

## Cumulative Academic Impact of Students Having Multiple Course Experiences With Instructors Who Have Completed One or More ACUE Microcredential Courses



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## EXECUTIVE SUMMARY

Numerous studies in the past several years have examined the impact of the Association of College and University Educators (ACUE) Certificate in Effective College Instruction on student course outcomes (e.g., Hecht, 2019; Lawner & Snow, 2018). However, the focus of those studies has been on the course section as the level of impact, and no research conducted to date has examined how those impacts on students' academic outcomes may accumulate across multiple course experiences with ACUE faculty. Based on the research showing that students perform better in courses taught by ACUE instructors (e.g., Hecht, 2019), it follows that effects should be additive such that students who take more courses with ACUE instructors will have higher GPAs and complete and succeed in more of their courses. Additionally, several of the practices and broad themes promoted in the ACUE courses may influence students in ways that transfer to their other courses. Furthermore, the emphasis throughout several modules in the ACUE courses on helping students develop a growth mindset may result in the cumulative impacts of taking courses with multiple ACUE instructors being more pronounced among minoritized students.

The current study examines the potential for cumulative impacts using a data set of all courses taken between fall 2015 and spring 2020 by the 24,277 students at the University of Southern Mississippi (USM) who took at least one course during that time period with an instructor who completed their ACUE credential by summer 2019 or one of the identified match instructors. ACUE "dosage" was calculated for each student based on the number of courses they took with ACUE faculty, distinguishing between a course taken with faculty who had started an ACUE microcredential at the time of the course but had not yet finished the full certificate and a course taken with ACUE-credentialed faculty. Analyses found that the higher a student's ACUE dosage, the higher their GPA and the more courses they completed, passed, and succeeded in. This pattern of results held even when outcomes were restricted to courses taught by instructors who had not yet started any ACUE microcredential course, suggesting that students are influenced by ACUE instructors in ways that are positively related to their engagement, behavior, and performance in all of their courses. In



addition, correlations with passing and success were significantly larger for Black students compared to White students.

## ABOUT ACUE

The Association of College and University Educators' (ACUE) mission is to ensure student success and equity through quality instruction. In partnership with colleges, universities, higher education systems, and associations, ACUE prepares and credentials faculty in the evidence-based teaching practices that improve student achievement and close equity gaps. Numerous and independently validated studies confirm that students are more engaged, learn more, and complete courses in greater numbers—more equitably with their peers—when taught by ACUE-credentialed faculty. ACUE's online, cohort-based credentialing programs are delivered through institutional partnerships and open-enrollment courses endorsed by the American Council on Education.<sup>1</sup>

## BACKGROUND

Informed by a mission of ensuring student success and equity through quality instruction, ACUE developed an evaluation framework to connect faculty development interventions, including ACUE's courses, to improved student outcomes (MacCormack et al., 2018). Based on this evaluation framework, numerous studies in the past several years have examined the impact of ACUE's course in effective teaching practices on student course outcomes (Hecht, 2019; Lawner & Snow, 2018; Lawner & Snow, 2019; Lawner & Snow, 2020; Lawner, Snow, & Burt, 2019; Lawner, Snow, MacCormack, & Waltje, 2019). However, several of these studies used course-section-level outcomes (Lawner & Snow 2018; Lawner & Snow, 2019; Lawner, Snow, & Burt, 2019). Even the studies that used student-enrollment-level data (Hecht, 2019; Lawner & Snow, 2020; Lawner, Snow, MacCormack, & Waltje, 2019) examined trends over time in courses taught by ACUE-credentialed instructors compared to courses taught by non-ACUE instructors. In other words, the focus has been on the course as the level of impact, and no research conducted to date has examined how those impacts on students' academic outcomes may accumulate across multiple course experiences with ACUE faculty.

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<sup>1</sup> To learn more visit [acue.org](https://www.acue.org).



Based on the research showing that students perform better in courses taught by ACUE instructors (e.g., Hecht, 2019), it follows that these effects should be additive such that students who take more courses with ACUE instructors will have higher GPAs and complete and succeed in more of their courses. For example, getting Bs instead of Cs in two courses will lead to a higher GPA than getting a B instead of a C in only one course. Moreover, the impact of taking multiple courses with ACUE instructors might be more than the sum of its parts. Several of the practices and broad themes promoted in the ACUE courses may influence students in ways that they take with them into their other courses. For example, one of the five competencies in ACUE's Effective Practice Framework (Association of College and University Educators, 2016) is on promoting higher order thinking and includes practices that faculty can use to teach their students how to take good notes in class and how to figure out how they learn and study best. Students who learn those skills would presumably use them in all of their classes, not just the class in which they learned the skills. Another possible avenue for cumulative impacts is that having multiple courses that use rubrics or other techniques that make assignment expectations clear may prompt students come to expect such clarity and ask for it in their other courses.

In addition, there is a large emphasis throughout several modules in the ACUE courses on helping students develop a growth mindset. Getting that message in multiple courses should be even more influential than if it occurs in a single course. Furthermore, growth mindset has been shown to narrow equity gaps in college courses (Canning et al., 2019), and thus the cumulative impacts of taking courses with multiple ACUE instructors may be more pronounced among minoritized students.

The purpose of this study is to examine the cumulative impact that might occur when students take multiple courses with instructors who have completed one or more of ACUE's microcredential courses, including how those instructors may influence their students in ways that would impact the students' outcomes in their other courses, as well as whether impacts may differ by student race. This study specifically focuses on student impacts that occurred as a result of the partnership between the ACUE and the University of Southern Mississippi (USM).

## METHODS

### Participants and Procedures

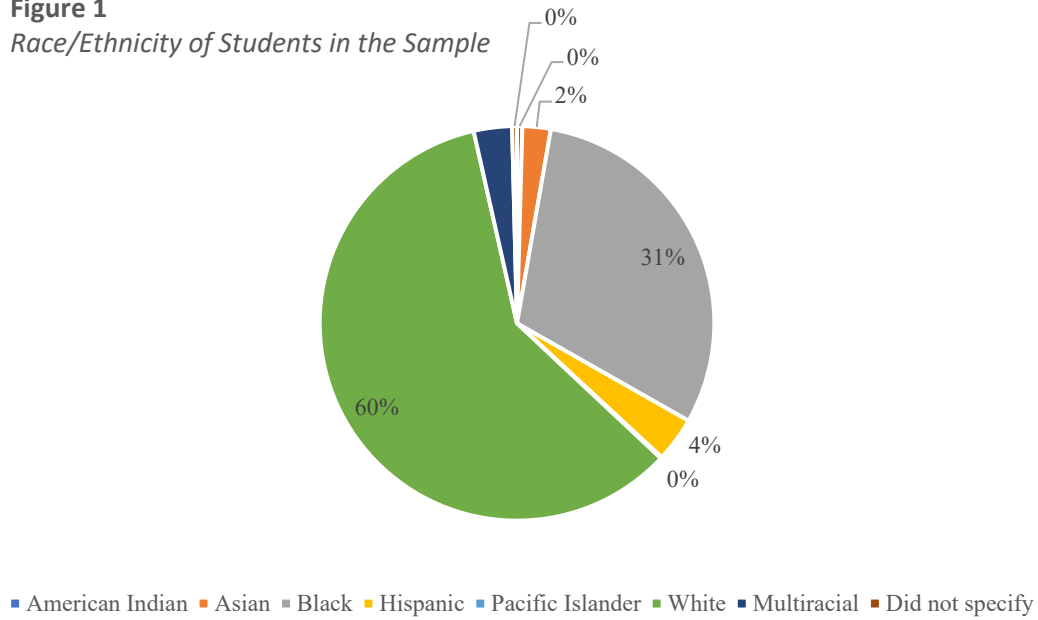
USM has been partnering with ACUE since fall 2016 to train their faculty through three microcredential courses that add up to the full Certificate in Effective College Instruction. The microcredential courses are offered each semester at USM, including during the summer, meaning that if faculty take the courses sequentially with no break, they can earn their credential in a year. However, some faculty take breaks between courses, and a small number of faculty at USM take only one or two of the courses and do not earn the full credential.

