UNPACKING THE GENDER ACHIEVEMENT GAP AMONG AMERICAN INDIAN AND
ALASKA NATIVE SECONDARY SCHOOL STUDENTS

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CHAPTER 1. INTRODUCTION

After centuries of forced assimilation and exploitation vis-à-vis the American education system, secondary schools with high American Indian and Alaska Native (AIAN) populations need extensive, intersectionally cognizant reform. Although there is budding interest in the unique cultural norms and community conditions encompassing AIAN youth's academic experiences and expectations, there remains a critical shortage of research on how the personal, behavioral, and environmental factors mediating these experiences contribute to the inflated gender gap in academic achievement among AIAN students of different backgrounds at high-density AIAN schools.

AIAN boys tend to perform worse in school relative to AIAN girls despite both groups facing many of the same pivotal challenges to academic success, such as high poverty rates (US Census Bureau, 2021), reduced access to internet (Howard & Morris, 2019) and few opportunities to attend high-quality schools (Faircloth, 2010). Evidence-based educational interventions that aim to pinpoint and overcome social and cultural barriers to academic success stop short of recognizing how intersecting racial and gender identities predict distinct trends in academic performance among AIAN students perpetually excluded from national surveys. This study thus seeks to reconcile the extent to which averred universal determinants of academic achievement diverge intersectionally by race and gender among a diverse sample of AIAN and non-AIAN secondary school students. In so doing, it supports the need for policymakers and school administrators to address intersectional inequities in scholastic performance via targeted, yet comprehensive, educational reform.

I begin by reviewing existing literature on contributors to the gender achievement gap more generally before discussing how such factors manifest among American Indian adolescents

specifically. Informed by the literature, I offer a conceptual framework for how socialized racial and gender differences emerge throughout human development, generating intersectional differences in students' propensity for academic success. I use a series of ordinal logistical models that mirrors this framework as the foundation of my analysis.

Given that nationally representative datasets include insufficient or restricted subsamples of AIAN youth, I use the Swaim & Stanley (2021) "Substance Use Among American Indian Youth: Epidemiology and Etiology, [United States], 2015-2020" dataset to evaluate the extent to which predictors of academic achievement vary by gender among a racially diverse set of students at schools with predominantly American Indian (AI) enrollment. I build on the work of scholars such as Fortin et al. (2015), who found evidence that students' expected educational attainment accounted for the growing gender-achievement gap at the end of the 20th century. Controlling for cognitive capacity, I observe how educational attainment expectations among secondary students contribute to the gender achievement gap among AIAN adolescents of different racial backgrounds compared to non-AIAN youth. Additional iterations of the model showcase whether and how other personal, behavioral, and environmental factors discussed in the literature inflate gender differences among different groups. After discussing key findings, I remark on the implications for policy interventions as well as topics for future research.

CHAPTER 2. LITERATURE REVIEW

Girls' superior scholastic performance has been a persistent trend among developed countries since the 1960s (DiPrete & Buchmann, 2013; Kleinfeld, 2009). Although there are a variety of socio-ecological factors that contribute to gender differences in adolescent achievement (Duncan & Murnane, 2011), evidence suggests that a significant portion of academic variance may be attributed to differences in educational attainment expectations (Duncan & Murnane, 2011; Fortin et al., 2015) and self-discipline (Xu, 2006; Duckworth et al., 2015; Marcenaro–Gutierrez et al., 2017), among other variables.

After reviewing the literature on determinates of the gender-achievement gap more generally, I assess recent research on how these factors transmit to gender differences in AIAN achievement, as well as what other unique variables may be at play. In so doing, I underscore how this study builds on and contributes to the currently limited body of work on AIAN boys' and girls' school performance.

The Gap in Context

Due to significant variation in boys' academic performance, boys dominate the lower end of the grade distribution while girls remain overrepresented near the top (DiPrete & Buchmann, 2013; Fortin et al., 2015). These discrepancies in gender achievement emerge as early as preschool and permeate all levels of education despite no innate gender differences in cognitive ability (Duckworth & Seligman, 2006; DiPrete & Buchmann, 2013). Developmental psychologists assert that beginning at an early age, children are socialized to subscribe to gender norms that exacerbate otherwise negligible, noncognitive sex differences in children's propensity for academic excellence (Carvalho, 2016).

Self-Regulation

In addition to intelligence, report cards reflect academic engagement activities such as participating in classroom discussions and completing homework assignments outside of class. Indeed, boys spend less time studying and working on schoolwork compared to girls (Wagner et al., 2008). Contrary to teachers' perceptions, however, academic motivation (Duckworth et al., 2015) and academic effort (Marcenaro–Gutierrez et al., 2017) may not differ by gender. In contrast, self-control – the ability to delay short-term gratification in pursuit of future goals – has been demonstrated to account for a significant portion of the gap between boys' and girls' school performance.

Whereas boys are more prone to procrastination (Balkis & Erdinç, 2017) and acting out in class (Borg, 2015), girls are more likely to adopt productivity management practices such as budgeting time, limiting distractions, and maintaining their work environment (Zimmerman & Martinez-Pons, 1990; Xu, 2006). Beyond self-regulation, these habits require organization, diligence, and other conscientious personality traits more commonly found among girls (Verbree et al., 2022).

Educational Attainment

A large portion of the gender achievement gap may be explained by the fact that girls expect to attend college and earn an advanced degree at a higher rate than boys (DiPrete & Buchmann, 2013; Fortin et al., 2015). Such expectations have proved more predictive of girls' achievement than boys' at all levels of attainment excluding the doctoral level at which Fortin and colleagues observed the opposite effect. Marcenaro–Gutierrez et al., 2017 account for this trend by proposing that girls' self-regulatory advantage causes them to adopt a work ethos that better aligns with their school attainment expectations.

Nonetheless, observed gender differences in students' anticipated level of schooling are not stagnant (DiPrete & Buchmann, 2013; Fortin et al., 2015). As educational expectations become more advanced, the share of girls holding those expectations widens such that girls are almost twice as likely as boys to anticipate earning a Ph.D. (DiPrete & Buchmann, 2013). These preferences might be partly explained by gendered career preferences as they intersect with contemporary labor market trends. For the first time ever, young women surpass young men in how much value they place on higher-paying careers (Patten & Parker, 2012). Meanwhile, boys' educational expectations may be tapered to mirror the number of financially viable jobs in male-dominated industries which do not require an advanced degree (Fortin et al., 2015).

Race and School Environment

Perhaps most relevant to public policy are findings suggesting that boys' academic performance is highly responsive to their external environment (Marcenaro–Gutierrez et al., 2017). School environment may be particularly predictive of academic outcomes for boys from racially marginalized backgrounds. A study by McKown, C., & Weinstein, R. S., 2008 found that teachers tended to have unjustifiably lower expectations for marginalized students which contributed to those students' poorer achievement. Amemiya & Wang, 2018 contend that boys of color may disproportionally benefit from external protective factors such as a school climate that promotes cultural pluralism.

