Research Report

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Predictive Validity of High School GPA and ACT Composite Score on Graduating College GPA: Examining First-Year College GPA as a Mediator

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Conclusions

The study concludes that both high school GPA (HSGPA) and ACT scores are significant predictors of college success, particularly first-year college GPA (FYGPA). However, FYGPA mediates the relationship between ACT scores and cumulative GPA (CGPA), but not between HSGPA and CGPA. Importantly, the interaction between HSGPA and ACT scores is a significant predictor of CGPA, with consistent achievement across both measures being crucial for better outcomes. The study emphasizes the value of using both HSGPA and ACT scores for more accurate predictions and tailored academic support.

So What?

For students, the study suggests the need to focus on both maintaining high grades and performing well on standardized tests to ensure a strong start in college. Teachers can use these insights to better identify students who might need extra help in aligning their academic performance across different achievement measures. For postsecondary professionals, the findings highlight the importance of a comprehensive admissions process that considers both HSGPA and ACT scores.

Now What?

Practical next steps from this study include encouraging high school students to strive for consistent performance both in their high school coursework and on the ACT in order to better prepare for college success. Teachers and counselors can use these findings to identify students who may need additional help aligning their academic achievements. Postsecondary institutions should consider both HSGPA and ACT scores when making admissions decisions and support processes that provide a more comprehensive evaluation of student readiness. Additionally, colleges can develop targeted interventions for students with discrepancies between their HSGPA and ACT scores to help improve their academic outcomes and retention rates.

About the Authors

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Dr. Sanchez is a lead research scientist at ACT, where he studies postsecondary admissions, national testing programs, test preparation efficacy, and intervention effectiveness. Throughout his career, Dr. Sanchez has focused on studying the transition between high school and college and supporting the decision-making capacity of college administrators, students, and their families. His research has been widely cited in academic literature and by the media, including *The Wall Street Journal*, *The Washington Post*, *USA Today*, and the education trade press.

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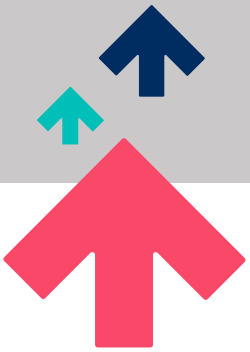


Introduction

Prior research has shown the importance of the ACT score and high school GPA (HSGPA) in predicting college success. For example, Coyle and Pillow (2008) demonstrated that both ACT and SAT scores retain their predictive validity for early college GPA (in the first or second semester) even after general intelligence is accounted for. Furthermore, Huh and Huang (2016) showed that both ACT scores and HSGPA are significant predictors of first-year college GPA (FYGPA). In a meta-analysis from 50 institutions, Westrick et al. (2015) found that while both ACT scores and HSGPA were significant predictors of college performance and retention, HSGPA was more predictive than ACT scores. Moreover, Marini et al. (2019) showed that SAT scores, when combined with HSGPA, effectively predicted FYGPA and retention to the second year. A recent study by Sanchez (2024) found similar results: In this study, both HSGPA and ACT scores were predictive of FYGPA, and using these precollege achievement indicators together was shown to result in better predictions of FYGPA.

Radunzel and Noble (2012) extended this line of research to long-term outcomes, demonstrating that both ACT Composite (ACTC) scores and HSGPA significantly predict degree completion, with FYGPA serving as an important intermediary step. Loria and Sanchez (in press) found that FYGPA serves as a mediator of the effects of ACTC score and HSGPA on degree completion by Years 4 and 6. FYGPA significantly predicts baccalaureate degree attainment, with HSGPA and ACTC score having both direct effects on graduation and indirect effects through FYGPA.

Early college success, as indicated by students' FYGPA, plays a pivotal role in later college success and timely degree completion (Demeter et al., 2022; Gershenfeld et al., 2016). The accurate prediction of FYGPA is important in helping colleges identify students who might need academic interventions and supports. Many studies have documented the relationship between FYGPA and the combination of HSGPA and ACT or SAT scores (Beard & Marini, 2018; Curabay, 2016; Marini et al., 2019; Warren & Goins, 2019; Westrick et al., 2015).

Steedle (2020) delved into why HSGPA tends to be a stronger predictor than ACT scores. This study showed that HSGPA's greater predictive validity seems to come from its ability to capture both cognitive and behavioral components such as motivation and determination. HSGPA provides a comprehensive measure of student potential, as it captures aspects of effort and persistence that standardized tests may not fully capture. The ACT® test provides a narrower cognitive assessment of core academic knowledge and skills.

Collectively, these studies suggest that a more comprehensive approach that includes both standardized test scores and HSGPA provides the most accurate prediction of college success. Thus, to further explore these relationships, the present study focuses on how FYGPA mediates the effects of ACT scores and HSGPA on cumulative graduating college GPA (CGPA).

The predictive validity of HSGPA and standardized test scores on college success is a topic of considerable interest in educational research. The present study examines the predictive validity of ACT scores and HSGPA on CGPA, with FYGPA acting as a mediator. Mediation occurs

when the effect of a predictor on an outcome is transmitted through a second predictor. In our case, the effect of ACTC score or HSGPA on CGPA passes through FYGPA. Specifically, I examine five research questions:

1. Does FYGPA mediate the relationship between HSGPA and CGPA or between ACTC score and CGPA?
2. What is the relationship between HSGPA and CGPA after FYGPA is accounted for?
3. What is the relationship between ACTC score and CGPA after FYGPA is accounted for?
4. What is the relationship between CGPA and both ACTC score and HSGPA after FYGPA is accounted for?
5. Which of the three hierarchical linear models fits the data best?

Methods

Analytical Sample

The sample in this study included ACT-tested students from a southern state that had a contract with ACT to test most of its public high school 11th graders. In the case of a statewide adoption contract, nearly all public high school graduates in the state have taken the ACT. The sample included students who entered college in the fall of 2017. These students were tracked for six years to determine whether they had completed a baccalaureate degree. They were then matched to ACT testing records. Students were required to have valid data for the following characteristics: ACTC score, HSGPA, FYGPA, student demographics (specifically, income, gender, and racial/ethnic background), and CGPA.

Measures

ACT Composite (ACTC) Score

Official ACTC scores were obtained from the graduating class record for the state in the analysis. A student's ACTC score may have been attained during either statewide testing or a national test administration. For students in the study who took the ACT more than once, I used their most recent score prior to high school graduation.

Cumulative High School GPA (HSGPA)

Self-reported grades in up to 23 courses in English, mathematics, social studies, and natural science were averaged to calculate each student's cumulative HSGPA. Sanchez and Buddin (2016) found a high correlation (r = 0.84) between students' self-reported HSGPA and students' transcript GPA, and other research supports the use of self-reported data for research purposes (Camara et al., 2003; Kuncel et al., 2005; Shaw & Mattern, 2009).

First-Year College GPA (FYGPA)

Official FYGPA was obtained from student transcripts at the institutions in which students enrolled immediately after high school.

Cumulative Graduating College GPA (CGPA)

Official CGPA was obtained from student transcripts at the institutions from which students received their baccalaureate degrees.

Demographic Characteristics.

When students registered for the ACT, they were asked to provide their family income, gender, and racial/ethnic background. Family income comprised five categories: below $36,000, $36,000–$60,000, $60,000–$100,000, above $100,000, and missing response. Students identified their gender as male or female. (While the ACT currently includes an option for another gender, this was not available in 2017.) Racial/ethnic identity included Asian, Black, Hispanic, American Indian/Alaska Native, Native Hawaiian/Pacific Islander, White, two or more races, prefer not to respond, or no response provided. Due to the limited number of students identifying as American Indian/Alaska Native and Native Hawaiian/Pacific Islander, these students were grouped with students who selected “two or more races.” Table 1 includes the demographic characteristics of this sample, as well as the characteristics of the entire 2017 graduating class.

