

# 2019 Longitudinal Intergenerational Poverty Research

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## ABSTRACT

Intergenerational poverty (IGP) affects over 70,000 individuals in the state of Utah. IGP is a major economic, legislative, and social concern. In addition, exposure to toxic stress during childhood, cultural and geographic isolation, and an inability to obtain a stable job or education, among other social and political factors, increases the transmission of poverty from generation to generation. In Utah, IGP is defined by public assistance usage: 12 months or more of public assistance as both a child and as an adult. This research aims to identify demographic, workforce, and education factors that increase the probability of experiencing IGP in Utah. Specifically, adults experiencing IGP from the 2012–2018 cohort are compared to a reference group of adults that have used public assistance for a significantly shorter length of time during their lives than those experiencing IGP (during childhood and/or adulthood). Logistic regression is used to understand how predictors of IGP, such as racial/ethnic background, gender, age, and educational level impact the probability that an individual will experience IGP. The results of this model suggest that being female, Native American, and/or having no education beyond the high school level increases the probability that an individual will experience IGP in the state of Utah. Furthermore, the longer an individual spends on public assistance as a child, the more likely they are to continue experiencing poverty in their adult lives. Comparisons of college GPA, average annual wages, and workforce attachment are also performed using linear models. Adults experiencing IGP experience lower college GPA attainment, lower wages, and lower workforce attachment than the reference adults. Cumulatively, these results suggest that children experiencing IGP (of any demographic background), women, poorly educated people, and Native Americans should be the target of public policies intended to break the cycle of poverty and reduce IGP in Utah.

## KEYWORDS

Intergenerational poverty (IGP); transmission of poverty; State of Utah; public assistance usage; welfare dependency

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## 1 | INTRODUCTION

Since the conception of Utah's Intergenerational Poverty (IGP) initiative in 2012, the commission has produced an annual report to analyze data and provide an update on the adults and children experiencing IGP or considered at-risk in Utah. The annual report utilizes data from multiple government agencies and provides an update on the progress of the Intergenerational Welfare Reform Commission's five- and 10-year plan. Following the 2018 annual report, the commission identified the need for a study to analyze the longitudinal data of the cohort of individuals originally identified as IGP in 2012. This study addresses that need through a literature review of national studies to better understand key factors that lead to IGP and the longitudinal data analysis of Utahns experiencing IGP.

IGP is of increasing public and legislative concern statewide. While Utah as a whole continues to experience high economic growth, leading to low unemployment rates, both in relative and absolute terms, many people in Utah continue to suffer from IGP-effectively unbenefitted by the economic expansion of the 2010s. In Utah, people are said to experience IGP if they spend 12 or more months consuming public assistance as an adult and 12 months or more as a child. Children experiencing IGP are those that received at least one month of public assistance in 2012 and have an adult on their case file that is in the IGP cohort. This report focuses on the 2012 cohort of adults and children experiencing IGP, which consists of 30,503 Utah adults. The 2012 cohort of children experiencing IGP consists of 44,261 individuals. The 2012 IGP cohorts are used in this study to employ a longitudinal analysis. Past IGP reports only capture snapshots of IGP, thus, the 2019 report leverages a novel data analysis approach. This longitudinal approach will ideally provide a fuller understanding of the lives of individuals experiencing IGP.

This research leverages longitudinal data from multiple state agencies to identify demographic, educational, and workforce predictors of IGP in Utah. Ultimately, many of these predictors, or factors, influence the transmission, or lack of transmission, of human capital from one generation to the next, which impacts workforce success in adulthood. This research also examines how IGP impacts earnings (wages) and workforce attachment in the Utah economy. Specifically, the following questions are addressed: 1) What demographic circumstances are associated with increased occurrence of IGP in the State of Utah? 2) How educated are individuals experiencing IGP? 3) What degree/certificate types are adults experiencing IGP earning and how do they perform in higher education (GPA attainment)? 4) How do adults experiencing IGP interact with the

Utah workforce? Summary statistics for 2012 IGP cohort adults from 2012-2017, such as wage, workforce attachment, and public healthcare data, for each individual remaining in the IGP cohort following 2012 are also included. Finally, a summary of data available on the 2012 cohort of children experiencing IGP is provided.

The following literature review provides an overview of external research on intergenerational poverty or cyclical poverty and builds foundational context for audiences to interpret research results. With an understanding of poverty research in other regions, states, and countries provided by the literature review, the results of the following research can be more accurately interpreted by audiences. Moreover, citation of experts in the field of poverty research increases the credibility of the research conducted in this research.

### 1.1 | Literature Review

Intergenerational poverty is a global social and economic concern that has been studied by a variety of political and social science groups. The predictors of IGP and its modes of persistence in society are varied, context and population dependent, and consist of social, geographic, and financial circumstances. Furthermore, it is probable that a combination of these factors leads to an increase in IGP rates, as many of these factors have known additive effects on socioeconomic status.

In the primary literature, IGP has been theorized to persist in four different ways (Corcoran 1995). The first theory of IGP persistence is the Resources model. This theory predicts that disadvantaged schools, neighborhood isolation, and female hardship lead to increases in IGP rates. The second model, the Correlated Disadvantages model, posits that it is not poverty itself that creates disadvantages for people, but instead that the associated disadvantages of poverty increase transmission across generations, ultimately through lack of transmission of human capital. The Welfare Culture model, the third, predicts that when the social stigma of using assistance is removed in isolated -geographically or demographically- populations, rates of use increase, which ultimately increases rates of poverty. Further, economic incentives for using welfare may be high as a result of policy decisions and lack of economic opportunity in some locations. However, the existence of a 'welfare culture' is difficult to prove due to the cyclical nature of poverty in people that experience IGP. Lastly, the Underclass model hypothesizes that IGP exists due to discrimination against minorities that inhibits their upward societal mobility (Corcoran 1995). Lastly, the Underclass model hypothesizes that IGP may exist due to minorities being inhibited in their upward societal mobility



(Corcoran 1995).

In studies employing longitudinal data, factors that influence rates of IGP, or predictors of IGP, are broadly grouped into three categories of capital: human, financial, and social/political. Studies of IGP incorporating longitudinal data sets are becoming more common because they provide more insights than simple descriptive statistics of an entire population. By tracking individuals or households that experience IGP through the years, a greater understanding of the causes and correlated predictors of IGP can be obtained. The persistence of IGP has been most widely studied in longitudinal datasets with respect to human capital predictors (e.g.: education levels). Access to quality education (de Vuijst et al. 2017), and the socioeconomic status of neighborhoods and families are two strong predictors of poverty transmission (Van Ham et al. 2014, de Vuijst et al. 2017). Additionally, toxic exposure to stress during early childhood brought upon families experiencing poverty is thought to cause developmental delays and neurological problems in young children, which can increase the likelihood that children will grow up to be poor adults (Sampson et al. 2017; Hanson et al. 2013). Many studies have quantified a strong correlation between being poor as a child and being poor as an adult (Moore 2003; Green & Hulme 2005; Corak 2006). Other facets of human capital that influence IGP include young parenthood, single parenthood (Van Ryzin et al. 2011; Bloome 2017), and general health. Young and single parents frequently have limited time to spend nurturing children, which increases chances that children will have limited social skills. Poor health limits the amount of work that individuals can successfully perform and depletes financial resources. Cumulatively, these factors may decrease soft skill development during childhood and may limit children's ability to successfully develop positive personal relationships in their adult lives. In turn this limits children's future ability to acquire and maintain employment.

Social and political capital influence the rate of IGP in many populations. Discrimination based on race, ethnicity, gender, and religion may prevent access to quality education and high level careers. Living in

rural areas increases social exclusion and increases the probability that individuals will have poor social relationships, leading to higher rates of poverty. Policy decisions, such as road and infrastructure decision biases can also influence rates of poverty. Low income in rural areas also leads to limited availability of funds for public schools, which can decrease the quality of education of these individuals that live in rural areas. Human and social factors can create additive tension on already stressful financial situations of households. Financial stress, in turn, increases transmission of debts from one generation to the next and decreases transmission of assets. In sum, factors that increase poverty in general act concurrently to increase the likelihood that children from impoverished families will grow up to be poor adults, thus inheriting poverty from the previous generation.

## 2 | METHODS

### 2.1 | Data

Data for this project were gathered from a variety of sources. Demographic (race, gender, age, highest educational attainment level, location of residence, and mental health data) and public assistance usage data (in number of months) were provided by the Management Information Systems (MIS) sub-division in the Division of Workforce Research and Analysis (WRA) in the Department of Workforce Services (DWS). Education performance and degree type data were provided by Utah State Higher Education (USHE) and Utah System of Technical Colleges (UTech). Wage data were sourced from the DWS wage record database. These data were integrated through the Utah Data Research Center (UDRC). Adults and children experiencing IGP in 2012 were tracked through 2017 to understand persisting factors of poverty. It should be noted that if individuals moved out of state any time after 2012, they are not included in the data following their move from Utah, since this study only uses data from Utah. Adults were aged 21-41, and children were aged 0-18. To perform statistical analyses, a 'reference' cohort of adults that used public assistance for 11 months or

**Table 1:** Months of public assistance use for individuals experiencing IGP and reference group.

\*Note that reference group adults may have used 12 months of public assistance as adults as long as they used less than 12 months of public assistance as children.

	<b>IGP</b>	<b>Reference*</b>
<b>Childhood public assistance use</b>	> 12 months	< 12 months
<b>Adulthood public assistance use</b>	> 12 months	Any number of months



less as adults was constructed (Table 1). Reference group adults may also have used public assistance for 12 months as long as they used public assistance for less than 12 months as children. Aside from this restriction, adults in the reference group may have used public assistance for any length of time, including no time, as children. This reference cohort of adults was also tracked longitudinally from 2012 – 2017. Children experiencing IGP are defined as those with an adult caregiver that is also experiencing IGP and that files for public assistance usage for them.

## 2.2 | Data Analysis

### 2.2.1 | Demographics

Data summaries were tabulated for adults experiencing IGP, reference adults, and children experiencing IGP. Race/ethnicity, gender, age, health coverage data, housing situation, county of residence, veteran status, and criminal history background data were summarized for IGP and reference group adults and IGP. Total number of individuals reporting each demographic data point were summed and calculated as a percent of the entire IGP or reference group populations within each category or county. Percentage of IGP individuals in each county were calculated using US Census Bureau population estimates for 2017. Data summarized for children experiencing IGP include gender, race/ethnicity, county of residence, and age. The number of individuals dropping out of the IGP records following 2012 and the number of individuals continuing to receive public healthcare (Medicaid or veteran's coverage) were also calculated.

