

## Sprint 2

# COLLEGE AND CAREER READINESS IN CHARLOTTE, NC: AN ANALYSIS ON ACADEMIC PERFORMANCE, CAREER READINESS, AND UPWARD MOBILITY.

---

Khem Khadka   Cody Scott   Joshua Hernandez

February 9, 2022

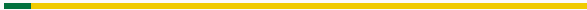
DTSC 4301  
School of Data Science  
University of North Carolina at Charlotte



# Table of contents

1. Background
2. Hypotheses
3. Data Sources
4. Variable Information
5. Analysis and Validation
6. Appendix

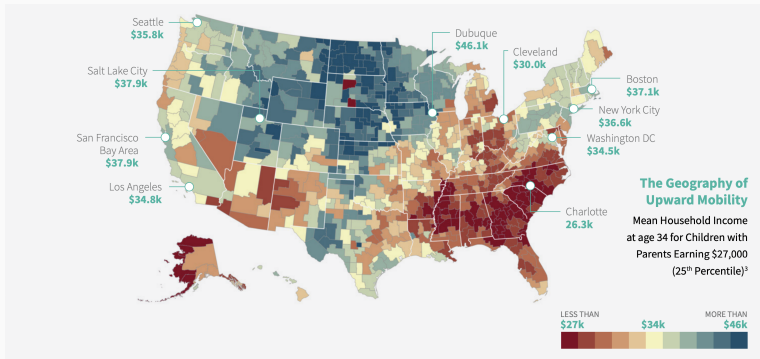
# Overview



# Project Overview

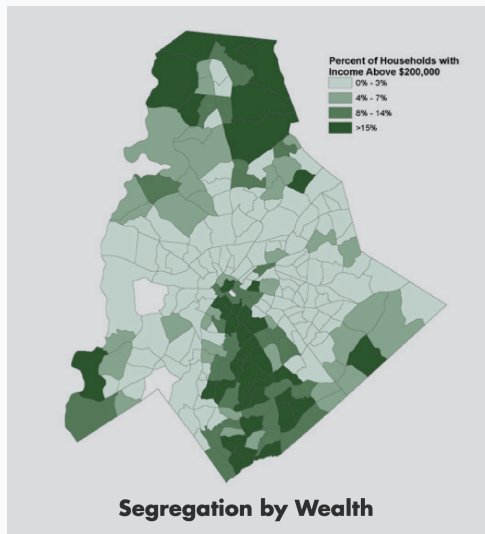
- Out of 50 largest cities in the United States, Charlotte ranks last in upward economic mobility
- Leading On Opportunity Task Force worked with experts and communities to recommend structural changes to improve mobility

Figure 1



Source: Chetty Report, 2014

Figure 2



Source: Leading on Opportunity Report, 2017

WILL THE RECOMMENDATIONS MADE FROM THE TASK FORCE SHOW A POSITIVE EFFECT ON MINORITY CHILDREN, AND CHILDREN FROM LOW ECONOMIC STATUSES IN EDUCATIONAL PERFORMANCE, COLLEGE READINESS, OR CAREER READINESS?

# Hypotheses

---



# Hypotheses

## Hypothesis 1

As the number and quality of mentors increase, there will be an increase in academic performance and college acceptance rates for low-socioeconomic students.

# Hypotheses

## Hypothesis 1

As the number and quality of mentors increase, there will be an increase in academic performance and college acceptance rates for low-socioeconomic students.

## Variables

- ▷ AP Participation Rate
- ▷ AP Passing Rate
- ▷ College Enrollment Rate
- ▷ Total Guidance Counselors in Charlotte-Mecklenburg Schools
- ▷ Quality of Mentor Bias Training

# Hypotheses

## Hypothesis 2

As the quality and number of mentors increase, there will be an increase in obtained CTE Credentials by students within Charlotte Mecklenburg County Schools.

# Hypotheses

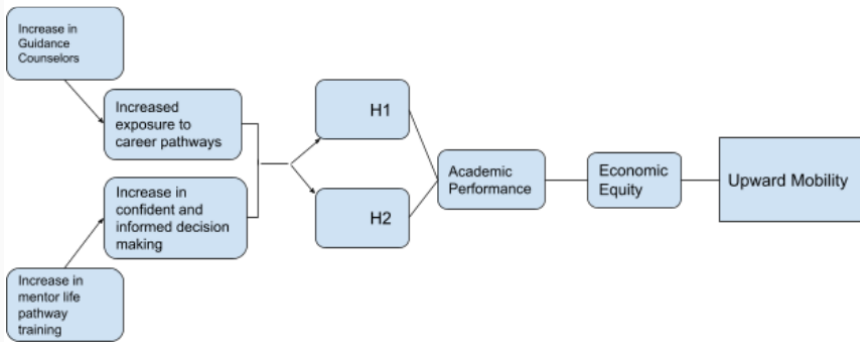
## Hypothesis 2

As the quality and number of mentors increase, there will be an increase in obtained CTE Credentials by students within Charlotte Mecklenburg County Schools.