Data Analysis

In the present analysis, students were nested within postsecondary institutions. Specifically, students were nested within the institution in which they enrolled immediately after high school. Although there is likely to have been additional nesting (e.g., students with a college program), that information was not available. The intraclass correlation was 0.05, suggesting that little variance was due to the nested structure. Given the reality of the nested structure, analysis was conducted to incorporate the clustering of students within postsecondary institutions. Two separate sets of analyses were conducted with the data. The first was a path analysis that used cluster robust standard errors. The second was a set of hierarchical linear models (HLMs) that incorporated the nesting structure described above. Although the intraclass correlation was relatively low, this analysis methodology was chosen to incorporate and correctly model the structure of the data and account for potential violations of the independence assumptions.

In all three HLMs, CGPA was the outcome of interest, and the predictors were HSGPA, ACTC score, gender, family income, and race/ethnicity. In these models, I did not consider any college-level characteristics. To evaluate model fit, I examined the Akaike information criterion (AIC) and Bayesian information criterion (BIC). I also calculated R^2 to estimate the variance explained at the student and institutional levels. Additionally, I examined the reduction in residual variance (i.e., the within-institution variance) to evaluate model fit. Total residual variance was attained by fitting a null model to assess the amount of residual variance not explained by postsecondary institutional nesting. Subsequently, I assessed the percentage of

reduction in this residual variance, which can be interpreted as the percentage of residual variance explained by the HSGPA, ACTC score, and combined models.

All three HLMs included a random intercept term. I determined that models that included random slopes for ACTC score and HSGPA fit slightly better than models without those random effects. As such, the HSGPA model included a random term for HSGPA, the ACTC score model included a random term for ACTC score, and the model that included both ACTC score and HSGPA included random terms for both achievement measures.

Results

Descriptive Statistics

As shown in Table 1, the sample consisted of more female than male students, 74% of the sample was White, and about 33% of the sample came from families with income greater than $100,000. The average ACTC score was 23.48, the average HSGPA was 3.52, and the average FYGPA and CGPA were both 3.38. There were a total of 7,516 students in the sample. Slight differences were observed between the characteristic percentages of the sample and those of the 2017 graduating class, which are also reported in Table 1. Notably, the current sample was relatively high achieving, with higher ACTC scores and HSGPA than those of the 2017 graduating class.

Table 1. Sample Descriptive Statistics

Characteristic		Current sample	2017 graduating class
Gender	Male	2,963 (39%)	939,730 (46%)
	Female	4,542 (60%)	1,047,170 (52%)
	Missing	11 (0%)	43,138 (2%)
Race/ethnicity	White	5,558 (74%)	1,065,439 (52%)
	African American	666 (9%)	256,756 (13%)
	American Indian/Alaska Native	37 (1%)	16,135 (1%)
	Asian	165 (2%)	96,097 (5%)
	Hispanic	585 (8%)	347,906 (17%)
	Native Hawaiian/Pacific Islander	5 (0%)	6,503 (0%)
	Prefer not to respond/missing	193 (3%)	158,083 (8%)
	Two or more races	307 (4%)	86,119 (4%)
Family income	<$36K	1,208 (16%)	426,337 (21%)
	$36K–$60K	1,254 (17%)	289,021 (14%)
	$60K–$100K	1,691 (23%)	318,381 (16%)
	>$100K	2,451 (33%)	385,166 (19%)
	Missing	912 (12%)	611,133 (30%)
ACTC mean (*SD*)		23.48 (4.81)	20.97 (5.63)
HSGPA mean (*SD*)		3.52 (0.51)	3.27 (0.63)
FYGPA mean (*SD*)		3.38 (0.54)	—
CGPA mean (*SD*)		3.38 (0.44)	—
Total number of students		7,516	2,030,038

Note. Percentages may not sum to 100% due to rounding.

As shown in Figures 1–4, the sample HSGPA, FYGPA, and CGPA were all skewed toward the upper end of their respective distributions (4.0). In Figure 3, we can see that most HSGPAs were above a 3.0. This is likely due to the attrition of students who did not graduate from college. Figure 4 illustrates that the ACTC scores were approximately normally distributed.

