Rev Up Your Engines:
Fueling Motivation, Retention, and Graduation Among Auto Tech Community College Students

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ECMC Foundation

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The Ohio State University resides on the traditional land of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. I acknowledge with gratitude the land and the people who have lived on it throughout generations.

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Agenda

- 🎯 Introduction and purpose
- 📚 Literature review
- 👥 Frameworks
- 🔬 Methods
- 🔍 Preliminary findings
- 💬 Discussion
- ⚖️ Implications

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Introduction: Study Team

Dr. Matthew Mayhew

Dr. Emily T. Creamer

Susannah Townsend

Yun-Han Weng

Allan Sells

Jossie Munoz

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Introduction and Purpose

The purpose of this paper is to examine community college environmental influences on automotive technology students' motivation to complete their degree.

What are the environmental factors that motivate a student to complete their degree in automotive technology?

Can enrollment in the ASSET program predict institutional commitment when demographics, personality, and self-determination are controlled for?

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Literature Review

The purpose of community colleges (Community College Research Center, 2022; Haviland & Robbins, 2021; Mullins, 2012; The National Student Clearinghouse, 2022)

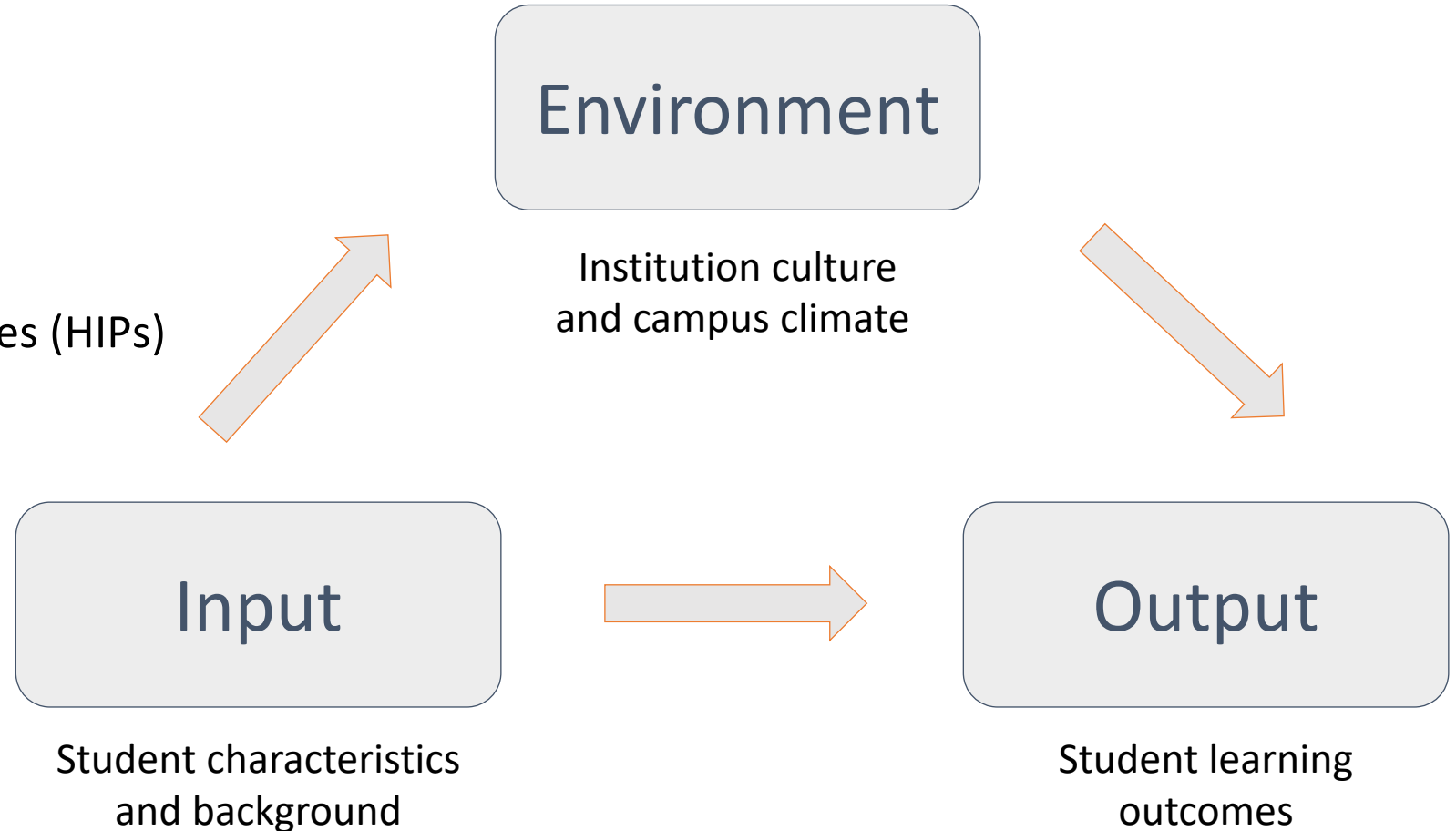High-impact practices at community colleges (See Valentine & Price, 2021)

Community college retention and graduation rates (Gardner, 2022; Mayhew et at., 2016; National Student Clearinghouse Research Center, 2022)

Motivation and community college students (See Fong et al., 2016)

