

# The Differential Impacts of North Carolina's Revised Comprehensive Articulation Agreement on the Outcomes of Black, Latin\*, and White NCCCS-to-UNC-System Transfer Students



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<sup>1</sup> Following Salinas (2020), we use Latin\* to refer to individuals that may have been classified as Latinx, Latino, Latina, Latine, or Hispanic using other classification structures and data sources. The term Latin\* is respectful of the various linguistic groups that comprise this racial/ethnic identification and is sensitive to a variety of gender identities.

# EXECUTIVE SUMMARY

**This study examines the early impact of North Carolina’s revised (2014) Comprehensive Articulation Agreement (CAA)** – designed to ease the transfer pathways between the North Carolina Community College System (NCCCS) and the University of North Carolina (UNC) System – and its impact on Black, Latin\*, and white transfer students. We evaluated its effectiveness among racial/ethnic groups based on factors such as students’ likelihood of completion, time to degree, and excess credits earned. Using a Critical Policy Analysis, we examined a dataset of all students who transferred from an NCCCS institution to a UNC System institution over the span of nine academic years. Findings from the study show patterns of inequality that the revised CAA appears to, at times, exacerbate.

While the policy is intended to assist all students with the transfer process, our results show students of different racial/ethnic groups appear to experience transfer differently. The revised CAA increased time to baccalaureate degree completion for all students, but the impact of the policy was greater for Black and Latin\* students – who took approximately an additional semester to graduate, disproportionately increasing their time to degree. Additionally, while revised CAA decreased excess credit-earning among white students, this benefit was not realized among Black and Latin\* students.

Based on previous research, we believe the omission of equity goals and accountability measures pertaining to students from historically marginalized racial/ethnic groups in developing the revised CAA could contribute to these students being underserved by their institutions of higher education. These inequitable outcomes may also be due to informational barriers, as studies have shown Black and Latin\* students make far less use of advising resources compared to white students. To correct these disparities, we recommend policymakers within the NCCC and UNC Systems incorporate consideration for race/ethnicity when crafting policy and include accountability measures that speak specifically to the success of students from historically marginalized groups, as well as to consider the kinds of data needed to advance the evaluation of policies like the CAA and enact policies that allow for its collection. In light of the differences in student outcomes, future work around the role of the CAA is necessary to continue optimizing the transfer landscape and ensuring equitable outcomes amongst all students.

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# INTRODUCTION

**Upward economic mobility** is closely tied to an individual's ability to participate in higher education, and the community college is often the choice of entry point for individuals who want to attain a four-year degree but who cannot afford to begin college at the university. Compared to other states, North Carolina ranks very low in measures of upward economic mobility (where a child advances to a higher income bracket than their parent) with all regions of the state measuring lower than the national average (JMBE, 2016). These low measures are disproportionately found among historically underrepresented racial/ethnic groups. Thus, "low mobility perpetuates existing distinctions between socioeconomic classes and racial/ethnic groups, maintaining long standing inequities and preventing [these] communities from building inclusive political, economic, and social systems" (JMBE, 2016, p. 17). Upward economic mobility is closely tied to an individual's ability to participate in higher education, and the community college is often the choice of entry point for individuals who want to attain a four-year degree but who cannot afford to begin college at the university. Yet, among all students that start at the community college, Black and Latin\*<sup>1</sup> students appear to experience significant barriers to transfer to a four-year institution and are consequently less likely to earn baccalaureate degrees than are white students (Hoachlander et al., 2003; Shapiro et al., 2018). These students tend to lose more credits during the transfer process (Giani, 2019) and therefore accumulate greater numbers of excess credits prior to graduation (Fink et al., 2018).

To address inefficiency in transfer, policymakers in many states have enacted statewide articulation legislation, which structures transfer between two- and four-year institutions (O'Meara et al., 2007). This study examines one such policy, North Carolina's Comprehensive Articulation Agreement (CAA), which was originally established in 1996 but underwent legislatively-mandated revision in 2014. The revised version made significant modifications to the existing articulation agreement between the North Carolina Community College System (NCCCS) and the University of North Carolina (UNC) System. For students that earn either the Associate in Arts (AA) or the Associate in Science (AS) degree, the revised CAA guarantees junior status and the waiver of general education requirements at the accepting UNC System transfer institution.

Furthermore, the revised CAA requires universities to publish and maintain baccalaureate degree plans for transfer hopefuls and assures AA/AS-degree earners of admission into at least one UNC System institution. This policy was designed to "optimize the transfer of credits" (UNC System & NCCCS, 2014, p.1) resulting in less excess credit accumulation, a decrease in time to degree, and, ultimately, an increase in the likelihood of baccalaureate degree completion among students who transfer from the NCCCS to the UNC System. While

agreements like the CAA are intended to ease the transfer process for students, research on the efficacy of articulation agreements is mixed. Some studies indicate that policies similar to the CAA were successful in decreasing the number of excess credits that students earned at graduation (Baker, 2016) and in increasing baccalaureate degree completion (Stern, 2016), while others have found that these policies increase time to degree (Boatman & Soliz, 2018).