Figure 1. Histogram of Sample HSGPA

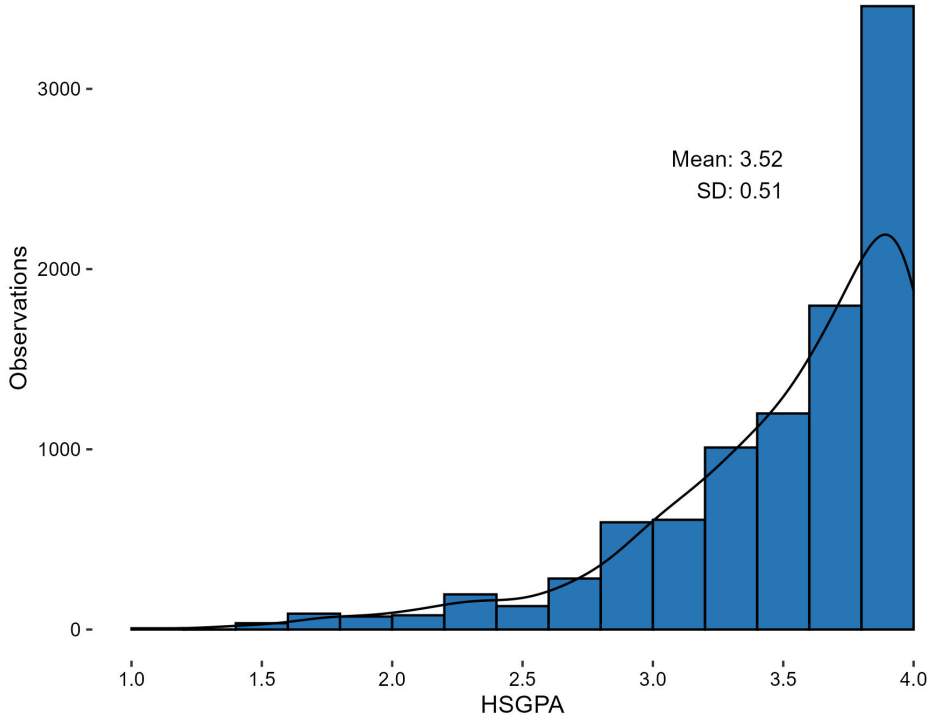


Figure 2. Histogram of Sample FYGPA

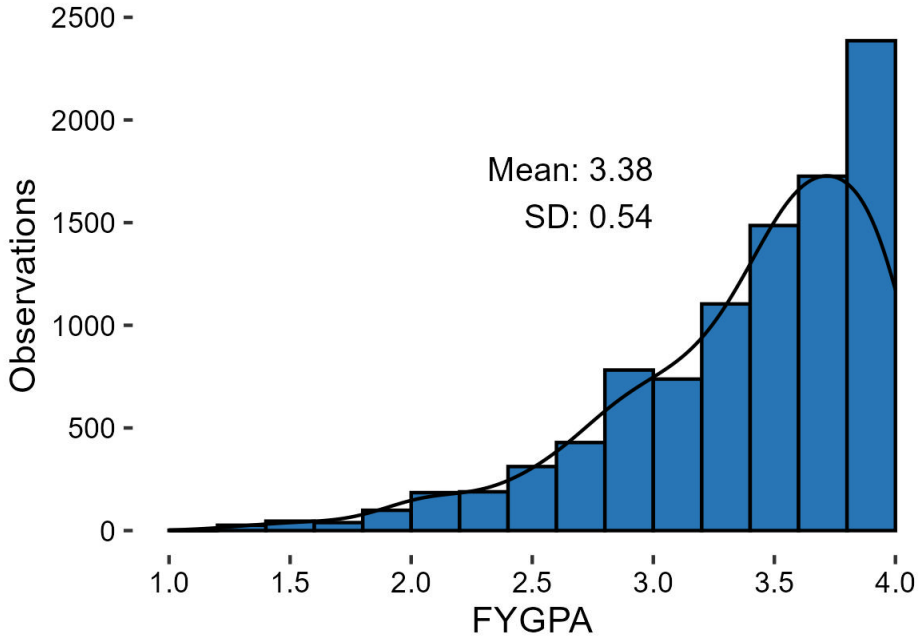


Figure 3. Histogram of Sample CGPA

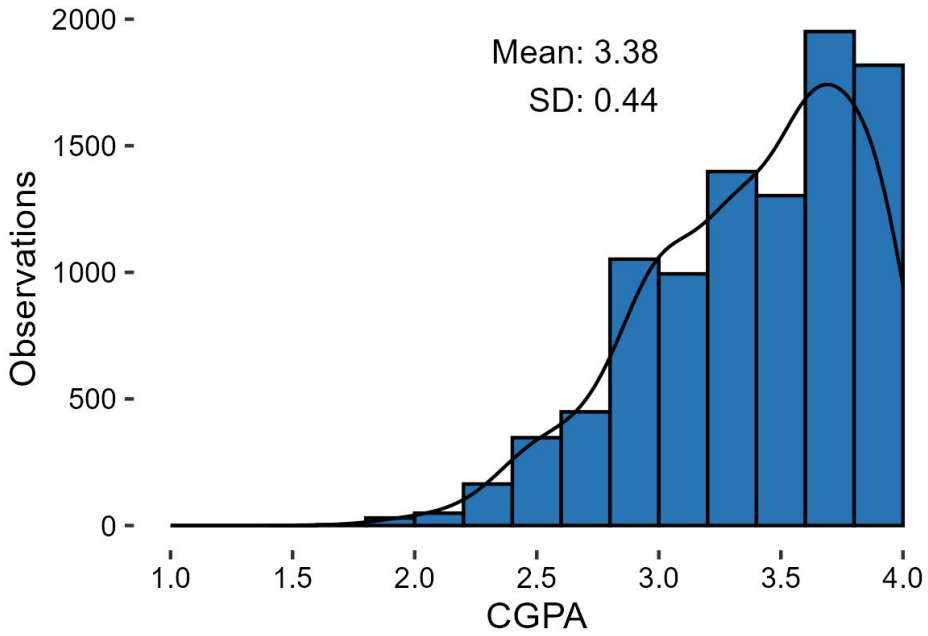
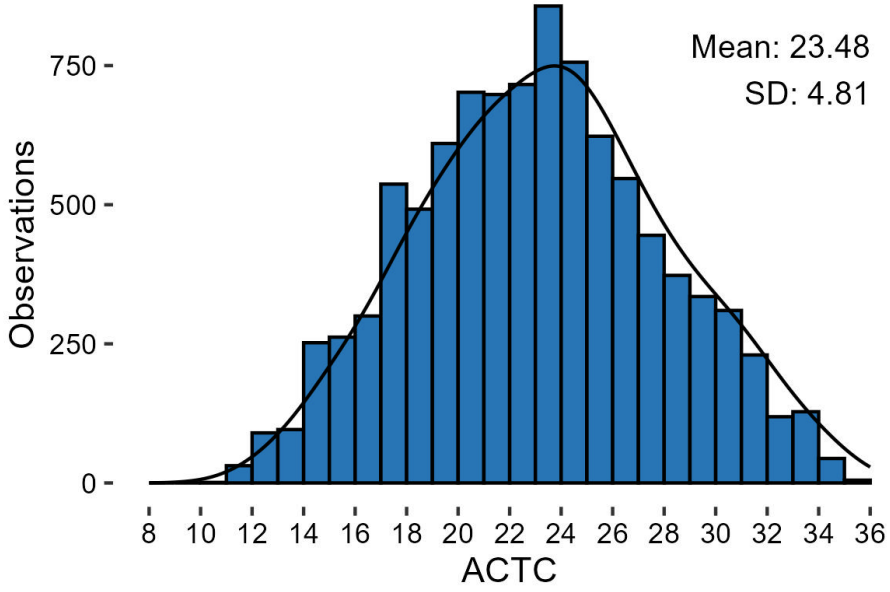


Figure 4. Histogram of Sample ACTC Score



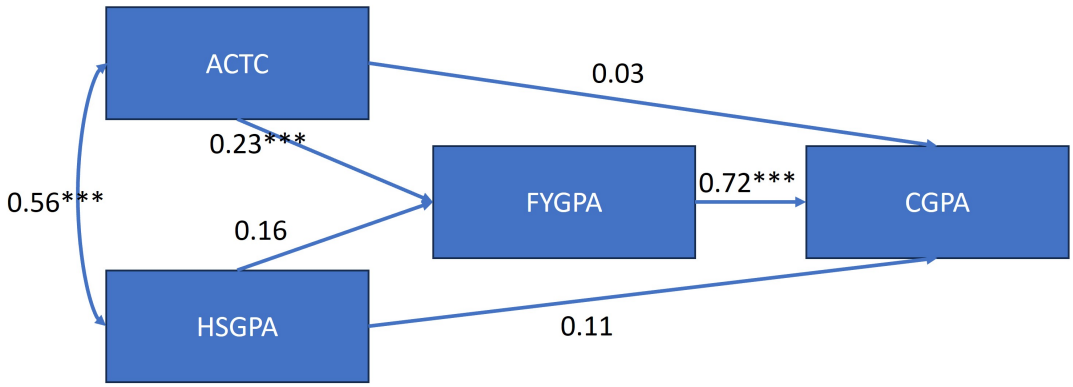
Does FYGPA mediate the relationship between HSGPA and CGPA or between ACTC score and CGPA?

The path analysis presented in Figure 5 is a simplified model that focuses on the mediation by FYGPA of the effects of precollege academic measures on CGPA. Unlike the HLMs that will follow in this paper, this analysis does not include student demographic information and uses cluster robust standard errors rather than hierarchical modeling. In this path analysis, we can see that the only significant paths were the one that identified ACTC score as a predictor of FYGPA and the one that identified FYGPA as a predictor of CGPA. In this initial analysis, HSGPA was not a significant predictor of either FYGPA or CGPA. This runs counter to what previous research has demonstrated. It is important to note that prior research utilized these academic achievement measures—usually in addition to demographic factors—in either a multiple regression methodology or a hierarchical linear modeling methodology without including FYGPA as a mediator.

This path analysis indicates that FYGPA is a mediator of the effect of ACTC score on CGPA. It is worth noting that the percentage of variance explained in FYGPA was low (11.8%), while the percentage of variance explained in CGPA was higher (60.6%). This indicates that the use of ACTC score and HSGPA alone accounted for a small proportion of the variance in FYGPA. It is possible that given the significant covariance between ACTC score and HSGPA, ACTC score is presenting as the more dominant predictor of FYGPA. From this initial analysis, focused on establishing FYGPA as a mediator of the effects of ACTC score and HSGPA on CGPA, we can see that FYGPA mediated the effect of ACTC score on CGPA. Considering this finding, I move

on to a more complex analysis that incorporates student demographic information in HLMs while accounting for FYGPA.

