina at Chapel Hill.

Jones, Lauren E. and Kevin S. Milligan and Mark Stabile. 2015. "Child Cash Benefits and Family Expenditures: Evidence from the National Child Benefit." NBER Working Paper 21101.

Kawamoto, Tetsuya and Toshihiko Endo. 2015. "Personality Changes in Adolescence: Results from a Japanese Sample." Journal of Research in Personality. Volume 57, pp 32-42.

Kling JR, Liebman JB, Katz LF. Experimental analysis of neighborhood effects. Econometrica. 2007; 75:83–119. doi:10.1111/j.1468-0262.2007.00733.x.

Klimstra, T. A., Bleidorn, W., Asendorpf, J. B., van Aken, M. A. G., & Denissen, J. J. A. (2013). Correlated change of Big Five personality traits across the lifespan: A search for determinants. Journal of Research in Personality, 47, 768–777.

Levy, Dan Maurice, and Greg Duncan. 2000. Northwestern University/University of Chicago Joint Center for Poverty Research Working Papers no. 168.

Lundberg, Olle. "Childhood Conditions, Sense of Coherence, Social Class and Adult Ill Health: Exploring Their Theoretical and Empirical Relations," Social Science and Medicine, 44, 1997: 821-831

McLeod, Jane and Michael Shanahan. 1993. " Poverty, Parenting, and Children's Mental Health." American Sociological Review, Volume 58, June, Pp. 351-366.

Mani, Anandi, and Sendhil Mullainathan, Eldar Shafir and Jiaying Zhao. (2013) "Poverty Impedes Cognitive Function." Science. Number 341, August.

Milligan, Kevin, and Mark Stabile. 2011. "Do Child Tax Benefits Affect the Well-Being of Children? Evidence from Canadian Child Benefits Expansion." *American Economic Journal: Economic Policy* 3 (3): 175–205.

Moffitt, Terrie E. and Louise Arseneault, Daniel Belsky, Nigel Dickson, Robert J. Hancox, HonaLee Harrington, Renate Houts, Richie Poulton, Brent W. Roberts, Stephen Ross, Malcolm R. Sears, W. Murray Thomson, and Avshalom Caspi. 2011. "A gradient of childhood self-control predicts health, wealth, and public safety." Proceedings of the National Academies of Science, Volume 108, No. 7, pp. 2693–2698.

Morris, Pamela, Greg J. Duncan, and Christopher Rodrigues. 2004. Does money really matter? Estimating impacts of family income on children's achievement with data from random-

assignment experiments. Institute for Policy Research, Northwestern University.

Murnane, R. J., Willett, J. B., & Levy, F. (1995). The growing importance of cognitive skills in wage determination. Review of Economics and Statistics, 77(2), 251–266.

Oreopoulos, Philip, and Marianne Page, and Ann Stevens. 2008. "The Intergenerational Effects of Worker Displacement." Journal of Labor Economics, vol. 26, no. 3, pp. 455 –484.

Paxson, Christina and Jane Waldfogel. (2002). "Work, Welfare, and Child Maltreatment." Journal of Labor Economics. Volume 20, No. 3.

Plug, Erik, and Wim Vijverberg. 2003. "Schooling, Family Background, and Adoption: Is It Nature or Is It Nurture?" *Journal of Political Economy*, 111(3): 611–41.

Shea, John. 2000. Does parents' money matter? *Journal of Public Economics* 77, no. 2 (August): 155–84.

Stock, James and M. Watson. 2008. "Heteroscedasticity Robust Standard Errors for Fixed Effects Panel Data Regression." Econometrica. Vol 76, Issue 1, p. 155-174.

Terracciano, A., McCrae, R. R., & Costa, P. T. Jr., (2006). Longitudinal trajectories in Guilford-Zimmerman Temperament Survey data: Results from the Baltimore Longitudinal Study of Aging. Journal of Gerontology: Psychological Sciences, 61B, P108–P116. http://dx.doi.org/10.1093/geronb/61.2.P108.

Thompson, Ross (2014) "Stress and Child Development" The Future of Children Volume 24, Number 1, Spring 2014

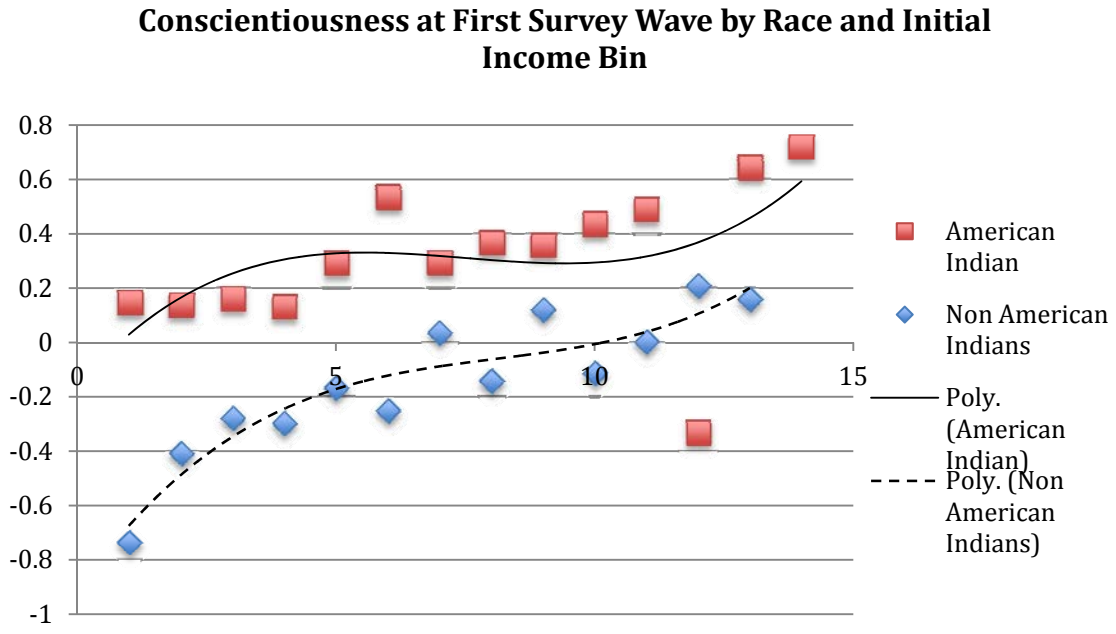
Tibshirani, Robert. 1996. "Regression Shrinkage and Selection via the Lasso." *Journal of the Royal Statistical Society.* Volume 58, No. 1, pp. 267-288.