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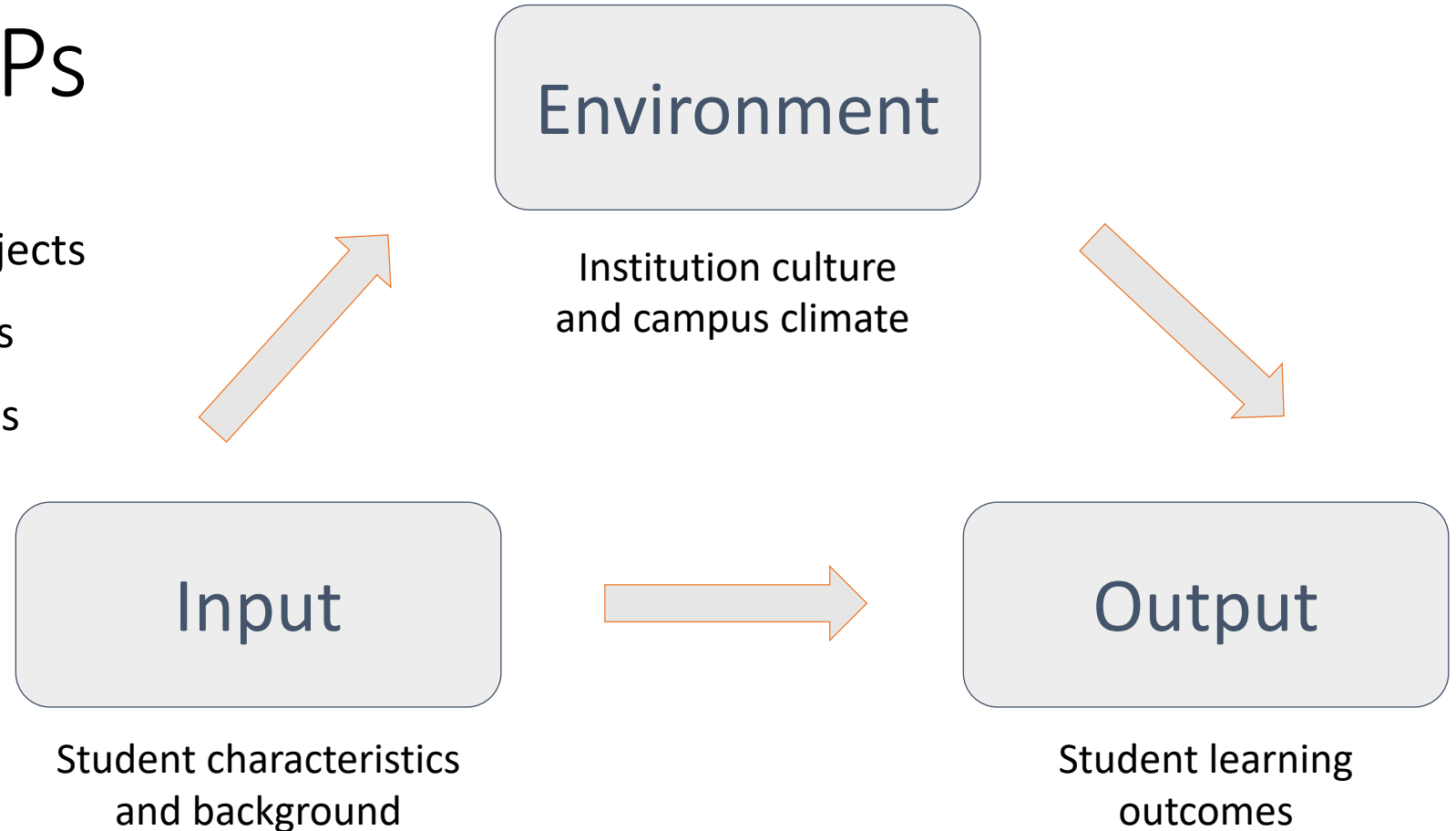ENHANCING DIVERSITY IN
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Framework

- Astin's (1993) I-E-O model
- Kuh's (2008) high-impact practices (HIPs)
- Self-Determination Theory (SDT)

(Decis & Ryan, 1985; 2020)