Figure 5. Path Analysis of the Effects of ACTC Score and HSGPA on CGPA With FYGPA as a Mediator

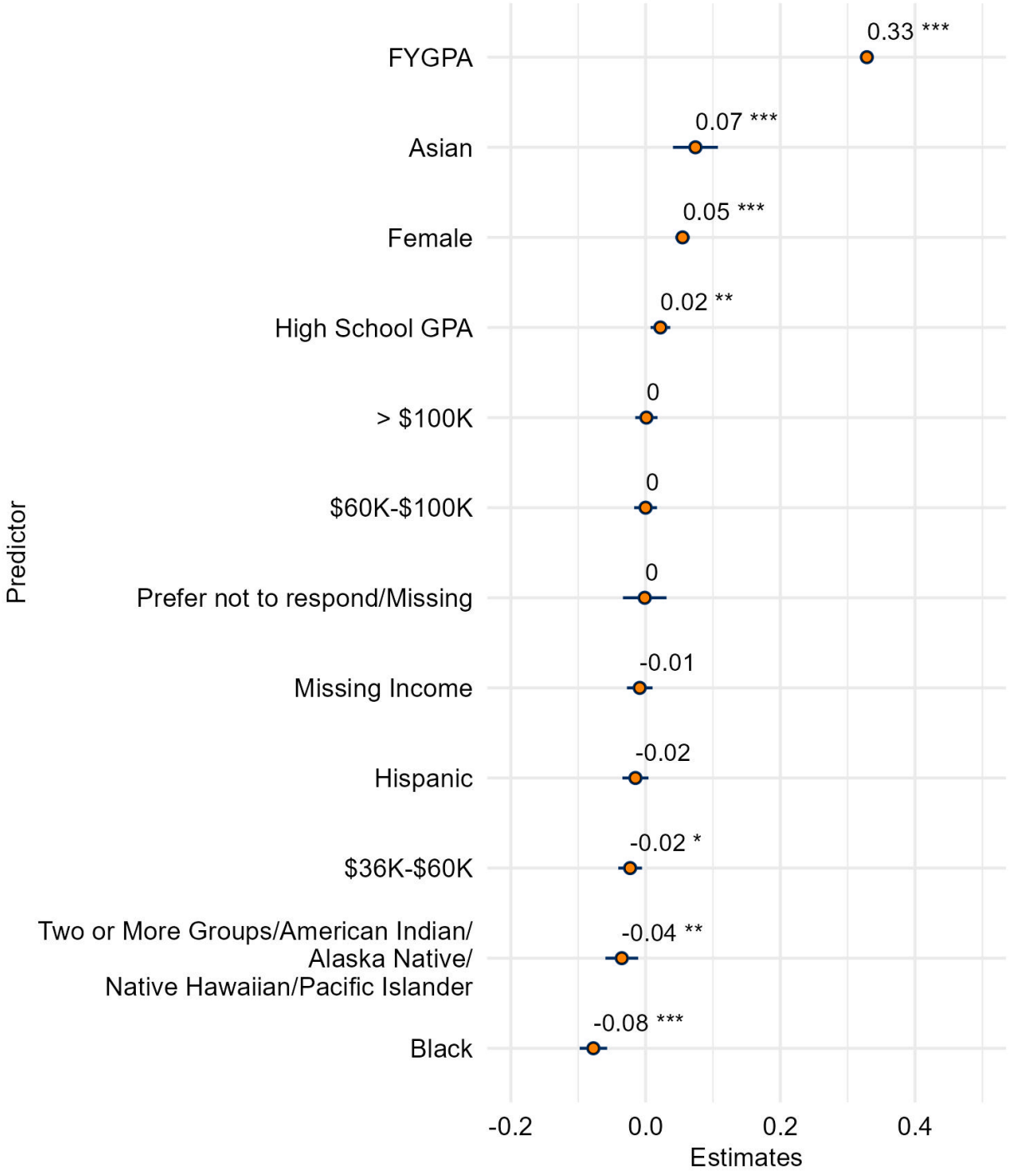


Note. ***$p < 0.01$

What Is the Relationship Between HSGPA and CGPA?

The fixed effect of the HLM, which included FYGPA, HSGPA, and demographics, accounted for 58.7% of the variance in CGPA. As seen in Figure 6, once FYGPA was accounted for, HSGPA was found to be the fourth-strongest positive predictor of CGPA. Other positive coefficients included an indicator of Asian race/ethnicity relative to White race/ethnicity and an indicator of female gender relative to male gender. Three predictors were found to have significant negative coefficients: an indicator of family income of $36,000–$60,000, an indicator of two or more racial ethnic groups/American Indian/Alaska Native/Native Hawaiian/Pacific Islander, and finally an indicator of Black race/ethnicity. It is worth noting that four demographic predictors were found to have stronger predictive power than HSGPA once FYGPA was accounted for. In absolute value, these four demographic predictors were stronger predictors of CGPA than HSGPA.

Figure 6. HSGPA HLM Coefficients



Note. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. The reference groups were male, White, and <$36,000. "Prefer not to respond/Missing" is a race/ethnicity category.

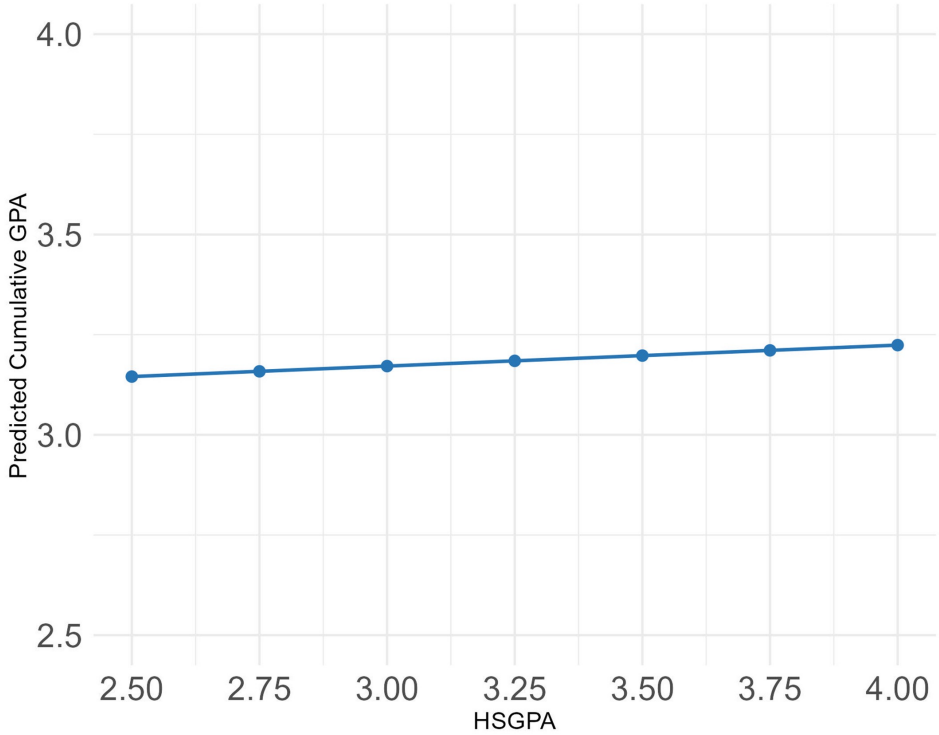
Table 2 displays the predicted CGPA by student demographic characteristic after FYGPA is accounted for. In this model, female students are predicted to have a higher CGPA than male students. In regard to race/ethnicity, students from all the following categories had similar predicted CGPAs that were not statistically significantly different from each other: White, Hispanic, two or more racial/ethnic groups/American Indian/Alaska Native/Native Hawaiian/Pacific Islander, prefer not to respond, and missing information. Compared to these students, Asian students were predicted to have a higher CGPA, while Black students were predicted to have a lower CGPA. Students from families with an income of $36,000–$60,000 were found to have a lower predicted CGPA than students from other family income levels.