Van den Akker, A. L., Dekovic´, M., Asscher, J., & Prinzie, P. (2014). Mean-level personality development across childhood and adolescence: A temporary defiance of the maturity principle and bidirectional associations with parenting. Journal of Personality and Social Psychology, 107, 736–750. http:// dx.doi.org/10.1037/a0037248.

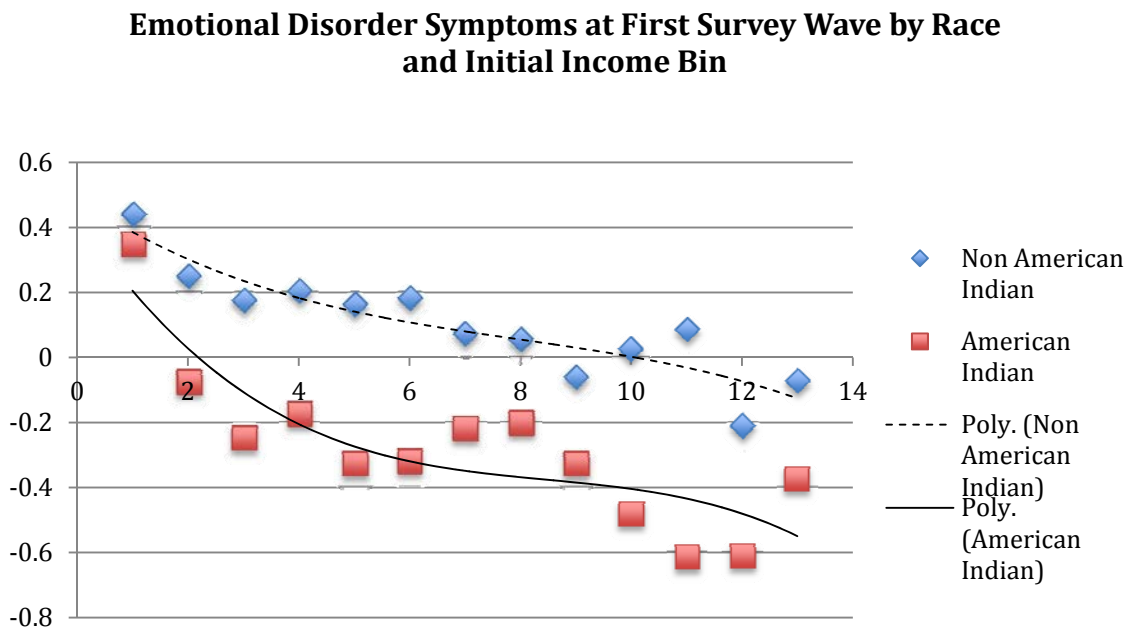
Walke, Roger. (2000). Indian-Related Federal Spending Trends, FY 1975-2001, US Congressional Research Service memorandum, March 1, 2000. In Report of the Committee On The Budget, United States Senate to Accompany S. Con. Res. 101 Together with Additional and Minority Views, Senate Report 106-251, March 31, 2000, pp. 199-250.

Wolfe, Barbara, Jessica Jakubowski, Robert Haveman, and Marissa Courey. 2012. "The Income and Health Effects of Tribal Casino Gaming on American Indians." *Demography* 49 (2): 499–524. doi:10.1007/s13524-012-0098-8.