Environment

Institution culture and campus climate

Input

Student characteristics and background

Output
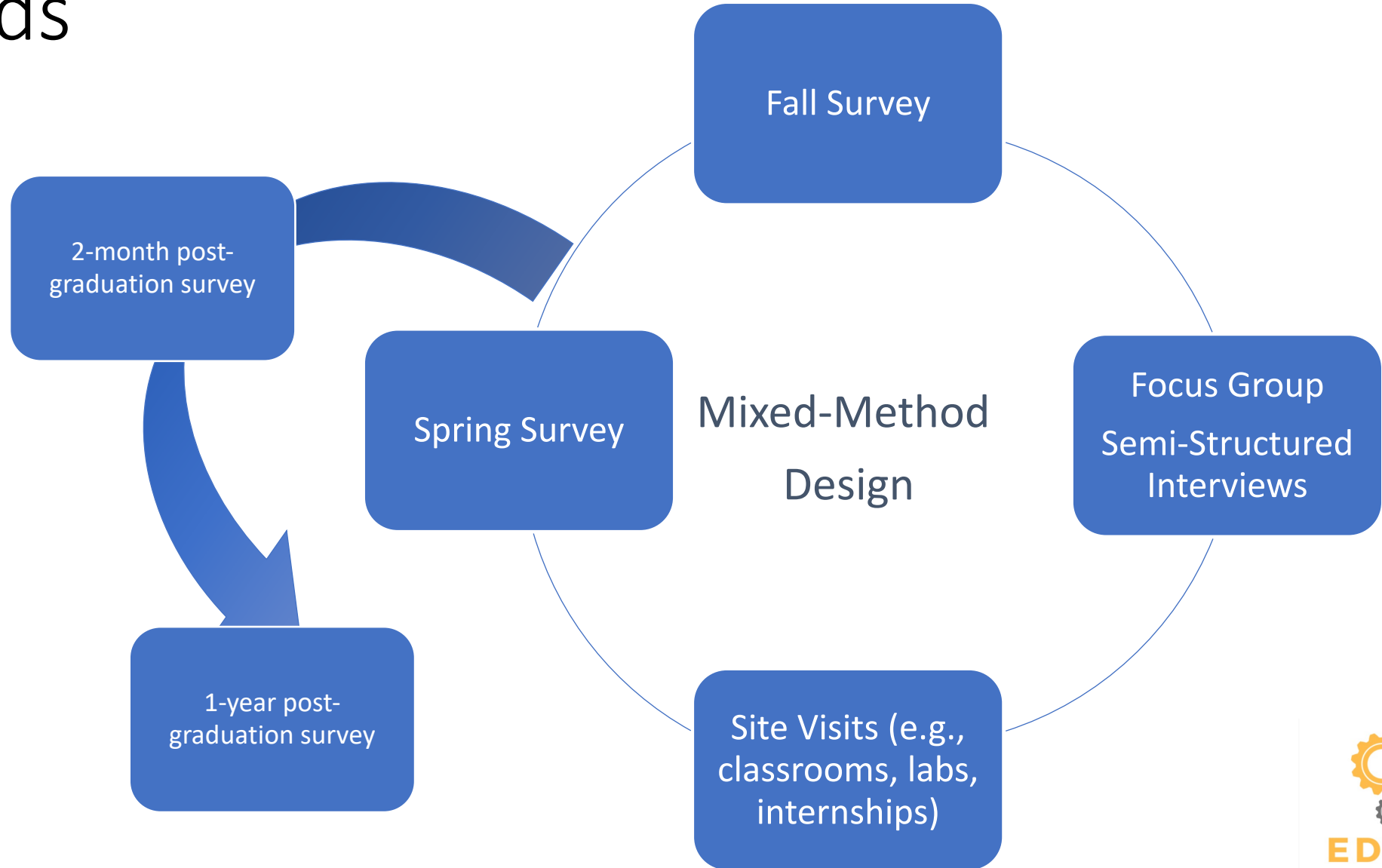
Student learning outcomes

Framework-HIPs

- Collaborative assignments & projects
- Common intellectual experiences
- First year-seminars & experiences
- Internships
- Undergraduate research

Environment

Institution culture
and campus climate

Input

Student characteristics
and background

Output

Student learning
outcomes

Methods

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Diversity in

Career &

Technical

STEM

Data Analysis

- Qual --> Quant

- Qual
  - Transcribed focus groups and one-on-one interviews
  - Summarized research notes and memos from site visits
  - Used NVivo for coding and emergent themes

- Qual findings helped to inform the direction of the quant methods

- Quant:
  - Frequencies
  - Correlations
  - t tests
  - Series of multiple regressions

Setting

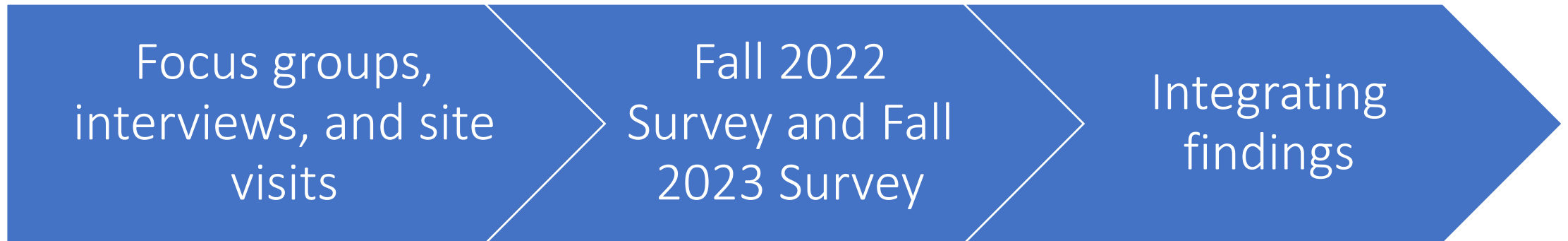ASSET = Automotive Student Service Education Training