### 2.2.2 | Education

Education level for each adult individual was extracted from DWS databases. Individuals who earned less than a high school level of education were grouped together into a single factor level- 'Less than High School (HS)'. Those who earned a high school diploma or GED were grouped into a single factor level - 'High School (HS) Level.' Individuals who earned an associate, bachelors, or attended/ graduated from graduate school were grouped into a single college attendance category. The final education factor levels were: less than HS, HS level, certificate, college (associate - graduate), and none/ unknown.

GPA data reported from USHE institutions were matched with IGP data and then averaged for each individual to obtain an estimate of performance for each study individual that attended a USHE institution at some point. Two OLS linear models were used to test for differences between average USHE GPA in adults experiencing IGP and reference adults.

In these models, race/ethnicity and gender were included as independent (fixed effects) variables, to reference for known variables affecting college performance. A separate factor for each race and ethnicity was included since some individuals had multiple reported races or ethnicities. Separate models with and without interactions between IGP status, gender, IGP status, and race were fit for ease of interpretation in a non-expert audience. Model formulas were as follows (race/ethnicity is abbreviated to one variable):

*no interactions: USHE GPA ~ race/ethnicity + gender + IGP status*

*interactions: USHE GPA ~ race/ethnicity x IGP status + gender x IGP status*

We tested for collinearity in the linear model excluding interaction terms by calculating variance inflation factors (VIFs). There were no VIF values greater than 1.30, so no collinearity was assumed in the selected dataset.

Finally, the top three Classification of Instructional Programs (CIP) codes for both individuals experiencing IGP and reference adults were calculated to determine which fields of work study individuals aim to enter after completing degrees.

### 2.2.3 | Wages and Workforce Attachment

Total annual wages and number of quarters employed was calculated for each individual for the years in 2012 – 2018. Number of quarters worked and annual wages were averaged across 2012-2018 to obtain a single data point for each study individual. Individuals who earned no wages during a single year are included in wage summaries. Similarly, those individuals who did not work in a single year or in any years (value of '0' for workforce attachment) are included in workforce attachment summary averages (2012-2018). It should be noted that some individuals in our study may earn income that is not reported in the wage record.

To explore the effects of IGP on wage earnings and the Utah workforce, OLS linear models were fit. Two separate models with average annual wage and average workforce attachment as dependent variables were fit: with and without interactive terms. Race, gender, and IGP status were included as independent variables. For race and ethnicity, a separate factor was included for each race and ethnicity, since some individuals reported multiple races or ethnicities. Interactions were included for race and IGP status and gender and IGP status since these interactions are known to have strong implications for an individual's educational experience and per-



formance. In interaction term models, interactions between race and IGP status and gender and IGP status were included. Separate non-interactive and interactive term models were fit to facilitate ease of interpretation for non-experts. Model formulas were as follows (race/ethnicity is abbreviated to one variable):

*no interactions:  $\mu$  wage/ $\mu$  workforce attachment ~ race/ethnicity + gender + IGP status*

*interactions:  $\mu$  wage/ $\mu$  workforce attachment ~ race/ethnicity x IGP status + gender x IGP status*

Average annual wages were square-root transformed to increase residual error normality—a standard procedure in the economics literature. Due to the high number of zeroes in the wage record data and workforce attachment data, normality could not be completely attained in the data set. However, given the large sample size (n=48,176), the bias in parameter estimate is likely very small. We tested for collinearity in the model without interaction terms by calculating VIFs. There were no VIFs values greater than 1.30, so no collinearity was assumed in the selected dataset.

Average annual wages for adults experiencing IGP and reference adults in the 2012 IGP cohort were tracked from 2012 -2018. The number of adult individuals from the 2012 cohorts (both reference and IGP) earning wages in four quarters of every year from 2012 to 2018 was also calculated.

## 2.2.4 | Logistic Regression Analysis

To determine the strongest demographic, education, and workforce data predictors of experiencing IGP, a logistic regression model was employed. Logistic regression was chosen for ease of interpretation of model results. IGP status was coded in a binary variable as 0/1, with unity (1) assigned to IGP individuals. Variables included in the regression model were: childhood months on public assistance (scaled by subtracting the mean and dividing by standard deviation), gender, age, educational attainment, average number of quarters worked per year from 2012-2018 (workforce attachment), race/ethnicity, felon status, criminal misdemeanor status, suspected domestic violence, suspected substance abuse, and veteran status (or spousal veteran status) (Y/N). The logistic model formula was written as follows:

*IGP(0/1) ~ Race + ethnicity + age + gender + workforce attachment + education level + childhood months of public assistance usage + felon status + misdemeanor status + possible domestic violence + possible substance abuse + veteran status (Y/N)*

For race and ethnicity, dummy variables were created since some individuals reported more than one race and ethnicity. For education level, no education/unknown education was used as the reference factor in the logistic regression. None/unknown education level are coded as the same factor in the raw data, so they could not be separated out. Models with and without interactions for gender & race, gender & education level, and gender & felon/misdemeanor records were fit. Some available variables, such as health care and housing situation, could not be included in the final regression model as there existed too many missing data points. Ideally, county of residence would have been included in the model, but there are too many counties in Utah to include this as a factor analysis. Additionally, health coverage data could not be included in this analysis since Medicaid usage is confounded with IGP status for many individuals. Wage data are not included in the logistic regression either as they are highly correlated with workforce attachment data. A Tukey's posthoc adjustment was performed on education level to determine significant differences between education levels. We tested for collinearity in the logistic regression model without interaction terms by calculating VIFs. There were no VIF values greater than 1.30, so no collinearity was assumed in the selected dataset.

All analyses were performed in R v. 3.5.2 (R Core Team 2019), and significance was set at  $P < 0.05$ . In all of the above models, the data are zero-inflated, so our results theoretically may be biased due to heteroskedasticity. However, our sample size was very large (n=48,176), so the bias in error is unlikely to have meaning. As a result, we chose to use the simplest model linear modeling results in standard OLS linear format.

## 3 | RESULTS

### 3.1 | Demographics

In Utah, many more females experience IGP than males - 66.97% of Adults experiencing IGP in 2012 were female and 31.92% were male. For reference, US Census estimates for 2018 indicated Utah is 49.6% female and 50.4% male (US Census Bureau 2019). Adults experiencing IGP are primarily white (68.49%), followed by Native American (5.89%), Black (2.36%), Asian (0.79%), and other races (0.61%). 21% of adults experiencing IGP reported no race. This



**Table 2:** Number of adults experiencing IGP from the 2012 cohort by year.

Year	Number of Adults Exp. IGP	% of 2012 IGP Cohort
2012	30,503	100
2013	25,613	83.97
2014	22,961	75.27
2015	22,502	73.77
2016	22,493	73.74
2017	23,223	76.13

**Table 3:** Number of children experiencing IGP from the 2012 cohort by year.

Year	Number of Children Exp. IGP	% of 2012 IGP Cohort
2012	44,261	100
2013	36,685	82.88
2014	32,053	72.42
2015	29,855	67.45
2016	27,671	62.52
2017	25,724	58.12

large quantity of unknown race data may explain some of the discrepancy between race of individuals experiencing IGP and census estimates. 2018 US Census estimates indicates the entire Utah population is 90.7% White, 1.4% Black, 1.5% Native American, 2.7% Asian, 1.1% Native Hawaiian or Pacific Islander, and 14.2% Hispanic (US Census Bureau 2019). Adults experiencing IGP are primarily non-Hispanic - 13.63% of adults reported a Hispanic ethnicity. This varies from the total state population: according to US Census estimates, about 18% of the population in Utah is Hispanic (United States Census Bureau 2018). Adults experiencing IGP tend to be younger than adults in the reference group (29 and 31 on average, respectively) (Fig. 1).

Reference group adults were more evenly split across genders (49.1% male and 50.6 % female). Reference group adults were also primarily white (67.95%), followed by Native American (2.14%), Black (1.92%), Asian (1.64%), Pacific Islander (1.31%), and other race (0.49%). 24.55% of reference group results had unknown racial backgrounds. Reference group adults are primarily non-Hispanic - 11.09% of reference group adults reported a Hispanic ethnicity. The number of adults in the 2012 IGP cohort continuing to experience IGP generally decreased from 2012-2017 (Table 2). The proportions of races within the reference group also vary from the estimated census race data for the entire state. However, this

could be due to the large number of individuals with unknown race.

Children experiencing IGP are also primarily white (59.73%), followed by Native American (6.65%), Black (2.69%), Pacific Islander (1.48%), Asian (0.79%), and other race (0.31%). 28.35% of children experiencing IGP had unknown racial backgrounds. Many children experiencing IGP are newborns or infants, but the gender breakdown for children is more evenly spread across genders than for adults experiencing IGP (48.71% of children experiencing IGP are male, and 51.29% of children experiencing IGP are female). The number of children from the 2012 IGP cohort continuing to experience IGP after 2012 generally decreased on an annual basis (Table 3). Most children experiencing IGP fall between the ages of 0 and 10, and split evenly across genders (Fig. 2). The three counties with the highest percentage of children experiencing IGP are Salt Lake County, Weber County, and Utah County (Table 4).

While most adults experiencing IGP live in these three counties since these counties (Salt Lake, Weber, and Utah) also have some of the highest populations. The county with the highest rate of adults experiencing IGP is San Juan County -12.80% of the San Juan County population was experiencing IGP in 2012. (Table 4). Carbon County and Sevier County also experience high rates of IGP (6.75% and 5.50%, respectively) (Table 4).



**Table 4:** Adults experiencing IGP, child, and references adults count, and percent of each demographic group by county. Population percentage estimates were calculated using 2017 US Census population estimates.