While useful in exploring the efficacy of articulation agreements in general, this body of work does not consider the differential impact that articulation agreements can have on students representing diverse racial/ethnic identities. Prior research on likelihood of vertical transfer for different racial/ethnic groups indicates that Black and Latin\* students transfer at lower rates than their white and Asian peers (Shapiro et al., 2018). This suggests that Black and Latin\* students may face more barriers in the transfer process. At the same time, rarely do articulation agreements address the issue of disparate experiences that may be present among different racial/ethnic groups, nor do they provide any accountability measures to identify inequities in the process (Chase et al., 2014). Accordingly, there is no specific mention of racial/ethnic groups in the text of the legislation nor is race/ethnicity addressed in any associated accountability measures for North Carolina's CAA. This report addresses whether the impact of the CAA revisions on students' likelihood of completion, time to degree, and excess credits earned varies by racial/ethnic group.

While the CAA was implemented with the intention of benefitting all students, we currently do not know whether the policy has differing effects on certain groups of students in the transfer process. Thus, this report is designed to provide policymakers with critical information concerning the impact of the CAA on important metrics of transfer success and whether those metrics differ based on the student's racial/ethnic identity.

To determine how the revised CAA may have differentially impacted historically underserved racial/ethnic groups, we conducted a Critical Policy Analysis (CPA). CPA is useful for identifying groups that benefit from the policy and groups that are harmed by the policy. It also provides a framework for understanding "the broader effect a given policy has on relationships of inequality and privilege" (Diem et al., 2014, p. 843). It also can assist researchers, policymakers, and practitioners in forming research questions, interpreting

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data, and providing suggestions for change (Heck, 2004). Lastly, CPA is helpful for identifying “social or institutional perpetuation of systemic inequities in [policy] processes and outcomes” (Stage, 2007, p. 10). In this study, we addressed the following three research questions:

- 1. Does the impact of the CAA on two-year baccalaureate completion rates vary by race/ethnicity?**
- 2. Does the impact of the CAA on time to baccalaureate degree vary by race/ethnicity?**
- 3. Does the impact of the CAA on excess credit accumulation at baccalaureate degree completion vary by race/ethnicity?**

## **DATA**

To assess the impact of the revised CAA on students’ outcomes (i.e., baccalaureate degree completion within two years of transferring, time to degree, and excess credits), we adopted a difference-in-difference estimation strategy.<sup>2</sup> In our analysis, we used data from AA/AS-degree earners and students who transferred without either degree (e.g., those who transferred with some other type of associate degree or those who transferred without any degree at all) to estimate what would have happened to AA/AS-degree earners had the CAA not been revised. The difference between this estimated outcome and the observed outcome is the impact of the revised CAA.

We conducted our analyses on each racial/ethnic group individually. Data disaggregation allows for each racial/ethnic group to be represented in its own right, which acknowledges the historically uneven distribution of opportunities and resources among students from different racial/ethnic backgrounds (Teranishi, 2007). We conducted separate analyses for each of the following three racial/ethnic groups: Black, Latin\*, and white. These students represent the largest racial/ethnic demographic groups in North Carolina (US Census Bureau, 2019) and were the groups for which we had ample data to conduct analyses.

The dataset we used in this study was provided by the UNC System Office. This dataset spanned nine (9) academic years (2010-2011 to 2018-2019), and included all students who transferred from an NCCCS institution to a UNC System institution during this time period

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<sup>2</sup> See a detailed explanation of the analytic approach in Appendix A.

( $N = 98,444$ ). We took subsamples of this dataset to accommodate each student outcome. First, we removed from our dataset any students who had earned only a diploma or a certificate from the community college prior to transfer ( $N = 2,211$ ). We excluded these students because diplomas and certificates are typically not intended to facilitate transfer. We kept those students who had earned any type of associate degree or no degree at all. To analyze both time to degree and excess credits, we limited the dataset to include only students who completed a baccalaureate degree during the years included in our study, as these variables are only applicable to degree completers (Black  $N = 4,530$ , Latin\*  $N = 2,296$ , White  $N = 22,354$ ). To evaluate two-year completion, we limited the dataset to academic years 2010-2011 to 2017-2018 to allow students two (2) years to complete a baccalaureate degree after transfer (Black  $N = 4,373$ , Latin\* = 2,183, White  $N = 22,359$ ). It is important to note that, because we do not have many years post-policy for this outcome in the dataset, the results from these analyses represent the early impact of the CAA on two-year completion.

**Table 1.**

Outcome	Definition
Two-Year Post-transfer Baccalaureate Completion	Either a student completed a baccalaureate degree in two (2) years or they did not.
Time to Degree: Semesters to Graduation	Number of semesters between transfer and graduation. (For the purpose of this outcome, we counted summer sessions as a single term.)
Excess Credits	Credits taken past the baccalaureate degree minimum (120) <sup>3</sup> .

Table 1 provides definitions of our three outcomes. Descriptive statistics, which include student demographic characteristics and information about the outcomes can be found in Appendix B.

We chose to analyze the impact of the revised CAA at two points in time. First, we defined policy implementation as occurring in Fall 2014, the first term that students were able to take advantage of the revised CAA. To explore the potential for a delayed impact of the policy (meaning that students took some time to take full advantage of the CAA revisions), we duplicated this analysis to explore the impact of the policy in 2016. A delayed effect is very possible for policies like the CAA, which require students both to obtain information about the revisions and to alter their credential-seeking behavior accordingly. Thus, while students were technically able to take advantage of the CAA revisions in Fall 2014, they were not necessarily aware of the revisions prior to this term and thus may not have been able to take full advantage of the CAA provisions until a later date.