Trends among American Indians

Until 2003, federal education databases were not required to collect data on AIAN populations (Faircloth et al. 2015). Since then, robust, secondary data on American Indian adolescents have been scarce, with only a handful of studies on the gender-achievement gap in AI

students. Using results from the National Assessment of Educational Progress (NAEP), López et al., 2015 found significant differences in 4th-grade reading scores in favor of girls[1]. Moreover, Thornton et al., 2006 estimated a half-point difference between girls' (Mean = 2.44) and boys' (Mean = 1.91) grade point averages (GPA), which fell well below the 2005 national average of 3.09 and 2.89 for girls and boys' respectively (U.S. Department of Education, et al., 2019). Additional studies observed that girls had higher educational attainment expectations than boys (Faircloth et al., 2015; Strong et al., 2018), whereas boys had more behavioral problems (Whitesell et al., 2009). Girls also appeared more likely to talk with parents and teachers about plans to attend college, which may be crucial to post-secondary enrollment (Strong et al., 2018).

Conversely, little research exists on whether American Indian girls benefit academically from greater self-regulation. Qualitative data suggest that American Indian parents may not prioritize managing children's self-regulation (Huffman, 2010). Nevertheless, Thornton and colleagues find evidence that American Indian girls are more academically resilient – that is, more likely to employ positive coping strategies to protect against environmental stressors. These qualities could be an important determinant of American Indians' achievement given that, like other minority students, they are incredibly responsive to their school environment in dimensions such as peer performance (Akee, 2018) and cultural fit (Whitesell et al., 2009).

Conclusion

Current literature on American Indian achievement helps reveal which personal, cultural, and environmental experiences might contribute to intersectional variance in boys' and girls' scholastic achievement. Still, a comprehensive framework for achievement that places gender at

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[1] Significant differences in 8th-grade reading scores were not observed.

the forefront of the analysis has yet to be developed. In the following section, I aim to illustrate how the dynamics of achievement discussed above might intersect with gender in this historically neglected group.

The gender achievement gap is the product of a long history of gendered social processes. I summarize the most widely accepted theories of the origin of diverging gender roles and how they are perpetuated over time. Building on existing theories, I pose a conceptual framework for how gender differences in adolescent development occur in context to produce intersectional differences in academic performance. Finally, I present a set of hypotheses for how gender differences manifest among AIAN students compared to non-AIAN students.

The Origin of the Gap

In reviewing how gender differences likely emerge, Hyde (2014) identifies two influential theories: Sociocultural Theory and Cognitive Social Learning Theory. Proposed by Eagly & Wood (1999) as an alternative to existing evolutionary theories, Sociocultural Theory contends that biological sex differences in strength and childbearing set the precedent for a gender-based division of labor that formed the gender constructs that persist today (Hyde, 2014). These constructs underpin gender norms that are socially and cognitively reinforced throughout human development (Bussey & Bandura, 1999). More specifically, Cognitive Social Learning Theory describes a process whereby gender norms are imitated and externally reinforced by social rewards and punishments (Hyde, 2014). Once socialized, norms are internally reinforced by cognitive skills and values that characterize gender differences observed today (Hyde, 2014).

Perceptions and normative values play a pivotal role in youth's judgment and decision-making. Scholars are increasingly turning to Eccles's (1983) Expectancy-Value Theory to understand how individual perceptions contribute to decisions around academic engagement. According to the decision theory, people engage in challenging tasks when they find the tasks rewarding and expect to succeed. This framework may help explain gender differences in

educational attainment expectations and other critical determinants of achievement such as self-control (Eccles, 1983; Hyde, 2014; Fortin, 2015; Galla et al., 2018).

Overview of the Conceptual Framework

A comprehensive assessment of gendered motivations requires a critical understanding of how perceptions, priorities, and personal attributes diverge intersectionally via distinct shared experiences. Drawing on insights from the preceding literature, as well as core concepts in psychology and sociology, I present a conceptual framework for how socially reinforced gender and ethnic-racial identities contribute to the gender achievement gap among intersectional groups (Figure 1).
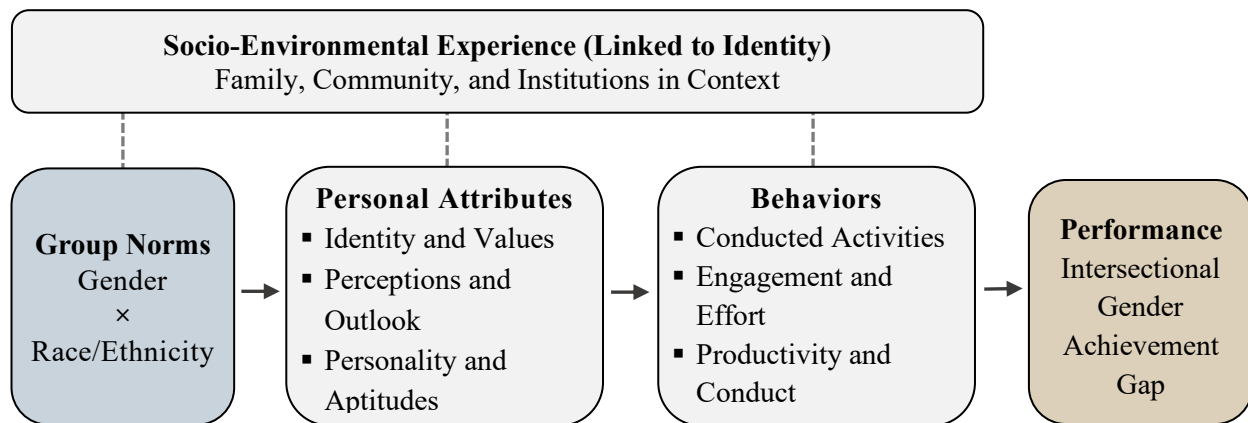
Figure 1. Conceptual Framework for the Gender Achievement Gap.

Expanding on Cognitive Social Learning Theory, Figure 1 illustrates how external social interactions reinforce intersecting gender and ethnic-racial norms. Through these preliminary interactions, norms are socialized and embedded in personal perceptions and attributes that differ intersectionally by ethnicity, race, and gender. Internalized qualities facilitate protective and disruptive behaviors that impact boys' and girls' academic performance along ethnic-racial lines.

Moreover, this process is moderated by gender differences in how adolescents respond to socio-environmental conditions which are inherently correlated to intersectional identities.

In context, socialized norms encourage higher educational expectations and conscientiousness among girls. These characteristics orient girls toward constructive behaviors such as discussing their post-secondary plans with parents and effectively allocating time for schoolwork. These practices encourage girls to "swim upstream" against environmental risk factors such as living in a single-parent household and racial bias in educational institutions (Fortin et al. 2015). Through their higher resilience, girls counteract conditions that would otherwise decrease the observed gender achievement gap (Thornton et al., 2015). Described as the inverse process, boys' social advantage is offset by their higher sensitivity to cognitive and environmental risk factors.

Hypotheses

Unique cultural norms and community risk factors facing AIAN youth on or near tribal lands may present personal, behavioral, or socio-environmental challenges that put AIAN boys at an increased risk for academic underachievement compared to their female and non-AIAN counterparts. As races/ethnicities promote distinct cultures and identities, AIAN boys of different racial backgrounds may have varying sensitivities to harmful and supportive propensities and experiences. To constructively explore these risks, this study tests the following hypotheses.