Appendix Figure 1
A

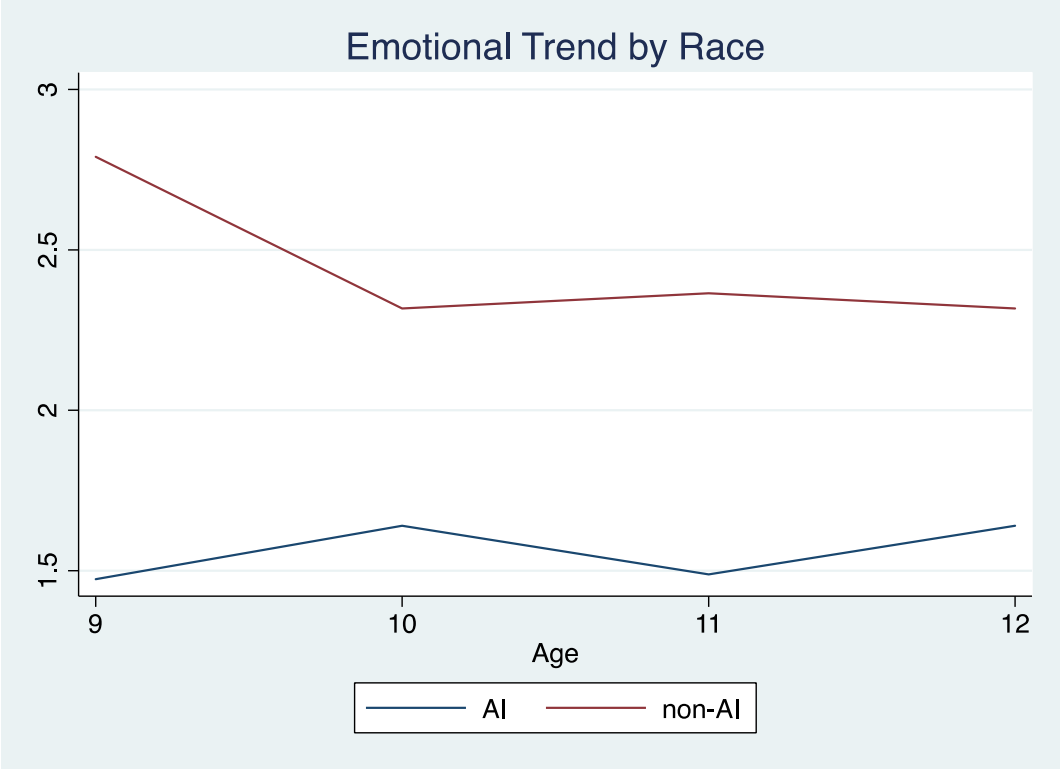



B

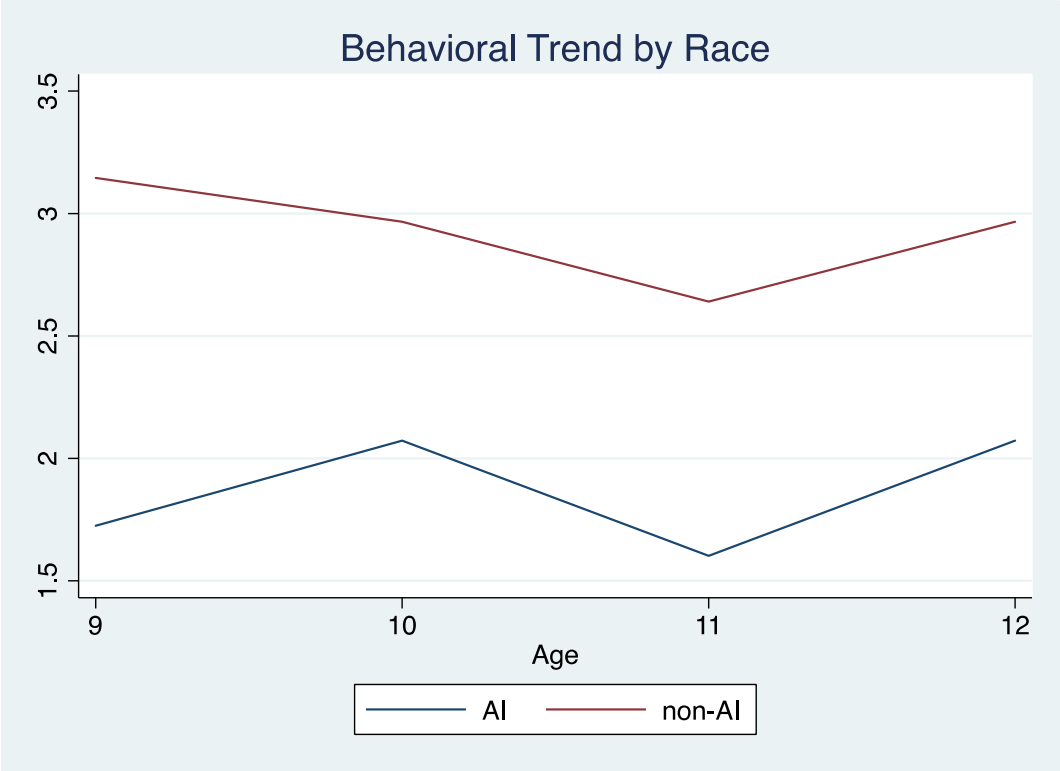


Appendix Figure 2

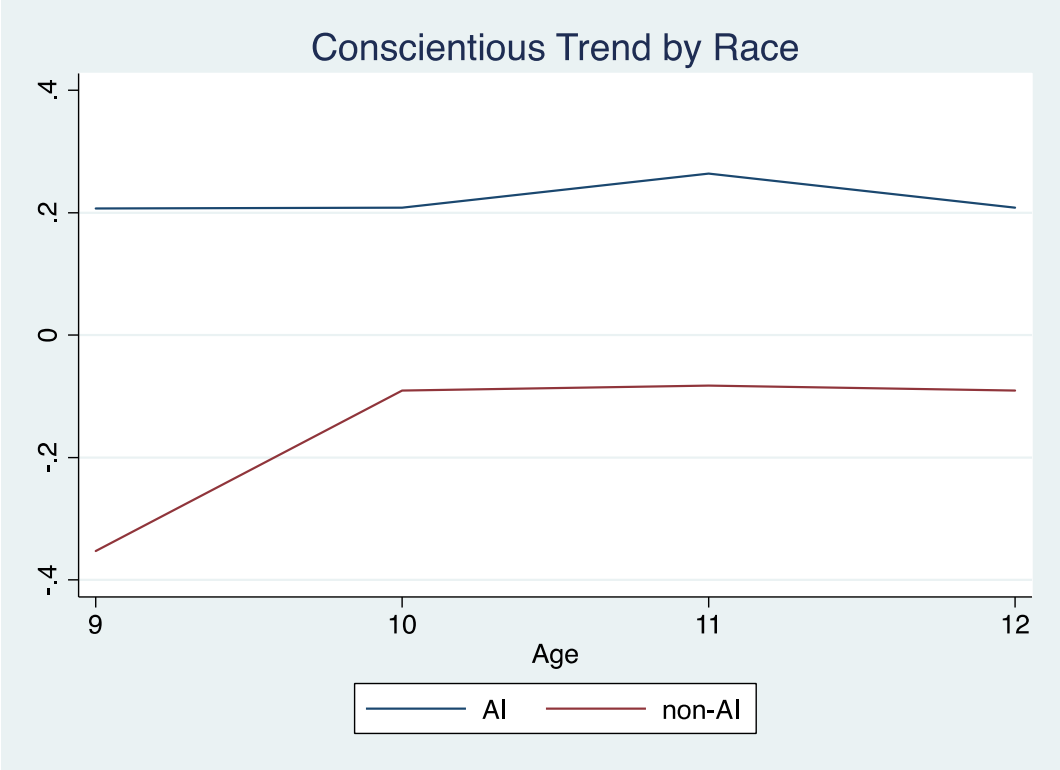
Panel A



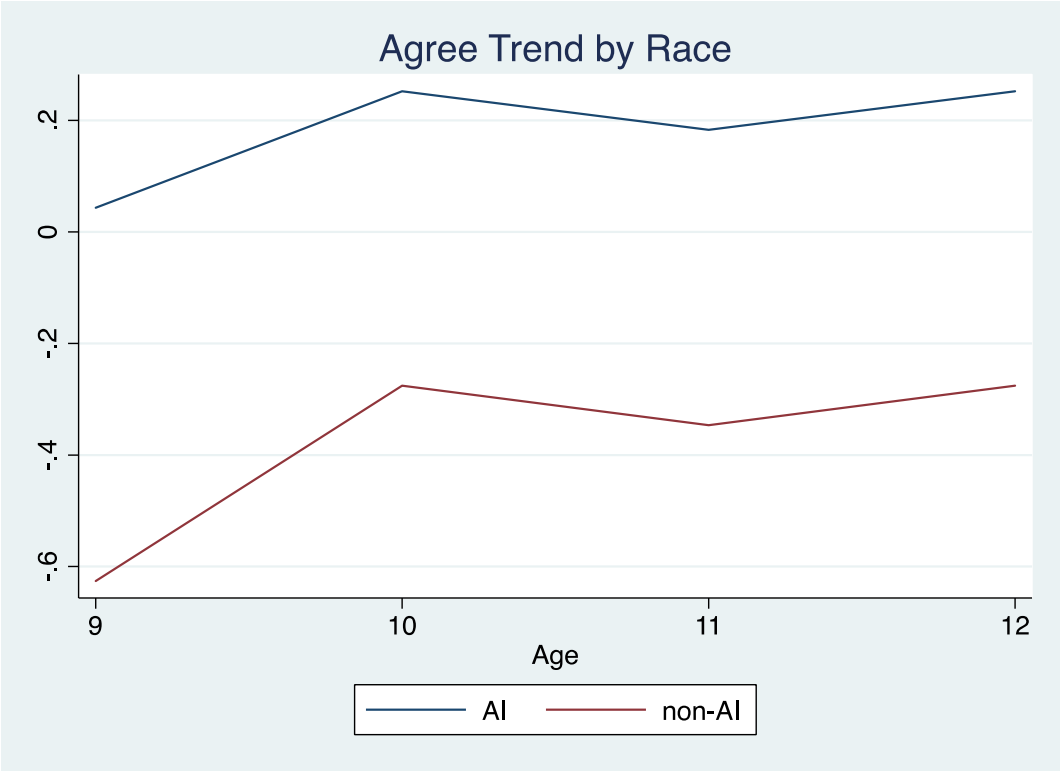
Panel B



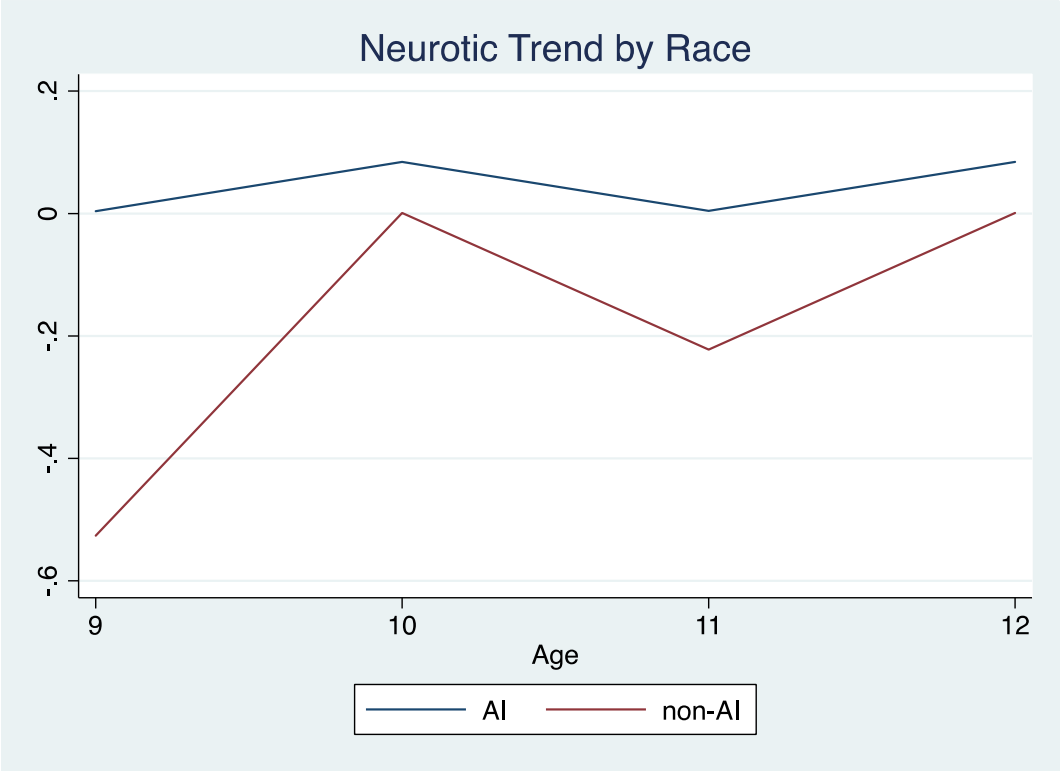

Panel C



Panel D



Panel E



## Appendix Tables

Table A1: Variables from GSMS Used To Create Big 5 Personality Traits: Agreeableness, Conscientiousness and Neuroticism and Behavioral and Emotional

| Agreeableness | Emotional | Behavioral |
|---|---|---|
| Number of Arguments with Parent1 (PAD1F01) | Sep.distress from home or att.figure | Often bullies, threatens, or intimidates others |
| Number of Arguments with Other Adults (PAL1F01) | Worry about possible harm | Often initiates physical fights |
| Number of Arguments with Peers at School (PBC0F01) | Worry about calamitous separation | Has used a weapon that can cause serious physical harm to others |
| Irritability Intensity (PDA8I01) | Persistent reluctance/refusal to go to school | Has been physically cruel to people |
| Bullies / Extortion (PGF7I01) | Avoidance of being alone | Has been physically cruel to animals |
| Cruelty to Animals (PGH3V01) | Reluctance to sleep away | Has stolen while confronting a victim (e.g., mugging, purse snatching, extortion, armed robbery) |
| Rumors (PGH4I01) | Separation nightmares | Has forced someone into sexual activity |
| Spiteful or Vindictive (PGA3I01) | Physical symptoms | Has deliberately engaged in fire setting with the intention of causing serious damage |
| Loses Temper (PGE0I01) | Diagnosed panic attacks | Has deliberately destroyed others' property (other than by fire setting) |