<sup>3</sup> Note that our difference-in-differences analyses use the log transformation of this variable to account for its skewed nature.

To account for the influence of other factors that may influence a students' completion outcomes, we controlled for student demographic and academic variables in our models. In particular, we included variables like gender, major, part-time enrollment status, socioeconomic status, and high school course-taking. While we would have liked to understand how these factors intersect with race/ethnicity as they relate to completion outcomes, our sample sizes were too small to allow for these analyses.

## RESULTS

### Two-Year Post-transfer Baccalaureate Completion

Our first outcome, which examined the role of the CAA in increasing or decreasing the likelihood that a student would complete a baccalaureate degree within two years post transfer, found that Black, Latin\*, and white students were no more or no less likely to graduate two years after transfer, regardless of whether policy implementation was considered to have occurred in 2014 or 2016.<sup>4</sup> Note that this analysis is limited to two-year graduation rates because of the number of available years in the dataset.

### Time to Degree

Overall, our analyses suggested that the CAA extended time to degree for all three racial/ethnic groups. However, some discrepancies emerged regarding exactly how much the policy extended students' timelines to graduation. As demonstrated in Figure 1, Black AA/AS-degree earning students who transferred in or after Fall 2014 spent, on average, three quarters of a semester longer at the four-year university. Our analyses also indicated that, for Black students, the effect of the CAA lessened over time, as those who entered in Fall 2016 or later spent about a half of a semester longer enrolled at the four-year university.

Initially, in 2014, the effect of the policy was not as prevalent for Latin\* students as it was for Black students. Yet, unlike their Black peers, the effect of the CAA among Latin\* students became more pronounced over time. Our analysis with policy implementation in 2014 showed that, after the CAA revision, Latin\* students spent no more nor no less time enrolled at the four-year university. When we looked at Latin\* students who entered the four-year

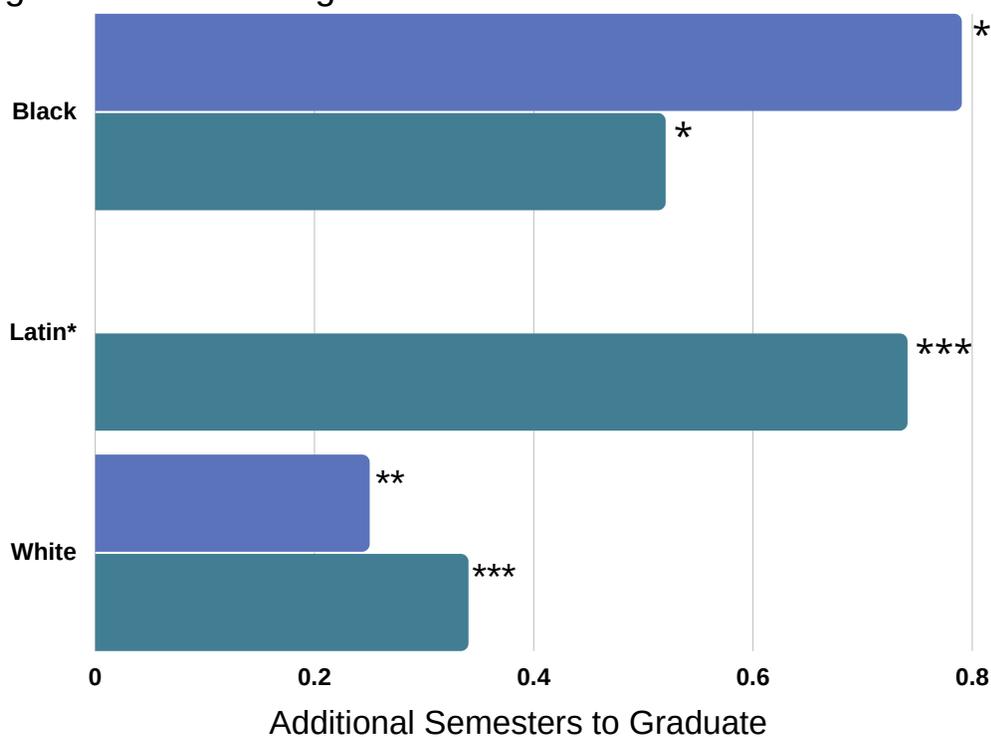
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<sup>4</sup> See Appendix C for a summary of these results.

university in or after Fall 2016 our models suggested that these students enrolled three quarters of a semester longer than their peers who did not transfer under the protections of the CAA.

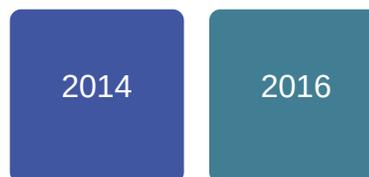
Finally, we observed that the impact of the policy on white students was not as pronounced as it was for Black and Latin\* students. White students who transferred in or after Fall 2014 spent one quarter of a semester longer enrolled at their four-year institution than they would have had the CAA not been revised. Similar to what we observed among Latin\* students, the effect of the CAA became more pronounced over time. White students who entered in or after Fall 2016 spent around one third of a semester longer enrolled at their four-year university.