Hypothesis 1

Compared to non-AIAN youth, educational attainment expectations will explain a smaller portion of the discrepancy between AIAN girls' and boys' school achievement. The gender gap among

students who identified as AIAN and no other race/ethnicity (AIAN Only) will be accounted for the least.

Hypothesis 2

Since AIAN boys may be more likely than their peers to experience mental health challenges (Autor et al., 2019), controlling for non-cognitive personal attributes that predict academic performance will explain a larger portion of the gender gap among AIAN Only students compared to other groups in the sample.

Hypothesis 3

Given that girls and youth from racially marginalized backgrounds are more likely to experience adverse external conditions (Fortin, et al. 2015), environmental factors will exacerbate differences in predicted performance between genders whilst serving to decrease racial disparities that are less pronounced among biracial students who identified as AIAN and White.

Hypothesis 4

Because boys are more likely to misbehave and less likely to engage in productive practices, accounting for such behaviors will decrease the predicted gender achievement gap for all groups, particularly AIAN Only students who may be more likely to partake in unconstructive behaviors.

CHAPTER 4. DATA AND METHODS

Sampling

This analysis uses repeated, cross-sectional data from the Substance Use Among American Indian Youth: Epidemiology and Etiology, [United States], 2015-2020 study by Swaim & Stanley (2021). The study uses the Our Youth, Our Future survey to assess patterns of substance use among American Indian adolescents and other related variables such as culture, self-efficacy, and school engagement. Stratified by region, the final sampling frame included public, private, and Bureau of Indian Education (BEI) secondary schools, with at least 20% AI student enrollment, located on or within 25 miles of AI reservations.

For the public sample data used in my analysis, online Qualtrics surveys were administered at schools to students in grades 7 through 12 from September 2017 to December 2019. Parents were given prior notice of the study and could opt their child out in advance. With less than 1% of students opted out by parents, the average student participation rate among selected schools was approximately 81%, on par with comparable national studies (Swaim & Stanley, 2021). As expected, fewer 12th-grade students participated in the survey compared to students in other grades due to school dropouts.

Data Limitations

The sample data represent an amalgamation of two versions of the survey deployed over the course of the study. Following the 2017-2018 academic year, questions were added and dropped from the initial survey form such that large chunks of data are missing for questions that were not included on both questionnaires. Demographic questions about students' race, ethnicity, and gender were constant across all variations of the survey. Although respondents could identify

as more than one race/ethnicity, they could only indicate their gender as male or female. As such, only students who identified as male or female are included in the final sample.

In addition to the data limitations posed by the survey forms, other notable limitations exist. The data are cross-sectional rather than longitudinal and do not contain information on school type or quality, parental educational attainment, or household economic status or resources. Because the sampling frame focused on schools near AI reservations, AI students in suburban and urban areas are not sufficiently represented. Finally, data on students' demographic and individual characteristics, including academic achievement, were all gathered via self-report.

Data Cleaning

To gauge academic achievement, students were asked to indicate what letter grades they usually earned in school from a list of multiple-choice options. The dependent variable, y = GPA was created by assigning numerical values from the 4-point GPA scale to corresponding letter grades (i.e., 4.0 = "Mostly A's"; 3.5 = "A's and B's"; 3.0 = "Mostly B's"; 2.5 = "B's and C's"; 2 = "Mostly C's"; 1.5 = "C's and D's"; 1.0 = "Mostly D's"; 0.5 = "D's and F's"; 0.0 = "Mostly F's"). Students who did not indicate their typical school letter grades were removed from the study sample.

Per a preliminary assessment of the demographic information reported in the survey, race/ethnicities defined by the study include White, Black, Hispanic, American Indian/Alaska Native (AIAN), and Native Hawaiian/Asian American/Pacific Islander (NHAAPI). Respondents who did not specify their race/ethnicity were categorized as Other/Unknown. Treating American Indian/Alaska Native as an ethnicity, the study created distinct ethnic-racial categories for respondents who identified as AIAN and White and respondents who marked AIAN and one or more other minoritized races/ethnicities. After data were imputed, non-AIAN students of color

were recoded into a single category to prevent overfitting the data during inferential analyses. Ethnic-racial categories for the final sample therefore included AIAN Only, AIAN Other, AIAN White, White (non-AIAN), and Other Races (non-AIAN).

To prepare data for imputation, ordinal scales for select categorical variables were re-coded to represent increasing agreement or alignment with a given concept. Missing values were imputed in R using missForest – a predictive machine learning algorithm that imputes missing values based on random forest (Shah et al., 2014). Unlike parametric regression models which predict missing values from random distributions of the data (Shah et al., 2014), random forest uses bootstrap aggregation of multiple regression trees (Shah et al., 2014), which iteratively subset the data based on predicted values ($\hat{y}$) given randomly selected parameters. Missing values were imputed without collinearity bias or overfitting (Shah et al., 2014). Bivariate regressions ($\hat{Y} = GPA$) before and after imputation revealed marginal differences in the magnitude and significance of estimated coefficients. Final sample frequencies by sample demographics are provided in Table 1.

Table 1. Sample Frequencies by Survey Characteristics.

Semester			School	
Fall 2017	1,843		Middle Schools	40
Spring 2018	1,550		High Schools	20
Fall 2018	973		Hybrid Schools	8
Spring 2019	2,541			
Fall 2019	2,206			
Region			Grade	
Southwest	4,317		Grade 7	2,567
Southeast	2,298		Grade 8	1,843
Northern Plains	1,071		Grade 9	1,525
Upper Great Lakes	952		Grade 10	1,209
Northwest	269		Grade 11	1,095
Southern Plains	206		Grade 12	874

Methodology

Congruent with my conceptual framework, I use a series of ordinal logistic (OL) regression models to reveal how demographic disparities in students' predicted achievement reflect complementary differences in socialized patterns among a diverse sample of AIAN boys and girls. Table 2 outlines the regression parameters for five OL regressions. Coefficients for the OL regressions are reported as proportional odds ratios. That is, if Y represents GPA with ordinal values j (0, 0.5… 4.0), and $Y > j$ is an event where GPA is greater than the jth category, then the predicted proportional odds ratio, $\hat{Y} > j$ when $x = 1$ versus $x = 0$ can be understood as notated in Equation 1.

Equation 1. Proportional Odds Ratio.

$$exp(\beta_n) = \frac{odds(\hat{Y} > j \mid x_1)}{odds(\hat{Y} > j \mid x_0)}$$

Table 2. Parameters for Ordinal Logistic Regressions.