| Angry or Resentful (PDA7I01) | Meeting criteria for obsessive compulsive disorder | Has broken into someone else's house, building, or car |
| | Social anxiety | Often lies to obtain goods or favors or to avoid obligations (i.e., "cons" others) |
| | Fear public performance | Has stolen items of nontrivial value without confronting a victim |
| **Conscientiousness** | Social phobia,animal type | Often stays out at night despite parental prohibitions, beginning before age 13 years |
| Lying Intensity (PGC3I01) | Social phobia,natural,other | Has run away from home overnight at least twice while living in parental or parental surrog home |
| Impulsive Intensity (PRC3I01) | Social phobia,blood,injection,injury | Is often truant from school, beginning before age 13 years |
| Rule Breaking Intensity (PGA0I01) | Agoraphobia | Often loses temper |
| Concentration / Difficulty Paying Attention (PCC3I01) | Post Traumatic Stress Painful recall screen positive | Often argues with adults |
| | Post Traumatic Stress hyperarousal screen positive | Often actively defies or refuses to comply with adults' requests or rules |
| | Post Traumatic Stress avoidance screen positive | Often deliberately annoys people |
| **Neuroticism** | Restlessness,Keyed up,on edge | Often blames others for his or her mistakes or misbehavior |
| Feels unloved (PDC0I01) | Easy fatigability | Is often touchy or easily annoyed by others |
| Feeling of Inferiority to others (PDC1I01) | Difficulty concentrating, mind blank | Is often angry and resentful |
| Subject feels sorry for himself | Irritability | Is often spiteful or vindictive |

| | | |
|---|---|---|
| (PDC2I01) | | |
| Feels helpless in general (PDC6I01) | Muscle soreness | Often fails to give close attention to details or makes careless mistakes |