Figure 1. Time to Degree



Note: +p<0.10 \* p<0.05 \*\* p<0.01 \*\*\* p<0.001

Key

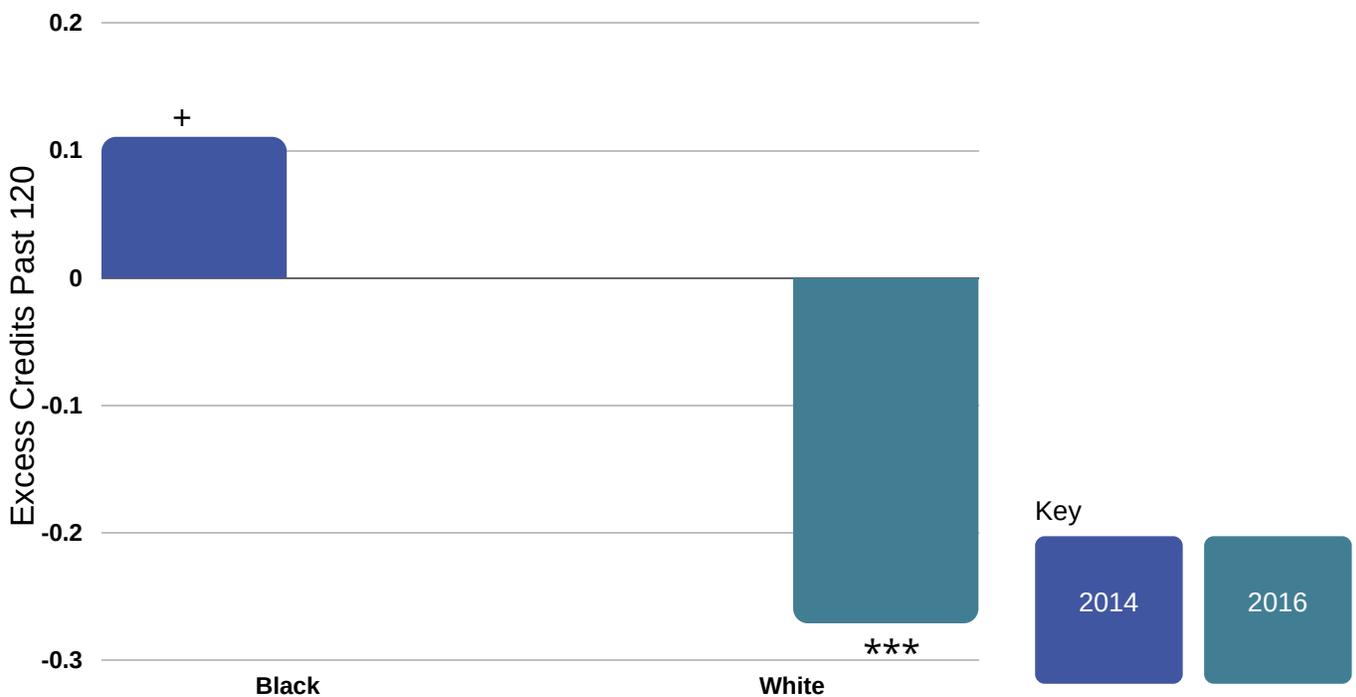


# Excess Credits

As demonstrated in Figure 2, our analyses exploring excess credit accumulation among Black students found that initial CAA implementation in 2014 exacerbated the amount of credits students took past 120.<sup>5</sup> Black students who transferred to a UNC system institution with an AA or an AS degree during or after Fall 2014 earned 11% additional excess credits than they would have earned had the CAA not been revised. The negative impact of the policy on Black students became less pronounced over time, as we also found that these students earned no more nor no fewer excess credits when we considered policy implementation in 2016.

Our analysis examining excess credit-earning among Latin\* students indicated that these students were unaffected by the CAA revision. Regardless of implementation date (2014 or 2016), these students earned no more nor no fewer credits past 120 after policy implementation. The same analysis for excess credit earning among white students suggests that the policy had no effect on the amount of credits they earned upon graduation with policy implementation in 2014. It appears that the policy may have had a delayed effect for white students, as they earned 27% fewer excess credits, a positive outcome for students from an efficiency perspective, when policy implementation was considered to be in 2016.

Figure 2. Excess Credit Accumulation



Note: +p<0.10 \* p<0.05 \*\* p<0.01 \*\*\* p<0.001

Findings that were not found to be statistically significant were excluded from this figure.

<sup>5</sup> We used 120 credits as the cutoff point for our measure of excess credits since it is the standard minimum of credits required for a baccalaureate degree. In January 2018, The UNC Board of Governors formally amended the UNC System Policy Manual to ensure all baccalaureate degrees required no more than 120 credits except under compelling circumstances approved by an institution's board of trustees - <https://www.northcarolina.edu/apps//bog/doc.php?id=60520&code=bog>.