$\hat{Y} = $ GPA

Controls	Model 1 $\Rightarrow$ A	(A)	$\alpha + \beta_{1\text{-}9}\,Gender race + \beta_{10}\,Age$ $+ \beta_{11}\,Grade + \beta_{12\text{-}13}\,Reading speed$
Expected attainment	Model 2 $\Rightarrow$ A + B	(B)	$\beta_{14\text{-}15}\,College + \beta_{16\text{-}17}\,Army$ $+ \beta_{18\text{-}19}\,Vocational$
Personal attributes	Model 3 $\Rightarrow$ A + B + C	(C)	$\beta_{20\text{-}22}\,Responsible + \beta_{23\text{-}24}\,Culture$ $+ \beta_{25\text{-}26}\,Depressed + \beta_{27\text{-}29}\,Interested$
Environment	Model 4 $\Rightarrow$ A + B + D	(D)	$\beta_{30}\,Over25mi + \beta_{31}\,Stepparent$ $+ \beta_{32}\,Single + \beta_{33}\,Noparent$ $+ \beta_{34\text{-}35}\,Safeschool$
Behavior	Model 5 $\Rightarrow$ A + B + E	(E)	$\beta_{35\text{-}36}\,Tried + \beta_{37\text{-}38}\,Smokedweed$

The equation originates from the traditional logit model: $logit(\hat{Y}_j) = \alpha_j - \beta_n x_n$, by exponentiating the beta coefficient, $exp(\beta_n)$. A proportional odds ratio for a given group is interpreted as the percent lower or higher odds of that group achieving a higher GPA instead of a lower GPA compared to students who are not in the group. Because coefficients for interaction terms may not be intuitive to interpret, I report results for ethnic-racial categories disaggregated by gender. White females were omitted from all regressions to represent the control.

Summary of Ordinal Logistic Regressions

I start by creating a baseline model (Model 1) with a proxy variable for students' scholastic ability. Because self-reported intelligence threatened to be endogenous with students' reported grades, the control variable leverages sample responses to the question "How fast do you read?". For conciseness, coefficients are numbered to reflect the number of scaled categories underlying each variable. After recording numerical values to begin at 0, variables for grade and age were regressed as continuous variables to preserve degrees of freedom. Values for all other parameters were transformed into indicator variables and independently regressed. Table 3 lists the independent variables regressed at each iteration of the model with corresponding units of measurement. Referenced scales are provided in Table A.1 in the appendix.

Building on Model 1, Model 2 investigates the extent to which sample differences in students' expected attainment explain intersectional differences in students' propensities for higher achievement levels. I then build on this model to compare how personal (Model 3), environmental (Model 4), and behavioral factors (Model 5) relate to gendered performance. Given that the models do not include important contextual controls (e.g., household income, learning disabilities, etc.) or responses from the same students or schools over time, estimated coefficients are correlational and do not imply causal relationships.

Table 3. List of Variables.

Variable	Measurement / Categories
Dependent variable	Estimated 4-pt GPA scale
GPA	4.0, 3.5, 3, 2.5, 2, 1.5, 1, 0.5, 0
Model 1: Base	
Key independent variables	
Gender/ethnic-race	AIAN Only, AIAN Other,
*Control	White Female*	Other races, AIAN White,
	and White (male) by gender
Age	12 or younger - 19 or older
Grade	Grade 7 - grade 12
Reading speed	Reading speed scale of 1 - 3
Model 2: Attainment Expectations	
Graduate college	Likelihood scale of 1 - 3
Join the army	Likelihood scale of 1 - 3
Attend vocational school	Likelihood scale of 1 - 3
Model 3: Personal	
Responsible	Accuracy scale of 1 - 4
Strong cultural attachment/identity	Agreement scale of 1 - 3 (a)
Depressed	Agreement scale of 1 - 3 (b)
Found schoolwork interesting	Frequency scale of 1 - 4 (c)
Model 4: Environmental	
Over 25 miles from reservation	1 = yes	0 = no
Lives with…	
*Control	Two parents (no stepparent)*	
Parent and stepparent	1 = yes	0 = no
Single parent	1 = yes	0 = no
No parent	1 = yes	0 = no
Feels safe at school	Agreement scale of 1 - 3 (a)
Model 5: Behavioral	
Tried their best in school	Frequency scale of 1 - 3 (a)
Smoked weed	Frequency scale of 1 - 3 (b)

Note: Scales are provided in Table A.1 in the appendix.

Descriptive Statistics

Table 4 reports sample frequencies and GPA means by race/ethnicity and gender. Weighted averages represent the mean of boys' and girls' mean GPAs for each ethnic-racial category. Additional descriptive results for the gender achievement gap by school and grade level are provided in the appendix.

With an average GPA of 2.53, boys who identified as AIAN and no other race or ethnicity the lowest academic achievement in the sample. To demonstrate how these achievement patterns manifested, Figure 5 displays the distribution of GPAs among AIAN Only students and the other students in the sample by gender. Distributions for girls (Figure 2a-b) and non-AIAN Only males (Figure 2c) are skewed toward a mode of 3.5 (i.e., As and Bs). The GPA distribution among AIAN

Table 4. Mean GPA by Gender and Race/Ethnicity.

Ethnic-Race	F (*n*)	M (*n*)	Sum.	GPA (F)	*s*	GPA (M)	*s*	Wgt. Avg.	Diff.
AIAN Only	1,802	1,737	3,539	2.87	0.85	2.53	0.89	2.70	0.34[*]
AIAN Other	564	662	1,226	2.94	0.88	2.69	0.93	2.82	0.25[*]
AIAN White[†]	545	534	1,079	3.17	0.76	2.79	0.93	2.98	0.37[*]
Non-AIAN White	770	840	1,610	3.33	0.71	3.02	0.87	3.17	0.31[*]
Other Races (sum.)	835	824	1659	3.06	0.78	2.82	0.89	2.94	0.24[*]
Biracial White[†]	239	244	483	3.27	0.70	2.91	0.81	3.09	0.36[*]
Hispanic	290	265	555	3.07	0.75	2.79	0.86	2.93	0.28[*]
Black	176	144	320	2.86	0.78	2.77	0.90	2.81	0.09
NHAAPI	11	17	28	-	-	-	-	3.59	-
Two or more races of color	43	50	93	3.02	0.88	2.81	1.01	2.92	0.21
Other / Unknown	76	104	180	2.78	0.92	2.67	1.01	2.73	0.11
Total	**4,516**	**4,579**	**9,113**	**3.03**	**0.83**	**2.73**	**0.92**	**2.88**	**0.30[*]**

Note: Categories include respondents who also identified as Other.
[*] $p < 0.01$ (all statistically significant differences were significant at $p < 0.01$).
[†] White and one other race/ethnicity (i.e., AIAN, Black, Hispanic, or NHAAPI).