| Depressed Mood (PDA0I01) | Trouble falling or staying asleep | Often has difficulty sustaining attention in tasks or play activities |
| | Excessive worry (a symptoms of generalized anxiety disorder) | Often does not seem to listen when spoken to directly |
| | Frequent somatic complaints for which no physical basis could be found | Often does not follow through on instructions and fails to finish school work, chores |
| | Excessive need for reassurance | Often has difficulty organizing tasks and activities |
| | Marked feelings of tension or inability to relax | Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort |
| | Depressed/irritable mood | Often loses things necessary for tasks or activities |
| | Anhedonia or lose interest | Is often easily distracted by extraneous stimuli |
| | Weight loss or gain/dysthymia | Is often forgetful in daily activities |
| | Insomnia or hypersomnia | Often fidgets with hands or feet or squirms in seat |
| | Psychomotor agitation/retardation | Often leaves seat in classroom or in other situations in which remaining seated is expected |
| | Fatigue or loss of energy | Often runs about or climbs excessively in situations in which it is inappropriate |
| | Low self-esteem/worthlessness/guilt | Often has difficulty playing or engaging in leisure activities quietly |
| | Diff concentrating/thinking/deciding | Is often "on the go" or often acts as if "driven by a motor" |
| | Think about, plan or attempt suicide | Often talks excessively |
| | Hopelessness | Often blurts out answers before questions have been completed |
| | | Often has difficulty awaiting turn |
| | | Often interrupts or intrudes on others (e.g., butts into conversations or games) |