## Variables

- ▶ Career and Technical Education Enrollment
- ▶ Career and Technical Education Credentials
- ▶ Total Guidance Counselors in Charlotte-Mecklenburg Schools
- ▶ Quality of Mentor Bias Training

# Hypotheses Model



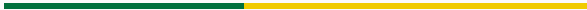
# Data Sources



## Sources

- ▶ North Carolina Department of Public Instruction
  - North Carolina School Report Cards
  - North Carolina Public Schools Statistical Profile
  - The Educational Directory and Demographical Information Exchange (EDDIE)
- ▶ The National Center for Education Statistics
  - Education Demographics and Geographic Estimates on School Neighborhood Poverty
- ▶ Charlotte Open Data Portal
  - 2019 Median Household Income by school Zip Code

## Variable Information





**Table 1**  
*Codebook*

Variable	Information		
	Years	Type	Description
AP_pass_pct	2014-2020	Continuous	Percent of AP exams with a score of 3 or more
enroll_subgroup	2011-2019	Continuous	Percent of students enrolling in college by demographic
CTE_cred_pct	2018-2020	Continuous	Ratio of CTE credentials earned over students enrolled in CTE programs
total_counselors	2015-2020	Discrete	Guidance counselors employed district wide
int_intention	2015-2020	Continuous	Percent of students by post-secondary intention

*Note.* Rest of codebook available in appendix

**Table 2**  
*Summary Statistics*

Variable	Statistics					
	Count	Mean	Std	Min	Max	Missing
AP_pass_pct	136.0	0.43	0.23	0.05	0.84	0.04%
enroll_Disadvantaged	63.0	0.36	0.19	0.07	0.85	0.56%
enroll_All	42.0	0.63	0.17	0.34	0.95	0.7%
CTE_cred_pct	19.0	16.26	14.95	0.0	54.0	0.87%
total_counselors	142.0	440.77	46.77	361.0	508.0	0.00%
int_employ	142.0	11.24	2.66	8.3	15.0	0.00%
int_tradesch	142.0	0.9	0.15	0.7	1.1	0.0%
int_commcoll	142.0	33.81	1.92	31.3	36.9	0.00%
int_pubsr	142.0	40.58	1.48	38.4	43.4	0.0%

*Note.* Rest of variables can be found in the appendix.

# Analysis and Validation

---

# Potential Analysis

## Regression

- ▷ Multivariate Regression
- ▷ Random Forest Regressor

## Evaluation Metrics

- ▷ R and  $R^2$
- ▷ Mean Squared Error
- ▷ Mean Absolute Error

## Chi-Squared Test

- ▷ Requires binning the data
- ▷ Determine significance of relationships between variables
- ▷ Metric to evaluate model performance

# Hypothesis Validation

## Limited Career and Technical Education Data

- ▷ Requires binning the data
- ▷ Determine significance of relationships between variables
- ▷ Metric to evaluate model performance

## Advanced Placement as a Measure of Academic Success

- ▷ Conflicting findings in literature
- ▷ Supplement with GPA, Reading, or Math scores

## Guidance Counselor Aggregation Level

- ▷ Current aggregated at the district level, not individual school

## Next Steps

- ▷ Search for more descriptive counselor data
- ▷ Incorporate community and school organizations that help increase the social capital of students
- ▷ More descriptive demographic information of schools and surrounding zones
- ▷ Adjust hypotheses accordingly

QUESTIONS?