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(a) Non-AIAN Only Female

(c) Non-AIAN Only Male

(b) AIAN Only Female

Estimated GPA

(d) AIAN Only Male
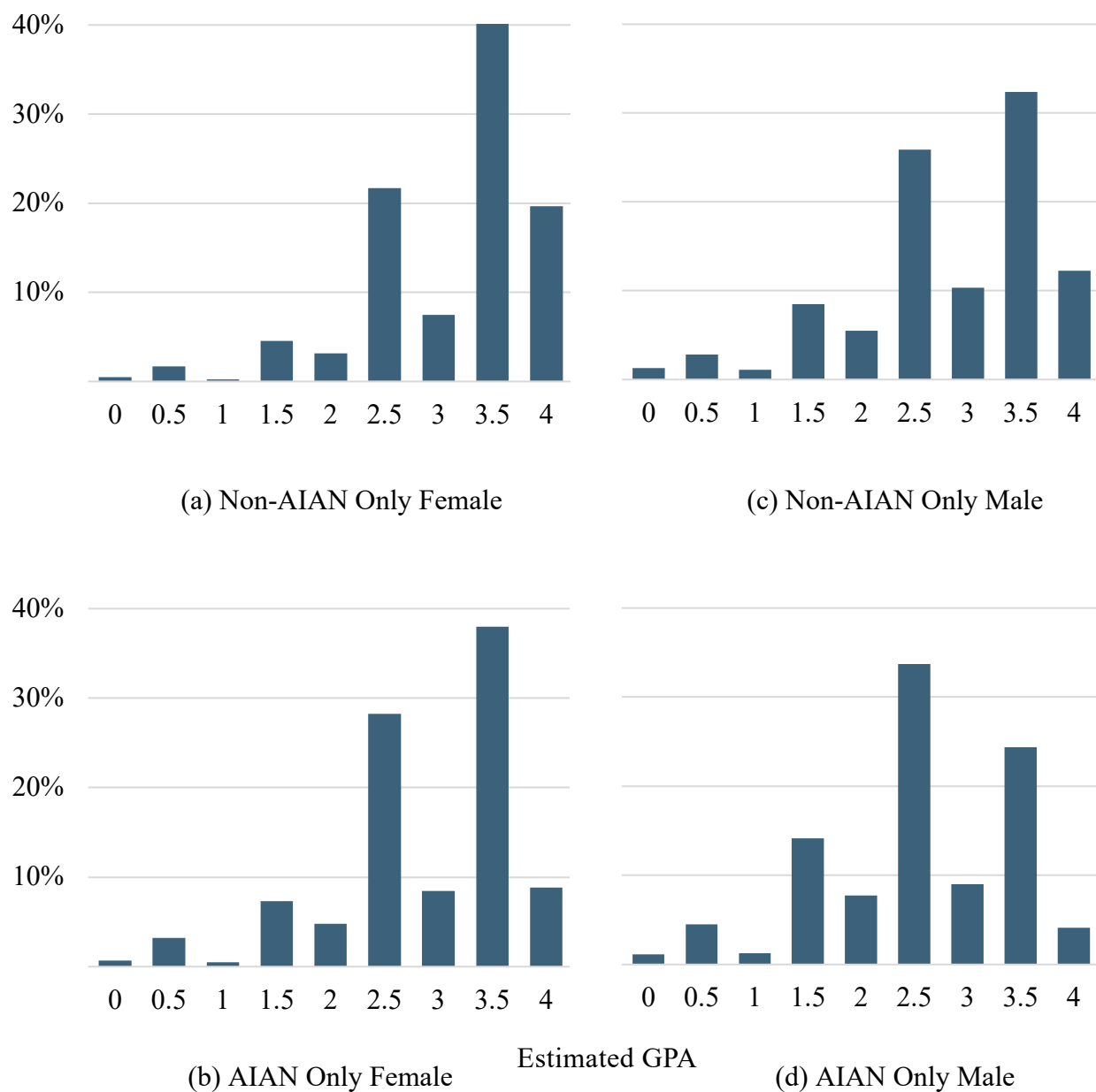
Figure 2. GPA Distributions by Gender and American Indian and Alaska Native Only.

Only boys (Figure 2d) noticeably diverges from the others by mirroring a normal distribution around 2.5 (i.e., B's and C's). Moreover, AIAN Only girls were less likely than non-AIAN Only students – and especially other girls – to report earning mostly A's.

As illustrated in Figure 3, sample differences between girls' and boys' academic performance mirrored significant gender differences in students' expectations to graduate from a four-year college. Parallel discrepancies were absent between aggregate ethnic-racial groups. The study conducted 60 *t*-tests to compare group responses within each gender, five of which yielded statistically significant results at $p < 0.05$. These findings suggest that factors relating to racial and

Figure 3. Expectations to Graduate from a Four-Year College by Gender and by Race/Ethnicity.

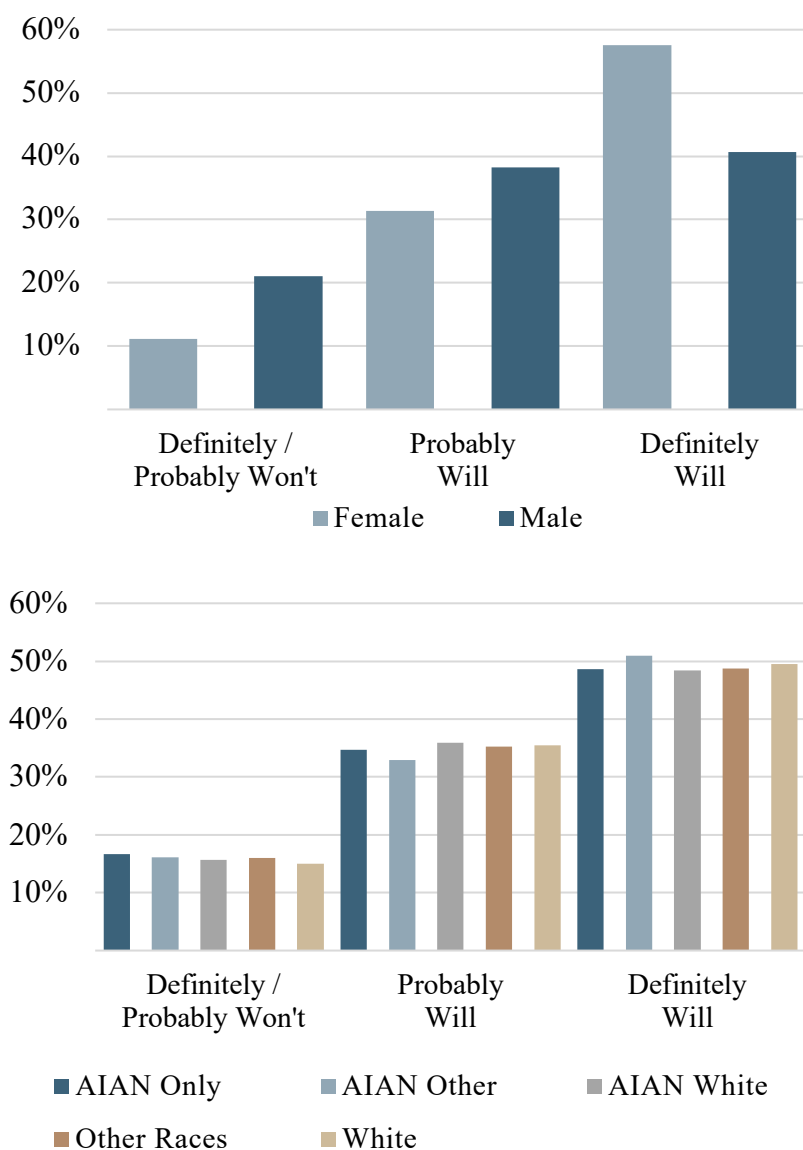gender disparities may be somewhat distinct. Mean GPAs by postsecondary attainment expectations for girls and boys in each demographic group are provided in Table A.2 in the appendix. As summarized in Table 5, the gender achievement gap among students of different races/ethnicities significantly varied by educational attainment expectations. Among students in the sample who reported that they "definitely will" go to college, the gender gap among AIAN students was over twice as large as that among White respondents. These findings suggest that other personal, environmental, or behavioral factors may better explain the gender achievement gap among AIAN adolescents, who expect to graduate from college.