## DISCUSSION

Our results speak to patterns of inequality that the revised CAA appears to perpetuate, if not exacerbate (Diem et al., 2014). Like many similar policies, the CAA is race-blind, meaning that neither racial equity goals nor accountability measures are explicitly mentioned in the policy (Chase et al. 2014). While the policy is intended to assist all students with the transfer process, our results offer an alternative perspective. Rather, students of different racial/ethnic groups appear to experience transfer differently, even after the revised CAA. Similar to findings of previous research on other educational policies (e.g., Kosiewicz & Ngo, 2020), our results indicate that the opportunities for academic success that students derive through transfer to a four-year institution are not equitably distributed. Key findings of our study include the following:

- 1. The revised CAA increased time to baccalaureate degree completion for all students, but the impact of the policy was greater for Black and Latin\* students. In practice, this means that Black and Latin\* students took approximately an additional semester to graduate, disproportionately increasing their time to degree.**
- 2. The revised CAA decreased excess credit-earning among white students, suggesting a reduction in the amount that a student pays to earn a baccalaureate degree. However, this benefit was not realized among Black and Latin\* students, and the policy even increased excess credit-earning among Black students, thus potentially increasing their cost of degree.**

In light of our findings, it is important to ask why we observed these differential impacts of the CAA on the outcomes of students of different racial/ethnic identities. Although our research does not provide evidence for why the effects of the policy are different for different racial/ethnic groups, we suggest some possibilities based on previous research. First, as mentioned, the CAA was not intentionally designed with the specific needs of historically marginalized students in mind. The omission of equity goals and accountability measures pertaining to students from historically marginalized racial/ethnic groups could well mean that these students will continue to be underserved by their institutions of higher education.

Next, it is possible that the inequitable outcomes we have observed are due to informational barriers. Policies such as the CAA rely on adequate relaying of information to students so that the policy can be effectively implemented (Dynarski & Scott-Clayton, 2006; Perna, 2006). That is, students cannot benefit from the CAA if they are unaware of the policy or the steps they need to take to access its benefits. Differential access to informational resources, especially through advising and Internet access, offers a possible explanation for our findings. Previous research suggests that white students historically receive more advising in community college transfer programs compared to Black students (Herndon et al., 1996). Orozco (2010) found that Black and Latin\* students make far less use of advising resources compared to white students, perhaps due to a lack of long-term or established relationships with advising staff. Other research has found that advisors' perspectives of student potential vary along racial/ethnic lines, benefitting white students (Kim & Yeh, 2002; Maldonado, 2019). Advising represents one pathway through which information about the CAA is communicated to students and thus suggests one potential explanation for the differential impact of the policy on white students on the one hand, and Black and Latin\* students, on the other.

Another way that students can access information about the CAA is through the Internet, where baccalaureate degree plans are published by each UNC System institution. Recent estimates from Carolina Demography (2018) indicate that, in North Carolina, 16% of white households lacked access to the Internet, while this was true of 29% of Black households and 27% of Latin\* households. Research in public policy suggests that differential access to the Internet and other digital communications has significant implications for historically marginalized communities regarding if and how they are able to take advantage of the benefits of policy (Brown et al., 2020). This differential access to the Internet could be another potential explanation for our findings, since students need to be able to rely on the Internet to access information about the CAA.

## **We see three main implications of our work for North Carolina policymakers within the NCCC and UNC Systems:**

- » **Incorporate consideration for race/ethnicity when crafting policy.** Not all racial/ethnic groups have the same needs when it comes to transfer success. Future revisions to the CAA should consider the provision of additional resources intended to support different groups of students, such as funding for additional advising for students representing historically marginalized racial/ethnic groups. While this report has highlighted what Bensimon (2020) calls the “racist outcomes” (p. 7) of educational policy, explicit mention of race as well as inclusion of race-conscious solutions in policy can go a long way toward addressing long-standing racial/ethnic inequality in our educational system.

- » **Include accountability measures that speak specifically to the success of students from historically marginalized groups**, thereby raising awareness of the different educational experiences that these students have in our higher education systems and encouraging community colleges and universities to take steps towards addressing them. Existing state policies around performance funding often contain metrics and indicators that speak to the success of students in certain historically minoritized groups, which may serve as examples for other state policies. For example, in Tennessee and Ohio, performance-based funding is awarded in part based on the graduation rates of students of color (Li, 2019). The state of Tennessee also includes a clause in the state board code regarding responsibility for equity, diversity, and inclusion (TBR, 2020).
  
- » **Consider the kinds of data needed to advance the evaluation of policies like the CAA and enact policies that allow for its collection.** While the research in this report drew from a rich dataset from the UNC System Office, we are unable to speak to many factors in students' community college environments that may have impacted their transfer success, such as their engagement with advisors or particular coursework prior to transfer. The ability to follow transfer students as they move from institution to institution within a single dataset would allow us to advance our understanding of transfer student success.

## NEXT STEPS & FUTURE DIRECTIONS

Additional institutional supports may go a long way in addressing the inequitable outcomes that we observed in our study. In sum, while our results suggest that the CAA has differential effects among community college transfer students along racial/ethnic lines, there are steps that policymakers can take to address long-standing inequities among transfer students in North Carolina. Below we included a series of questions for leaders within the state to consider as the revision of the CAA comes up on having been in place for seven years. These questions are designed to facilitate to discussion around the future of the policy given the findings of this study and larger conversations around transfer student success that are currently underway.

### Questions for Policymakers and System Leaders to Consider:

1. Is it time to consider another significant revision to the North Carolina CAA? If so, how can equity goals and accountability measures be included in the next iteration of this important transfer policy?

2. How could state performance measures for both NCCCS and UNC System institutions be structured to reward growth in decreasing the transfer equity gaps between different populations of students?
3. What data would be useful to collect to assist with understanding how well the CAA is working and whether different populations of students have equitable experiences with transfer?
4. How could the two systems of higher education in North Carolina -- the NCCCS and the UNC System -- collaborate in sharing data to allow for a deeper, richer analysis of the transfer process as students move between the two systems? What technological systems could be implemented to assist with this process?