Table 2. Predicted CGPA for Student Demographic Characteristics in the HSGPA Model

Characteristic		Predicted CGPA
Gender	Male	3.35
	Female	3.40
Race/ethnicity	White	3.38
	Black	3.31
	Two or more races/American Indian/Alaska Native/Native Hawaiian/Pacific Islander	3.35
	Asian	3.46
	Hispanic	3.37
	Prefer not to respond/missing	3.38
Family income	<$36K	3.38
	$36K–$60K	3.36
	$60K–$100K	3.38
	>$100K	3.38
	Missing	3.37

Figure 7 illustrates the predicted CGPA for the HSGPA model. We see a positive linear relationship between HSGPA and predicted CGPA. The predicted CGPA ranged from a low of 3.15 for students with a 2.5 HSGPA to a high of 3.22 for students with a 4.0 HSGPA. Practically speaking, there is very little change in CGPA according to a model that includes HSGPA as the sole precollege academic achievement indicator.

Figure 7. HSGPA Model Predicted CGPA

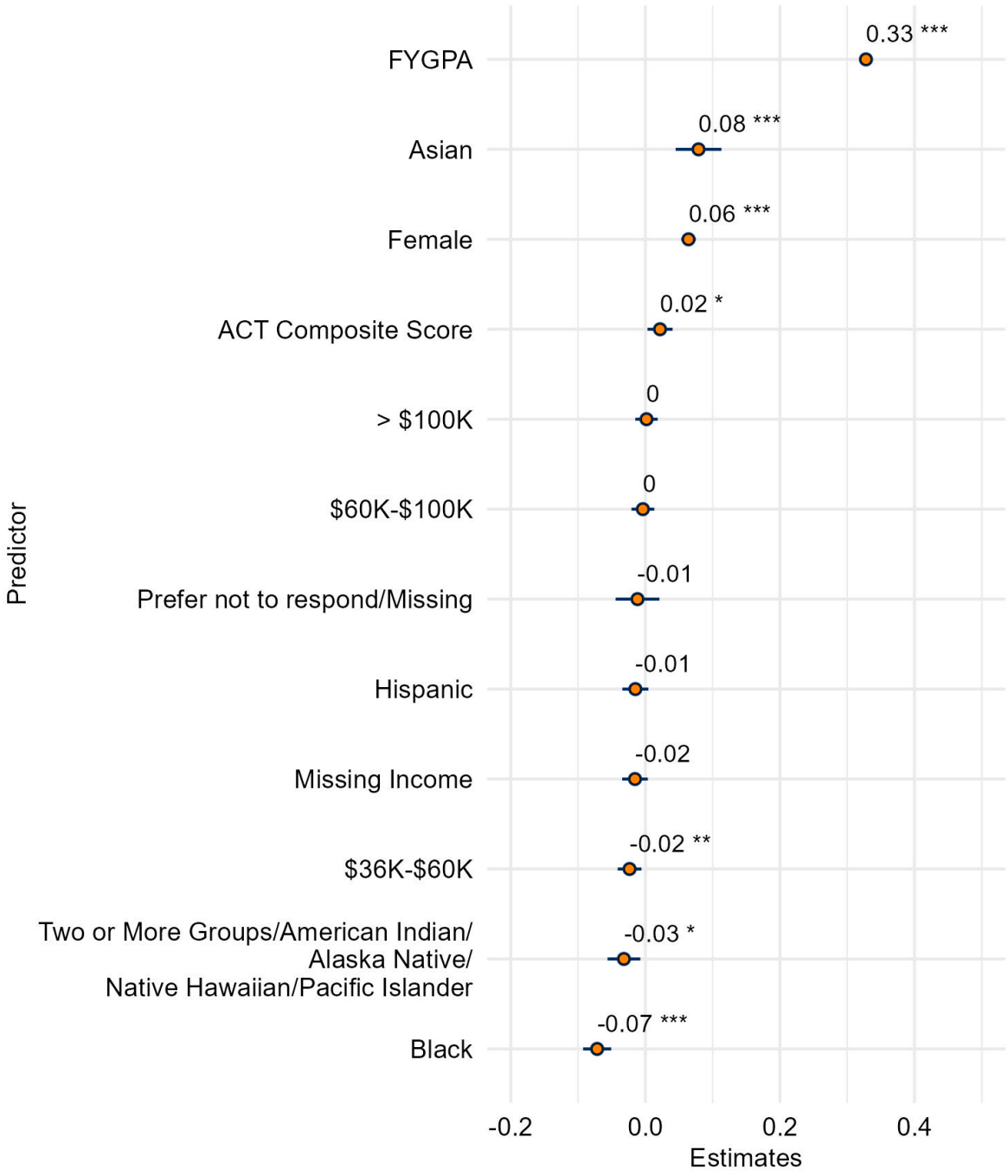


Note. The HSGPA range of 2.5–4.0 is shown because it represents most values of HSGPA.

What Is the Relationship Between ACTC Score and CGPA?

The fixed effects of the HLM that included FYGPA, ACTC score, and demographics accounted for 58.3% of the variance in CGPA. Figure 8 displays the coefficients for the model that uses ACTC score as its sole measure of precollege academic achievement alongside student demographics and FYGPA. We can see that after FYGPA was accounted for, ACTC score was the fourth-strongest positive predictor of CGPA. The strongest predictor of CGPA was FYGPA. The next-strongest positive predictor was an indicator for Asian race/ethnicity, followed by an indicator for female gender. The strongest negative predictor of CGPA was an indicator for Black race/ethnicity, followed by an indicator for two or more races/American Indian/Alaska Native/Native Hawaiian/Pacific Islander and finally by an indicator for family income of $36,000–$60,000.

Figure 8. ACTC Score HLM Coefficients



Note. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. The reference groups were male, White, and <$36,000. "Prefer not to respond/Missing" is a race/ethnicity category.

Table 3 displays the predicted CGPA by student demographic characteristic for the ACTC score model. We can see that female students had a higher predicted CGPA than male students did. In regard to race/ethnicity, Black students had the lowest predicted CGPA, and Asian students

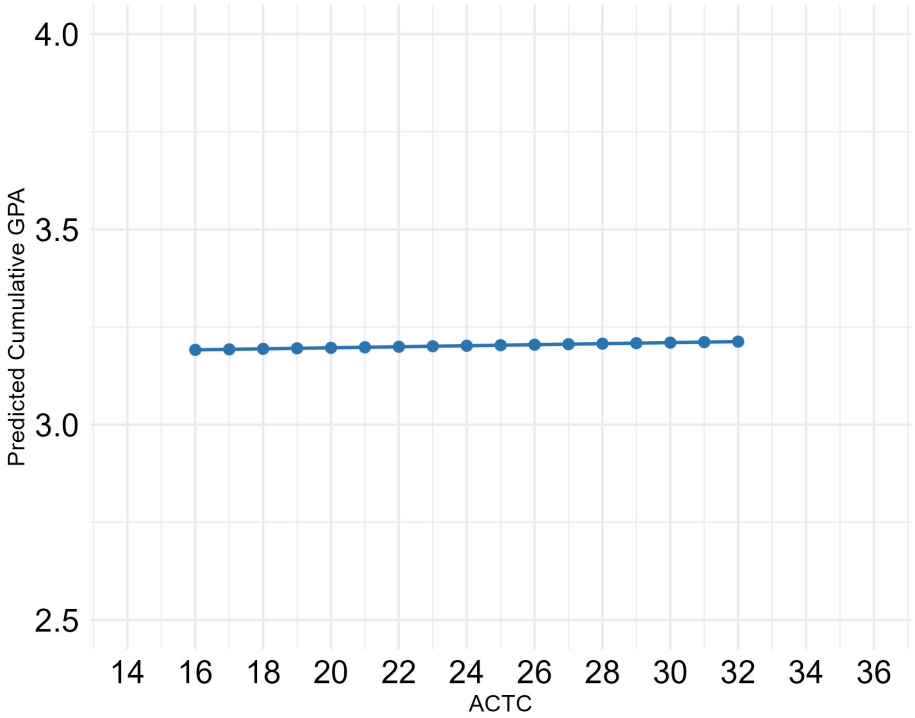
had the highest predicted CGPA. All other races/ethnicities examined were statistically equivalent. When looking at family income, we see some differences in predicted CGPA, but the differences are small.