Table 5. GPA Gender Gap by Race/Ethnicity and Expectations to Graduate from a Four-Year College.

	Probably / Definitively Won't	Probably Will	Definitively Will
AIAN Only	0.14*	0.23***	0.28***
AIAN Other	0.21***	0.03	0.26***
AIAN White	0.40***	0.23**	0.25***
Other Races	0.35***	0.13*	0.15***
White	0.20	0.28***	0.12***
Total	**0.20*****	**0.19*****	**0.23*****
% of sample	16.12	34.86	49.02

$^{***}p < 0.01, ^{**}p < 0.05, ^*p < 0.1$

Inferential Statistics

Proportional odds ratios for ordinal logistic regressions were estimated for the sample and reported in Table 6. For categorical variables with ordinal scales, values omitted for comparison represent the mode survey response. Numbered scale values listed in Table A.1 are denoted in parentheses next to applicable variables.

Table 6. Regression Results.

Variables		Model 1	Model 2	Model 3	Model 4	Model 5
Gender/ethnic-race						
AIAN Only	Female	0.334***	0.352***	0.343***	0.413***	0.415***
		(0.037)	(0.036)	(0.038)	(0.038)	(0.040)
AIAN Only	Male	0.170***	0.218***	0.194***	0.245***	0.255***
		(0.020)	(0.025)	(0.023)	(0.026)	(0.030)
AIAN Other	Female	0.403***	0.420***	0.441***	0.518***	0.540***
		(0.048)	(0.045)	(0.051)	(0.050)	(0.057)
AIAN Other	Male	0.231***	0.287***	0.281***	0.332***	0.375***
		(0.027)	(0.032)	(0.035)	(0.035)	(0.041)
AIAN White	Female	0.630***	0.642***	0.684***	0.715***	0.766**
		(0.078)	(0.078)	(0.088)	(0.083)	(0.094)
AIAN White	Male	0.283***	0.368***	0.375***	0.394***	0.459***
		(0.036)	(0.046)	(0.050)	(0.045)	(0.057)
Other Races	Female	0.478***	0.512***	0.508***	0.569***	0.588***
		(0.052)	(0.050)	(0.048)	(0.050)	(0.056)
Other Races	Male	0.284***	0.352***	0.333***	0.373***	0.434***
		(0.030)	(0.033)	(0.032)	(0.033)	(0.040)
White	Male	0.466***	0.610***	0.603***	0.595***	0.676***
		(0.043)	(0.054)	(0.055)	(0.053)	(0.059)
Age		0.732***	0.781***	0.777***	0.790***	0.808***
		(0.036)	(0.038)	(0.039)	(0.038)	(0.040)
Grade		1.306***	1.246***	1.210***	1.235***	1.273***
		(0.085)	(0.077)	(0.077)	(0.076)	(0.083)
Reading speed						
Slow/a little slow (1)		0.527***	0.575***	0.624***	0.582***	0.596***
		(0.033)	(0.035)	(0.036)	(0.037)	(0.034)
Fast/very fast (3)		1.662***	1.566***	1.571***	1.566***	1.599***
		(0.081)	(0.079)	(0.079)	(0.078)	(0.074)
Graduate college						
Probably / Definitely won't (1)			0.231***	0.325***	0.264***	0.343***
			(0.013)	(0.018)	(0.016)	(0.022)
Probably will (2)			0.463***	0.559***	0.485***	0.580***
			(0.023)	(0.027)	(0.024)	(0.028)
Join the army						
Probably will (2)			0.693***	0.680***	0.707***	0.682***
			(0.041)	(0.039)	(0.041)	(0.039)
Definitely will (3)			0.612***	0.593***	0.621***	0.623***
			(0.035)	(0.035)	(0.035)	(0.037)
Attend vocational school						
Probably will (2)			0.959	0.854***	0.962	0.918
			(0.049)	(0.045)	(0.050)	(0.049)
Definitely will (3)			0.922	0.823**	0.906	0.880
			(0.070)	(0.061)	(0.068)	(0.068)

Table 6. (Cont.)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Responsible					
A little like me (1)			0.492***		
			(0.040)		
Somewhat like me (2)			0.686***		
			(0.046)		
Exactly like me (4)			1.322***		
			(0.069)		
Strong cultural attachment/identify					
Not much/at all (1)			0.881***		
			(0.039)		
A lot (3)			1.162**		
			(0.074)		
Depressed					
Not at all (1)			1.125*		
			(0.079)		
Some/a lot (3)			0.749***		
			(0.036)		
Found schoolwork interested					
Never (1)			0.575***		
			(0.038)		
Not often (2)			0.805***		
			(0.040)		
Almost always (4)			1.191***		
			(0.071)		
Over 25 miles from reservation				1.266***	
				(0.104)	
Lives with…					
Parent and stepparent				0.777***	
				(0.047)	
Single parent				0.659***	
				(0.040)	
No parent				0.628***	
				(0.047)	
Feels safe at school					
Not much/at all (1)				0.732***	
				(0.035)	
A lot (3)				1.199***	
				(0.061)	

Table 6. (Cont.)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Tried their best in school					
Not often/Never (1)					0.313***
					(0.029)
Sometimes (2)					0.417***
					(0.019)
Smoked weed					
1-40 times (2)					0.727***
					(0.045)
40 or more times (3)					0.536***
					(0.040)

Standard errors in parentheses
***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Model 1 reports baseline results for the first ordinal logistic regression. All estimated coefficients were significant at $p < 0.01$. Controlling for grade level indicated that students a year older than their classmates had 26.8% lower predicted odds of achieving a higher GPA than younger students in the same grade. Conversely, students in higher grade levels had about 1.3 times greater odds of earning a higher GPA compared to students in lower grades. Students who claimed to be fast readers were estimated to have about 1.67 times higher odds of performing better in school compared to students at lower reading levels. Controlling for scholastic ability, AIAN Only adolescents had the lowest estimated proportional odds ratios by gender, with girls and boys predicted to have 66.6% and 83.0% lower odds of reporting a higher level of achievement compared to their male and female counterparts.

Results in Model 2 are congruent with the literature that gender discrepancies in school achievement reflect gendered patterns in post-school expectations. The model displays results for students' expectations to graduate from college, join the army, and attend a vocational or technical school. Students who indicated that they "probably/definitely won't" or "probably will" graduate

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from a four-year college had 76.9% ($p < 0.01$) and 53.7% ($p < 0.01$) lower predicted odds of earning a higher GPA compared to students who confirmed that they "definitely will" graduate from college. Effect sizes regarding expectations to join the army or attend a vocational school were meaningfully smaller (the latter measurement was not statistically significant). In line with Hypothesis 1, White males displayed the largest change in their estimated coefficient, going from 53% to 39% lower odds of higher achievement between Model 1 and Model 2 relative to the White females in the control group. Meanwhile, AIAN Only boys went from having 83% to 78% lower predicted odds of having a higher GPA.