USM's Center for Faculty Development identified a match instructor for each instructor at USM who had earned their ACUE credential by summer 2019. The current study uses a data set of all courses taken between fall 2015 and spring 2020 by the 24,277 students at USM who took at least one course during that time period with an instructor who completed their ACUE credential by summer 2019 or one of the identified match instructors. Each student had between one and 113 courses in the data set, with an average of 23.11 ( $SD = 14.60$ ).

The majority of the students in the sample were female (63.8%), continuing generation college students (62.4%), and were not international students (98.2%). Most students were White (59.5%) or Black (30.5%; see Figure 1 for more detail). The majority of students (52.6%) received a Pell grant for at least one of the semesters they were in the data set, though only 30.1% received a Pell grant during all their semesters in the data set. Students' ages ranged from 15 to 82 years old at the time that they took the course. Averaging each student's age across all their courses in the data set, the mean participant age was 23.03 ( $SD = 6.72$ ). Most commonly, students' earliest point in the data set is when they were freshmen (33.9%), and their latest is when they were seniors (52.3%). However, some students do not have all four class years in the data set, and there are some graduate students, including some who initially started as undergraduates. See Figure 2 for more detail.

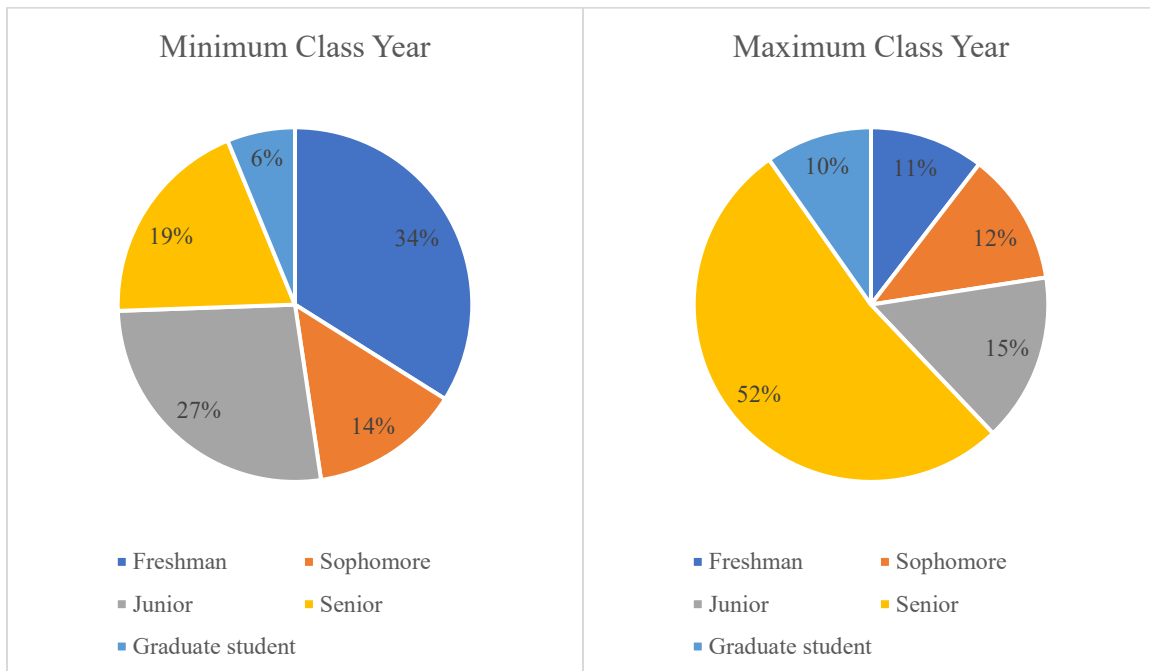
**Figure 1**

*Race/Ethnicity of Students in the Sample*



**Figure 2**

*Frequencies of Students' Minimum and Maximum Class Year in the Data Set*





## MEASURES

ACUE “dosage” was calculated by first coding each course based on whether the instructor had not taken any of the ACUE microcredential courses at the time (i.e., non-ACUE or pre-ACUE instructor; coded as 0), had started at least one ACUE microcredential course at the time, but had not yet earned the credential (i.e., during ACUE; coded as 1), or had already earned the ACUE credential (i.e., post-ACUE; coded as 2). For co-taught courses, the ACUE dosage of the course was calculated by multiplying the ACUE status of each instructor by their teaching load in the course. Then each student’s ACUE dosage was calculated by summing the ACUE dosage of each of their courses. For example, a student who took one course with an instructor who was in the process of earning their ACUE credential at the time and one course with an instructor who had already earned their ACUE credential when they taught the course would have a dosage of 3. The range of ACUE dosage in the sample was 0 to 35 ( $M = 4.04$ ,  $SD = 4.54$ ).

Academic outcomes were assessed based on course grades on a 4.0 scale, completion, passing, and success. See Table 1 for how each grade is considered for those outcomes. Each course outcome was then averaged to the student level, such that the outcomes represent students’ GPA and the proportion of their courses that they completed, passed, and succeeded in.

**Table 1**

*All Possible Grades at USM and Their Use in the Current Study*

	Grade on 4.0 scale	Pass	Success	Complete
A	4.0	1	1	1
A–	3.7	1	1	1
B+	3.3	1	1	1
B	3.0	1	1	1
B–	2.7	1	1	1
C+	2.3	1	1	1
C	2.0	1	1	1
C–	1.7	1	1	1
D+	1.3	1	0	1
D	1.0	1	0	1
F	0.0	0	0	1
AUD	—	—	—	—
E	—	—	—	1
I	—	—	—	—
N	—	0	0	1
NA	—	—	—	—
NP	—	0	0	1
P	—	1	1	1
PS	—	1	1	1
S	—	1	1	1
U	—	0	0	1
W	—	0	0	0
XF	0.0	0	0	1
Z	—	1	1	1

*Note.* For more information on grades at USM, see:

<http://catalog.usm.edu/content.php?catoid=19&navoid=1124#Grades>. For information on grades during the spring

2020 semester, see: <https://www.usm.edu/registrar/grade-options-2020.php>





## ANALYTIC PLAN

Analyses were conducted at the unique student level using hierarchical linear regression, which requires that all categorical variables be dummy coded. All student demographics variables, as well as the number of courses a student had in the data set, were entered in step 1. For demographics that could vary over time, such as age and Pell receipt, the demographics were averaged across a student's courses in the data set. In order to calculate an average for class year, class year was first converted into a numeric scale, with 1 = freshman, 2 = sophomore, 3 = junior, 4 = senior, and 5 = graduate student. Due to the small proportion of students in the sample who belonged to racial/ethnic categories other than Black or White, race/ethnicity was simplified to Black, White, and all others. White students were used as the reference group because they were the largest of the three groups.