- Key features:
  - 2 –year associate degree program
  - Full-time enrollment required
  - Paid internship at a Ford/Lincoln dealership
  - College coursework (Gen Ed)
  - Automotive coursework (technical coursework and Ford/Lincoln courses)
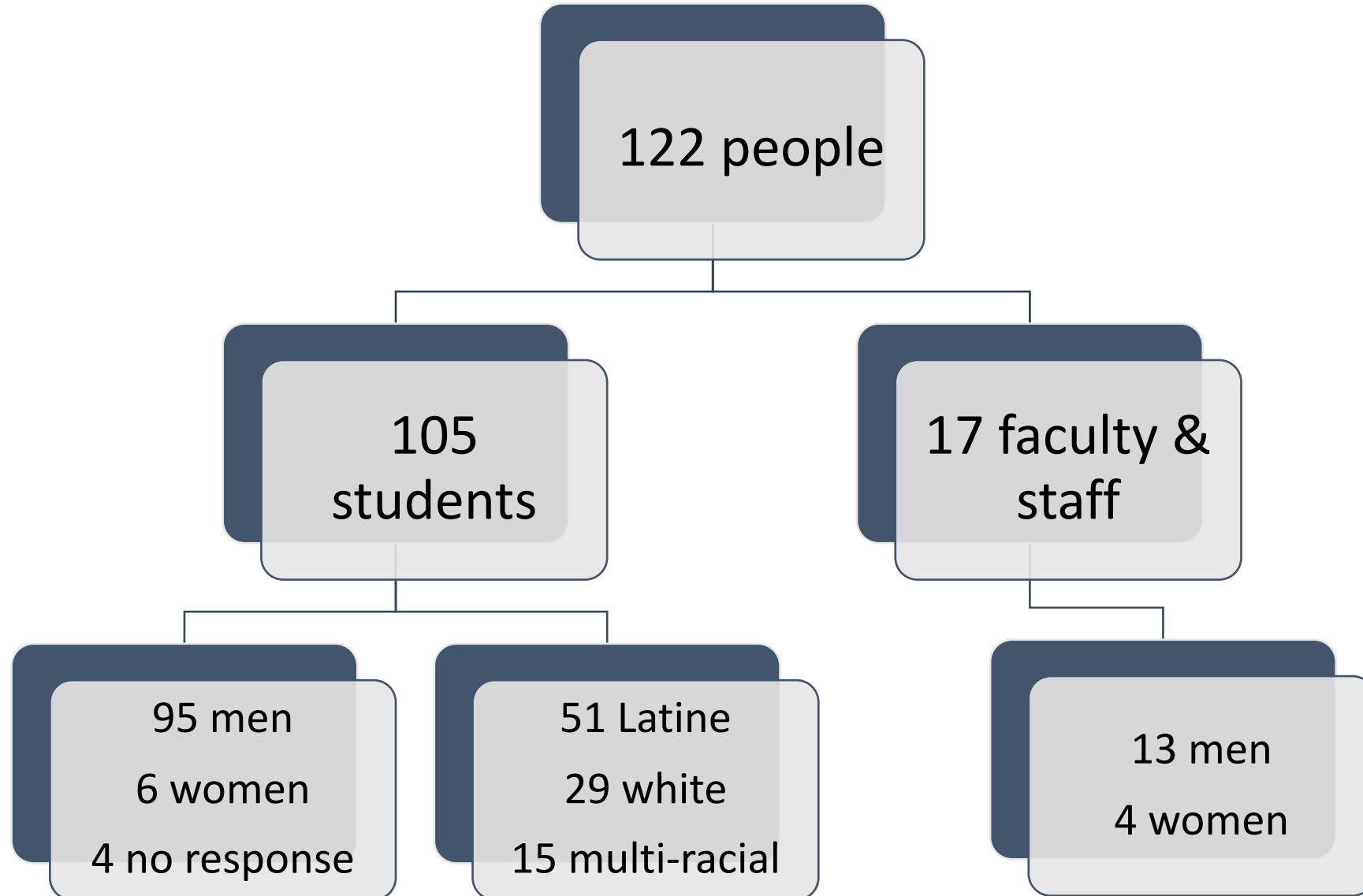- 4 community colleges in the southcentral USA

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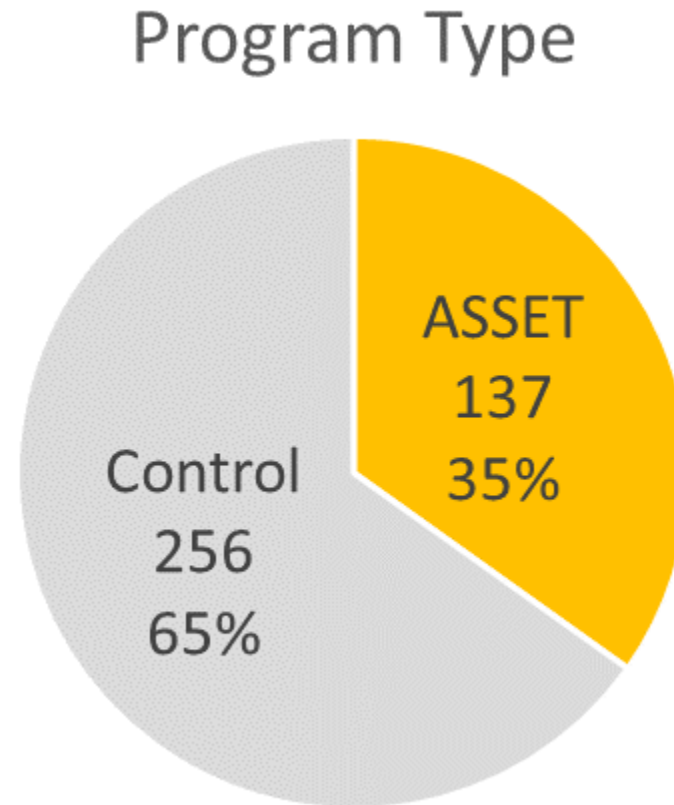CAREER & TECHNICAL STEM

Exploratory Sequential Design

Focus groups, interviews, and site visits → Fall 2022 Survey and Fall 2023 Survey → Integrating findings

Participants-Qualitative Data

- 122 people
  - 105 students
    - 95 men, 6 women, 4 no response
    - 51 Latine, 29 white, 15 multi-racial
  - 17 faculty & staff
    - 13 men, 4 women