County	IGP (Number)	Reference (Number)	IGP (%)	Reference (%)	Children (Number)	Children (%)	2017 Census Population est.	% IGP of total pop	% Reference of Total Pop
Beaver	69	35	0.23	0.20	132	0.30	6,386	3.15	0.55
Box Elder	589	285	1.93	1.61	908	2.05	54,079	2.77	0.53
Cache	834	648	2.73	3.67	1,309	2.96	124,438	1.72	0.52
Carbon	617	140	2.02	0.79	752	1.70	20,295	6.75	0.69
Daggett	4	3	0.01	0.02	4	0.01	1,029	0.78	0.29
Davis	2,340	1,517	7.67	8.58	3,557	8.04	347,637	1.70	0.44
Duchesne	350	87	1.15	0.49	525	1.19	20,026	4.37	0.43
Emery	144	43	0.47	0.24	241	0.54	10,077	3.82	0.43
Garfield	43	24	0.14	0.14	65	0.15	5,078	2.13	0.47
Grand	169	82	0.55	0.46	271	0.61	9,674	4.55	0.85
Iron	714	363	2.34	2.05	1,194	2.70	51,001	3.74	0.71
Juab	135	62	0.44	0.35	258	0.58	11,250	3.49	0.55
Kane	53	52	0.17	0.29	84	0.19	7,567	1.81	0.69
Millard	180	76	0.59	0.43	304	0.69	12,863	3.76	0.59
Morgan	22	30	0.07	0.17	35	0.08	11,873	0.48	0.25
Out of State	208	364	0.68	2.06	392	0.89			
Piute	15	5	0.05	0.03	36	0.08	1,420	3.59	0.35
Rich	9	14	0.03	0.08	22	0.05	2,391	1.30	0.59
Salt Lake	11,539	6,729	37.83	38.08	15,723	35.52	1,135,649	2.40	0.59
San Juan	753	144	2.47	0.81	1,213	2.74	15,356	12.80	0.94
Sanpete	409	144	1.34	0.81	665	1.50	30,035	3.58	0.48
Sevier	458	140	1.50	0.79	714	1.61	21,316	5.50	0.66
Summit	53	76	0.17	0.43	62	0.14	41,106	0.28	0.18
Tooele	835	436	2.74	2.47	1,232	2.78	67,456	3.06	0.65
Uintah	534	163	1.75	0.92	909	2.05	35,150	4.11	0.46
Utah	3,474	2,922	11.39	16.53	5,333	12.05	606,425	1.45	0.48
Wasatch	87	110	0.29	0.62	141	0.32	32,106	0.71	0.34
Washing- ton	1,356	1,168	4.45	6.61	2,430	5.49	165,662	2.29	0.71
Wayne	26	16	0.09	0.09	25	0.06	2,719	1.88	0.59
Weber	4,145	1,738	13.59	9.83	5,715	12.91	251,769	3.92	0.69
Unknown	339	57	1.11	0.32	10	0.02			



Rates of criminal offense tend to be higher in adults experiencing IGP. In Utah, 7.15% of adults experiencing IGP were convicted felons in 2012 and 12.44% of adults experiencing IGP had misdemeanors on their records. Comparatively, only 3.30% of reference group adults were convicted felons in 2012 and 4.65% of reference adults had misdemeanors on their records. The housing situation of many IGP and reference adults is unknown, but renting is the most common housing option for both of these groups, followed by 'living with other.' (Table 5).

Available health care coverage data among IGP individuals is sparse, but many adults experiencing IGP are covered by Medicaid (27.12%) since Medicaid qualifies as public assistance and thus is part of the definition of IGP in Utah. The rate of Medicaid coverage for adults experiencing IGP was much higher

than reference adults (7.34%). The health coverage of 51% of IGP individuals was unknown at the time of this report. Adults experiencing IGP are reported to experience higher rates of domestic violence, mental/emotional issues, and substance abuse. 13.19% of adults experiencing IGP experienced possible domestic violence, while only 4.31% of reference adults were possible domestic violence victims. 2.50% of adults experiencing IGP had possible mental or emotional issues, while 0.40% of reference adults had possible mental or emotional issues. The rate of possible substance abuse in adults experiencing IGP was more than double the rate in reference adults - 6.49% and 2.91%, respectively. The number of adults in the 2012 IGP cohort continuing to experience IGP after 2012 and receiving public health care coverage generally decreased through 2017 (Table 6).

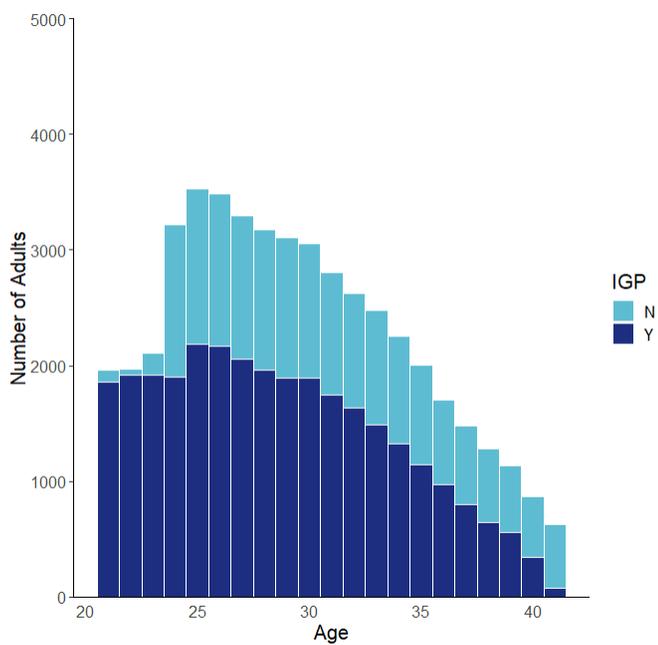
**Table 5:** Housing situation data summary (percentages of each population in housing type).

Housing Situation	IGP (Number of Indivs.)	Reference (Number of Indivs.)	IGP (%)	Reference (%)
Homeless	808	257	2.65	1.45
Living with other	5,849	1,542	19.18	8.73
Mortgage	237	186	0.78	1.05
Other	324	97	1.06	0.55
Own	173	64	0.57	0.36
Rent	6,259	1,826	20.52	10.33
Subsidized	1,637	107	5.37	0.61
Temp. Residence/Shelter	440	116	1.44	0.66
Unknown	14,776	13,478	48.44	76.26

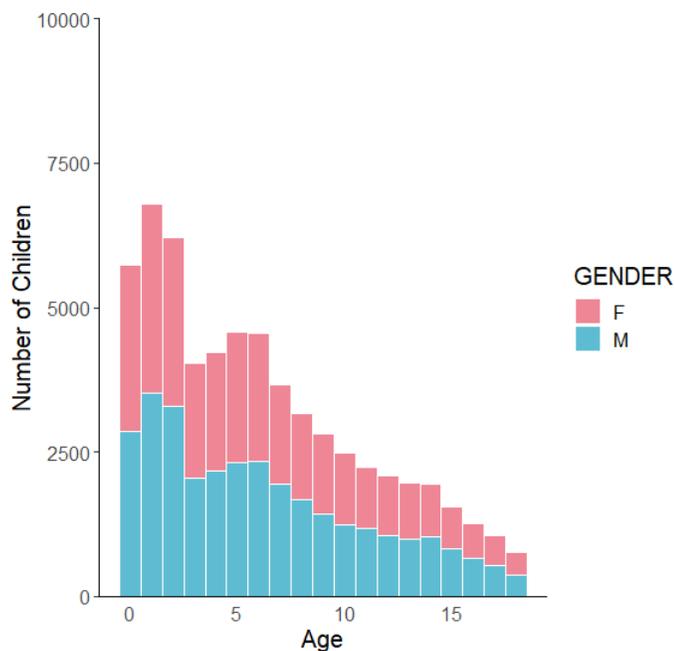
**Table 6:** Number and percent of adults in the 2012 IGP cohort with public health insurance (Medicaid or veteran coverage)

Year	Number of IGP on Medicaid or Veteran Health Insurance	% of 2012 cohort
2012	8,280	27.14
2013	6,932	22.73
2014	6,432	21.09
2015	6,320	20.72
2016	6,195	20.31
2017	6,175	20.24





**Figure 1:** Number of adults by age and IGP status (Y - experiencing IGP; N - reference group/not experiencing IGP).



**Figure 2:** Number of children experiencing IGP in 2018 by age and gender (M - male; F - female).

### 3.2 | Education

IGP individuals in our study tend to lack education beyond a high school level (52.70% have a high school level education), and many did not complete

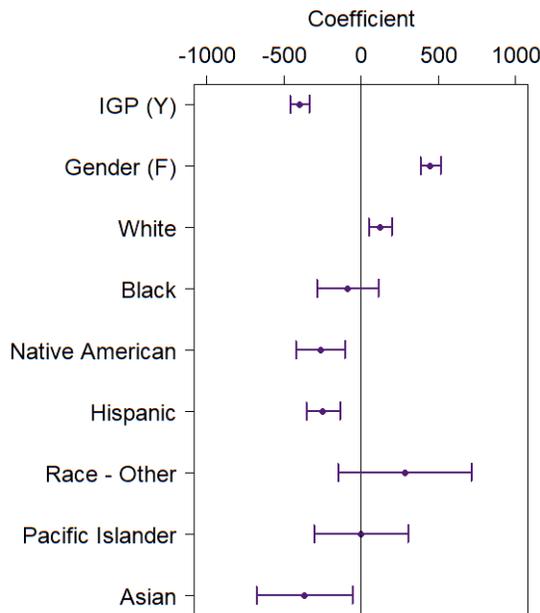
high school (21.10% lack a high school diploma or GED). Beyond a high school level, 6.71% of adults experiencing IGP have at least one college degree, and 7.27% have attended post-secondary school or have attended school for a certificate or completed a certificate. Comparatively, in the reference group, 11.10% of individuals have a less than high school education, 50.56% of individuals have a high school level education, 14.39% of individuals have at least one college degree, and 7.94% have post-secondary education or have attended school to obtain a certificate or have completed a certificate. Adults experiencing IGP also perform worse in USHE institutions compared to reference adults.

The results of the linear model with average GPA as the dependent variable indicated adults experiencing IGP earned significantly lower GPAs than reference adults (Fig 3, Table 7). Females performed much better in USHE institutions than their male counterparts. Out of the racial groups, Whites had the highest GPA scores, while Native Americans, Hispanics, and Asians scored the lowest GPAs (Fig. 3). Significant interactions from this linear model included gender\*IGP status and Race-White\*IGP status (Fig. A1). (Parameter estimates and confidence intervals for the interaction model can be found in Table A1.) While experiencing IGP, females had a more significant decline in USHE GPA than males did while experiencing IGP (Fig. A1a). Similarly, Whites saw a larger reduction in USHE GPA while experiencing IGP; however, the other races combined had lower baseline GPAs, so their reduction in GPA while experiencing IGP was lower, comparatively (Fig. A1b).