ACUE dosage was entered in step 2, and interactions with race/ethnicity were added in step 3. The analyses used a fully interacted model in which the demographic of interest (race/ethnicity) was interacted with all other control variables, in addition to being interacted with the primary factor of interest (ACUE dosage). When an interaction between race/ethnicity and ACUE dosage was significant, subgroup analyses were conducted to examine the main effect of ACUE dosage among each relevant racial/ethnic group separately.

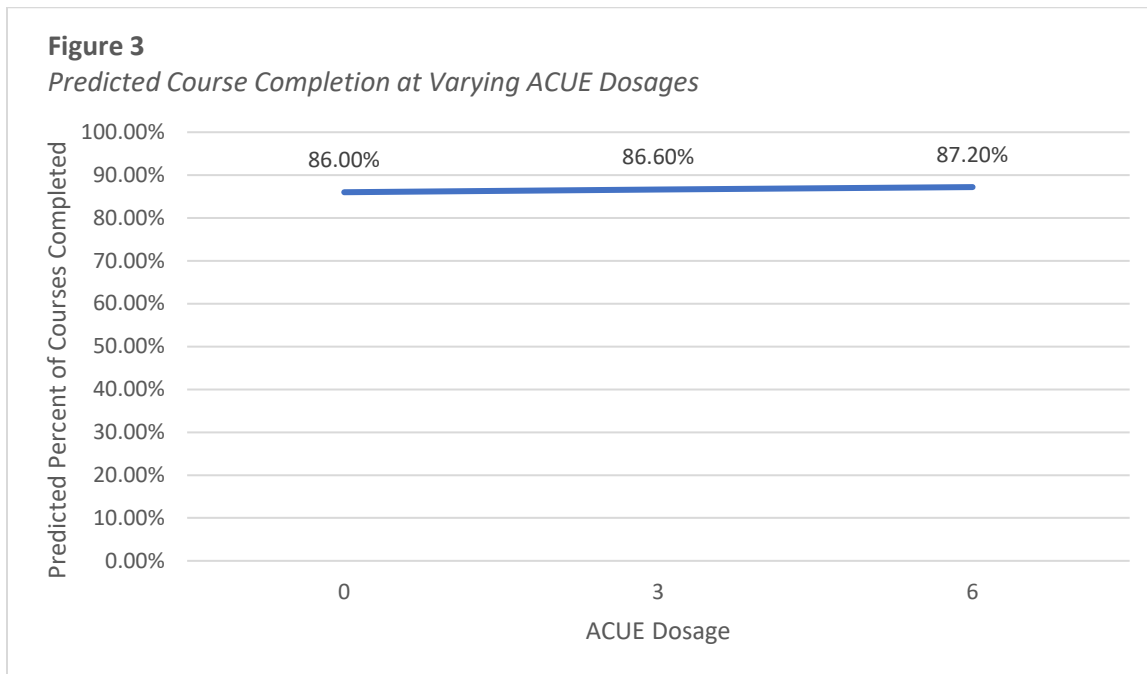
To distinguish between purely additive effects of having multiple ACUE instructors and effects that occur due to an impact on students' performance in their other classes, a second set of analyses were conducted that excluded courses taught by during-ACUE or post-ACUE instructors.

## RESULTS

### Academic Outcomes Including ACUE Courses

#### **Completion**

There was a significant main effect of ACUE dosage on the proportion of courses students completed,  $b = .002$ ,  $SE < .001$ , 95% CI [.002, .003],  $\beta = .064$ ,  $p < .001$  (see Figure 3).

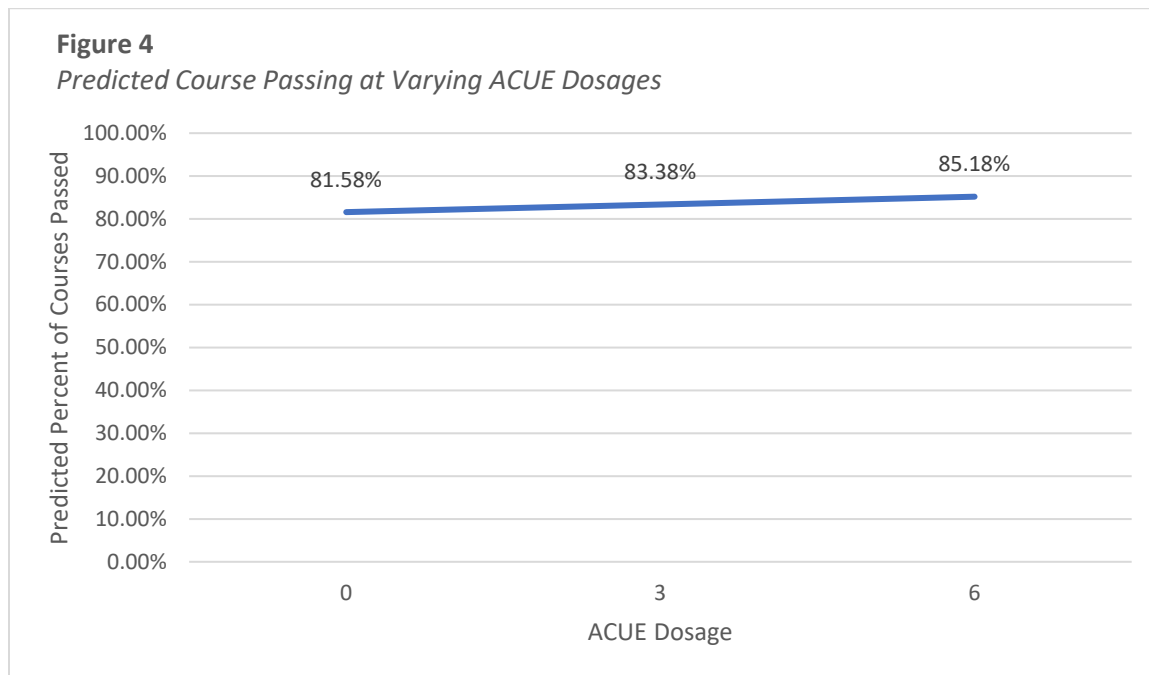


*Note.* Calculations use average values for all control variables.

The interactions between race and ACUE dosage were not significant for Black students,  $b = .001$ ,  $SE = .001$ , 95% CI [.000, .002],  $\beta = .020$ ,  $p = .072$ , nor other students,  $b = -.001$ ,  $SE = .001$ , 95% CI [-.002, .001],  $\beta = -.010$ ,  $p = .318$ .

