CCAT SYMPOSIUM 2019

PUBLIC ACCEPTANCE OF AUTONOMOUS VEHICLES ACROSS TRANSPORTATION DISADVANTAGED AREAS IN INDIANAPOLIS

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CURRENT AND EMERGING TRENDS

270 million registered vehicles in the US (US EPA, 2017).

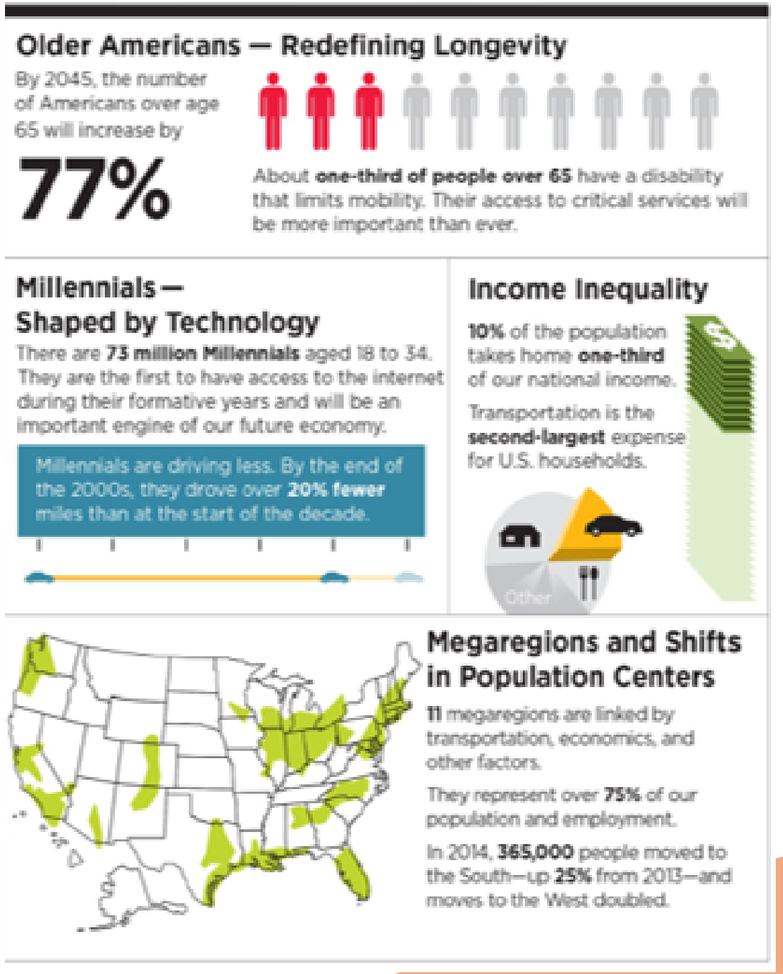
40 miles traveled per respondent (FHWA, 2015).

Slight downward trend since 2006 on annual vehicle miles.

Approximately 73 million Millennials (18-34 years old).

Millennials drove 20% fewer miles than last decade.

By 2045, increase by 77% of people older 65 years old and increase of income inequality

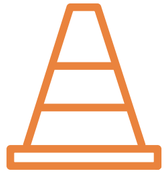


Pooled SAVs provide mobility for disadvantaged group of people and complement public transit.

RESEARCH MOTIVATION

AVs emerging transportation mode in urban areas.

Widespread emergence of AVs could impact:



Widespread emergence of AVs could impact:

Understanding characteristics of distinct market segments can lead to smoother transition

RESEARCH OBJECTIVES

Assess the socio-economic implications related to SAVs:

- Identify market segments with different characteristics and different levels of adoption
- Identify transportation disadvantaged areas
- Provide best strategies and suggestions to these areas to ensure smooth transition

SURVEY DESIGN

Metropolitan Area

Online Distribution

400 Responses

5% of margin of error and 95% confidence level

Respondents over 18 years old

March 2018

IRB Protocol # 1701018708

Indianapolis

SURVEY QUESTIONS

Section 1

Questions regarding people's awareness towards advances on AVs.