**Table 7:** Parameter estimates and 95 percent CIs of linear model of IGP and demographic effects on average USHE GPA

Independent Variables	Parameter Estimate (95% CI)
IGP(Y)	-398.07*** (-462.41, -333.73)
Gender(F)	448.34*** (383.28, 513.40)
White	122.04** (46.69, 197.38)
Black	-90.34 (-289.55, 108.88)
Native American	-264.72** (-423.95, -105.50)
Hispanic	-248.91*** (-357.34, -140.48)
Race - Other	283.03 (-149.60, 715.65)
Pacific Islander	0.70 (-302.84, 304.23)
Asian	-367.88* (-677.39, -58.37)
Observations	6629
R <sup>2</sup>	0.051





**Figure 3:** Effect and 95% confidence intervals of IGP, race and gender on USHE performance (average GPA of individuals that attended).

In general, adults experiencing IGP and reference group adults are earning similar degree types. The top three earned USHE degree CIP types for adults experiencing IGP were: 1) liberal arts and sciences, 2) general studies and humanities, health professions and related support, and 3) business, management, marketing and related support. For the reference group, the top three CIP categories were: 1) health professions and related support, 2) liberal arts and sciences, general studies and humanities, and 3) business, management, marketing and related support. A total of 679 adults experiencing IGP and 1118 reference adults in this cohort earned USHE degrees as of 2018. At UTECH institutions, the top three earned certificate categories for adults experiencing IGP were: 1) health professions and related support, 2) business management, marketing and related support, and 3) personal and culinary services. The top three earned CIP categories for reference adults at UTECH institutions were: 1) health professions and related support, 2) personal and culinary services, and 3) precision production. There were a total of 567 IGP and 346 reference adults that had completed UTECH certificates during 2012-2017.

### 3.3 | Wages and Workforce Attachment

On average, IGP individuals earned statistically significantly lower wages than reference adults (\$7,432 versus \$13,313, respectively, averaged across 2012-2018;  $t_{25172} = -46.06$ ,  $P < 0.001$ ). Annual wages for adults in the 2012 IGP cohort and the 2012 reference

cohort generally increased from 2012-2017 (Table 9). Adults experiencing IGP also have statistically significantly lower workforce attachment than reference group adults (1.81 quarters worked annually for adults experiencing IGP versus 2.01 quarters worked annually for reference adults, averaged across 2012-2018 for each study individual;  $t_{35200} = -15.31$ ,  $P < 0.001$ ). The results of the linear model for average wages indicate that women earn substantially less than men, and out of the reported races, (for all genders), Native Americans and Blacks, on average, earn the least. Pacific Islanders, Whites, and Hispanics had the highest reported wages (Fig. 4, Table 9). This linear model also indicated that those experiencing IGP earned substantially less wages than the reference group of individuals in our study (results of this linear model can be found in Table A2). Significant interactions in this model are illustrated in Fig. A2. Interactions between gender & IGP status, and interactions between races/ethnicities of White, Native American, Black, and Hispanic & IGP status were statistically significant ( $P < 0.05$ ). The strongest interaction effect on wages is experienced by Blacks - in general, their wages remain consistently low regardless of IGP status (flat slope), while other races earn significantly more if they are part of the reference group (not experiencing IGP).

**Table 8:** Annual Wages (in USD) for 2012 cohort adults experiencing IGP and reference group adults (2012-2018).

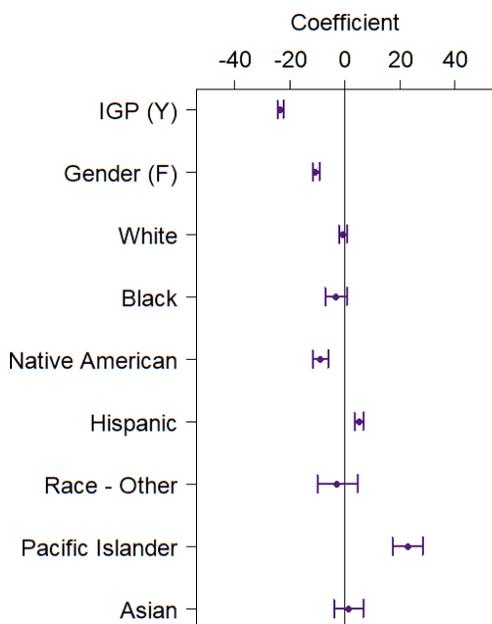
Year	IGP (AVG)	Reference (AVG)	IGP (Median)	Reference (Median)
2012	\$5,241	\$8,533	\$829	\$3,440
2013	\$5,991	\$10,434	\$915	\$3,844
2014	\$6,799	\$12,028	\$1,004	\$3,875
2015	\$7,576	\$13,804	\$1,300	\$4,514
2016	\$8,084	\$15,353	\$1,149	\$4,908
2017	\$8,653	\$16,627	\$1,146	\$4,610
2018	\$9,715	\$17,699	\$1,286	\$4,814
Average	\$7,437	\$13,497		

The number of 2012 IGP cohort individuals who earned wages year-round (four quarters) increased from 33.76% to 42.78% from 2012 to 2017 (Table 10). The results of the workforce attachment linear model indicate that adults experiencing IGP work significantly less than reference group adults, and that certain race/ethnic groups are more attached to the workforce than others (Fig. 5, Table 11). Significant interactions between race, gender, and IGP status on workforce attachment are illustrated in



Fig. A3. (Parameter estimates of this linear model on average workforce attachment including gender and race interactions can be found in Table A3.) Hispanics and Pacific Islanders were most attached to the workforce, and Native Americans were least attached to the workforce. Overall, females had lower workforce attachment than males. However, females in this study have a constant workforce attachment rate regardless of IGP status (gender\*IGP status

interaction), while men’s rates of workforce attachment varies much more according to IGP status (Fig. A3). Blacks and Hispanics displayed increased rates of workforce attachment compared to other races/ethnicities when they were IGP (Fig.8). Native Americans showed consistently lower rates of workforce attachment than other races regardless of IGP status (flat response slope) (Fig. A3).



**Figure 4:** 95% confidence intervals from linear model results with average wage in USD (2012 - 2018) as a dependent variable. Interaction terms were excluded for ease of interpretation.

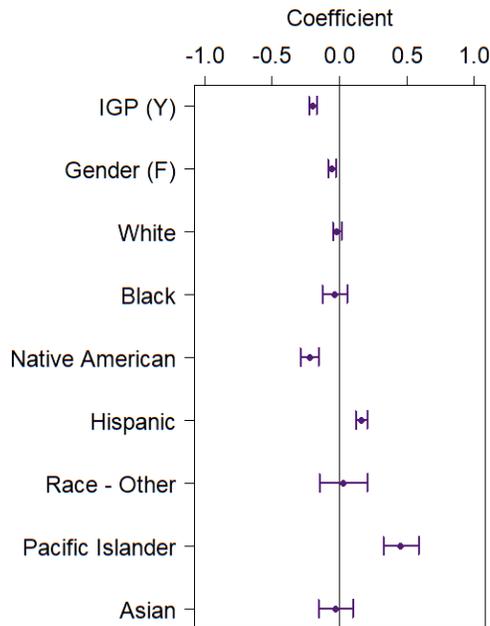
**Table 9:** Parameter estimates and 95 percent CIs of linear model of IGP and demographic effects on average wages from 2012-2018. \*p<0.05; \*\*p<0.01; \*\*\*p<0.001.

Independent Variables	Parameter Estimate (95% CIS)
IGP(Y)	-23.38*** (-24.54, -22.23)
Gender(F)	-10.52*** (-11.66, -9.38)
White	-0.80 (-2.11, 0.52)
Black	-3.26 (-7.10, 0.57)
Native American	-8.75*** (-11.55, -5.94)
Hispanic	5.10*** (3.45, 6.75)
Race - Other	-2.72 (-10.04, 4.60)
Pacific Islander	22.87*** (17.40, 28.34)
Asian	1.53 (-3.78, 6.84)
Observations	48,176
R <sup>2</sup>	0.05
Adjusted R <sup>2</sup>	0.05

**Table 10:** Adults employed for 4 quarters (2012-2018).

Employed four quarters	IGP (number)	Reference (number)	IGP (%)	Reference (%)
2012	8,502	5,966	27.87	33.76
2013	9,279	6,799	30.42	38.47
2014	9,744	7,112	31.94	40.24
2015	10,154	7,369	33.29	41.70
2016	10,397	7,653	34.09	43.30
2017	10,393	7,736	34.07	43.77
2018	10,729	7,561	35.17	42.78





**Figure 5:** 95% confidence intervals from linear model results on workforce attachment (average number of quarters worked annually). Interaction terms were excluded for ease of interpretation.

**Table 11:** Parameter estimates and 95 percent CIs of linear model of IGP and demographic effects on average workforce attachment from 2012-2018. \*p<0.05; \*\*p<0.01; \*\*\*p<0.001.