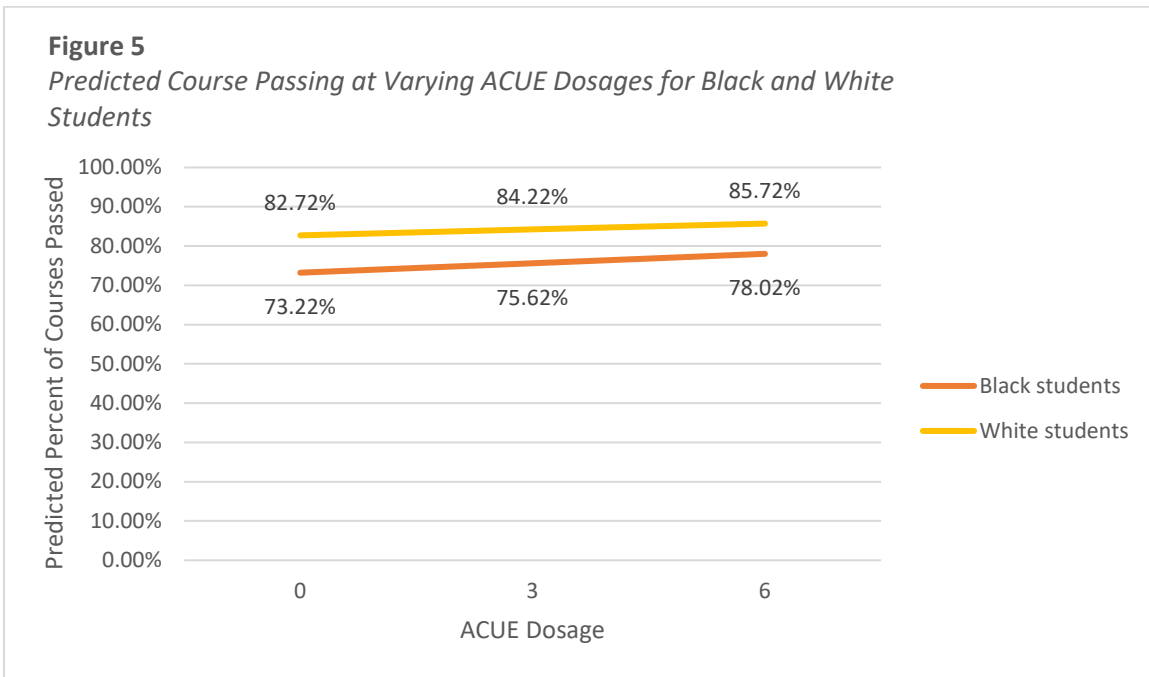
### Passing

There was a significant main effect of ACUE dosage on the proportion of courses students passed,  $b = .006$ ,  $SE < .001$ , 95% CI [.005, .006],  $\beta = .106$ ,  $p < .001$  (see Figure 4).



*Note.* Calculations use average values for all control variables.

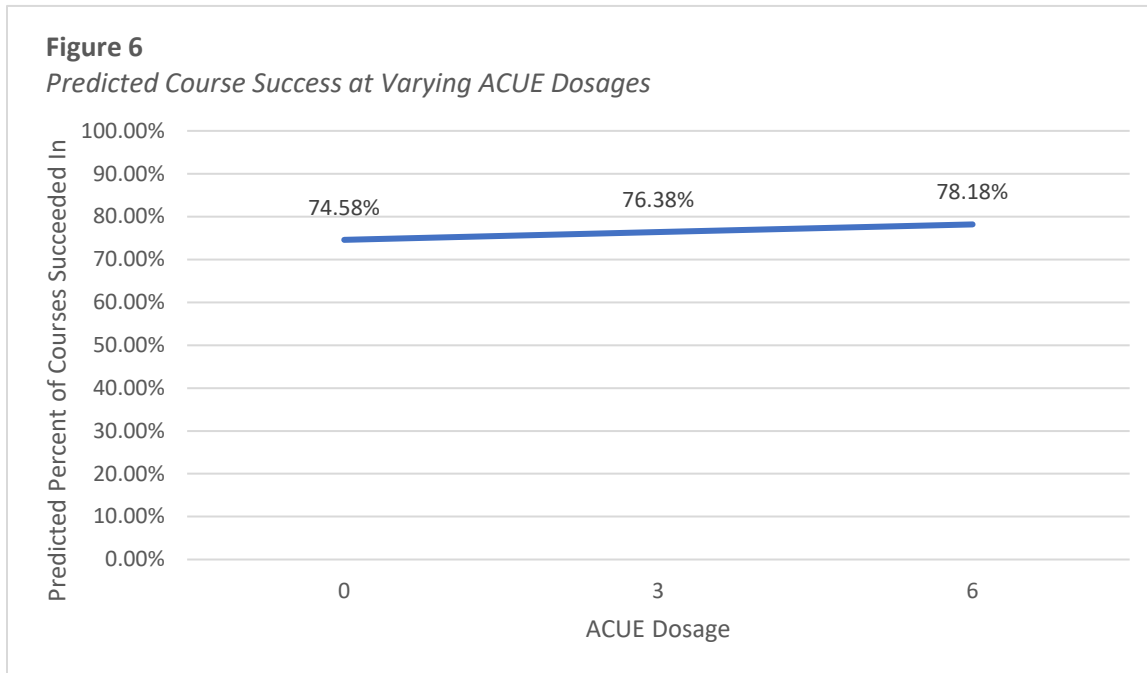
The interaction between Black students and ACUE dosage was significant,  $b = .003$ ,  $SE = .001$ , 95% CI [.001, .004],  $\beta = .032$ ,  $p = .001$ , with the direction of the effect indicating that the ACUE dosage effect was larger among Black students compared to White students (see Figure 5). Subgroup analyses showed that the ACUE dosage effect was significant among both Black students,  $b = .008$ ,  $SE = .001$ , 95% CI [0.006, 0.009],  $\beta = .128$ ,  $p < .001$ , and White students,  $b = .005$ ,  $SE < .001$ , 95% CI [.004, .006],  $\beta = .101$ ,  $p < .001$ . The interaction between other students and ACUE dosage was not significant,  $b = -.001$ ,  $SE = .001$ , 95% CI [-.004, .001],  $\beta = -.009$ ,  $p = .312$ .



*Note.* Calculations use average values within each subgroup for all control variables.

## Success

There was a significant main effect of ACUE dosage on the proportion of courses students succeeded in,  $b = .006$ ,  $SE < .001$ , 95% CI [.005, .007],  $\beta = .104$ ,  $p < .001$  (see Figure 6).

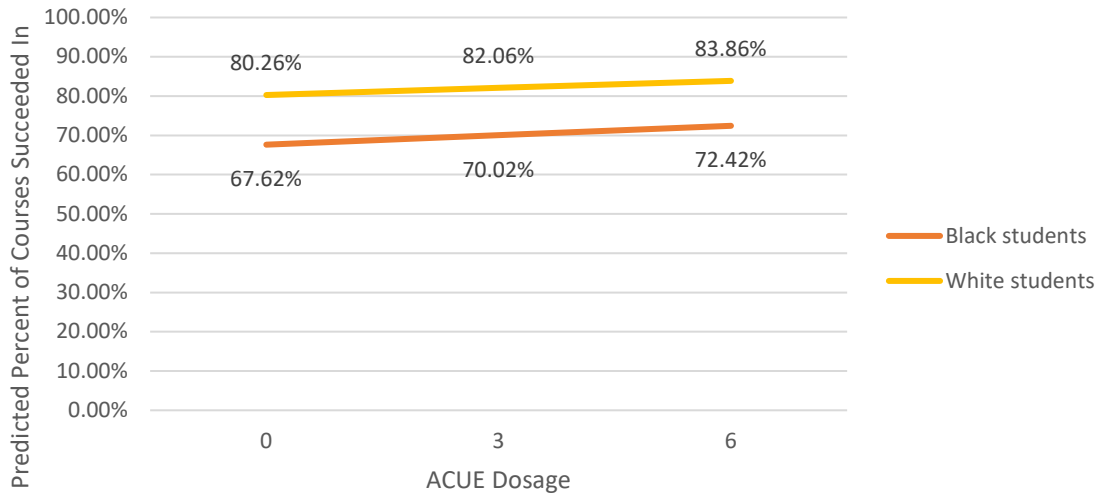


*Note.* Calculations use average values for all control variables.