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Sampling and Participants

- N = 393
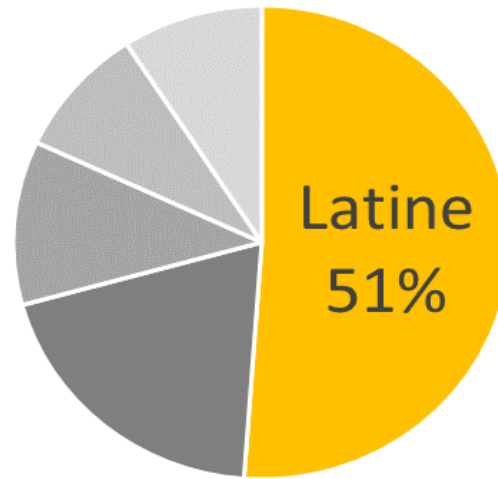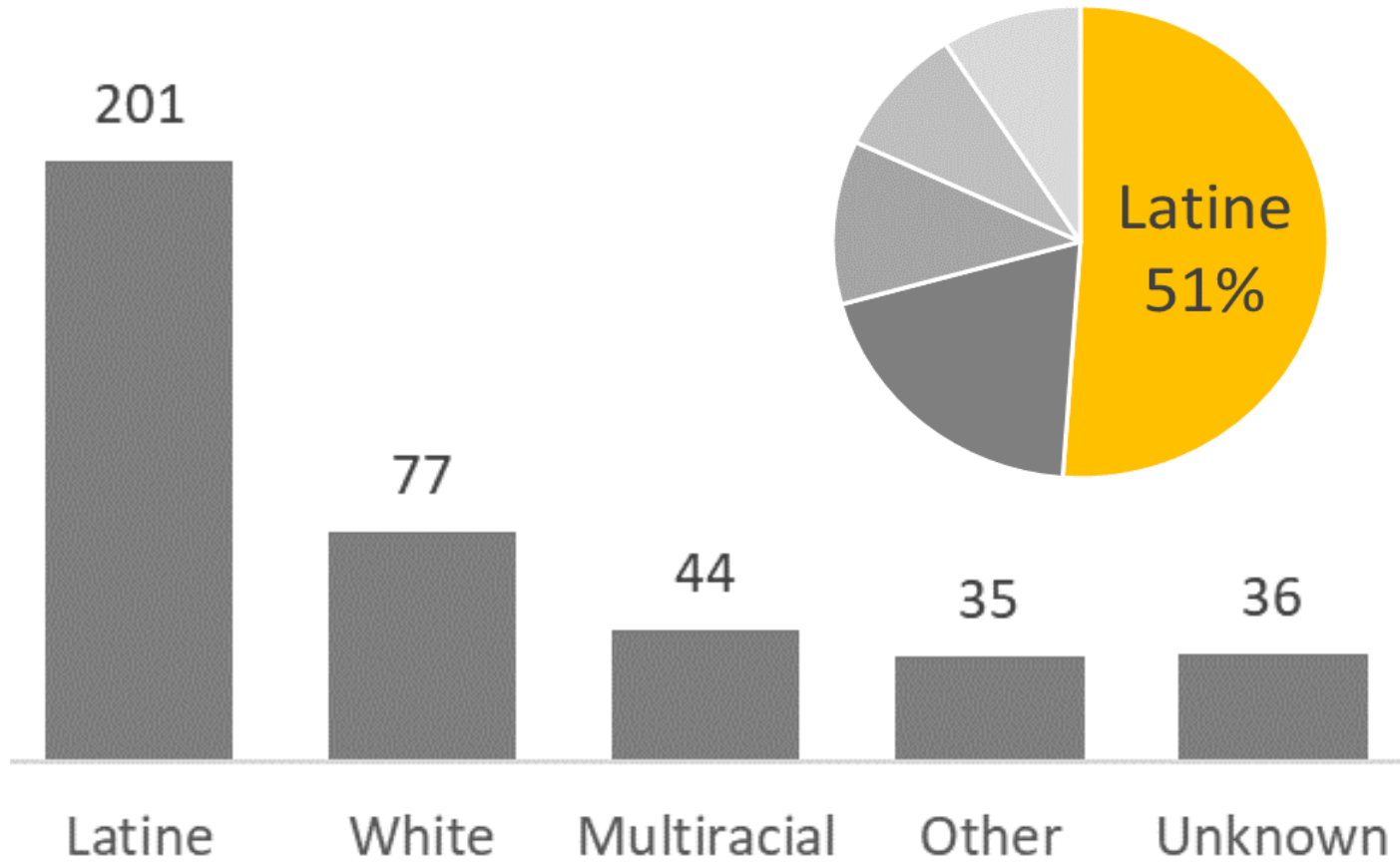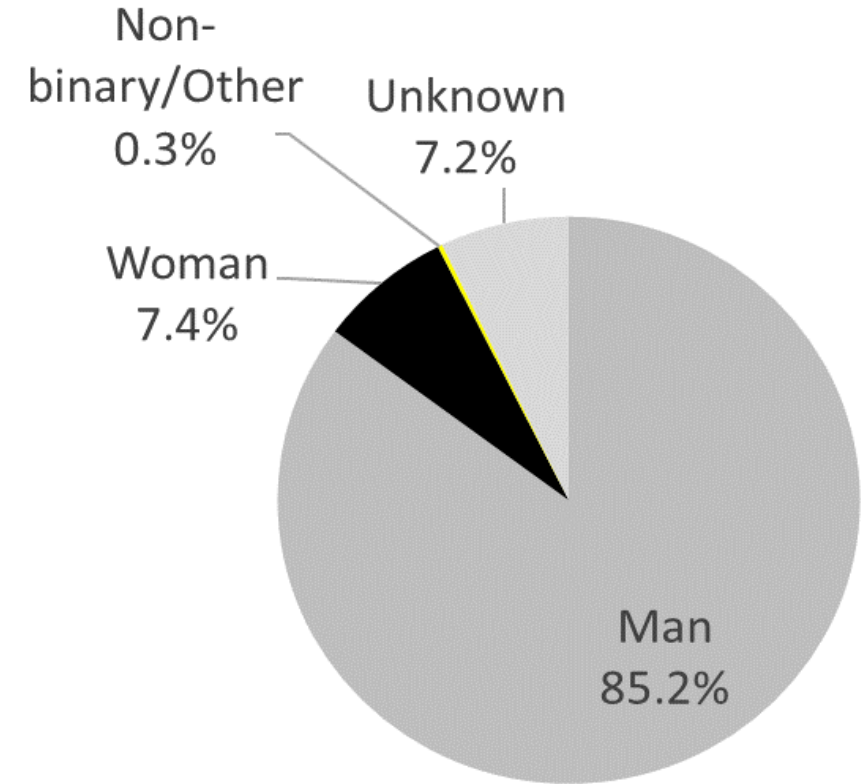
Program Type