Model 3 includes controls for cognitive factors (responsibleness), sources of resilience (cultural attachment/identity), emotional well-being (depression), and school engagement (interest in class content). Controlling for these attributes on top of attainment expectations supports the notion that personal attributes are fairly predictive of school achievement, with levels of personal responsibility and interest in schoolwork being the most decisive indicators of school performance. That is, compared to respondents who said that completing their responsibilities was "pretty much like me", as well as those who found their schoolwork interesting "sometimes", students who indicated that being responsible was "exactly like me" and found their schoolwork interesting "a lot" had 1.32 and 1.16 times greater odds of earning better grades, respectively. When accounting for personal qualities, students who expected to attend a vocational school had slightly lower, yet statistically significant predicted odds of earning higher rather than lower grades compared to students who did not expect to attend. Proportional odds ratios predicted for most demographic groups were also lower than those predicted in the previous model. AIAN White was the only ethnic-racial category for which both genders had more favorable predicted odds ratios relative to

Model 2. Overall, the estimated difference between girls' and boys' propensity for academic achievement slightly increased.

Model 4 adds to Model 2 by accounting for environmental factors in addition to postsecondary attainment expectations. Additional variables included whether students lived over 25 miles away from the nearest reservation, what primary caregiver(s) lived in their household, and how safe respondents felt at school. Students who did not live in a traditional, two-parent household had comparatively lower predicted odds of earning higher grades. Adolescents who lived far away from the nearest reservation had 1.27 times greater predicted odds of earning a higher GPA compared to students who lived closer. Respondents who reported that they feel safe at school "a lot" had 1.2 times higher predicted odds of performing better in school compared to students who indicated feeling safe "sometimes". As anticipated, controlling for environmental factors mainly increased students of color's predicted odds of greater achievement. Meanwhile, White males' prospects of earning higher grades relative to White females' were predicted to be lower. Changes in estimates relative to Model 2 were indeed larger for girls compared to boys, especially for students of more racially marginalized backgrounds.

Finally, Model 5 builds on Model 2 by controlling for academic engagement and obstructive behaviors. Additional parameters measured how often students tried to do their best in school and how many times they had smoked weed. Results indicated that compared to students who always tried their best in school, students who "not often/never" and "sometimes" tried had 68.7% and 58.3% lower odds of earning a higher rather than a lower GPA. Adolescents who had smoked weed less than or at least 40 times had 27.3% and 46.4 % lower odds of earning a higher grade compared to those who never smoked weed. Out of the three models that build on Model 2, the final model controlling for these behaviors explained the largest portion of intersectional

differences in groups' estimated odds of achieving a higher versus a lower grade relative to White females.

CHAPTER 6. DISCUSSION

Summary of Findings

Highlighting students with different racial backgrounds revealed important trends in the gender achievement gap among a diverse sample of American Indian and Alaska Native students. In line with the literature, controlling for attainment expectations led to a larger increase in boys' estimated odds of earning a higher GPA relative to girls. As predicted in Hypothesis 1, differences in attainment expectations accounted for a smaller portion of the predicted gender achievement gap among AIAN and especially AIAN Only students compared to other races. Controlling for personal attributes, however, did not further explain the racial or gender achievement gap, both of which were estimated to be larger between students who reported similar characteristics and perceptions related to academic success. Predicted gender differences were also wider when controlling for environmental conditions, supporting the notion that environmental factors explain racial, but not gender differences between adolescents' GPAs. Indeed, girls' increased likelihood of experiencing environmental hardships along with their higher levels of resilience against these conditions resulted in a larger increase in AIAN girls' predicted odds of earning a higher GPA relative to boys – particularly girls categorized as AIAN Only and AIAN Other. Lastly, controlling for behaviors related to academic achievement in addition to educational attainment expectations in the final model explained a larger portion of the gender achievement gap than controlling for personal attributes and environmental factors. Such behaviors explained less of the discrepancy between AIAN Only boys' and girls' school performance compared to boys and girls in other groups.

Limitations

The study had a number of limitations that should be addressed in future research. As previously mentioned, the sample is limited to students who were enrolled in schools on or near AI reservations and is not representative of all AIAN students and other demographic groups around the country. Furthermore, because the analysis lacks important controls (e.g., parental educational attainment) and relies on data from a cross-sectional sampling design, the study does not present results with causal implications. It also does not explore nuances among students with non-cisgender gender identities. Future research should include AIAN students in suburban and urban areas, allow students to indicate gender identities aside from male and female, and incorporate mechanisms to verify respondents' information rather than rely on self-report.

CHAPTER 7. CONCLUSION

AIAN boys on or near reservations are more vulnerable to scholastic underachievement compared to their female counterparts. Although the study sheds light on important inequities around AIAN students' academic performance, much of the gender gap remains unexplained. Findings suggest that gender discrepancies among AIAN youth are largest among students who are most certain that they will graduate from college. Additional research is needed to understand how personal characteristics, environmental conditions, and adolescent behaviors relate to intersectional differences in academic achievement among AIAN boys and girls with high educational attainment expectations. Factors such as boys' and girls' participation in non-academic school activities and gender discrepancies in disciplinary action and learning disabilities are worth additional exploration. In the meantime, policymakers must provide additional resources for research and interventions that aim to increase AIAN boys' collegiate preparedness and propensity for high scholastic achievement.

Table A.1. Scales for Categorical Variables.

Speed scale		Agreement scale (a)	
	(1) Slow/a little slow		(1) Not at all/much
	(2) Moderately fast		(2) Somewhat
	(3) Fast/very fast		(3) A lot
Likelihood scale		**Agreement scale (b)**	
	(1) Probably/definitely won't		(1) Not at all
	(2) Probably will		(2) Not much
	(3) Definitely will		(3) A lot/somewhat
Accuracy scale		**Agreement scale (c)**	
	(1) Not at all/a little like me		(1) Not at all
	(2) Somewhat like me		(2) Not much
	(3) Pretty much like me		(3) Somewhat
	(4) Exactly like me		(4) A lot
Frequency scale (a)		**Frequency scale (b)**	
	(1) Not often/Never		(1) Never
	(2) Sometimes		(2) 0-40 times
	(3) Almost always		(3) 40 or more times

Table A.2. Mean GPA by Gender, Race/Ethnicity, and Expectations to Graduate from a Four-Year College.