The interaction between Black students and ACUE dosage was significant,  $b = .002$ ,  $SE = .001$ , 95% CI [.000, .003],  $\beta = .021$ ,  $p = .030$ , with the direction of the effect indicating that the ACUE dosage effect was larger among Black students compared to White students (see Figure 7). Subgroup analyses showed that the ACUE dosage effect was significant among both Black students,  $b = .008$ ,  $SE = .001$ , 95% CI [.006, .009],  $\beta = .119$ ,  $p < .001$ , and White students,  $b = .006$ ,  $SE < .001$ , 95% CI [.005, .007],  $\beta = .105$ ,  $p < .001$ . The interaction between other students and ACUE dosage was not significant,  $b = -.002$ ,  $SE = .001$ , 95% CI [-.005, .001],  $\beta = -.014$ ,  $p = .118$ .

**Figure 7**

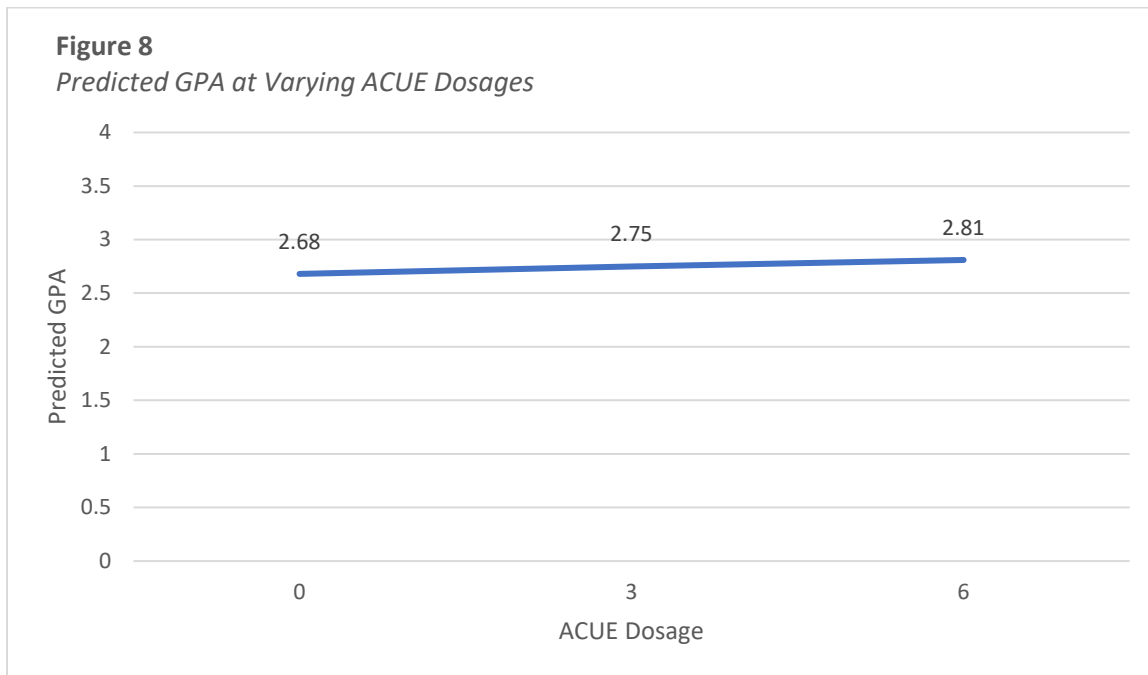
*Predicted Course Success at Varying ACUE Dosages for Black and White Students*



*Note.* Calculations use average values within each subgroup for all control variables.

**GPA**

There was a significant main effect of ACUE dosage on students' GPA,  $b = .022$ ,  $SE = .001$ , 95% CI [.019, .025],  $\beta = .101$ ,  $p < .001$  (see Figure 8). The interactions between race and ACUE dosage were not significant for Black students,  $b = .003$ ,  $SE = .003$ , 95% CI [−.003, .009],  $\beta = .011$ ,  $p = .257$ , nor other students,  $b = −.007$ ,  $SE = .005$ , 95% CI [−.016, .002],  $\beta = −.013$ ,  $p = .135$ .

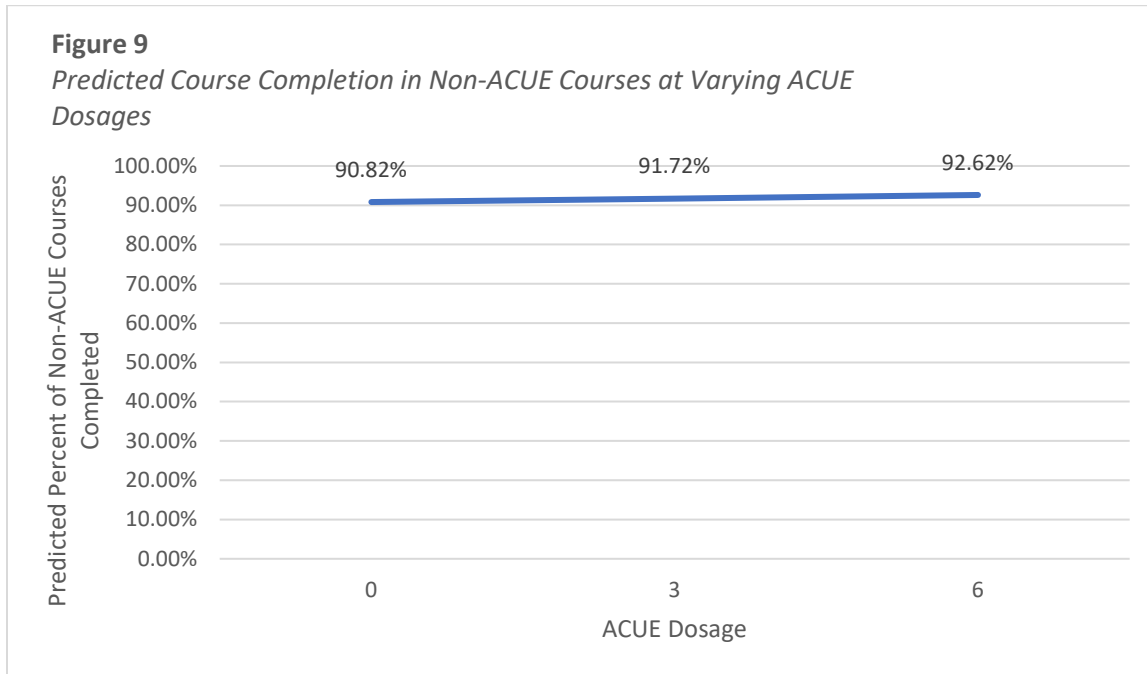


*Note.* Calculations use average values for all control variables.

## Academic Outcomes Excluding ACUE Courses

### Completion

There was a significant main effect of ACUE dosage on the proportion of courses students completed,  $b = .003$ ,  $SE < .001$ , 95% CI [.003, .004],  $\beta = .092$ ,  $p < .001$  (see Figure 9).