Future work around the role of the CAA is necessary to continue optimizing the transfer landscape and ensuring equitable outcomes. The differences in student outcomes are evident, however the reasons why these disparities continue is unclear. We recommend opportunities to engage students, particularly those from historical marginalized groups, in interviews and focus groups about their experience transferring under the CAA to build a deeper understanding of the challenges they are facing and the ways institutions, both community colleges and UNC system institutions, can support their pathway to a baccalaureate degree. By understanding the unique circumstances that different racial/ethnic groups of students face, policymakers and practitioners can leverage culturally relevant strategies and metrics to promote their success. While the CAA is one of many policies governing transfer in the state, its large reach across both systems and multiple degree pathways suggests that it can serve as an important lever to promoting equity.

## REFERENCES

- Alfonso, M. (2006). The impact of community college attendance on baccalaureate attainment. *Research in Higher Education*, 47(8), 873-903. <https://doi.org/10.1007/s11162-006-9019-2>
- Baker, R. (2016). The effects of structured transfer pathways in community colleges. *Educational Evaluation and Policy Analysis*, 38(4), 626-646. <https://doi.org/10.3102/0162373716651491>
- Bensimon, E.M. (2020). The case for an anti-racist stance toward paying off higher education's racial debt. *Change: The Magazine of Higher Learning*, 52(2), 7-11. <https://doi.org/10.1080/00091383.2020.1732752>
- Boatman, A., & Soliz, A. (2018). Statewide transfer policies and community college student success. *Education Finance and Policy*, 13(4), 449-483. [https://doi.org/10.1162/edfp\\_a\\_00233](https://doi.org/10.1162/edfp_a_00233)
- Brown, A., Mossberger, K., & Cho, S.K. (2020). Race, place, and digital governance. In A. Rutherford & K.J. Meier (Eds.), *Race and public administration* (pp. 98-118). Taylor & Francis.
- Carnevale, A.P, Rose, S.J., & Cheah, B. (2011, August). *The college payoff: Education, occupations, lifetime earnings*. Washington, D.C.: Georgetown University's Center on Education and the Workforce. Retrieved from <https://cew.georgetown.edu/cew-reports/the-college-payoff/#full-report>
- Carolina Demography. (2018). NC in Focus: Internet Access. <https://www.ncdemography.org/2018/12/13/nc-in-focus-internet-access/>
- Chase, M.M., Dowd, A.C., Pazich, L.B., & Bensimon, E. (2014). Transfer equity for "minoritized" students: A critical policy analysis of seven states. *Education Policy Studies*, 28(5), 669-717. <https://doi.org/10.1177/0895904812468227>
- Diem, S., Young, M.D., Welton, A.D., Cummings Mansfield, K., & Lee, P. (2014) The intellectual landscape of critical policy analysis. *International Journal of Qualitative Studies in Education*, 27(9), 1068-1090. <https://doi.org/10.1080/09518398.2014.916007>
- Doyle, W.R. (2009). The effect of community college enrollment on bachelor's degree completion. *Economics of Education Review*, 28(2), 199-206. <https://doi.org/10.1016/j.econedurev.2008.01.006>
- Dynarski, S., & Scott-Clayton, J. (2006). The cost of complexity in federal student aid: Lessons from optimal tax theory and behavioral economics. *National Tax Journal*, 59(2), 319-356. <https://doi.org/10.3386/w12227>
- Fink, J., Jenkins, D., Kopko, E., & Ran, F.X. (2018). *Using data mining to explore why community college transfer students earn bachelor's degrees with excess credit*. (CCRC Working Paper No.100). Columbia University, Teachers College, Community College Research Center.

- Giani, M. (2019). The correlates of credit loss: How demographics, pre-transfer academics, and institutions relate to the loss of credits for vertical transfer students. *Research in Higher Education, 60*(1), 1-29. <https://doi.org/10.1007/s11162-019-09548-w>
- Heck, R. H. (2004). *Studying educational and social policy: Theoretical concepts and research methods*. Lawrence Erlbaum Associates.
- Herndon, J., Kaiser, J., & Creamer, D. (1996). Student preferences for advising styles in community college environments. *Journal of College Student Development, 37*(6), 637–648.
- Hoachlander, G., Sikora, A.C., Horm, L., & Carroll, C.D. (2003). *Community college students: Goals, academic preparation, and outcomes*. National Center for Education Statistics, U.S. Department of Education.
- JMBE. (2016). *State of the South: North Carolina's Economic Imperative: Building an Infrastructure of Opportunity*. Retrieved from <https://www.mdcinc.org/wp-content/uploads/2018/01/North-Carolinas-Economic-Imperative-Building-an-Infrastructure-of-Opportunity.pdf>
- Khandker, S. R., Koolwal, G. B., & Samad, H. A. (2010). *Handbook on impact evaluation: Quantitative methods and practices*. World Bank.
- Kim, A., & Yeh, C.J. (2002). *Stereotypes of Asian American students*. ERIC Digest, ERIC Clearinghouse on Urban Education. Retrieved from <http://ericass.uncg.edu/virtuallib/diversity/1077.html>
- Kosiewicz, H., & Ngo, F. (2020). Giving community college students choice: The impact of self-placement in math courses. *American Educational Research Journal, 57*(3), 1358-1391. <https://doi.org/10.3102/0002831219872500>
- Li, A. (2019). *Lessons learned: A case study of performance funding in higher education*. Third Way. Retrieved from <https://www.thirdway.org/report/lessons-learned-a-case-study-of-performance-funding-in-higher-education>
- Long, B.T., & Kurlaender, M. (2009). Do community colleges provide a viable pathway to a baccalaureate degree? *Educational Evaluation and Policy Analysis, 31*(1), 30-53. <https://doi.org/10.3102/0162373708327756>
- Ma, J., Pender, M., & Welch, M. (2019). Education pays 2019: The benefits of higher education for individuals and society. The College Board. Retrieved from <https://research.collegeboard.org/pdf/education-pays-2019-full-report.pdf>
- Maldonado, C. (2019). "Where your ethnic kids go:" How counselors as first responders legitimate proper course placements for community college students. *Community College Journal of Research and Practice, 43*(4), 280-294.