Table A2: Effects of casino transfers on parental marital arrangements

Parental Marital Status Fixed-Effects Regression

| VARIABLES | (1) Parents currently married? |
|---|---|
| Casino Payment? | -0.0290 |
| | (0.0323) |
| Number of Children Less than 6 years old in Household | 0.00366 |
| | (0.00792) |
| Constant | 0.533*** |
| | (0.0163) |
| Observations | 6,004 |
| Number of gsms | 1,405 |
| R-squared | 0.047 |

Note: American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A3: Casino transfers and parental employment

Parental Employment Fixed Effects

| VARIABLES | (1) Mother Full Time Employed? | (2) Father Full Time Employed? |
|---|---|---|
| Casino Payment? | -0.0182 | 0.0493 |
| | (0.0521) | (0.0400) |
| Number of Children Less than 6 years old in Household | -0.0274* | -0.00953 |
| | (0.0155) | (0.0106) |
| Constant | 0.532*** | 0.924*** |
| | (0.0302) | (0.0223) |
| Observations | 5,007 | 3,105 |
| R-squared | 0.022 | 0.010 |
| Number of gsms | 1,265 | 814 |

Note: American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A4: Placebo Test of Casino Payment Prior to Casino Operations (First Four Survey Waves) and Cohorts 1 and 2 Treated

| VARIABLES | (1) Behavioral Disorder Symptoms | (2) Emotional Disorder Symptoms | (3) Conscientiousness | (4) Agreeableness | (5) Neuroticism |
|---|---|---|---|---|---|
| Casino Payment? | 0.00892 | 0.219 | -0.281* | -0.131 | -0.252 |
| | (0.106) | (0.138) | (0.163) | (0.163) | (0.174) |
| Constant | 0.147** | 0.169** | -0.245*** | -0.557*** | -0.604*** |
| | (0.0630) | (0.0719) | (0.0704) | (0.102) | (0.120) |
| Observations | 4,607 | 4,607 | 4,521 | 4,335 | 4,497 |
| R-squared | 0.030 | 0.024 | 0.046 | 0.091 | 0.062 |
| Number of gsms | 1,401 | 1,401 | 1,398 | 1,392 | 1,396 |

Note: American Indian Trend and Age Fixed Effect and Number of Kids Less than 6 Years old and Standard errors clustered at the individual level provided in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table A5: Regression Analysis without Individual Fixed Effects and Interaction and Level Variables of Initial Child Personality Endowment

| VARIABLES | (1) Behavioral Disorder Symptoms | (2) Emotional Disorder Symptoms | (3) Conscientiousness | (4) Agreeableness | (5) Neuroticism |
|---|---|---|---|---|---|
| Casino Payment? | -0.139 | -0.0729 | 0.155 | 0.0874 | 0.0437 |
| | (0.105) | (0.120) | (0.107) | (0.128) | (0.137) |
| Interaction of Pre-Casino Behavioral Disorder Symptoms x Casino | -0.241 | | | | |
| | (0.199) | | | | |
| Initial Level Behavioral Disorder Symptoms* | 0.841*** | | | | |
| | (0.0239) | | | | |
| Interaction of Pre-Casino Emotional Disorder Symptoms x Casino | | -0.175 | | | |
| | | (0.208) | | | |
| Initial Level Emotional Disorder Symptoms * | | 0.817*** | | | |
| | | (0.0193) | | | |
| Interaction of Pre-Casino Conscientiousness x Casino | | | -0.255** | | |
| | | | (0.123) | | |
| Initial Level Conscientiousness* | | | 0.798*** | | |
| | | | (0.0191) | | |
| Interaction of Pre-Casino Agreeableness x Casino | | | | -0.246* | |
| | | | | (0.135) | |
| Initial Level Agreeableness * | | | | 0.771*** | |
| | | | | (0.0202) | |
| Interaction of Pre-Casino Neuroticism x Casino | | | | | -0.595*** |
| | | | | | (0.140) |
| Initial Level Neuroticism* | | | | | 0.728*** |
| | | | | | (0.0229) |
| Constant | 0.0638* | 0.0912** | -0.278*** | -0.299*** | -0.391*** |
| | (0.0338) | (0.0407) | (0.0505) | (0.0600) | (0.0806) |
| Observations | 6,050 | 6,050 | 5,886 | 5,692 | 5,879 |
| Number of gsms | 1,405 | 1,405 | 1,399 | 1,394 | 1,399 |

Note: American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses. *calculated as the average in the initial 3 (pre-casino) survey waves by subject
*** p<0.01, ** p<0.05, * p<0.1