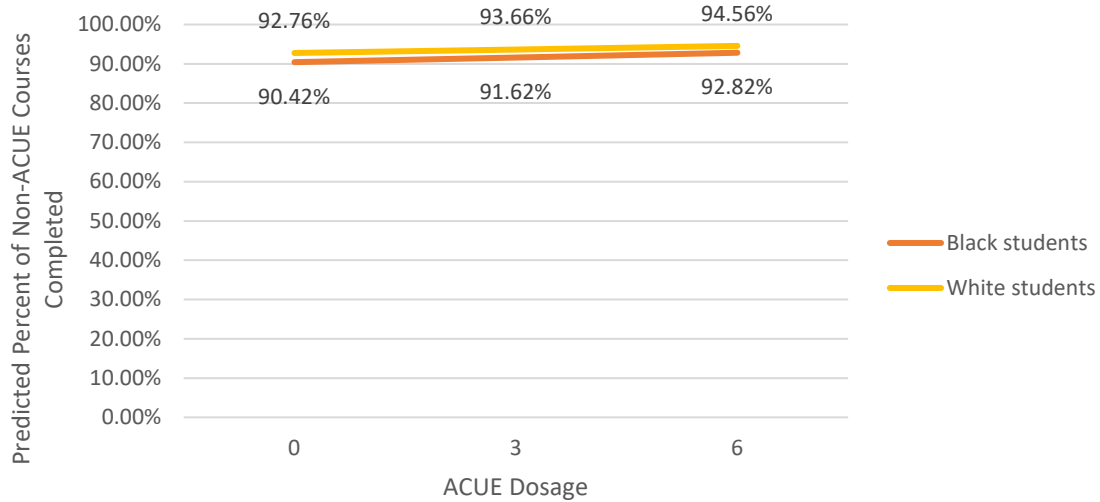
*Note.* Calculations use average values for all control variables.

The interaction between Black students and ACUE dosage was significant,  $b = .001$ ,  $SE = .001$ , 95% CI [.000, .002],  $\beta = .022$ ,  $p = .037$ , with the direction of the effect indicating that the ACUE dosage effect was larger among Black students compared to White students (see Figure 10). Subgroup analyses showed that the ACUE dosage effect was significant among both Black students,  $b = .003$ ,  $SE < .001$ , 95% CI [.002, .003],  $\beta = .088$ ,  $p < .001$ , and White students,  $b = .002$ ,  $SE = .001$ , 95% CI [.001, .003],  $\beta = .060$ ,  $p = .005$ . The interaction between other students and ACUE dosage was not significant,  $b = -.001$ ,  $SE = .001$ , 95% CI [-.002, .001],  $\beta = -.010$ ,  $p = .276$ .



**Figure 10**

*Predicted Course Completion in Non-ACUE Courses at Varying ACUE Dosages for Black and White Students*



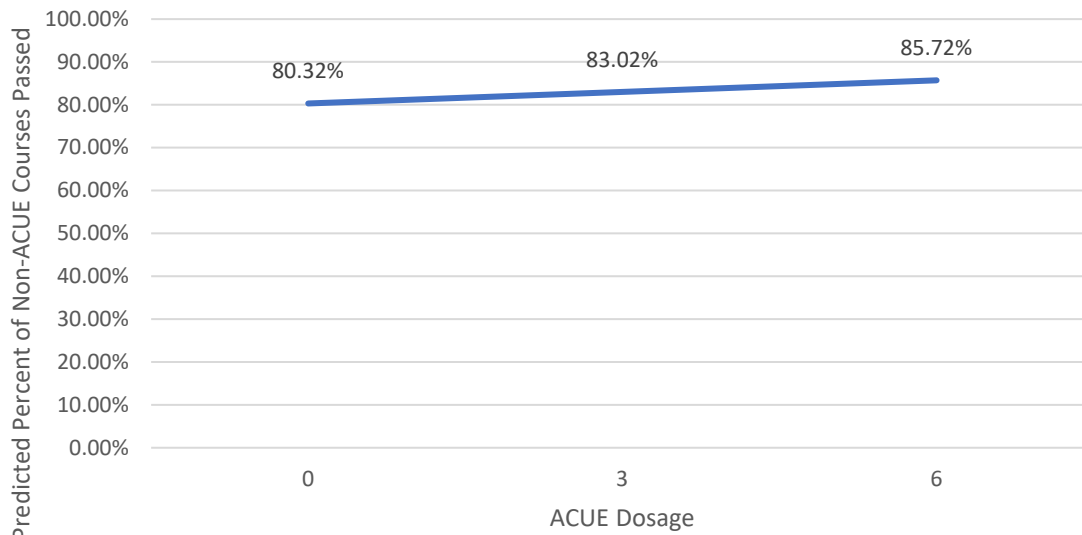
*Note.* Calculations use average values within each subgroup for all control variables.

### **Passing**

There was a significant main effect of ACUE dosage on the proportion of courses students passed,  $b = .009$ ,  $SE < .001$ , 95% CI [.008, .009],  $\beta = .157$ ,  $p < .001$  (see Figure 11).

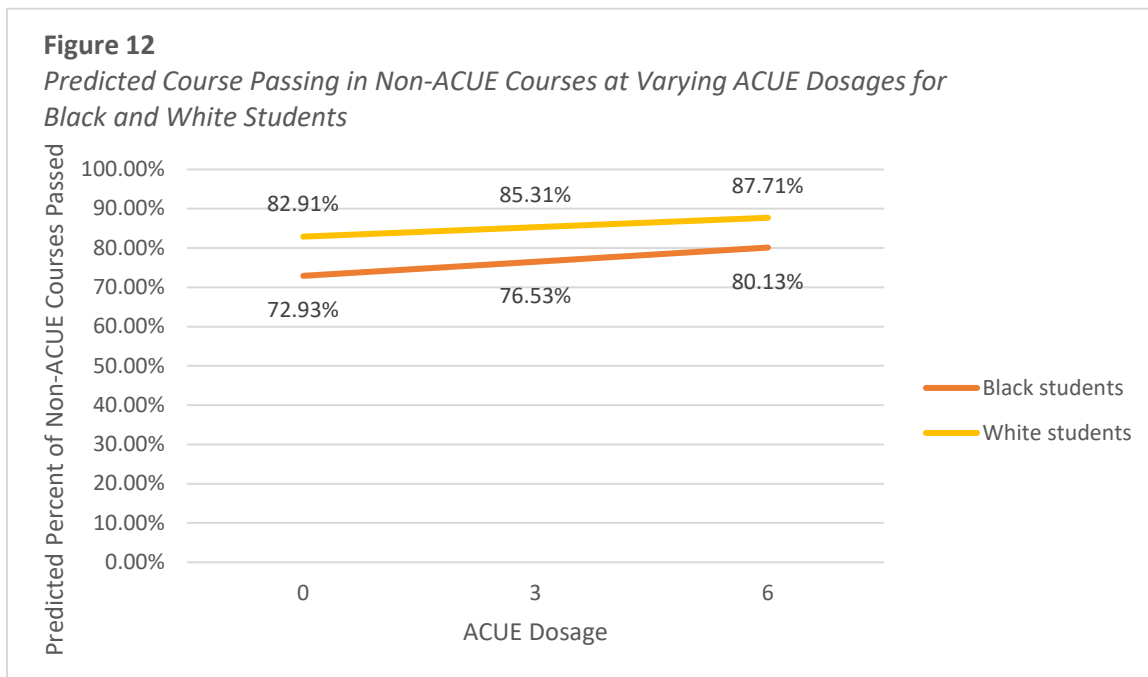
**Figure 11**

*Predicted Course Passing in Non-ACUE Courses at Varying ACUE Dosages*



Note. Calculations use average values for all control variables.