|	Probably / Definitively Won't		Probably Will		Definitely Will	
	F	M	F	M	F	M
AIAN Only	2.28	2.14	2.70	2.47	3.08	2.80
	(0.976)	(0.946)	(0.869)	(0.863)	(0.735)	(0.803)
AIAN Other	2.42	2.21	2.74	2.71	3.15	2.89
	(1.089)	(1.051)	(0.888)	(0.878)	(0.749)	(0.835)
AIAN White	2.78	2.38	2.99	2.76	3.32	3.07
	(0.846)	(0.952)	(0.810)	(0.917)	(0.677)	(0.827)
Other Races	2.7	2.35	2.93	2.80	3.22	3.07
	(0.935)	(1.017)	(0.782)	(0.807)	(0.704)	(0.791)
White	2.74	2.54	3.21	2.93	3.48	3.36
	(0.969)	(0.914)	(0.751)	(0.894)	(0.573)	(0.655)
Total	**2.5**	**2.29**	**2.87**	**2.68**	**3.22**	**2.99**
s	(0.99)	(0.978)	(0.848)	(0.886)	(0.713)	(0.809)
n	501	968	1418	1759	2597	1870
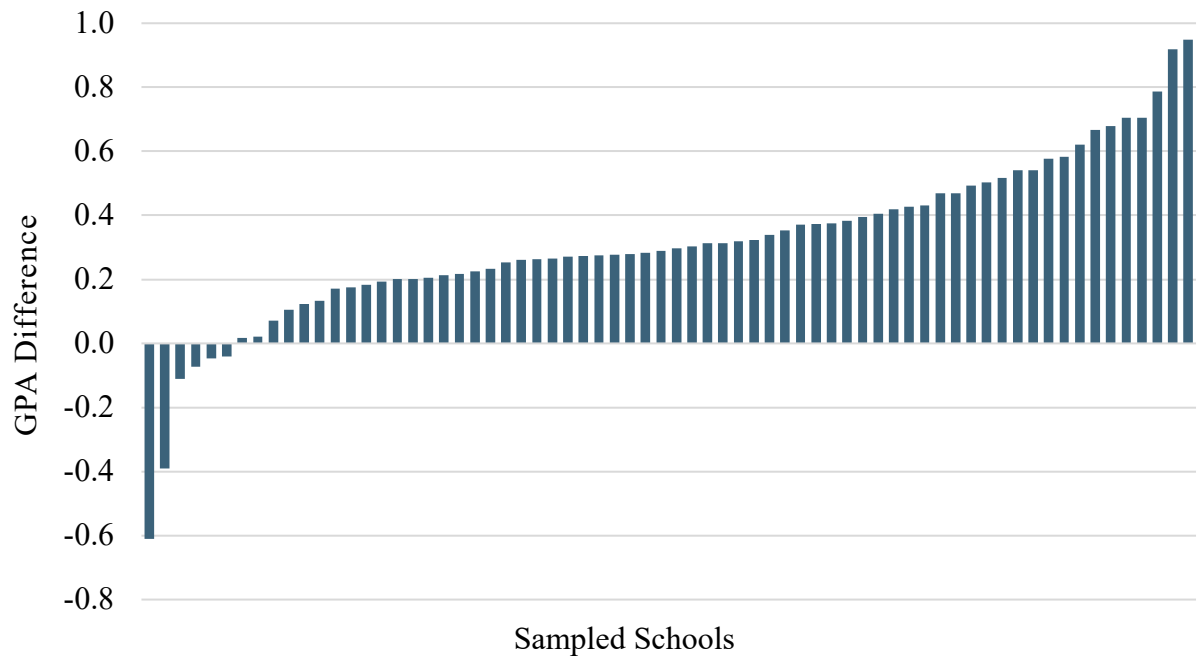
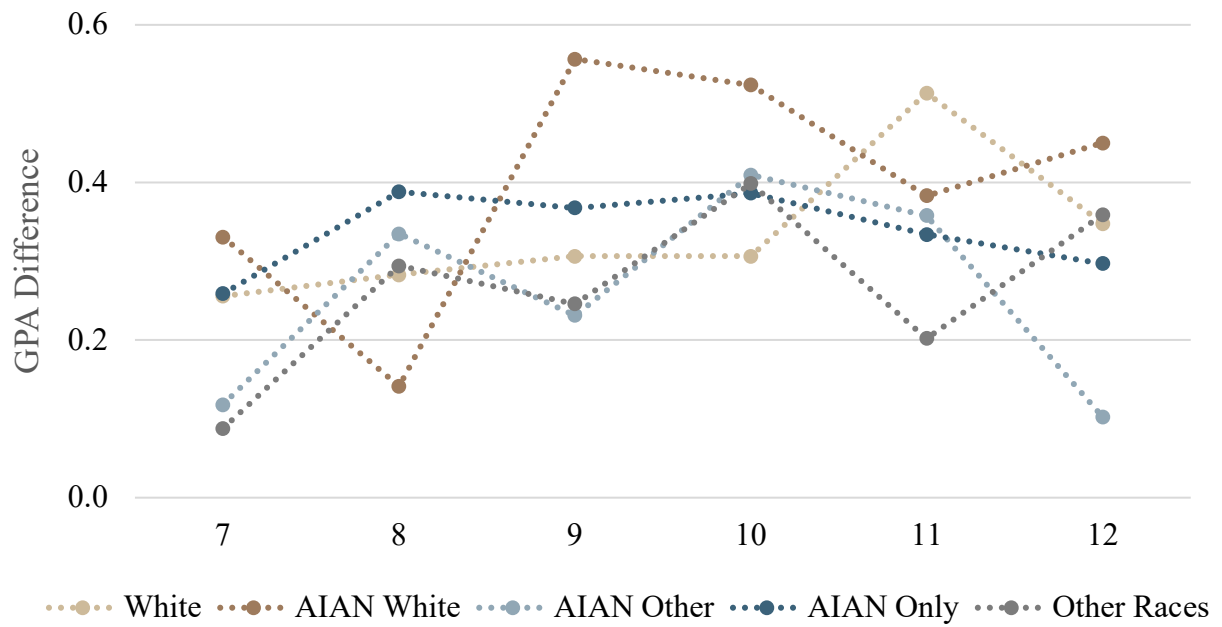**Figure A.1. GPA Gender Gap by School.**

Figure A.2. GPA Gender Gap by Grade and Race/Ethnicity.

Table A.3. Descriptive Statistics for American Indian and Alaska Native Only.

	Female (n = 1802)		Male (n = 1737)	
Variables	Mean	s	Mean	s
Age[†]	14.500	1.740	14.590	1.801
Grade[‡]	9.004	1.679	8.935	1.700
Reading speed	2.013	0.675	1.999	0.695
Expectations to…				
Graduate from college[*]	2.451	0.698	2.189	0.763
Join the army[*]	2.084	0.999	2.303	1.040
Attend a vocational school[*]	2.615	0.968	2.705	0.953
Responsible[§]	2.834	0.920	2.801	0.949
Cultural attachment/identity[*]	2.014	0.767	1.870	0.769
Depressed[*]	2.286	0.734	2.066	0.745
Found schoolwork interesting[§]	2.757	0.895	2.727	0.957
Lives over 25mi from reservation[∥]	0.071	0.257	0.084	0.277
Feels safe at school	2.035	0.740	2.048	0.769
Lives with…				
Two parents (no stepparent)[∥]	0.342	0.475	0.350	0.477
Parent and stepparent[∥]	0.196	0.397	0.203	0.402
Single parent[∥]	0.328	0.470	0.310	0.463
No parent[∥]	0.134	0.341	0.138	0.345
Tried their best in school[*]	2.473	0.665	2.349	0.699
Smoked weed	1.665	0.763	1.665	0.804

Note: Based on a 3-point scale unless otherwise specified. All statistically significant differences were significant at $p < 0.01$.
[*] Means are significantly different at $p < 0.01$.
[†] 12 or younger to 19 or older.
[‡] Grade 7 to grade 12.
[§] 4-point scale.
[∥] Binary scale (0 or 1).

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