Table 3. Predicted CGPA for Student Demographic Characteristics in the ACTC Score Model

Characteristic		Predicted CGPA
Gender	Male	3.35
	Female	3.41
Race/ethnicity	White	3.39
	Black	3.32
	Two or more races/American Indian/Alaska Native/Native Hawaiian/Pacific Islander	3.36
	Asian	3.47
	Hispanic	3.37
	Prefer not to respond/missing	3.38
Family income	<$36K	3.39
	$36K–$60K	3.36
	$60K–$100K	3.38
	>$100K	3.39
	Missing	3.37

Figure 9 illustrates the predicted CGPA for the ACTC score model. We see a positive linear relationship between ACTC score and predicted CGPA. The predicted CGPA ranged from a low of 3.19 for students with a 16 ACTC score to a high of 3.21 for students with a 32 ACTC score. After other predictors, including FYGPA, were accounted for, there was only a slight increase across the ACTC score.

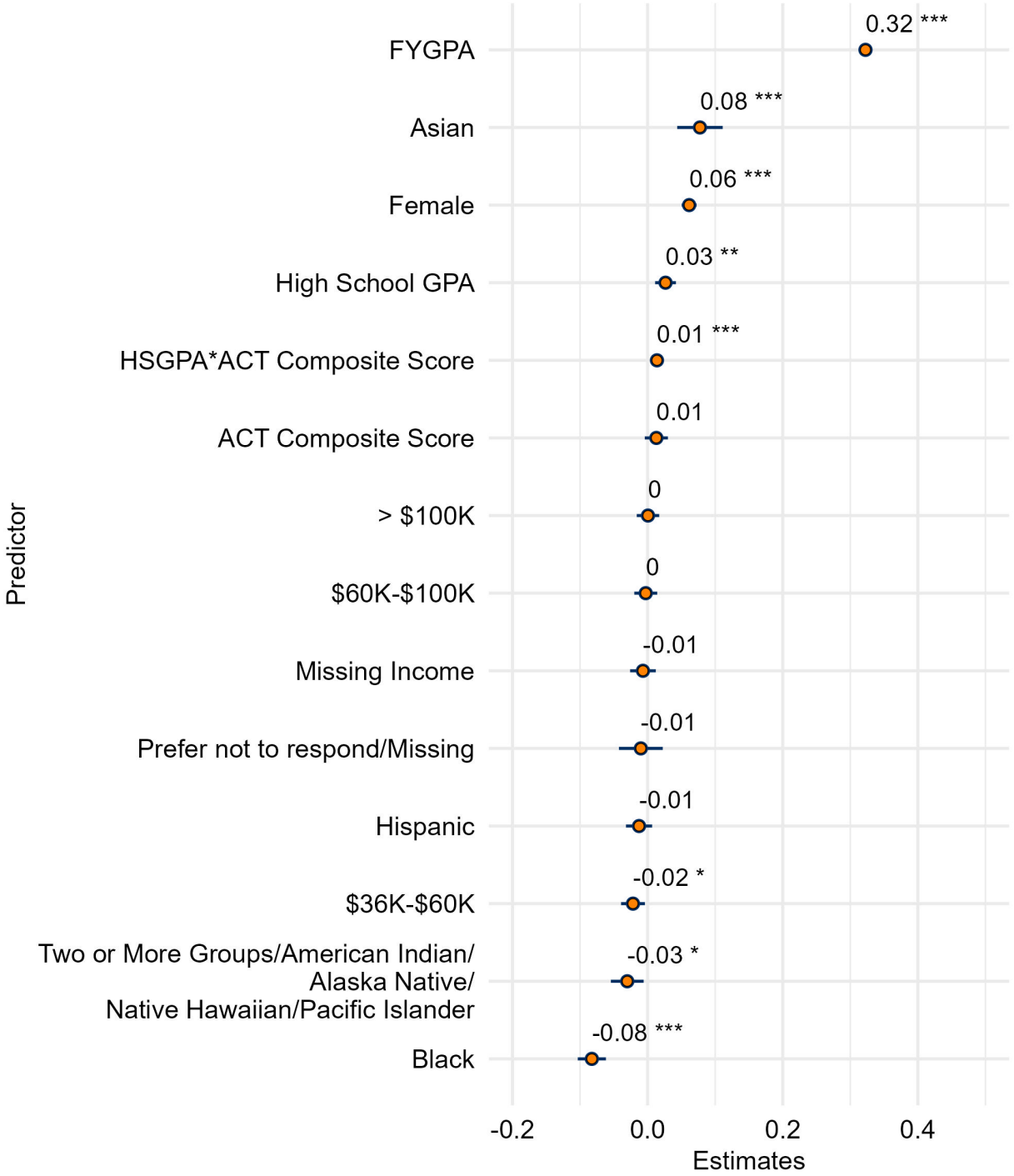
Figure 9. ACTC Score Model Predicted CGPA



What Is the Relationship Between CGPA and Both ACTC Score and HSGPA Together?

The fixed effects of the HLM that included FYGPA, HSGPA, ACTC score, and demographics accounted for 59.3% of the variance in CGPA. Figure 10 displays the coefficients for the model that includes both HSGPA and ACTC score. We can see that once again, FYGPA was the strongest predictor of CGPA. We can also see that after FYGPA was accounted for, HSGPA was the fourth-strongest positive predictor of CGPA, with the interaction between HSGPA and ACTC score and the main effect for ACTC score being tied for the fifth-strongest positive predictor. The second-strongest positive predictor was an indicator for Asian race/ethnicity, followed by an indicator for female gender. The strongest negative predictor of CGPA was an indicator for Black race/ethnicity, followed by an indicator for two or more races/American Indian/Alaska Native/Native Hawaiian/Pacific Islander and finally by an indicator for family income of $36,000–$60,000.

Figure 10. HSGPA and ACTC Score HLM Coefficients



Note. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$. The reference groups were male, White, and <$36,000. "Prefer not to respond/Missing" is a race/ethnicity category.