Section 2

Questions about people's travel characteristics

Section 3

Factors affecting people's behavioral intention to ride in AVs

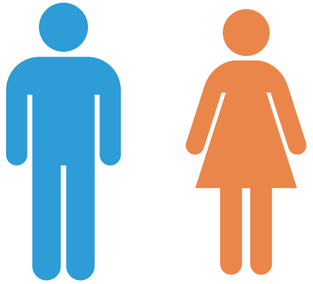
Section 4

Mode choice experiment

Section 5

Socio-demographic questions

SURVEY - SAMPLE



45% 55%

8% 2% 81% 3% 6%

MARKET SEGMENTATION ANALYSIS (MSA)

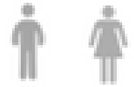
Cluster Analysis – group cases similar to each other and address heterogeneity in data set.

Classify respondents into distinct market segments.

Partitioning method – k-means algorithm (minimize variation within clusters).

Five clusters: a) innovators, b) early adopters, c) early majority,
d) late majority, e) laggards.

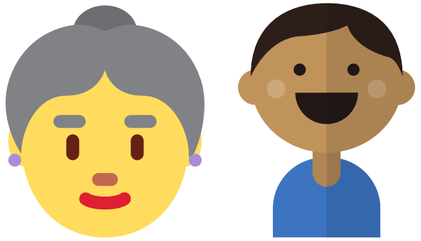
MSA - INDIANAPOLIS

	13.75% Innovators	24.50% Early Adopters	26.25% Early Majority	21.00% Late Majority	14.50% Laggards
Gender					
Commute Trips					
Age	<34 years old	<44 years old	35-54 years old	>45 years old	>55 years old
Income	$$$$$	$$$$	$	$$$	$$
Vehicle Ownership					
Household Size					

MULTI-SPATIAL PERSPECTIVE APPROACH

Accessibility

What opportunities are close to the area?



Mobility

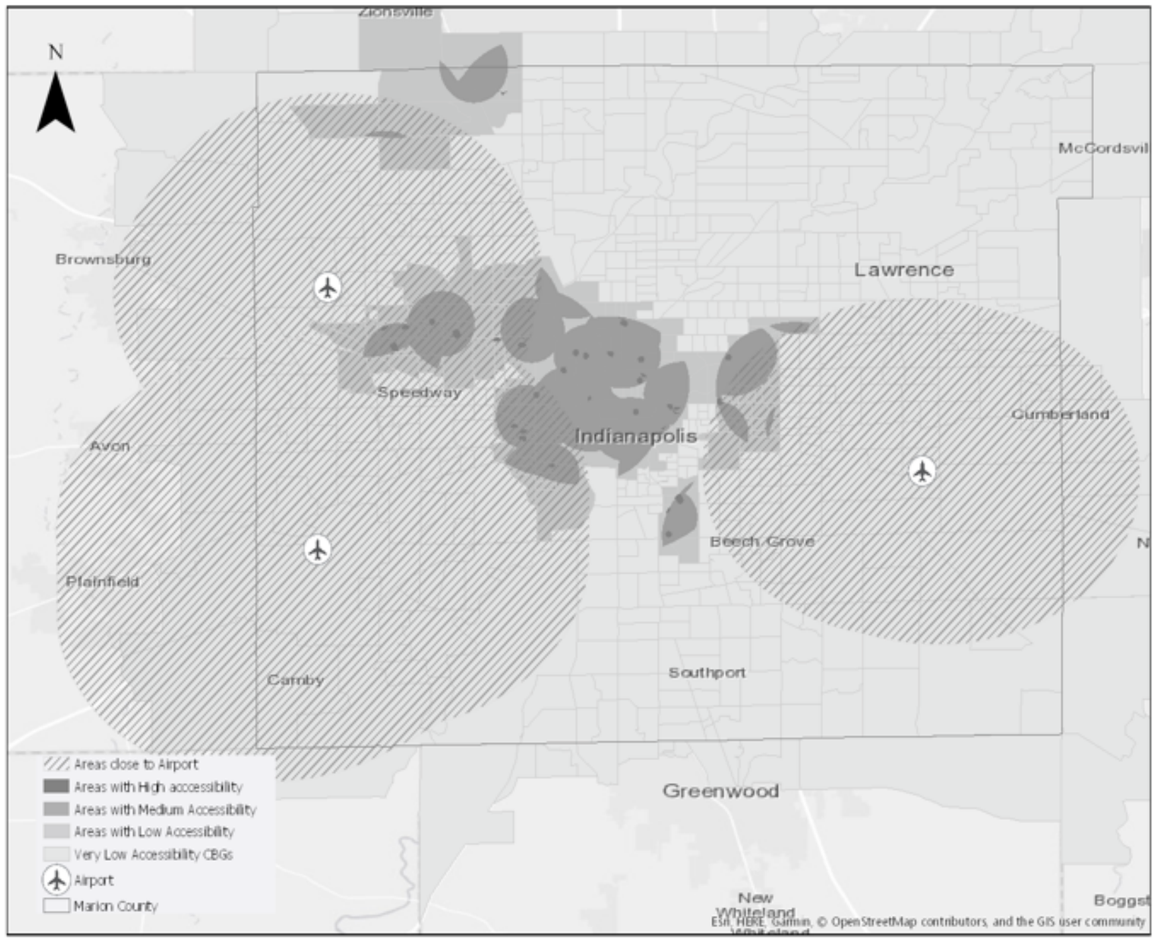
What are the demographics of the area?