Table A6: Child Outcomes regressed on Casino and Percent American Indian Household by Census Tract

| VARIABLES | (1) Behavioral Disorder Symptoms | (2) Emotional Disorder Symptoms | (3) Conscientiousness | (4) Agreeableness | (5) Neuroticism | (6) Behavioral Disorder Symptoms | (7) Emotional Disorder Symptoms | (8) Conscientiousness | (9) Agreeableness | (10) Neuroticism |
|---|---|---|---|---|---|---|---|---|---|---|
| Casino Payment? | -0.172 | -0.315* | 0.284 | 0.393* | 0.471** | -0.234* | -0.302* | 0.366** | 0.464** | 0.391* |
| | (0.132) | (0.162) | (0.184) | (0.227) | (0.195) | (0.122) | (0.161) | (0.171) | (0.209) | (0.201) |
| Casino x Perecent AI Head of Household in Census Tract | -0.00111 | 0.000704 | 0.00217 | 0.00183 | -0.00364* | | | | | |
| | (0.00137) | (0.00164) | (0.00202) | (0.00239) | (0.00208) | | | | | |
| Casino x Residing on Reservation | | | | | | 0.00429 | 0.0403 | 0.0276 | 0.0166 | -0.153 |
| | | | | | | (0.0902) | (0.103) | (0.126) | (0.147) | (0.126) |
| Number of Children Less than 6 years old in Household | 0.0623* | 0.0277 | -0.0792* | -0.0349 | -0.130* | 0.0621* | 0.0273 | -0.0754* | -0.0311 | -0.131* |
| | (0.0331) | (0.0374) | (0.0442) | (0.0412) | (0.0678) | (0.0331) | (0.0373) | (0.0442) | (0.0414) | (0.0679) |
| Constant | 0.0698 | 0.140* | -0.466*** | -0.776*** | -0.756*** | 0.0770 | 0.129 | -0.485*** | -0.769*** | -0.750*** |
| | (0.0770) | (0.0817) | (0.0865) | (0.102) | (0.121) | (0.0774) | (0.0819) | (0.0860) | (0.102) | (0.122) |
| Observations | 5,650 | 5,650 | 5,510 | 5,333 | 5,497 | 5,601 | 5,601 | 5,464 | 5,288 | 5,449 |
| R-squared | 0.022 | 0.018 | 0.049 | 0.078 | 0.054 | 0.022 | 0.017 | 0.051 | 0.076 | 0.053 |
| Number of gsms | 1,289 | 1,289 | 1,286 | 1,281 | 1,285 | 1,276 | 1,276 | 1,273 | 1,268 | 1,272 |

Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A7: Parental Behaviors on Casino and Percent Indian Household by Census Tract

| VARIABLES | (1) Adequate Parental Supervision? | (2) Enjoyable Relationship with Parent? | (3) Poor relationship between parents? | (4) Arguments with Parent | (5) Adequate Parental Supervision? | (6) Enjoyable Relationship with Parent? | (7) Poor relationship between parents? | (8) Arguments with Parent |
|---|---|---|---|---|---|---|---|---|
| Casino Payment? | 0.0785 | 0.170** | -0.114 | -7.836** | 0.0727 | 0.162* | -0.100 | -10.11*** |
| | (0.0613) | (0.0832) | (0.0947) | (3.934) | (0.0617) | (0.0833) | (0.0930) | (3.110) |
| Casino x Perecent AI Head of Household in Census Tract | 0.000486 | -0.000110 | -0.000218 | -0.0204 | | | | |
| | (0.000662) | (0.000542) | (0.00121) | (0.0385) | | | | |
| Casino x Residing on Reservation | | | | | 0.0377 | 0.000971 | -0.0344 | 1.766 |
| | | | | | (0.0433) | (0.0342) | (0.0805) | (1.602) |
| Number of Children Less than 6 years old in Household | -0.00957 | -0.0180 | -0.00109 | 0.0863 | -0.00971 | -0.0182 | -7.59e-05 | -0.0199 |
| | (0.00990) | (0.0142) | (0.0167) | (0.636) | (0.00995) | (0.0142) | (0.0167) | (0.643) |
| Constant | 1.972*** | 1.862*** | 0.557*** | 11.98*** | 1.972*** | 1.862*** | 0.557*** | 11.77*** |
| | (0.0227) | (0.0307) | (0.0337) | (1.768) | (0.0230) | (0.0310) | (0.0339) | (1.767) |
| Observations | 4,722 | 5,078 | 5,215 | 5,639 | 4,679 | 5,030 | 5,169 | 5,590 |
| R-squared | 0.013 | 0.008 | 0.035 | 0.011 | 0.013 | 0.008 | 0.036 | 0.011 |
| Number of gsms | 1,168 | 1,219 | 1,276 | 1,289 | 1,156 | 1,206 | 1,263 | 1,276 |

Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A8: Individual Fixed Effects Regression by Initial Household Poverty Status

| Panel A: Not in Poverty | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Behavioral Disorder Symptoms | Emotional Disorder Symptoms | Conscientiousness | Agreeableness | Neuroticism |
| Casino Payment? | -0.242* | -0.0661 | 0.348* | 0.442* | -0.0798 |
| | (0.141) | (0.176) | (0.211) | (0.246) | (0.313) |
| Initially in Poverty? | N | N | N | N | N |
| Observations | 3,579 | 3,579 | 3,492 | 3,402 | 3,485 |
| R-squared | 0.020 | 0.021 | 0.055 | 0.086 | 0.056 |
| Number of gsms | 806 | 806 | 806 | 802 | 805 |

Note: Individual Fixed Effects, American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

| Panel B: Initially in Poverty | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Behavioral Disorder Symptoms | Emotional Disorder Symptoms | Conscientiousness | Agreeableness | Neuroticism |
| Casino Payment? | -0.182 | -0.478** | 0.271 | 0.539** | 0.482* |
| | (0.173) | (0.201) | (0.221) | (0.267) | (0.273) |
| Initially in Poverty? | Y | Y | Y | Y | Y |
| Observations | 2,471 | 2,471 | 2,401 | 2,293 | 2,395 |
| R-squared | 0.023 | 0.028 | 0.039 | 0.075 | 0.057 |
| Number of gsms | 599 | 599 | 596 | 594 | 595 |