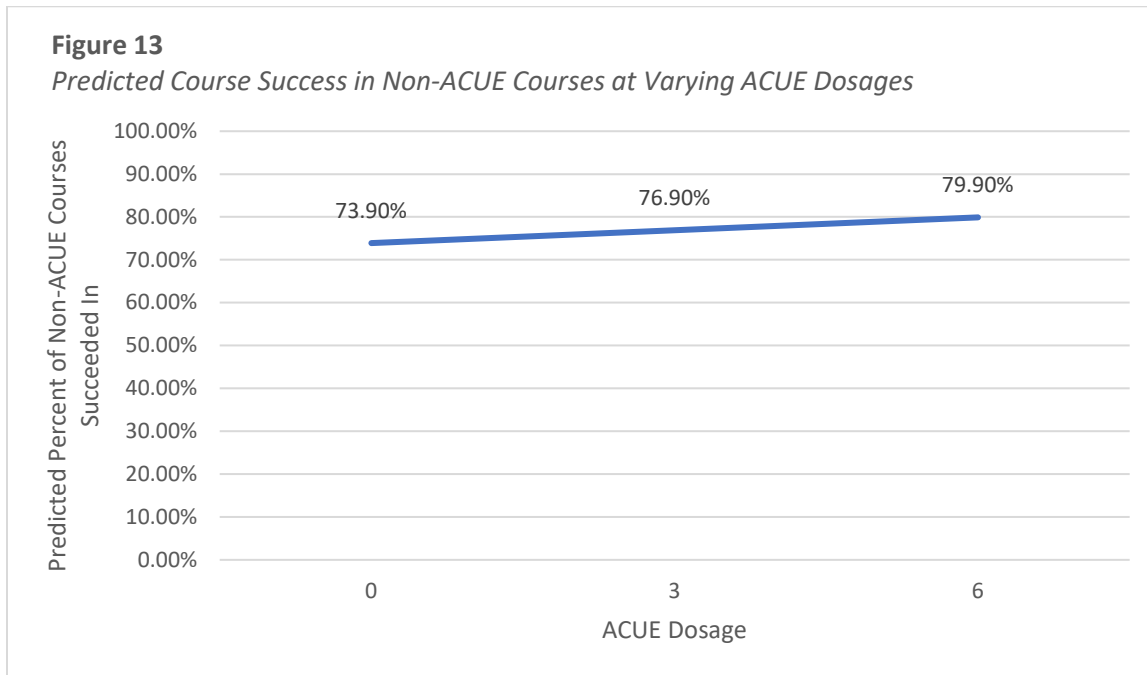
The interaction between Black students and ACUE dosage was significant,  $b = .004$ ,  $SE = .001$ , 95% CI [.002, .005],  $\beta = .046$ ,  $p < .001$ , with the direction of the effect indicating that the ACUE dosage effect was larger among Black students compared to White students (see Figure 12). Subgroup analyses showed that the ACUE dosage effect was significant among both Black students,  $b = .011$ ,  $SE = .001$ , 95% CI [0.010, 0.012],  $\beta = .187$ ,  $p < .001$ , and White students,  $b = .008$ ,  $SE < .001$ , 95% CI [.007, .008],  $\beta = .149$ ,  $p < .001$ . The interaction between other students and ACUE dosage was not significant,  $b = -.001$ ,  $SE = .001$ , 95% CI [-.003, .001],  $\beta = -.010$ ,  $p = .253$ .



Note. Calculations use average values within each subgroup for all control variables.

## Success

There was a significant main effect of ACUE dosage on the proportion of courses students succeeded in,  $b = .010$ ,  $SE < .001$ , 95% CI [.009, .010],  $\beta = .162$ ,  $p < .001$  (see Figure 13).

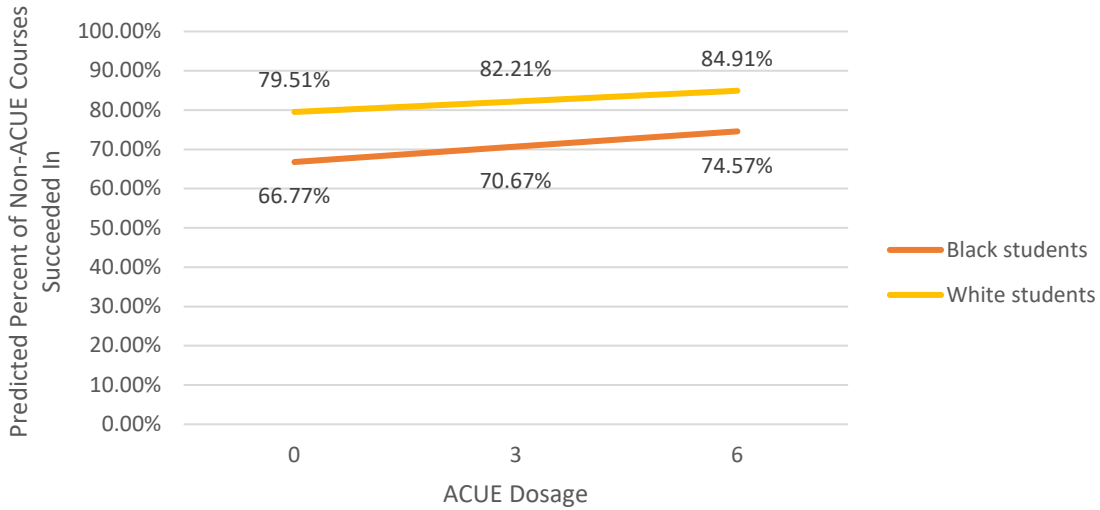


*Note.* Calculations use average values for all control variables.

The interaction between Black students and ACUE dosage was significant,  $b = .004$ ,  $SE = .001$ , 95% CI [.002, .005],  $\beta = .041$ ,  $p < .001$ , with the direction of the effect indicating that the ACUE dosage effect was larger among Black students compared to White students (see Figure 14). Subgroup analyses showed that the ACUE dosage effect was significant among both Black students,  $b = .012$ ,  $SE = .001$ , 95% CI [.011, .014],  $\beta = .192$ ,  $p < .001$ , and White students,  $b = .009$ ,  $SE < .001$ , 95% CI [.008, .010],  $\beta = .158$ ,  $p < .001$ . The interaction between other students and ACUE dosage was not significant,  $b = -.002$ ,  $SE = .001$ , 95% CI [-.004, .001],  $\beta = -.013$ ,  $p = .125$ .

**Figure 14**

*Predicted Course Success in Non-ACUE Courses at Varying ACUE Dosages for Black and White Students*



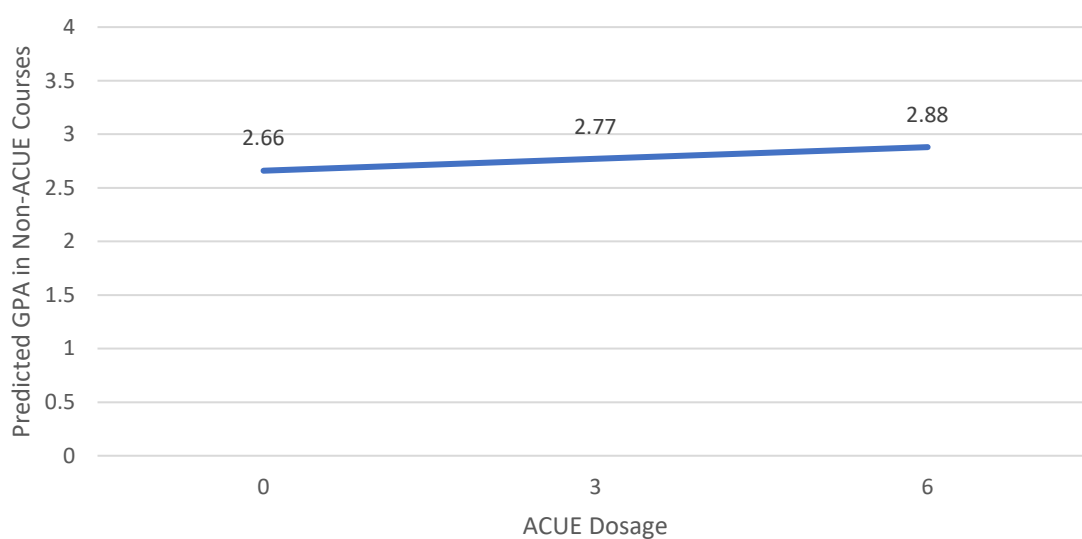
Note. Calculations use average values within each subgroup for all control variables.