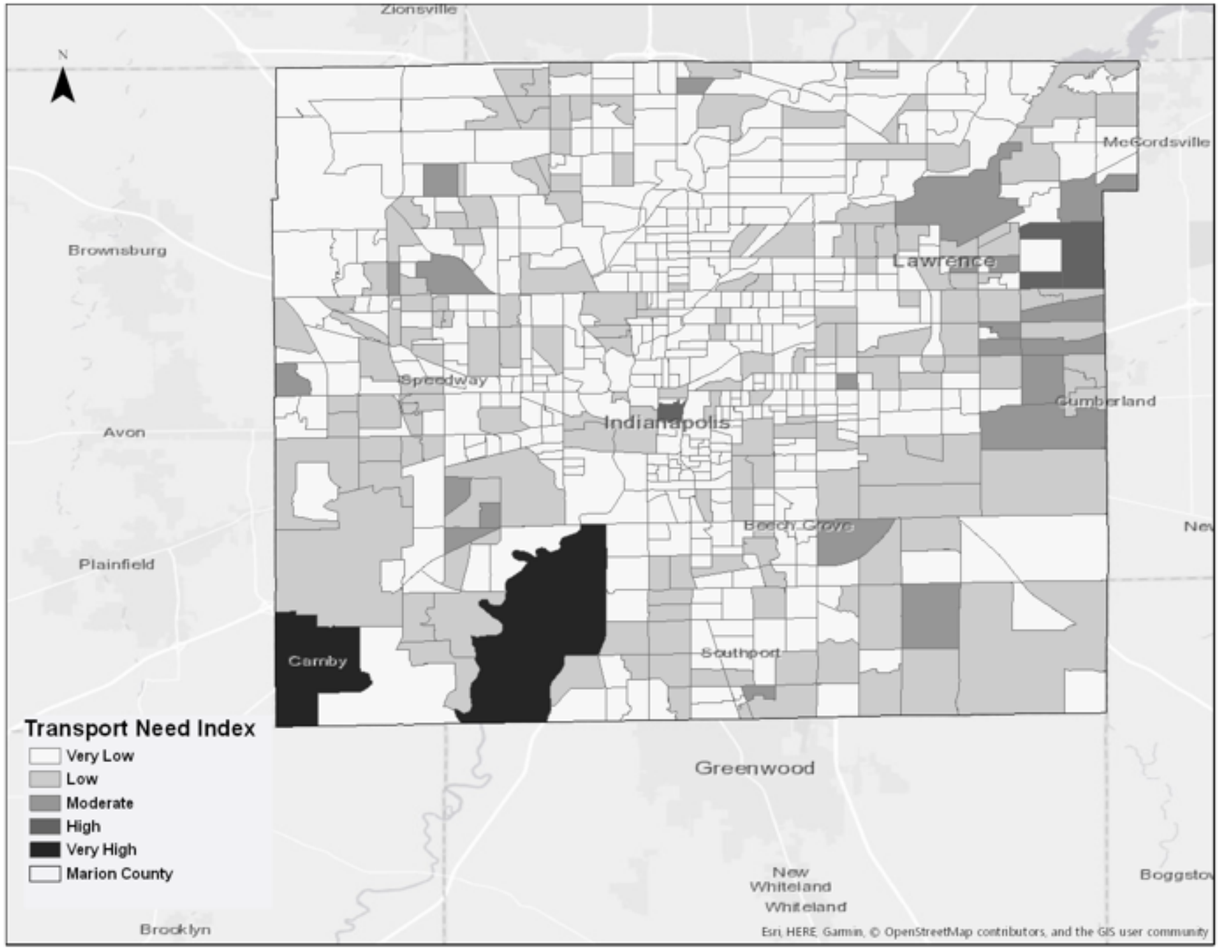
Outcome

How much does a person in an certain area drive daily?