Independent Variables	Parameter Estimate (95% CIs)
IGP(Y)	-0.20*** (-0.23, -0.17)
Gender(F)	-0.06*** (-0.09, -0.03)
White	-0.02 (-0.05, 0.01)
Black	-0.04 (-0.13, 0.05)
Native American	-0.22*** (-0.29, -0.16)
Hispanic	0.16*** (0.12, 0.20)
Race - Other	0.03 (-0.15, 0.20)
Pacific Islander	0.45*** (0.32, 0.58)
Asian	-0.03 (-0.16, 0.10)
Observations	48,176
R <sup>2</sup>	0.01
Adjusted R <sup>2</sup>	0.01

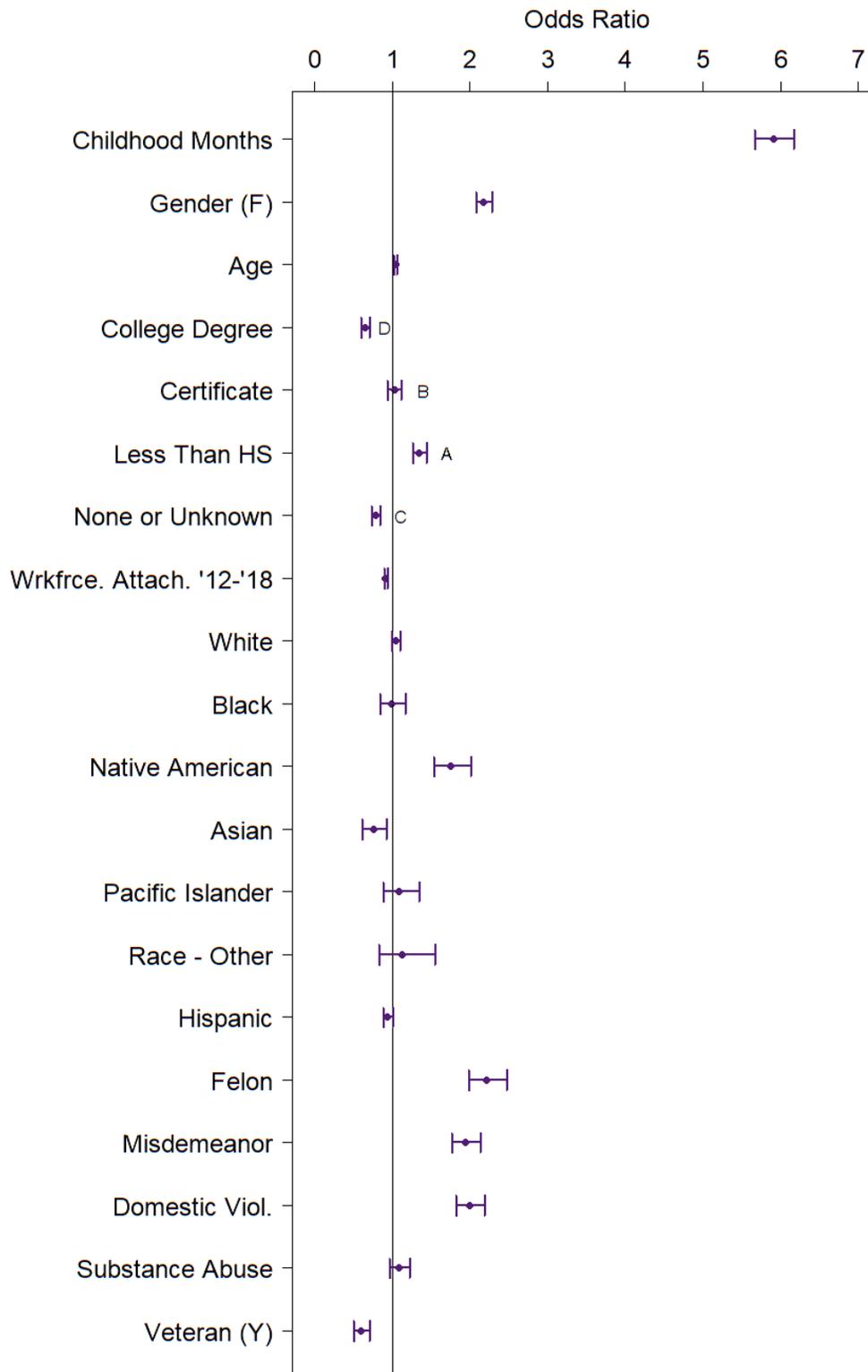
### 3.4 | Regression Analysis of IGP Predictors

A number of variables incorporated in the IGP regression model significantly increased the probability of an individual experiencing IGP (when excluding interactive model terms) (Fig. 6, Table 12). Most strongly related with experiencing IGP was the number of months an individual spent on welfare as a child. Females are more than twice as likely to experience IGP as males (Fig. 6), *ceteris paribus*. Obtaining a high level of education, specifically to a college level (associate, bachelor's or graduate level) significantly decreased risk of experiencing IGP (Fig. 6). Having less than a HS level of education increased risk of experiencing IGP compared to having a HS level of education or higher. However, possessing a post-secondary certificate had no effect on the risk of experiencing IGP compared to a HS level education. This result may arise from the over-representation of individuals experiencing IGP and possessing post-secondary certificates. Those with lower workforce attachment are more likely to experience IGP. Being Native American increased risk of experiencing IGP nearly twofold, while being Asian significantly decreased the risk of experiencing IGP. Those who were felons, had misdemeanors on their records, or were possible victims of domestic violence were more likely to experience IGP. Lastly, being a veteran decreased the odds of experiencing IGP (Fig. 6).

A full logistic regression model including interactions between gender & race, gender & education, and gender & criminal history was fit. The parameter estimates from this model can be found in Table A4. Female Pacific Islanders are slightly less likely to experience IGP than those who do not have Pacific Islander backgrounds (Fig 7). Male Pacific Islanders, however, were more likely to experience IGP than their non-Pacific Islander counterparts. Conversely, Black females are slightly more likely to experience IGP than females of other races - the interaction slope for gender and Black females is slightly positive, while it is negative for males (Fig. 7). However, Black males are less likely to be IGP compared to all other races (Fig. 6). The slope fit for workforce attachment and IGP for females was nearly flat, while for males, IGP rates decreased as their workforce attachment increased. All other significant race-by-gender interactions were related to magnitudes of increase in IGP rates - they did not have major differences in parameter signs.

Education interacted significantly with gender on multiple levels (Fig. 8). Males with high school level education displayed decreased rates of IGP from a less than HS education, while females retain similar rates of IGP regardless of HS completion. Males that completed a post-secondary certificate or attending courses to obtain a certificate have increased prob-





**Figure 6:** Odds ratios and 95% confidence intervals for IGP predictors. Significant interactions are plotted in Fig. A#. Letters next to education level represent Tukey's post-hoc significance ( $P < 0.05$ ) between education levels. All education levels were significantly different from "None or Unknown" education level, which is not plotted here because it was coded as the reference factor level. Parameters on the right hand side of the 0 axis marker line are those that are correlated with experiencing IGP. Parameters on the left hand side are correlated with the reference group, or those not experiencing IGP.



**Table 12:** Odds ratios and 95 percent confidence intervals for predictors from the logistic regression model with IGP as the response.

<b>Independent Variables</b>	<b>Parameter Estimates &amp; (95% CIs)</b>
Childhood Months	5.91*** (5.67, 6.17)
Gender - Female	2.17*** (2.07, 2.28)
Age	1.04** (1.02, 1.07)
Education - College	1.03 (0.94, 1.12)
Education - Certificate	0.65*** (0.60, 0.70)
Education - Less than High School	1.34*** (1.26, 1.44)
Education - None or Unknown	0.78*** (0.73, 0.84)
Workforce Attachment	0.91*** (0.89, 0.93)
White	1.05 (0.99, 1.10)
Black	0.99 (0.84, 1.17)
Native American	1.76*** (1.53, 2.01)
Asian	0.75** (0.61, 0.93)
Pacific Islander	1.09 (0.88, 1.34)
Race - Other	1.13 (0.83, 1.54)
Hispanic	0.94 (0.88, 1.01)
Felon	2.22***(1.98, 2.48)
Misdemeanor	1.94 (1.77, 2.13)
Possible Domestic Violence	2.00*** (1.82, 2.19)
Possible Substance Abuse	1.08 (0.96, 1.22)
Veteran	0.59*** (0.50, 0.71)
Observations	48,176
Akaike Inf. Crit.	45,318.98

ability of experiencing IGP compared to those with only a high school level of education. Females that completed or attended courses for a post-secondary certificate had slightly decreased rates of IGP compared to those females with only a high school level education. Obtaining a college degree (associates or higher), reduced IGP rates for both males and females (Fig. 8).

## 4 | DISCUSSION

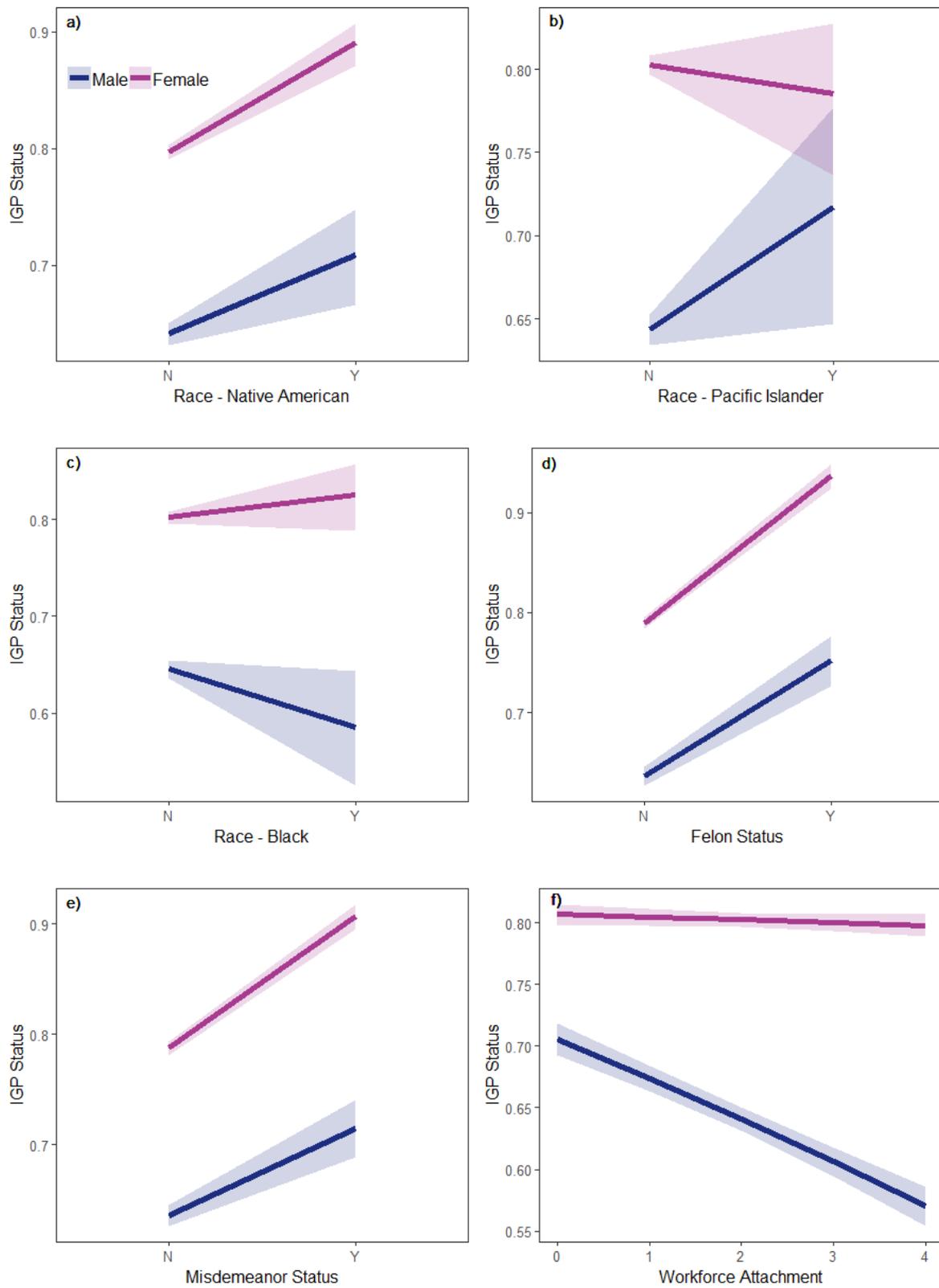
### 4.1 | Demographics

Gender plays a significant role in determining who experiences IGP. This could be due to high rates of single motherhood in our population, though parentage data is unavailable. Single motherhood may prohibit females from obtaining high-salary

employment, since taking care of children is a full time commitment and the cost of childcare can be prohibitively expensive for many low income individuals. Females with less than a high school level of education and females from minority groups, specifically Black females and Native American females, experience some of the highest rates of IGP in Utah. Pregnancy during high school may be causing many young women to drop out of high school, which makes obtaining steady employment difficult. IGP females also have significantly higher rates of felony and misdemeanor than reference group females. Whether or not crime rates are causal or only correlated with IGP remains unknown.