Note: Individual Fixed Effects, American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A9: Individual Fixed Effects Regression by Number of American Indian Parents

| VARIABLES | (1) Behavioral Disorder Symptoms | (2) Emotional Disorder Symptoms | (3) Conscientiousness | (4) Agreeableness | (5) Neuroticism |
|---|---|---|---|---|---|
| Casino Payment: First American Indian Parent? | -0.233** | -0.327** | 0.330** | 0.454*** | 0.372** |
| | (0.108) | (0.129) | (0.144) | (0.175) | (0.187) |
| Casino Payment: Second American Indian Parent? | -0.0443 | -0.116 | 0.130 | 0.172 | 0.0431 |
| | (0.0685) | (0.0877) | (0.0869) | (0.108) | (0.136) |
| Observations | 6,050 | 6,050 | 5,893 | 5,695 | 5,880 |
| R-squared | 0.020 | 0.019 | 0.045 | 0.077 | 0.052 |
| Number of gsms | 1,405 | 1,405 | 1,402 | 1,396 | 1,400 |

Note: Individual Fixed Effects, American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A10: Individual Fixed Effects Regressions on Behavior and Emotional Disorders by Source of Reporting

| VARIABLES | (1) Behavioral Disorder Symptoms: Both Reports | (2) Emotional Disorder Symptoms: Both Reports | (3) Behavioral Disorder Symptoms: Parent Report Alone | (4) Emotional Disorder Symptoms: Parent Report Alone | (5) Behavioral Disorder Symptoms: Child Report Alone | (6) Emotional Disorder Symptoms: Child Report Alone |
|---|---|---|---|---|---|---|
| Casino Payment? | -0.180* | -0.292** | -0.237** | 0.0503 | -0.138 | -0.293** |
| | -0.109 | -0.137 | -0.103 | -0.147 | -0.136 | -0.139 |
| Observations | 6050 | 6050 | 6050 | 5809 | 6050 | 6050 |
| R-squared | 0.019 | 0.019 | 0.013 | 0.027 | 0.008 | 0.014 |
| Number of gsms | 1405 | 1405 | 1405 | 1396 | 1405 | 1405 |

Note: Includes number of children less than 6 years of age, a constant and Individual Fixed Effects, American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A11: Effects of Welfare Reform on Observed Outcomes by Single Parent Status

| VARIABLES | (1) Behavioral Disorder Symptoms | (2) Emotional Disorder Symptoms | (3) Conscientiousness | (4) Agreeableness | (5) Neuroticism |
|---|---|---|---|---|---|
| Casino Payment? | -0.149 | -0.271* | 0.324** | 0.398** | 0.215 |
| | (0.118) | (0.144) | (0.152) | (0.191) | (0.217) |
| Single Parent x Casino Payment | -0.111 | -0.0743 | -0.0688 | 0.0524 | 0.185 |
| | (0.111) | (0.103) | (0.129) | (0.115) | (0.115) |
| Observations | 6,050 | 6,050 | 5,893 | 5,695 | 5,880 |
| R-squared | 0.020 | 0.019 | 0.045 | 0.077 | 0.052 |
| Number of gsms | 1,405 | 1,405 | 1,402 | 1,396 | 1,400 |

Note: Includes number of children less than 6 years of age, a constant and Individual Fixed Effects, American Indian Trend and Age Fixed Effects and Standard errors clustered at the individual level provided in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A12: Comparison of Economic Characteristics with other American Indian Tribes

| | Eastern Cherokee | Other Tribes | African Americans |
|---|---|---|---|
| Percent of Age 25+ with a high school degree | 0.63 | 0.61 | 0.63 |
| Unemployment Rate | 0.108 | 0.104 | 0.129 |
| Per Capita Income | 6944 | 6611 | 8859 |

Note: Data from 1990 US Census for American Indian Reservations. Dollar figures are reported in 1989$. Source: Social Explorer and 1990 Characteristics of the Black Population, 1990 CP-3-6.

Table A13: Three-Month Prevalence Rates of Psychiatric Disorders, by Sex and Ethnic Group

| | American Indian | | White | |
|---|---|---|---|---|
| | % | SE | % | SE |
| Separation Anxiety | 4.6 | 1.2 | 3.3 | 0.8 |
| Any Anxiety Disorder | 5.3 | 1.3 | 5.6 | 1 |
| Any Depressive Disorder | 0.3 | 0.3 | 1.5 | 0.5 |
| Conduct or Oppositional Disorder | 6.5 | 1.4 | 5.3 | 0.8 |
| Attention deficit hyperactivity disorder | 1.2 | 0.6 | 1.9 | 0.4 |
| Substance abuse or dependence | 1.2 | 0.6 | 0.1 | 0.1 |
| Any tic disorder | 1.9 | 0.8 | 4.2 | 1 |
| Enuresis or Ecopresis | 4 | 1.1 | 4.8 | 0.9 |
| Core Disorders | 13.3 | 1.9 | 12.2 | 1.3 |
| More than one disorder | 3.1 | 1 | 3.1 | 0.6 |
| Any disorder | 16.7 | 2.1 | 19.2 | 1.7 |

Source: Costell, E. Jane, Elizabeth Farmer, Adrian Angold, Barbara Burns and Alaattin Erkanli. 1997. "Psychiatric Disorders among American Indian and White Youth in Appalachia: The Great Smoky Mountains Study." American Journal of Public Health. Volume 87, No. 5, pp. 827-832.