MULTI-SPATIAL PERSPECTIVE APPROACH

Indianapolis





MULTI-SPATIAL PERSPECTIVE APPROACH

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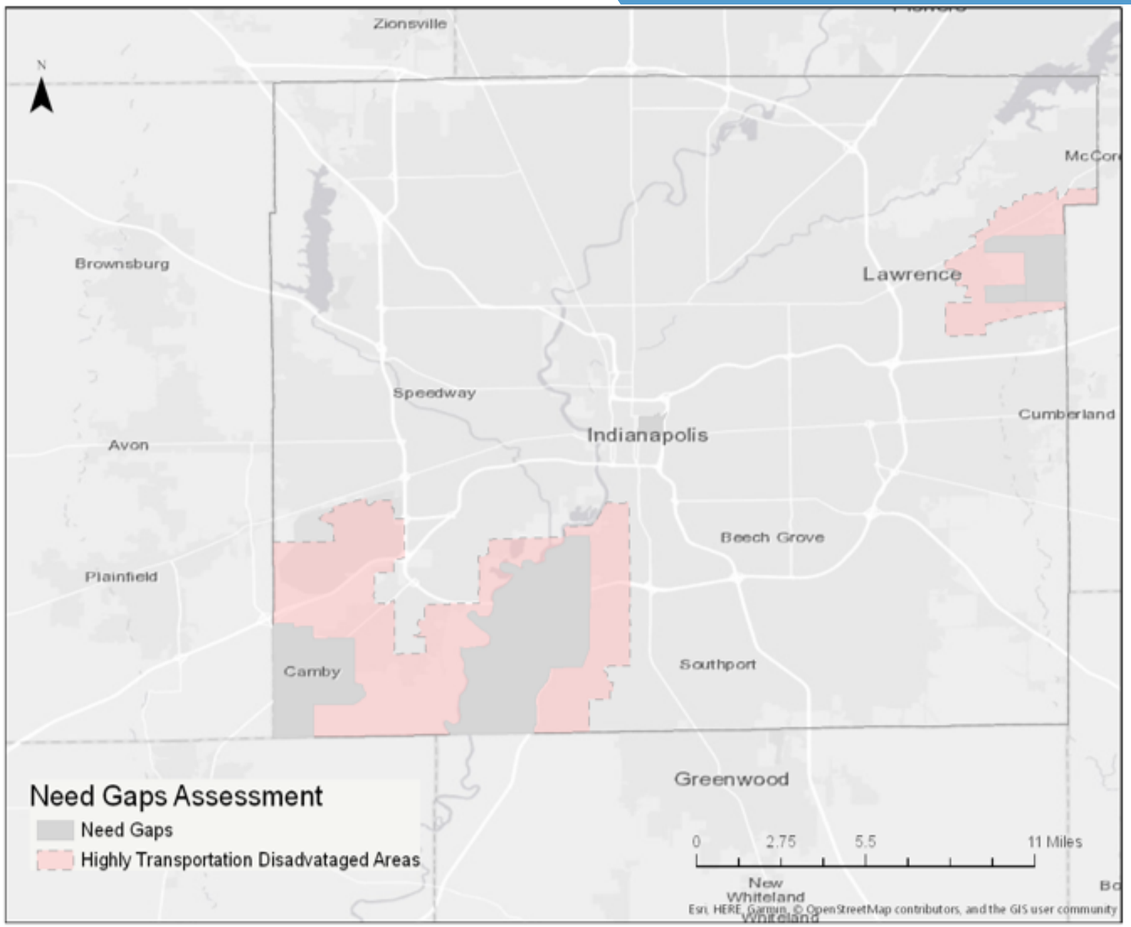
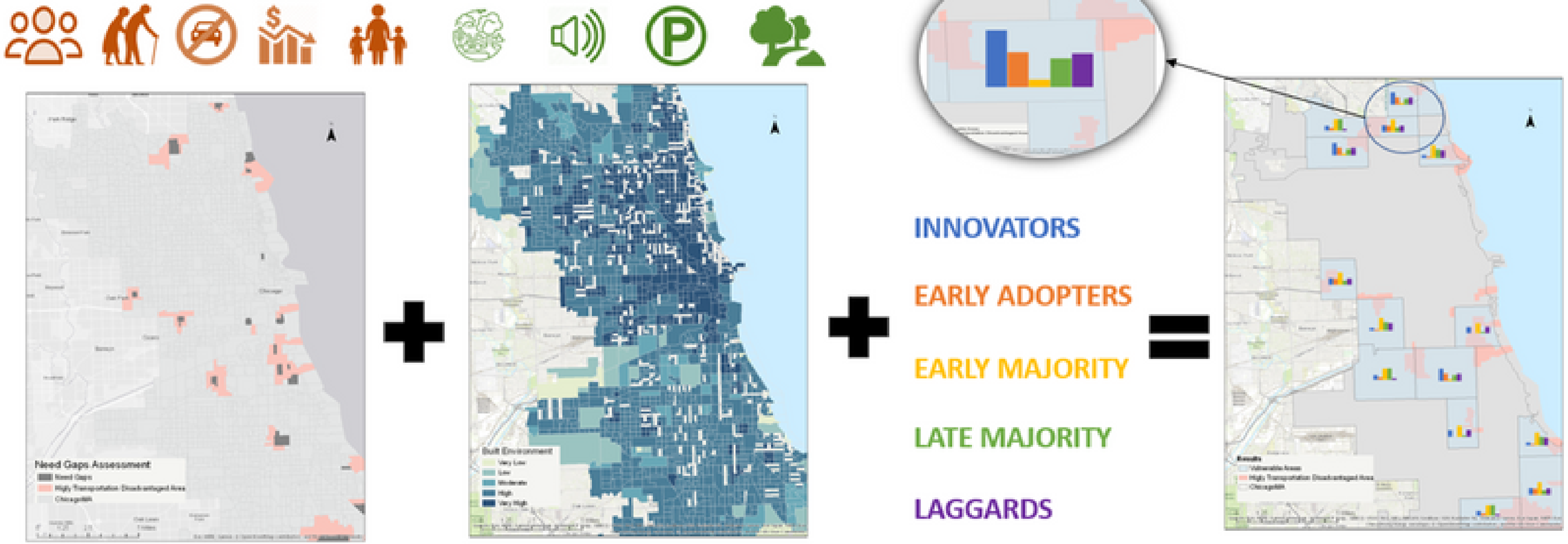