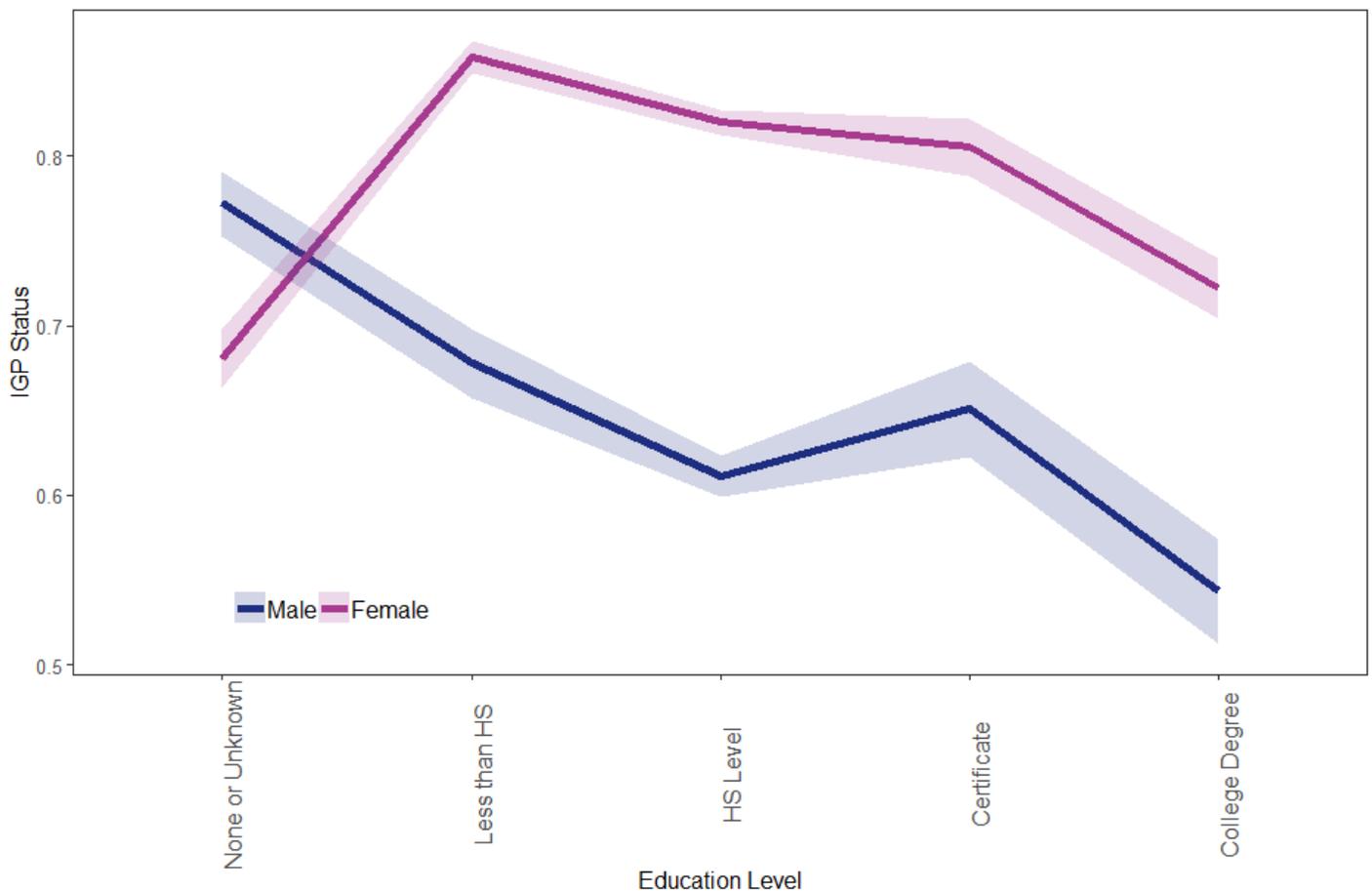
The number of adults in the 2012 IGP cohort continuing to experience IGP decreased from 2012 - 2017 (Table 2). While a small portion of adults may





**Figure 7:** Significant interactions ( $P < 0.05$ ) and 95% confidence intervals for IGP predictors (Native American, Pacific Islander, black, felon status, misdemeanor status, and workforce attachment). Males are denoted in blue, females in violet. Non-significant interactions are not plotted.





**Figure 8:** Significant interactions between education level and gender in IGP predictor logistic regression (means of parameter estimates) and 95% confidence intervals. Males are denoted in blue, females in violet.

have disappeared from the record due to moving out of state, it is also likely that the associated rising average wages/workforce attachment (Tables 8 & 10) and benefits received from welfare programs aided these individuals in discontinuing public assistance usage following 2012.

This research illustrates many disparities among the predictors of IGP when comparing different races/ethnicities. As a whole, Native Americans in Utah experience much higher rates of IGP than the other racial and ethnic groups. Indigenous groups around the world face high rates of poverty, so it is no surprise that they are at increased risk of experiencing it in Utah (Maru et al. 2012). A combination of factors, such as race, social and geographical isolation, and neighborhood effects of poverty likely lead to the high rates of IGP experienced by Native Americans. Some counties with high populations of Native Americans, such as San Juan County, are geographically isolated and have limited economic growth opportunities outside of tourism. Additionally, the primary literature suggests that normalization of welfare usage in communities may reduce people's drive to end public assistance usage (Corcoran 1995). Normalization of welfare usage may occur in certain

geographically isolated regions of Utah, such as San Juan and Duchesne Counties, though data to support this hypothesis are not currently available. It is important to note, however, that high percentages of Utah's total Native American population also live in highly populated counties, such as Salt Lake and Utah Counties, and so geographic isolation alone cannot explain the higher risk for IGP that Native Americans experience.

Many Whites also experience IGP, though this is unsurprising given the vast majority of Utahns are white. Counties with high rates of Whites experiencing IGP also tend to occur in geographically and socially isolated places, such as Carbon, Duchesne, Grand, and Sevier Counties, though Whites also experience IGP in urban centers, such as Salt Lake County. No other racial groups except for Asians, who have decreased risk of experiencing IGP, experience statistically significant increases or decreases in risk of experiencing IGP.

Interestingly, some of the aforementioned counties experiencing high rates of IGP (Carbon, Sevier, and Duchesne Counties) have economies based on coal, oil, or gas mining. Mining economies are typically volatile economies, and will continue to be volatile

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in Utah into the near future as many coal mining operations in these counties shut down. Volatile economies are well known to increase poverty rates where they occur, since in some years families may have relatively high income, and other years they may have almost no income.

## 4.2 | Education

Educational attainment, specifically to the college level, played a significant role in differentiating reference group adults (those that experience some poverty) and individuals experiencing IGP in our study. Those experiencing poverty during childhood have much higher earning potential if they can secure a college degree. Young adults who attend college away from home have a broadened world view and thus may be better equipped to escape poverty than those that do not attend college. This is not the first research to suggest education plays a strong role in reducing poverty. College education specifically has been found to mitigate the effects of intergenerational poverty in other studies (de Vuijst et al. 2017). However, due to lifelong exposure to cultures of poverty, toxic stress during childhood, and lack of exposure to higher education at a young age, individuals experiencing IGP likely face significant disadvantages even when they can enter institutions of higher education. For example, adults experiencing IGP that attended USHE institutions performed more poorly than reference group individuals. Furthermore, many individuals experiencing IGP may choose not to pursue higher education or may lack the resources or tools needed to pursue higher education because these resources are not available to them in young adulthood. In fact, a strong connection between parents' and children's education levels has been found in other studies, whereas children are likely to obtain similar levels of education as their parents (Castaneda & Aldaz-Carroll 1999). Future research should investigate the educational background of individuals experiencing IGP and the educational background of their parents could specifically answer the question of whether or not education can reduce transmission of poverty.

Surprisingly, obtaining a post-secondary certificate did not reduce the probability of experiencing IGP (Fig 9). Adult males experiencing IGP, and attending certificate programs especially, do not appear to greatly benefit from obtainment of certificates in Utah. However, adults experiencing IGP and reference adults earned similar certificate types at UTECH institutions, so the reason for correlation between certificate obtainment and IGP, especially in males, remains somewhat unclear. Individuals experiencing IGP may be living in closer proximity to UTECH institutions than reference individuals, and are therefore more likely to attend them. Similarly, IGP and reference individuals earned similar

degree types at USHE institutions, so they likely enter or look for jobs in the same fields. Difference in selected workforce industries also cannot explain differences in adults experiencing IGP and reference group adults.

## 4.3 | Wages and Workforce Attachment

Intergenerational poverty is associated with severe reduction in wages and workforce attachment, though the effects are not the same across genders and racial groups. For example, Blacks and females already have low wage earnings compared to other groups, so when they are experiencing IGP the reduction in wages is low because their baseline earnings as a group are lower. These groups already have lower baseline wages compared the rest of the population. Some racial or ethnic groups, such as Blacks and Hispanics actually increase workforce attachment when they are experiencing IGP. These groups may be choosing to remain in more stable, yet lower paying jobs when they are experiencing IGP, while those not experiencing IGP are taking shorter term, higher paying positions.