ASSET
137
35%

Control
256
65%

Demographics

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What are the environmental factors that motivate a student to complete their degree in automotive technology?

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AND HUMAN ECOLOGY
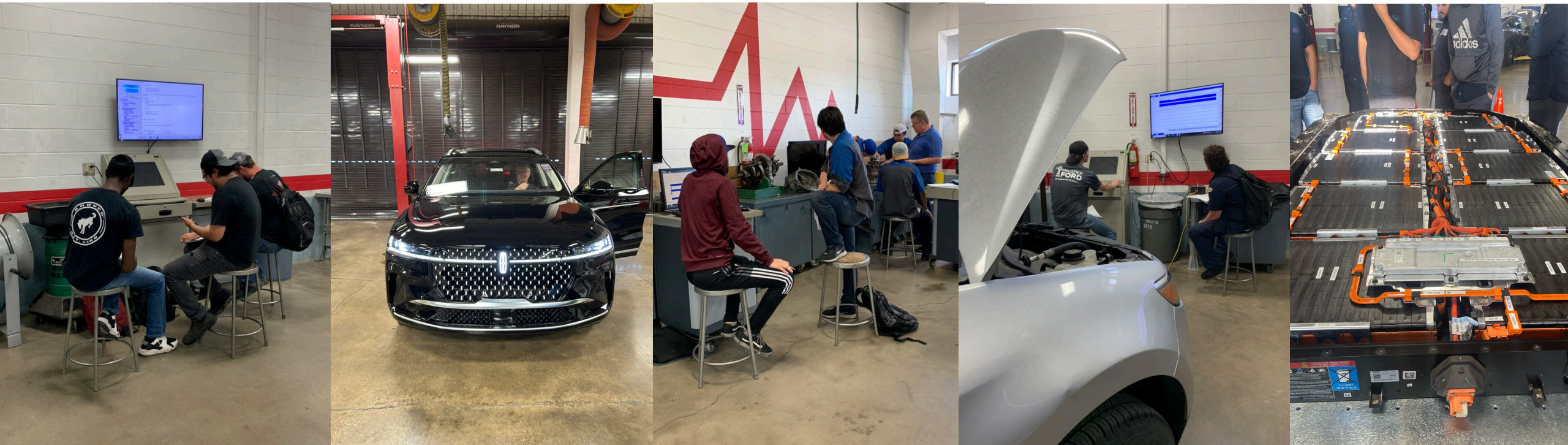
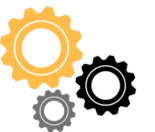*The guys [cohort] will text me if I'm late to class, wondering if I'm okay, making sure up/awake…. Even Mr. [Instructor] will text us if we aren't here by a certain time.* (Student discussing the social support)

Meeting with my mentor is always positive I believe he's does want me to succeed and keep moving forward and we have ran into situations concerning my raise at work to we're I told him my situation and he went and talked to the higher up manager and told him that I needed a raise and that pushed me to talk to the manager and told him hey I've been asking you for a raise for 4 months and you haven't given it to me and I've been working my ass off and soon enough next check had my raise and I saw that support for what he did for me and he gives me advise on how to take charge (Student discussing support from mentor/supervisor)

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Student Support

Item	Overall Rank	Rank Distribution	No. of Rankings
Family	1		77
Professors & instructors	2		76
Work/internship supervisor	3		76
Peers in the ASSET program	4		77
Friends outside of the ASSET program	5		77
Counselors or advisors at your college	6		76
Other	7		70