# Appendix

---



**Table 1**  
*Codebook*

Variable	Info		
	Years	Type	Description
AP_part_pct	2014-2020	Continuous	Percent of students enrolled in AP classes
CTE_enroll_pct	2018-2020	Continuous	Percentage of students enrolled in a CTE program
2019_med_hh_inc	2019	Discrete	2019 Median Household Income by Zip Code

**Table 2**  
*Summary Statistics*

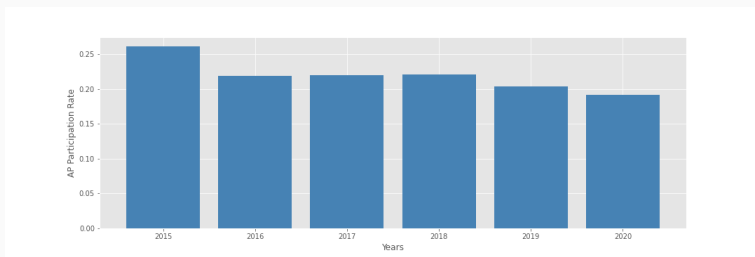
Variable	Statistics					
	Count	Mean	Std	Min	Max	Missing
AP_part_pct	138.0	0.22	0.13	0.0	0.57	0.03
CTE_enroll_pct	69.0	65.91	14.8	22.12	97.99	0.51
enroll_AmericanIndian	0.0	nan	nan	nan	nan	1.0
enroll_Asian	31.0	0.52	0.31	0.06	0.95	0.78
enroll_Black	88.0	0.41	0.21	0.06	0.95	0.38
enroll_EnglishLearners	12.0	0.3	0.16	0.05	0.55	0.92
enroll_Female	91.0	0.48	0.19	0.15	0.92	0.36
enroll_Hispanic	65.0	0.25	0.19	0.05	0.7	0.54
enroll_Male	87.0	0.4	0.18	0.11	0.84	0.39
enroll_Twoormore	13.0	0.65	0.21	0.05	0.93	0.91
enroll_PacificIslander	0.0	nan	nan	nan	nan	1.0

*Note.* Continued on next slide.

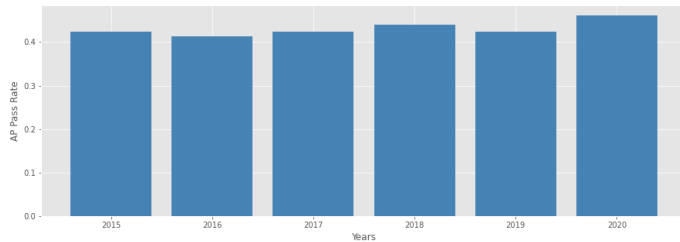
**Table 2**  
*Summary Statistics*

Variable	Statistics					
	Count	Mean	Std	Min	Max	Missing
enroll_Disabilities	16.0	0.39	0.12	0.24	0.66	0.89
enroll_White	63.0	0.52	0.25	0.05	0.91	0.56
int_military	142.0	2.6	0.3	2.2	3.0	0.0
int_other	142.0	1.75	0.81	1.0	3.1	0.0
int_privjr	142.0	0.33	0.11	0.2	0.5	0.0
int_privsr	142.0	8.75	0.63	7.8	9.5	0.0

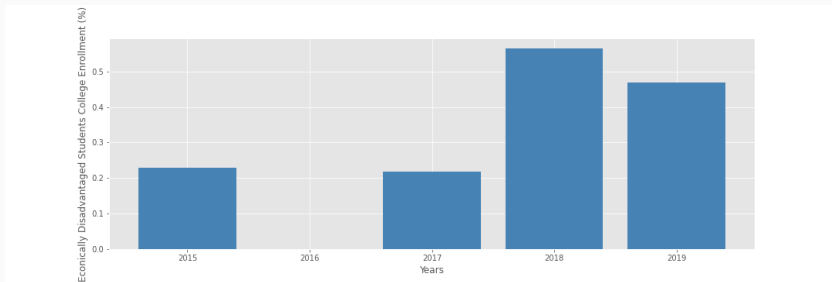
**Figure 3:** AP Participation Percent over Time



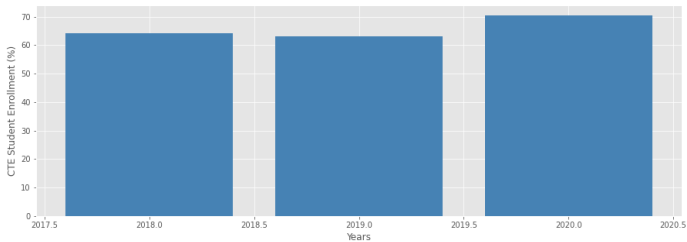
**Figure 4: AP Pass Rate over Time**



**Figure 5:** Economically Disadvantaged Students College Enrollment over Time



**Figure 6:** CTE Student Enrollment over Time



**Figure 7:** Number of Counselors at District Level