The average wages and workforce attachment of individuals experiencing IGP in the 2012 cohort increased slightly from 2012-2017 (Tables 8 & 10). These increases may be due to the assistance that individuals receive from public sources, or may be due to the recovery of the economy post 2008 recession. Regardless of the cause of wage increase, it was concurrent with a decrease in the number of individuals from the 2012 cohort continuing to experience IGP after 2012 (Table 2).

## 4.4 | Children Experiencing IGP

The results presented in this report strongly suggest that the longer children spend on public assistance, the more likely they are to continue experiencing IGP as adults. The use of public assistance, poverty, and toxic exposure to stress during childhood is well documented to increase risk of poverty in adult life (Gottschalk 1992, Corcoran 1995, Bird et al. 2001). An 'underclass' or poverty culture may develop in some disadvantaged neighborhoods or regions that traps children in poverty for the rest of their lives (Bird et al. 2001). Results of this IGP report suggest that targeting improvements in the lives of children that are experiencing IGP may drastically reduce rates of adults experiencing IGP. The cumulative impacts of poverty have been shown to impact brain development and cognitive ability in children in the United Kingdom (Dickerson & Popli 2016). The number of children experiencing IGP in the 2012 cohort decreased from 2012-2017 (Table 3). This is partially due to a proportion of the cohort reaching age 18 and being excluded from the children cohort



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in years following 2012. However, children in the 2012 IGP cohort were primarily below age 10 (Fig. 2). As children grow older, their public assistance needs may decrease, explaining additional attrition from the cohort in following years.

## 5 | CONCLUSION

Being female, Native American, and/or having poor education increases the risk of experiencing IGP in the state of Utah. Geographic isolation, race, and the nature of the economies where large pockets of IGP occur may partially explain many cases of poverty in Utah. Geographic isolation, race, and the nature of the economies where large pockets of IGP occur may partially explain many cases of poverty in Utah. Females may have higher risk for experiencing IGP than males due to the time and energy requirements of having children. Furthermore, duration of time spent on public assistance as a child strongly impacts the likelihood that the child will grow up to experience IGP. These four groups (women, Native Americans, poorly educated people, and children), should be the target groups of policies aimed at mitigating the effects of intergenerational poverty. In theory, if the lives of children living in poverty are improved, they will have increased skills to succeed as adults, both in their personal lives and in the workforce, which may ultimately break the cycle of poverty for many.



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## APPENDIX

Results of interaction term models are included in this appendix. Average USHE GPA, average annual wages ('12-'18), and average workforce attachment ('12-'18).

**Table A1:** Coefficients and 95 percent confidence intervals of linear model of IGP, race, gender, and interaction effects on average USHE GPA. Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Independent Variables	Parameter Estimates (95% CIs)
IGP(Y)	-142.42 (-292.55, 7.70)
Gender(F)	537.00*** (444.28, 629.71)
White	242.02*** (128.48, 355.55)
Black	-192.53 (-523.68, 138.61)
Native American	-269.12 (-608.79, 70.56)
Hispanic	-138.00 (-322.06, 46.06)
Race - Other	557.21 (-103.55, 1,217.96)
Pacific Islander	-68.56 (-454.26, 317.13)
Asian	-382.43 (-805.38, 40.53)
IGP(Y)*Gender(F)	-170.66* (-300.80, -40.52)
IGP(Y)*White	-208.24** (-360.01, -56.47)
IGP(Y)*Black	159.78 (-254.82, 574.38)
IGP(Y)*Native American	-33.86 (-419.63, 351.91)
IGP(Y)*Hispanic	-160.59 (-388.32, 67.13)
IGP(Y)*Race - Other	-485.56 (-1,359.34, 388.21)
IGP(Y)*Pacific Islander	247.39 (-381.13, 875.92)
IGP(Y)*Asian	61.15 (-560.93, 683.24)
Observations	6,629
R <sup>2</sup>	0.05



**Table A2:** Coefficients and 95 percent confidence intervals of linear model of IGP, race, gender, and interaction effects on wages. Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

<b>Independent Variables</b>	<b>Parameter Estimates (95% CIs)</b>
IGP(Y)	-36.78*** (-39.37, -34.19)
Gender(F)	-29.28*** (-31.08, -27.49)
White	4.32*** (2.23, 6.40)
Black	-16.88*** (-23.53, -10.22)
Native American	-19.50*** (-25.84, -13.17)
Hispanic	-1.16 (-4.03, 1.70)
Race - Other	-8.78 (-21.59, 4.04)
Pacific Islander	20.61*** (12.62, 28.59)
Asian	8.18* (0.99, 15.36)
IGP(Y)*Gender(F)	31.06*** (28.76, 33.37)
IGP(Y)*White	-8.88\$*** (-11.56, -6.20)
IGP(Y)*Black	17.43*** (9.32, 25.54)
IGP(Y)*Native American	10.89** (3.82, 17.95)
IGP(Y)*Hispanic	9.86*** (6.37, 13.35)
IGP(Y)*Race - Other	8.40 (-7.15, 23.95)
IGP(Y)*Pacific Islander	5.26 (-5.62, 16.15)
IGP(Y)*Asian	-13.17* (-23.75, -2.58)
Observations	48,176
R <sup>2</sup>	0.06



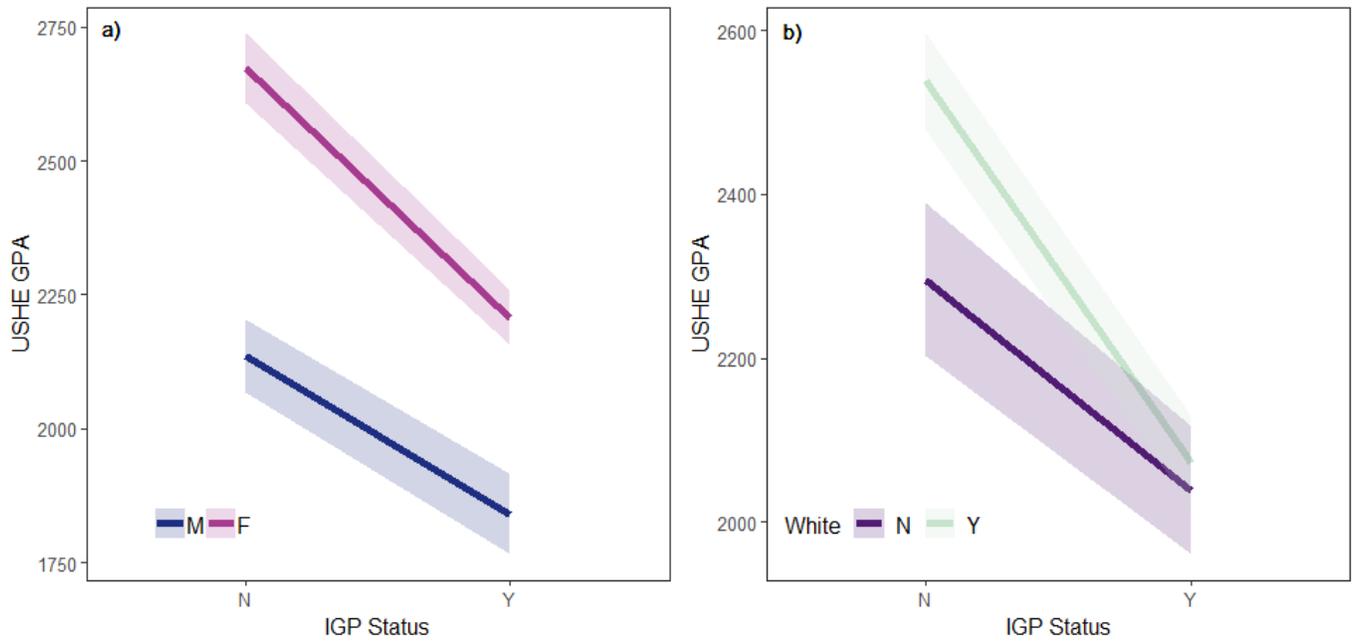
**Table A3:** Coefficients and 95 percent confidence intervals of linear model of IGP, race, and gender effects on average annual workforce attachment. Note: \*p<0.05; \*\*p<0.01; \*\*\*p<0.001

Independent Variables	Parameter Estimate (95% CIs)
IGP(Y)	-0.41*** (-0.48, -0.35)
Gender(F)	-0.34*** (-0.39, -0.30)
White	0.06** (0.01, 0.11)
Black	-0.28*** (-0.44, -0.12)
Native American	-0.40*** (-0.55, -\$0.24)
Hispanic	0.02 (-0.05, 0.09)
Race - Other	-0.07 (-0.38, 0.24)
Pacific Islander	0.38*** (0.19, 0.57)
Asian	0.11 (-0.06, 0.28)
IGP(Y)*Gender(F)	0.47*** (0.42, 0.53)
IGP(Y)*White	-0.14*** (-0.20, -0.07)
IGP(Y)*Black	0.32*** (0.13, 0.51)
IGP(Y)*Native American	0.18** (0.01, 0.35)
IGP(Y)*Hispanic	0.22*** (0.14, 0.31)
IGP(Y)*Race - Other	0.13 (-0.24, 0.51)
IGP(Y)*Pacific Islander	0.15 (-0.11, 0.41)
IGP(Y)*Asian	-0.29** (-0.54, -0.04)
Observations	48,176
R <sup>2</sup>	0.02