Lowest Rank — Highest Rank

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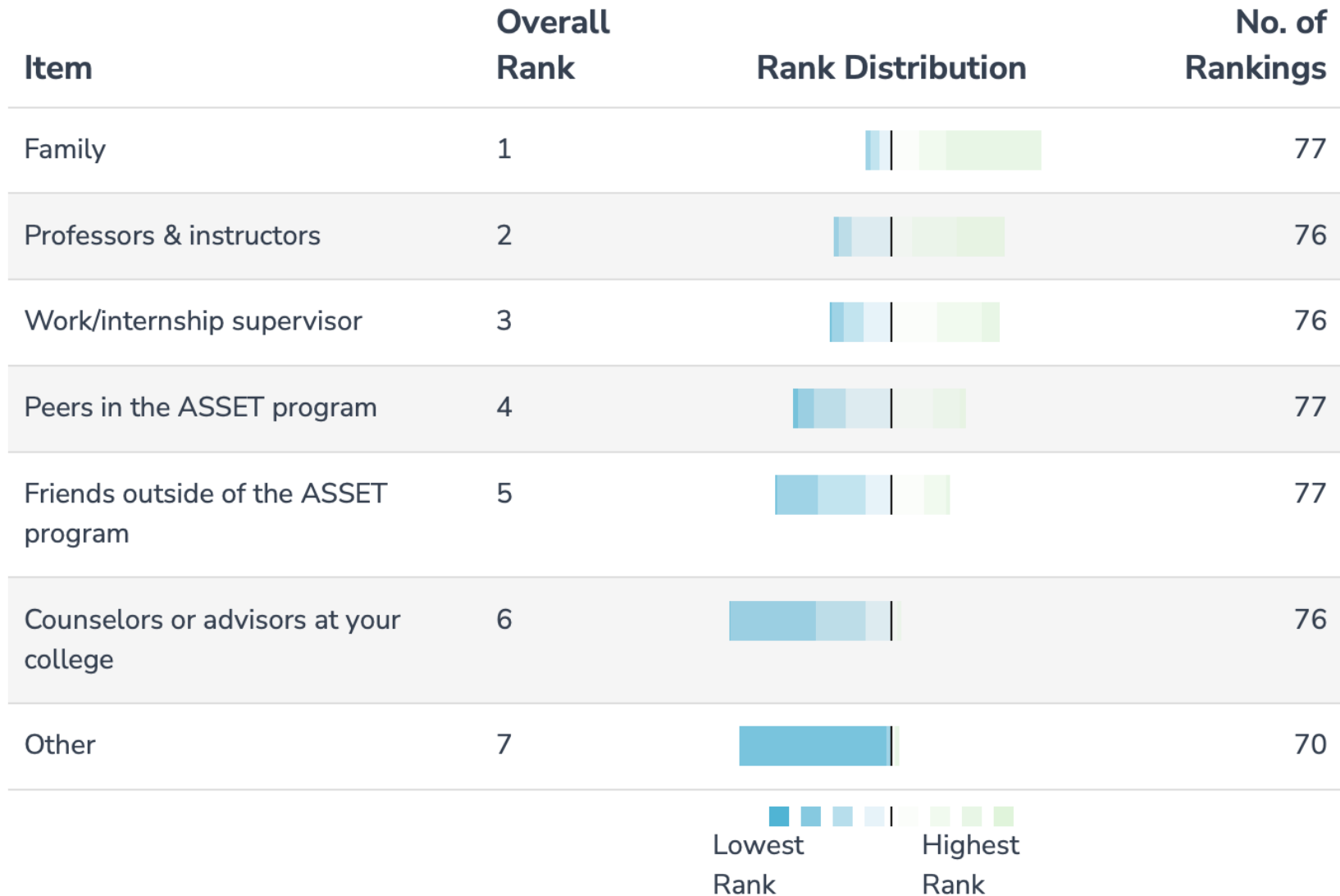
I feel like my mentor cares about my success as a student.