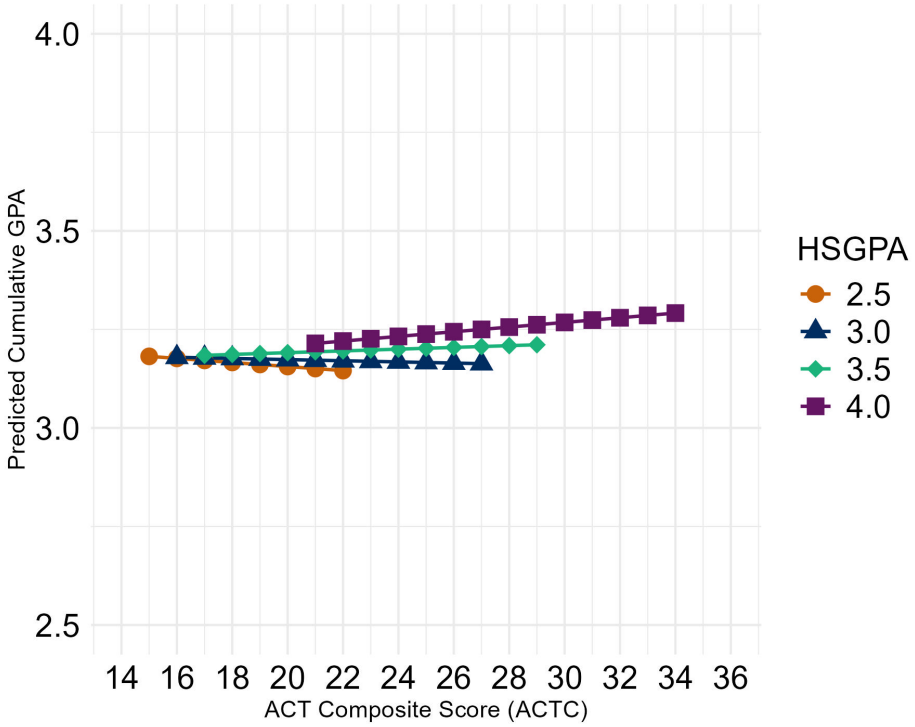
Table 4 displays the predicted CGPA by student demographic characteristic for the HSGPA and ACTC score model. We can see that female students had a higher predicted CGPA than male students did. Black students had the lowest predicted CGPA, and Asian students had the highest. All other races/ethnicities examined were statistically equivalent. Although there were some differences between family income levels, these differences were quite small.

Table 4. Predicted CGPA for Student Demographic Characteristics in the HSGPA and ACTC Score HLM

Characteristic		Predicted CGPA
Gender	Male	3.34
	Female	3.40
Race/ethnicity	White	3.38
	Black	3.30
	Two or more races/American Indian/Alaska Native/Native Hawaiian/Pacific Islander	3.35
	Asian	3.46
	Hispanic	3.37
	Prefer not to respond/missing	3.37
Family income	<$36K	3.38
	$36K–$60K	3.36
	$60K–$100K	3.38
	>$100K	3.38
	Missing	3.37

Figure 11 shows the predicted CGPA by HSGPA and ACTC score. We can see that for students with a HSGPA of 2.5, the predicted CGPA ranged from 3.18 for students with an ACTC score of 15 to 3.07 for students with an ACTC score of 22. For students with a HSGPA of 3.0, the predicted CGPA ranged from 3.18 for students with a 16 ACTC score to 3.16 for students with a 27 ACTC score, an essentially flat effect. For students with a HSGPA of 3.5 or 4.0, a positive relationship was found for predicted CGPA. For students with a 3.5 HSGPA, predicted CGPA ranged from 3.18 for students with a 17 ACTC score to 3.21 for students with a 29 ACTC score. For students with a 4.0 HSGPA, predicted CGPA ranged from 3.21 for students with a 21 ACTC score to 3.29 for students with a 34 ACTC score.

Figure 11. ACTC Score and HSGPA HLM Predicted CGPA



Which of the Three Hierarchical Linear Models Fits the Data Best?

By examining the percentage of reduction in residual variance, marginal R^2, conditional R^2, the Akaike information criterion (AIC), and the Bayesian information criterion (BIC), we can assess which of the three models best fits the data (see Appendix). We can see that the model that included both HSGPA and ACTC score resulted in the greatest reduction in residual variance (65.76), followed by the HSGPA model (65.35) and finally the ACTC score model (65.30). The marginal and conditional R^2 for the models indicate that the HSGPA model and the model with both achievement measures had a similar explanation of variance for both the marginal and conditional R^2, within rounding (59% and 70%, respectively), followed by the ACTC score model (58% and 70%, respectively). The AIC and BIC for the three models suggest that the model that included both measures of academic achievement fit best, followed by the HSGPA model and finally the ACTC score model. Practically speaking, the differences between the model fit statistics were small. Based on these statistics, the model that incorporated both HSGPA and ACTC score fit the data slightly better than the HSGPA-alone and ACTC-alone models. Previous studies on early college outcomes have tended to show that using both HSGPA and ACTC score together results in greater prediction accuracy, but for longer-term outcomes, this distinction is less clear.

Discussion

Prior research demonstrates that both ACT scores and HSGPA are significant predictors of future college success, particularly FYGPA. The research of Coyle and Pillow (2008) and Huh

and Huang (1996) found that both measures of academic achievement are important predictors of FYGPA. Moreover, research has shown that a relationship exists between these precollege achievement measures and college success—including retention to the second year—with HSGPA being a stronger predictor than ACT scores. Sanchez (2024) found similar results in a study that examined the predictive power of HSGPA and ACT test scores on FYGPA. This predictive power has also been found to hold for longer-term college outcomes such as degree completion, with FYGPA playing an important intermediary role in students' college journeys (Radunzel & Noble, 2012). The importance of accurately predicting FYGPA is illustrated by FYGPA's role in timely degree completion and in identifying students who may need additional academic supports (Demeter et al., 2022; Gershenfeld et al., 2016).

Consistently, research has found that using both HSGPA and ACT scores together results in increased predictive accuracy. The present research sought to bridge these two lines of research by examining whether FYGPA mediates the relationship between HSGPA and CGPA or between ACTC score and CGPA.

To test the mediating effect of FYGPA, I used a path analysis methodology. In the present analysis, FYGPA was a significant mediator of the effect of ACTC score on CGPA; however, HSGPA had neither significant direct nor significant indirect effects. In the second set of analyses in this paper, the HLMs, we can see that both ACTC score and HSGPA were significant predictors of CGPA when each was used as the sole precollege academic achievement indicator. It is worth noting that, in all the models, certain demographic predictors (i.e., Asian race/ethnicity and female gender) had a stronger effect than either HSGPA or ACTC score. We can also note that in the model that included both precollege achievement measures, the interaction between ACTC score and HSGPA was a significant predictor of CGPA after other predictors in the model were accounted for. For students with a 2.5 or 3.0 HSGPA, for example, a negative trend was found in conjunction with ACTC score, while at higher GPA levels (3.5 and 4.0), a positive trend was observed. The negative trend may have to do with the mismatch between HSGPA and ACTC scores. Inconsistent achievement on the two measures may indicate underprepared students or behavioral concerns such as low motivation or learning issues. When achievement levels are similar, a positive trend is observed.

There are a number of reasons why the two analytical methodologies might differ in identifying significant direct effects. First, it is possible that the path analysis, which examines direct and indirect relationships among variables, may not fully account for the hierarchical structure of the data. HLMs explicitly account for nesting and may therefore identify significant effects that the path analysis does not. Additionally, the inclusion of random slopes for both HSGPA and ACTC score in the HLMs accounts for between-group variability that the path analysis does not.

When students have both measures of precollege achievement, they can better understand their academic readiness for college. If they find that they have a mismatch between their HSGPA and ACTC score, they can begin to identify their strengths and areas for improvement and target their supplementary learning to skill up for college. The clear message from the model with both precollege achievement measures is that it is essential to have consistent achievement between HSGPA and ACTC score. When this is not the case, students can take

steps to address differences in performance on these achievement measures. Steps can include working to increase content mastery and developing a balanced academic strategy that includes effective study habits and time management.

Importantly, having both precollege measures allows colleges to identify students who did not demonstrate similar achievement on the two measures. This is important information for colleges to have, as we can see that students with a mismatch in performance are predicted to perform worse on CGPA. This prediction is possible only with both measures of precollege achievement. Having both pieces of information can also help colleges identify students who might need additional academic supports. For example, identifying students whose combination of HSGPA and ACTC score indicates a lower predicted CGPA could help colleges tailor their support services, which would in turn help students in their educational journeys. Finally, this study shows that, while the three HLMs were very similar in model fit, there is clear value in having both measures for providing students and postsecondary administrators with actionable information.