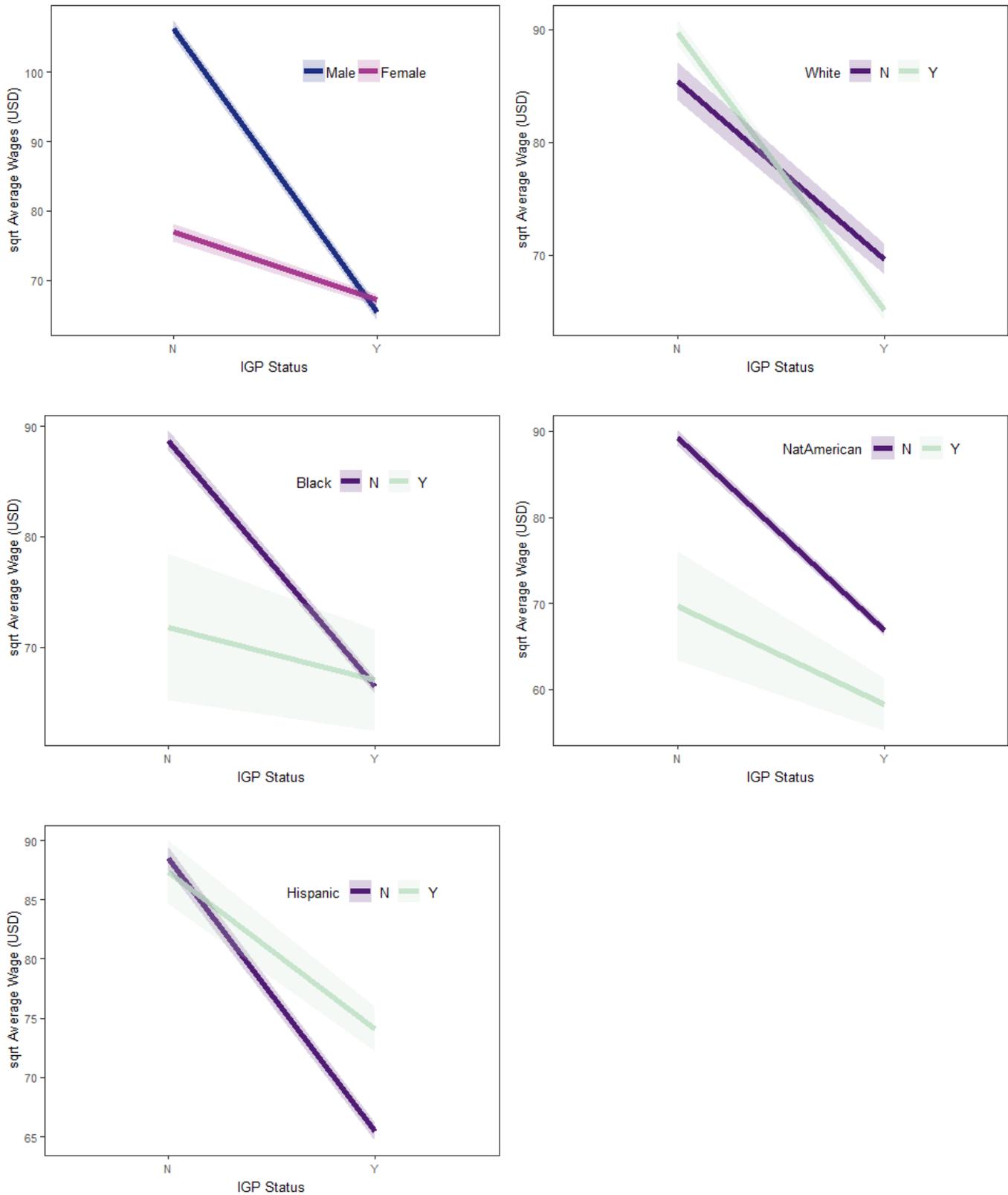
**Table A4:** Odds ratios and 95 percent confidence intervals for the logistic regression model on IGP. (Includes interaction terms).

<b>Independent Variables</b>	<b>Parameter Estimate (95% CIs)</b>
Childhood Months	5.72*** (5.48, 5.97)
Gender - Female	2.43*** (2.19, 2.70)
Age	1.04** (1.01, 1.06)
Education - College	1.19* (1.04, 1.36)
Education - Certificate	0.76*** (0.66, 0.86)
Education - Less than High School	1.34*** (1.21, 1.49)
Education - None or Unknown	2.15*** (1.91, 2.43)
Workforce Attachment	0.81*** (0.78, 0.84)
White	1.00 (0.92, 1.08)
Black	0.78* (0.61, 0.99)
Native American	1.36** (1.11, 1.67)
Asian	0.60** (0.41, 0.86)
Pacific Islander	1.40* (1.01, 1.93)
Race - Other	1.17 (0.76, 1.82)
Hispanic	0.97 (0.86, 1.10)
Felon	1.73*** (1.51, 1.99)
Misdemeanor	1.43*** (1.26, 1.64)
Possible Domestic Violence	1.87*** (1.71, 2.06)
Possible Substance Abuse	1.12 (0.99, 1.27)
Veteran	0.62*** (0.52, 0.74)
Certificate*Gender(F)	0.77** (0.64, 0.91)
College*Gender(F)	0.76*** (0.64, 0.89)
High School*Gender(F)	1.00 (0.87, 1.15)
Less than High School*Gender(F)	0.22*** (0.19, 0.25)
Workforce Attachment*Gender(F)	1.22*** (1.16, 1.28)
Gender(F)*White	1.07 (0.96, 1.19)
Gender(F)*Black	1.51* (1.07, 2.13)
Gender(F)*Native American	1.52** (1.15, 2.00)
Gender(F)*Asian	1.41 (0.90, 2.21)
Gender(F)*Pacific Islander	0.64* (0.42, 0.98)
Gender(F)*Race - Other	0.90 (0.48, 1.69)
Gender(F)*Hispanic	0.97 (0.83, 1.13)
Gender(F)*Felon	2.29*** (1.79, 2.96)
Gender(F)*Misdemeanor	1.84*** (1.52, 2.21)
Observations	48,176



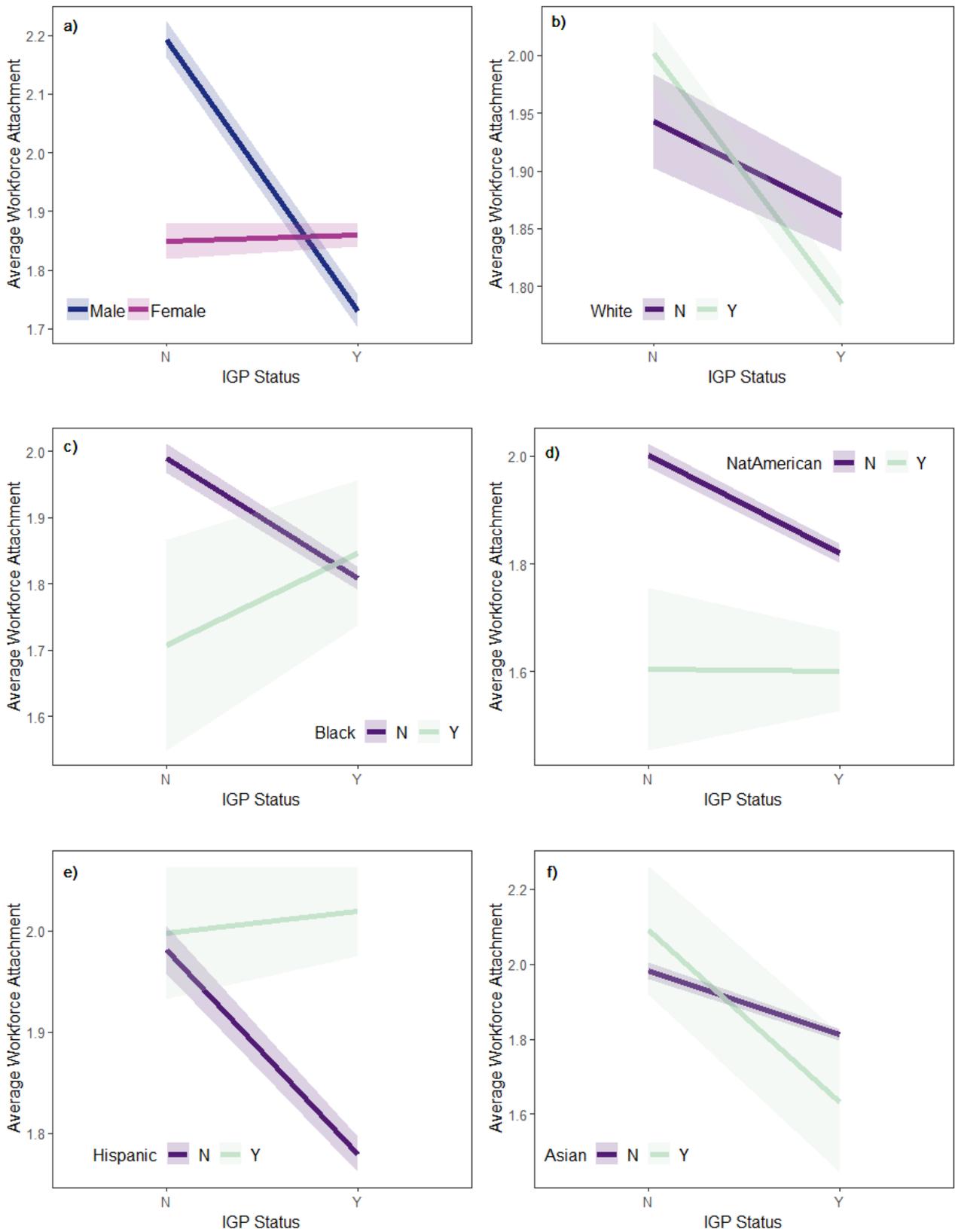


**Figure A1:** Significant interactions ( $P < 0.05$ ) and 95 percent confidence intervals for effects on average USHE GPA. Non-significant interactions are not plotted. a) USHE GPA means by gender and by IGP status; b) USHE GPA means by White racial status and IGP status.



**Figure A2:** Model estimates of categorical variable means with significant interactions ( $P < 0.05$ ) for effects on average wage in USD. 95% confidence intervals are indicated using faded colors around the bold mean lines. Non-significant interactions are not plotted. a) interaction between gender and IGP status; b) interaction between White racial status and IGP status; c) interaction between Black racial status and IGP status; d) interaction between Native American racial status and IGP status; e) interaction between Hispanic ethnicity status and IGP status. See table A2 for all model results.





**Figure A3:** Significant interactions and 95 percent confidence intervals for race & gender on workforce attachment (average number of quarters worked annually from 2012-2108) model. Non-significant interactions are not reported. a) average workforce attachment by gender and IGP status; b) average workforce attachment by White racial status and IGP status; c) average workforce attachment by Black racial status and IGP status; d) average workforce attachment by Native American racial status and IGP status; e) average workforce attachment by Hispanic ethnicity status and IGP status, f) average workforce attachment by Asian racial status and IGP status.



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## DATA PARTNERS