## GPA

There was a significant main effect of ACUE dosage on students' GPA,  $b = .036$ ,  $SE = .001$ , 95% CI [.033, .038],  $\beta = .164$ ,  $p < .001$  (see Figure 15).

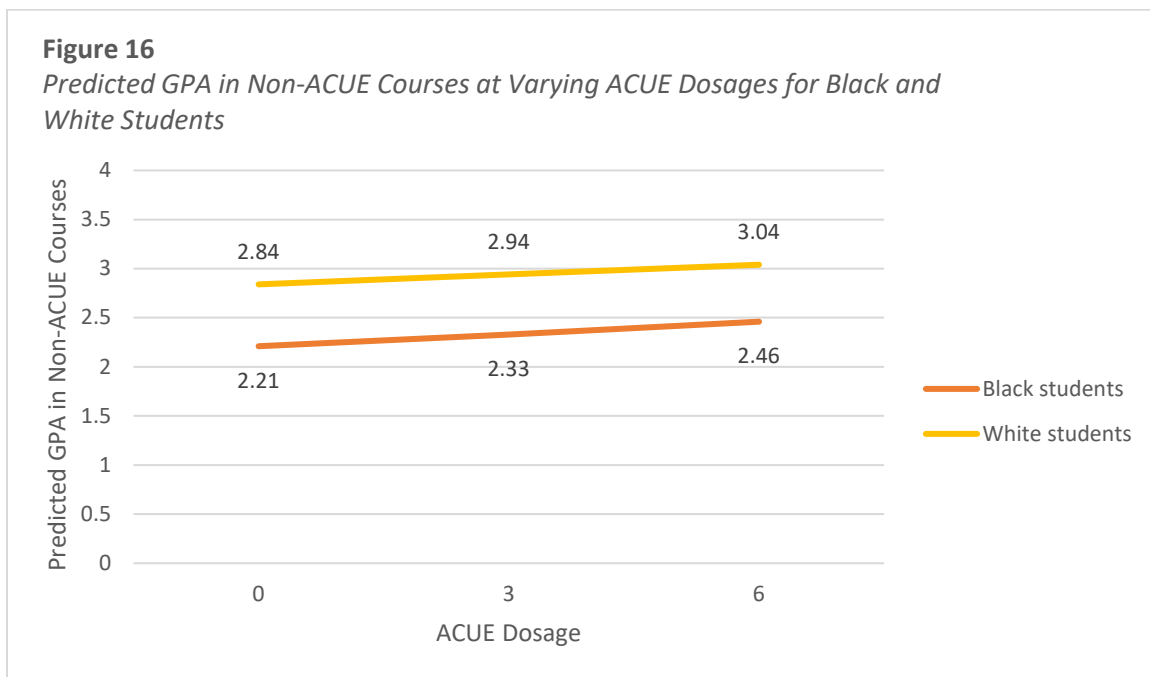
**Figure 15**

*Predicted GPA in Non-ACUE Courses at Varying ACUE Dosages*



*Note.* Calculations use average values for all control variables.

The interaction between Black students and ACUE dosage was significant,  $b = .008$ ,  $SE = .003$ , 95% CI [.003, .014],  $\beta = .027$ ,  $p = .003$ , with the direction of the effect indicating that the ACUE dosage effect was larger among Black students compared to White students (see Figure 16). Subgroup analyses showed that the ACUE dosage effect was significant among both Black students,  $b = .042$ ,  $SE = .002$ , 95% CI [.037, .047],  $\beta = .189$ ,  $p < .001$ , and White students,  $b = .034$ ,  $SE = .002$ , 95% CI [.030, .037],  $\beta = .166$ ,  $p < .001$ . The interaction between other students and ACUE dosage was not significant,  $b = -.007$ ,  $SE = .004$ , 95% CI [-.015, .002],  $\beta = -.012$ ,  $p = .138$ .



*Note.* Calculations use average values within each subgroup for all control variables.



## DISCUSSION

The results from this study demonstrate the cumulative impact on students' academic outcomes of taking multiple courses with instructors who have completed, or are currently engaged in, one or more ACUE microcredential courses. The magnitude of effects indicates that a student with an ACUE dosage of 6, from taking three courses with ACUE-credentialed instructors, for example, would on average have a GPA that is 0.132 grade points higher, complete 1.2% more of their courses, and pass and succeed in 3.6% more of their courses compared to a student who did not take any courses with ACUE instructors.

In addition, the cumulative impacts on passing and success were larger for Black students, with the magnitude of effects indicating that a Black student with an ACUE dosage of 6 would, on average, pass and succeed in 4.8% more of their courses compared to a Black student who did not take any courses with an ACUE instructor. This larger effect among Black students suggests that some of the ACUE course content, such as the emphasis on growth mindset, may be particularly beneficial for students who have been marginalized in higher education.

Furthermore, when outcomes were restricted to courses taught by non-ACUE or pre-ACUE instructors to examine how ACUE instructors influence their students' performance in other courses, the effects were not only still significant, but were actually larger in magnitude. It is not clear why the impacts in non-ACUE courses were larger, but one possibility is that ACUE instructors might hold their students to higher standards.

These results supplement prior research (e.g., Hecht, 2019) finding benefits for student academic outcomes when faculty complete ACUE courses, with larger impacts for Black students (Lawner & Snow, 2020). However, this is one of the first studies to date to explore the impact of ACUE courses with faculty who earned the Certificate in Effective College Instruction through completing microcredential courses. In addition, it is the first study to examine the impact on students' cumulative GPA and course outcomes, rather than examining impacts at the student-enrollment level, allowing for exploration of how effective instruction impacts students in ways that transfer to their coursework more broadly.



One limitation of the current study is that the design is correlational rather than experimental or quasi-experimental. Thus, we cannot say for certain that ACUE faculty *cause* their students to perform better in their other classes; we can only assert that experiences with ACUE faculty and positive academic outcomes are correlated. Although there are mechanisms by which faculty could reasonably influence their students in ways that would transfer to their coursework more broadly, such as improving students' growth mindset and self-efficacy, it is also possible that higher performing students seek out courses with ACUE faculty based on their reputations for being better instructors.

Future research should further explore the skills or mindsets that students are learning when they take courses with ACUE instructors that may prompt them to perform better in their courses in general, including the reasons that the positive relationship between ACUE dosage and students' academic outcomes was larger when restricted to courses taught by non-ACUE/pre-ACUE instructors. Surveys, interviews, and focus groups with both faculty and students might provide useful insight into the mediators of the positive relationship between number of experiences with ACUE instructors and students' academic outcomes across their courses.

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