This study highlights the importance of using both HSGPA and ACTC scores when predicting long-term college success such as CGPA. For high school students, predicting success means examining their performance as reflected by HSGPA and ACT scores and striving to consistently demonstrate their academic knowledge and skills. For colleges, the study emphasizes the importance of having a holistic evaluation process, using all available information to target supplementary supports and implement data-driven strategies to bolster student outcomes. These types of action items are possible only when both measures of academic achievement are available.

References

Beard, J., & Marini, J. (2018). *Validity of the SAT® for predicting first-year grades: 2013 SAT validity sample*. College Board. https://files.eric.ed.gov/fulltext/ED582459.pdf

Camara, W., Kimmel, E., Scheuneman, J., & Sawtell, E. A. (2003). *Whose grades are inflated?* (College Board Research Report No. 2003-4). College Board. https://files.eric.ed.gov/fulltext/ED563203.pdf

Coyle, T. R., & Pillow, D. R. (2008). SAT and ACT predict college GPA after removing *g*. *Intelligence*, *36*(6), 719–729. https://doi.org/10.1016/j.intell.2008.05.001

Curabay, M. (2016). *Meta-analysis of the predictive validity of Scholastic Aptitude Test (SAT) and American College Testing (ACT) scores for college GPA* [Master's thesis, University of Denver]. Digital Commons. https://digitalcommons.du.edu/cgi/viewcontent.cgi?article=2225&context=etd

Demeter, E., Dorodchi, M., Al-Hossami, E., Benedict, A., Slattery Walker, L., & Smail, J. (2022). Predicting first-time-in-college students' degree completion outcomes. *Higher Education*, *84*(3), 589–609. http://dx.doi.org/10.1007/s10734-021-00790-9

Gershenfeld, S., Ward Hood, D., & Zhan, M. (2016). The role of first-semester GPA in predicting graduation rates of underrepresented students. *Journal of College Student Retention: Research, Theory & Practice*, *17*(4), 469–488. https://doi.org/10.1177/1521025115579251

Huh, N., & Huang, C. Y. (2016). *Examining the validity of ACT Composite score and high school grade point average for predicting first-year college GPA of special-tested students* (ACT Research Report No. 2016-7). ACT. https://www.act.org/content/dam/act/unsecured/documents/5931-research-report-2016-7-examining-the-validity-of-act-composite-score-and-hs-gpa.pdf

Kuncel, N. R., Credé, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research*, *75*(1), 63–82. https://doi.org/10.3102/00346543075001063

Loria, R. N., & Sanchez, E. I. (in press). *Validity of ACT Composite score and high school GPA for predicting student probability of timely degree completion: Examining first-year college GPA as a mediator*. ACT.

Marini, J. P., Westrick, P. A., Young, L., Ng, H., Shmueli, D., & Shaw, E. J. (2019). *Differential validity and prediction of the SAT: Examining first-year grades and retention to the second year*. College Board. https://files.eric.ed.gov/fulltext/ED597325.pdf

Radunzel, J., & Noble, J. (2012). *Predicting long-term college success through degree completion using ACT Composite score, ACT Benchmarks, and high school grade point average* (ACT Research Report No. 2012-5). ACT. https://www.act.org/content/dam/act/unsecured/documents/ACT_RR2012-5.pdf

Sanchez, E. I. (2024). *Changes in predictive validity of high school grade point average and ACT Composite score after the COVID-19 pandemic* (ACT Research Report). ACT. https://www.act.org/content/dam/act/secured/documents/R2328-Changes-in-Predictive-Validity-of-HSGPA-and-ACT-Composite-Score-After-COVID-19-2024-09.pdf

Sanchez, E., & Buddin, R. (2015). *How accurate are self-reported high school courses, course grades, and grade point average?* (ACT Research Report No. 2016-3). ACT. https://www.act.org/content/dam/act/unsecured/documents/5269-research-report-how-accurate-are-self-reported-hs-courses.pdf

Shaw, E. J., & Mattern, K. D. (2009). *Examining the accuracy of self-reported high school grade point average* (College Board Research Report No. 2009-5). College Board. https://files.eric.ed.gov/fulltext/ED562616.pdf

Steedle, J. (2020, April 20). *Decomposing GPA: Why is high school GPA the best single predictor of first-year GPA?* [Poster presentation]. AERA Annual Meeting, Online. https://doi.org/10.3102/1569408

Warren, J. M., & Goins, C. L. (2019). Exploring the relationships between high school course enrollment, achievement, and first-semester college GPA. *Journal of Educational Research and Practice*, *9*(1), 386–399. https://doi.org/10.5590/JERAP.2019.09.1.27

Westrick, P. A., Le, H., Robbins, S. B., Radunzel, J. M. R., & Schmidt, F. L. (2015). College performance and retention: A meta-analysis of the predictive validities of ACT® scores, high school grades, and SES. *Educational Assessment*, *20*(1), 23–45. https://doi.org/10.1080/10627197.2015.997614

Appendix. Coefficients for the HSGPA, ACT Composite Score, and HSGPA Plus ACT Composite Score HLMs

Predictor	HSGPA model	ACT Composite score model	HSGPA & ACT Composite score model
HSGPA	0.022***	—	0.027***
	0.007	—	0.008
ACTC	—	0.022**	0.013
	—	0.009	0.008
FYGPA	0.328***	0.328***	0.322***
	0.003	0.003	0.003
Gender: female	0.055***	0.064***	0.061***
	0.006	0.006	0.006
Race/ethnicity: Black	−0.077***	−0.072***	−0.083***
	0.010	0.011	0.011
Race/ethnicity: Two or more races/American Indian/Alaska Native/Native Hawaiian	−0.035***	−0.032**	−0.030**
	0.012	0.012	0.012
Race/ethnicity: Asian	0.074***	0.079***	0.077***
	0.017	0.017	0.017
Race/ethnicity: Hispanic	−0.015	−0.015	−0.013
	0.010	0.010	0.010
Race/ethnicity: prefer not to respond/missing	−0.001	−0.012	−0.010
	0.017	0.017	0.017
Family income: 36K–60K	−0.023**	−0.023***	−0.022**
	0.009	0.009	0.009
Family income: 60K–100K	−0.00002	−0.004	−0.003
	0.009	0.009	0.009
Family income: >100K	0.001	0.002	0.001
	0.008	0.008	0.008
Family income: Missing	−0.009	−0.015	−0.007
	0.010	0.010	0.010
HSGPA*ACTC	—	—	0.014***
	—	—	0.003
Intercept	3.362***	3.364***	3.359***
	0.030	0.030	0.029
Number of institutions	31	31	31
sd (intercept slope)	0.149	0.153	0.144
sd (ACTC score slope)	—	0.032	0.028
sd (HSGPA slope)	0.026	—	0.028
σ^2 (residual variance)	0.060	0.060	0.059
t_{00} (intercept variance)	0.022	0.024	0.021

t_{11} (ACTC slope variance)	—	0.001	0.001
t_{11} (HSGPA slope variance)	0.001	—	0.001
% reduction in residual variance (null model)	65.346	65.297	65.76
Marginal R^2 (fixed effects only)	0.587	0.583	0.593
Conditional R^2 (random effects included)	0.702	0.704	0.703
Observations	9,559	9,559	9,559
Log likelihood	−211.706	−222.037	−170.252
AIC	457.412	478.074	384.503
BIC	579.221	599.884	542.139

Note. $^{**}p < 0.05$; $^{***}p < 0.01$

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