- Monaghan, D., & Attewell, P. (2015). The community college route to the bachelor's degree. *Educational Evaluation and Policy Analysis*, 37(1), 70-91. Retrieved from <https://www.jstor.org/prox.lib.ncsu.edu/stable/43773487>
- Murnane, R.J. & Willett, J.B. (2011) *Methods matter: Improving causal inference in educational and social science research*. Oxford University Press.
- O'Meara, R., Carmichael, M., & Hall, T. (2007). A discussion of past, present, and future articulation models at postsecondary institutions. *The Journal of Technology Studies*, 33(1/2), 9-16. <https://doi.org/10.21061/jots.v33i1.a.2>
- Orozco, G.L., Alvarez, A.N., & Gutkin, T. (2010). Effective advising of diverse students in community colleges. *Community College Journal of Research and Practice*, 34(9), 717-737. <https://doi.org/10.1080/10668920701831571>
- Perna, L.W. (2006). Studying college access and choice: A proposed conceptual model. In J.C. Smart (Ed.), *Higher Education: Handbook of Theory and Research* (pp. 99-157). Springer.
- Salinas, C. (2020). The complexity of the "x" in Latinx: How Latinx/a/o students relate to, identify with, and understand the term Latinx. *Journal of Hispanic Higher Education*, 19(2), 149-168.
- Shapiro, D., Dundar, A., Huie, F., Wakhungu, P.K., Yuan, X., Nathan, A., & Hwang, Y. (2017). Tracking transfer: Measures of effectiveness in helping community college students to complete bachelor's degrees. *Signature Report*, (13)1-31.
- Shapiro, D., Dundar, A., Huie, F., Wakhungu, P.K., Bhimdiwali, A., Nathan, A., & Youngsik, H. (2018). Transfer and Mobility: A National View of Student Movement in Postsecondary Institutions, Fall 2011 Cohort (Signature Report No. 15). National Student Clearinghouse Research Center.
- Stage, F.K. (2007) Answering critical questions using quantitative data. *New Directions for Institutional Research*, 133, 5-16
- Stern, J.M. (2016). The effect of articulation agreements on community college transfers and bachelor's degree attainment. *Community College Journal of Research and Practice*, 40(5), 3555-369. <https://doi.org/10.1080/10668926.2015.1065209>
- TBR (Tennessee Board of Regents). (2020). Equity, Diversity, and Inclusion. Retrieved from <https://www.tbr.edu/oesi/equity>
- Teranishi, R. T. (2007). Race, ethnicity, and higher education policy: The use of critical quantitative research. *New Directions for Institutional Research*, 2007(133), 37-49. <https://doi.org/10.1002/ir.203>
- The United States Census Bureau. (2019). [Charts of population characteristics]. Quick facts: North Carolina. Retrieved from <https://www.census.gov/quickfacts>

The University of North Carolina System, & The North Carolina Community College System. (2014, February 21). *2014 comprehensive articulation agreement between the University of North Carolina and the North Carolina Community College System*. [https://www.nccommunitycolleges.edu/sites/default/files/basic-pages/academic-programs/attachments/caa\\_final\\_04-25-13vs2.pdf](https://www.nccommunitycolleges.edu/sites/default/files/basic-pages/academic-programs/attachments/caa_final_04-25-13vs2.pdf)

Worsham, R.E., Whatley, M., & Loss, J.E. (2021). Opportunity for all? The differential impacts of North Carolina's revised comprehensive articulation agreement by race/ethnicity. *Education Policy Analysis Archives*, 29(28), <https://doi.org/10.14507/epaa.29.5385>.

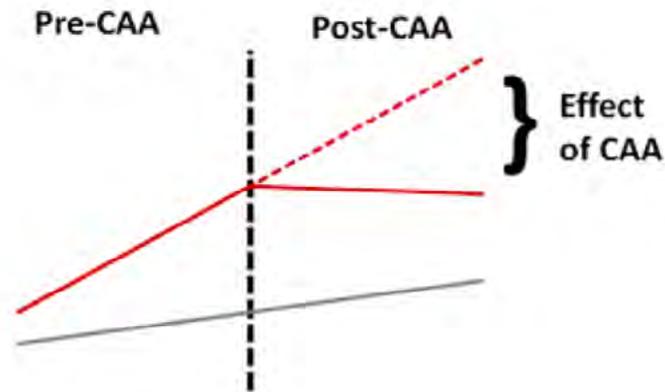
## APPENDIX A: Difference-in-Differences Analysis

In quantitative evaluations of policies or programs, researchers seek to understand the effects of an intervention (in our case, the CAA revision) on an outcome or series of outcomes (in our case, two-year baccalaureate degree completion, time to degree, and excess credit accumulation). To understand the true effects of the intervention, researchers are tasked with separating out the influence of other factors from the effect of interest (in our case, the CAA revision) on the outcomes of interest. One way to separate out the effects of other factors from the true effects of the intervention is through random assignment of individuals (students, in our case) to treatment and control groups (i.e., some students would, at random, be covered by the protections of the CAA while others would not). This would ensure that the makeup of the treatment and control groups are similar, which allows the researcher to isolate the effect of the intervention without concern that the composition of the groups will mask the treatment effect.