NEXT STEPS - SPATIAL MARKET SEGMENTATION



KEY TAKEAWAYS

Innovators are young used to take advantage of walking and transit.

Late adopters are mainly female older than 45 who often use their car for commute.

Disadvantaged areas in Indianapolis are located in the south and east part of Marion County.

Non-transportation disadvantage areas have higher access to transit stops and interstates, among other factors.

Preliminary results of the SMSA show that Zip Codes in Indianapolis tend to be late adopters.

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https://engineering.purdue.edu/STSRG

INNOVATORS	EARLY ADOPTERS	EARLY MAJORITY	LATE MAJORITY	LAGGARDS
Highest level of awareness on AVs	Higher than average level of awareness on AVs	Lower than average level of awareness on AVs	Higher than average level of awareness on AVs	Lowest level of awareness on AVs
25% use public transportation or walk to their commute trips as primary modes, 4% bike commute	15% use public transportation or walk to their commute trips as primary modes	80% use their personal vehicles for their commute trips	90% use their personal vehicles for trips regardless the trip purpose	90% use their personal vehicles for trips regardless the trip purpose, only 3% walk
10% do not own a vehicle. They drive about 12,000 mi/year (highest of any group)	10% do not own a vehicle. They drive about 10,000 mi/year on average	10% do not own a personal vehicle	2% do not own a personal vehicle	5% do not own a personal vehicle, though this group drives the least on (avg 9000 mi/year)
65% use ride-hailing services, 20% have a car-sharing service account	40% use ride-hailing services, 5% have a car-sharing service account	40% use ride-hailing services	20% use ride-hailing services and none of them use car-sharing services	10% use ride- hailing services, 0 respondents had a car sharing account.
64% are male	54% are female	58% are female	64% are female	52% are female
55% are Millennials (<34 y.o.)	Avg. age 29 y.o.	32% are Millennials (<34 y.o.)	35% are Millennials (<34 y.o.)	55% are people over 55 years old and 23% over 65 years old
60% work full time, 13% are students	38% work full time, 8% unemployed	44% work full time, 15% part time	24% have retired	22% have retired, 10% unemployed
Higher than average income – 52,000 on average	Higher than average income – around 50,000	Lowest average income – around 45,000	Average income around 48,000	Average income around 48,000
40% finished college degree, 10% did not graduate high school	32% finished undergraduate degree	21% are not high school graduates	17% are not high school graduates, 35% college graduates	41% finished college degree