Random assignment to treatment and control groups in this study was not possible or, for that matter, ethical; therefore, we utilized a difference-in-differences (DID) analytic approach, which offers us a way to estimate what would have happened to our treatment group (students who benefitted from the CAA) had the CAA not been implemented (Khandker et al., 2010). DID compares the treatment and control groups before and after policy implementation by subtracting the difference in the treatment group outcome variable (denoted by  $t$ ) from the control group outcome variable (denoted by  $c$ ), before (denoted by 0) and after (denoted by 1) the intervention, as in the following equation:

$$DID = (\bar{Y}_{t1} - \bar{Y}_{c1}) - (\bar{Y}_{t0} - \bar{Y}_{c0})$$

Assuming that differences between the groups are stable over time, this calculation isolates the effect of the intervention on the treated groups (Murnane & Willett, 2011). In other words, this analytic approach uses the control group to estimate what would have happened to the treatment group in the absence of treatment. It relies on control group data to create a counterfactual scenario wherein policy implementation did not happen. Below is a graphical representation of DID, using excess credit accumulation as an example. The dotted black vertical line denotes the revised CAA policy implementation date, the red line represents credits at graduation for those with AA or AS degrees, and the gray line represents credits for those without either degree. The dotted red line represents the treatment groups' credits earned at graduation had the CAA not been revised, and the solid red line shows their actual credits earned. The difference between the dotted and solid red lines is the effect of the CAA on excess credit accumulation.



A primary assumption of DID is that both the treatment and the control groups follow parallel trends on outcomes over time (in our case, degree completion, time to degree, and excess credit accumulation) prior to policy implementation. Researchers usually check this assumption by plotting outcomes for the treatment and the control groups over time before policy implementation. Generally speaking, visual inspection indicated that this assumption was met for this study. Please see Worsham et al. (2021) for figures of these plots and additional information about our assumption checking.

Our DID estimates, summarized in the main content of this report, are the results that speak to the impact of the revised CAA. Our study used regression to estimate our DID models so that we could incorporate control variables, namely a student's race/ethnicity and gender, whether a student transferred from a rural community college, whether a student received a federal Pell Grant, whether a student majored in a STEM field, whether a student earned AP or IB credits in high school, whether a student was ever enrolled part-time, and a student's number of changes in their declared major. Our regression models took the following form:

$$\overline{Y_{ist}} = \alpha + \beta CAA_i + \gamma Post_t + \delta_{DID} CAA_i * Post_t + \theta X_i + \vartheta X_s + \varepsilon_{ist}$$

where  $\overline{Y_{ist}}$  represents our outcomes (baccalaureate degree completion, time to degree, and excess credit accumulation) for student  $i$  following transfer pathway  $s$  during semester  $t$ . The coefficient  $\delta_{DID}$  on the  $CAA_i * Post_t$  interaction term estimates the effect of CAA implementation for those students who transferred from a NCCCS institution with an AA or an AS transfer degree.  $\theta X_i$  represents student-level covariates, and  $\vartheta X_s$  are transfer pathway fixed effects. Our models clustered standard errors at the four-year institution level.

## APPENDIX B: Descriptive Statistics

Variable	Black	Latin*	White
Two-Year Graduation Rate	26%	32%	36%
Average Semesters to Graduation	8.5	7.79	7.6
Average Credits at Graduation	138	136	138
Transferred from Rural Community College <sup>6</sup>	18%	18%	28%
Received Pell Grant	78%	75%	53%
Female	64%	57%	55%
STEM Major	11%	18%	19%
Enrolled in AP/IB	6%	13%	10%
Part-Time	60%	57%	55%
Number of Changes in Major	1.4	1.4	1.3
Hours Transferred to Four-Year Institution	59	61	63
N	4,372	2,183	22,359

<sup>6</sup> We utilized the U.S. Census Bureau three category locale designation: mostly urban, mostly rural, and completely rural. Per the Bureau, “counties with less than 50 percent of the population living in rural areas are classified as mostly urban; 50 to 99.9 percent are classified as mostly rural; 100 percent rural are classified as completely rural” (U.S. Census Bureau, 2010).

## APPENDIX C: Regression Results Summary

Outcome	Black	Latin*	White
<b>Graduated in Two Years</b>			
Policy in 2014	-0.03	0.01	0.03
Policy in 2016	0.01	-0.02	0.04
<b>Time to Graduation</b>			
Policy in 2014	0.79*	0.38	0.25**
Policy in 2016	0.52*	0.74***	0.34***
<b>Excess Credits</b>			
Policy in 2014	0.11+	0.06	-0.12
Policy in 2016	-0.04	-0.25	-0.27***

**Note:**+p<0.10 \* p<0.05 \*\* p<0.01 \*\*\* p<0.001. Standard errors clustered at the four-year institution.