3.9% Strongly disagree

7.8% Neither agree nor disagree

28.6% Agree

59.7% Strongly agree
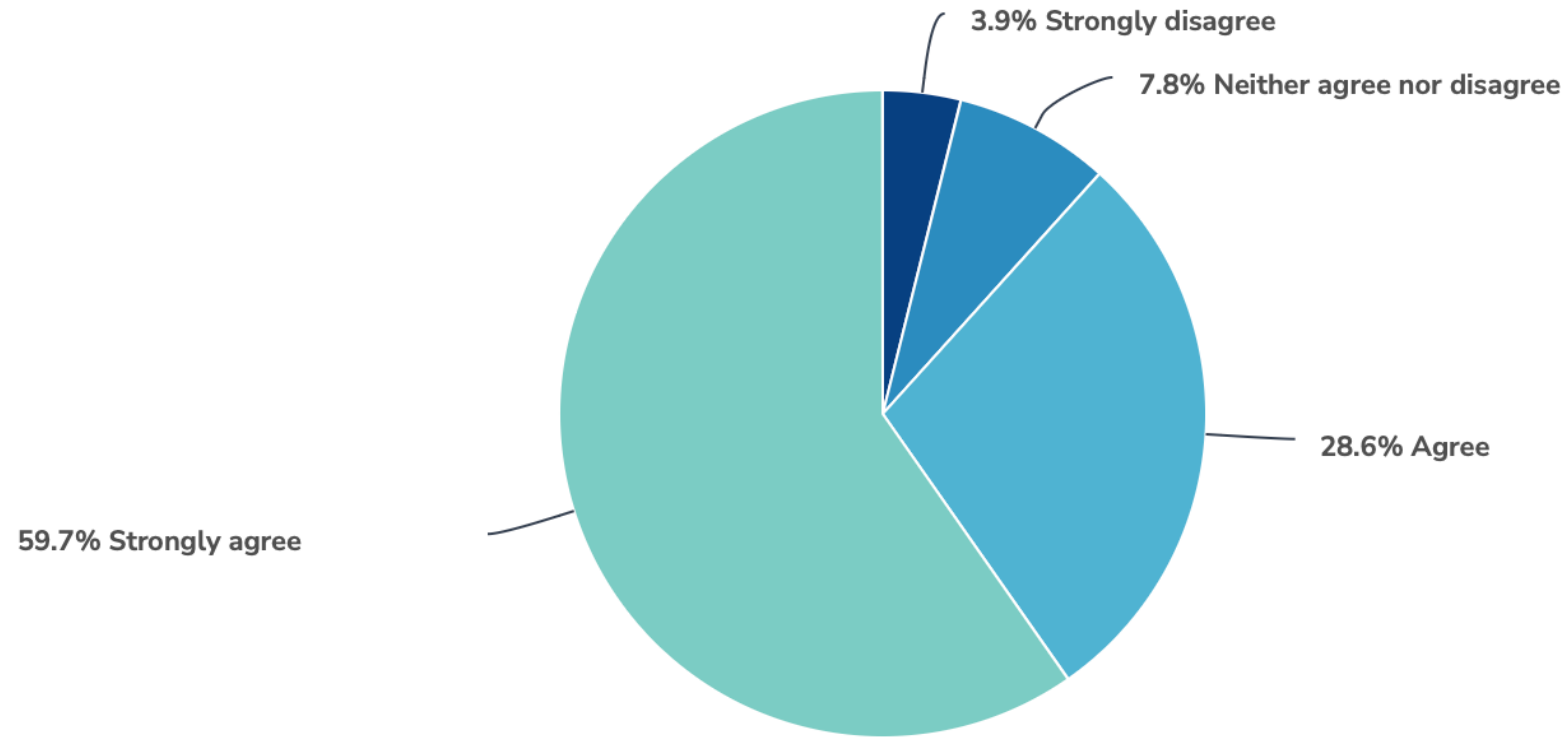
Qualitative Themes
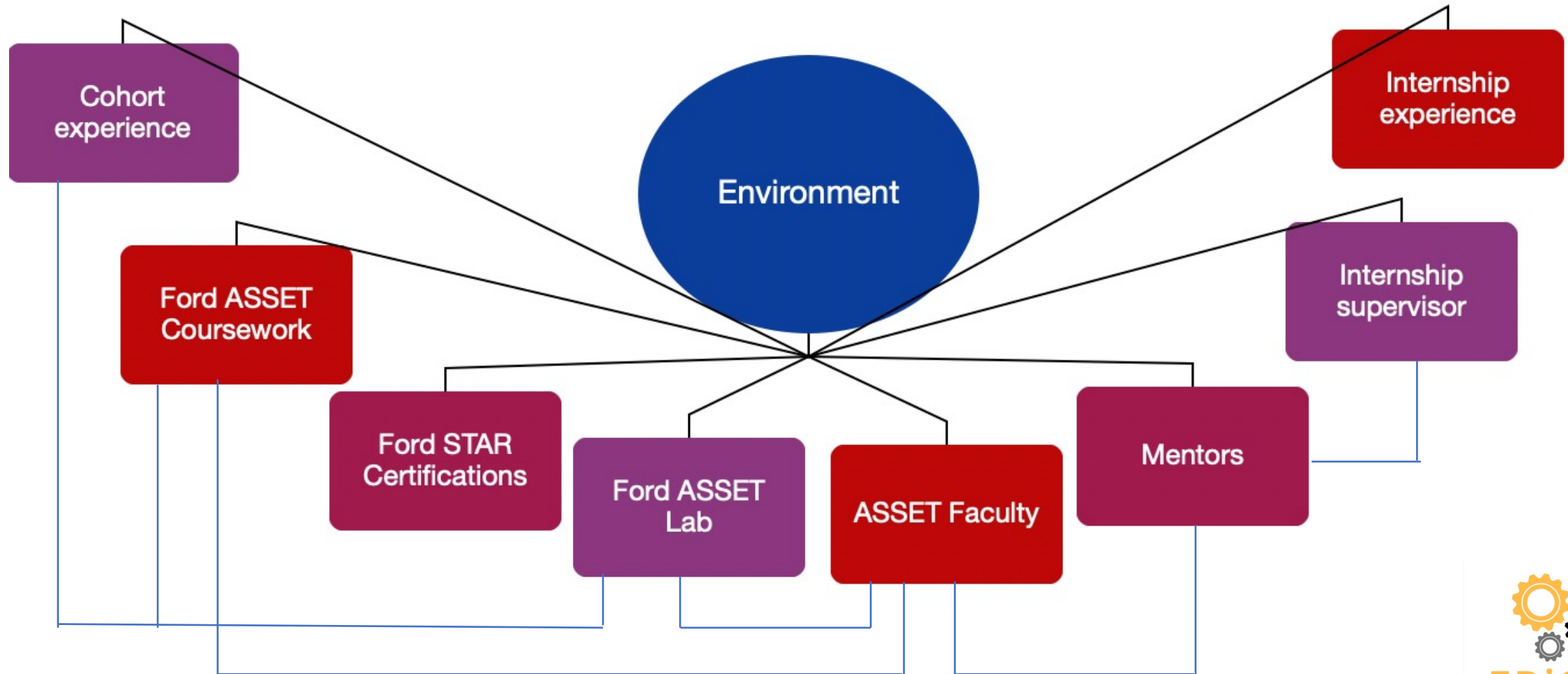
INPUTS

- ✿ Student demographics (e.g., age, gender, income, parental education, race)
- ✿ Academic background (e.g., GPA, tests scores)
- ✿ Pre-college automotive experiences
- ✿ Motivations, aspirations, and personality

ENVIRONMENTS

- ✿ Cohort experience
- ✿ Sense of belonging
- ✿ ASSET coursework
- ✿ Ford STARS/Certification
- ✿ Relationship with ASSET faculty
- ✿ Mentors and supervisors
- ✿ Internships

OUTCOMES

- ✿ Retention in ASSET program
- ✿ Graduation from ASSET program
- ✿ Job/Career as a Ford technician
- ✿ Career decision making self-efficacy

ENVIRONMENTS

INPUTS → OUTCOMES

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Least Self-Determined (-18)

Most Self-Determined (18)

Self-Determination Score

Knowledge

Amotivation

External Regulation

Introjection

Identification

Accomplishment

Stimulation

Extrinsic Motivation

Intrinsic Motivation
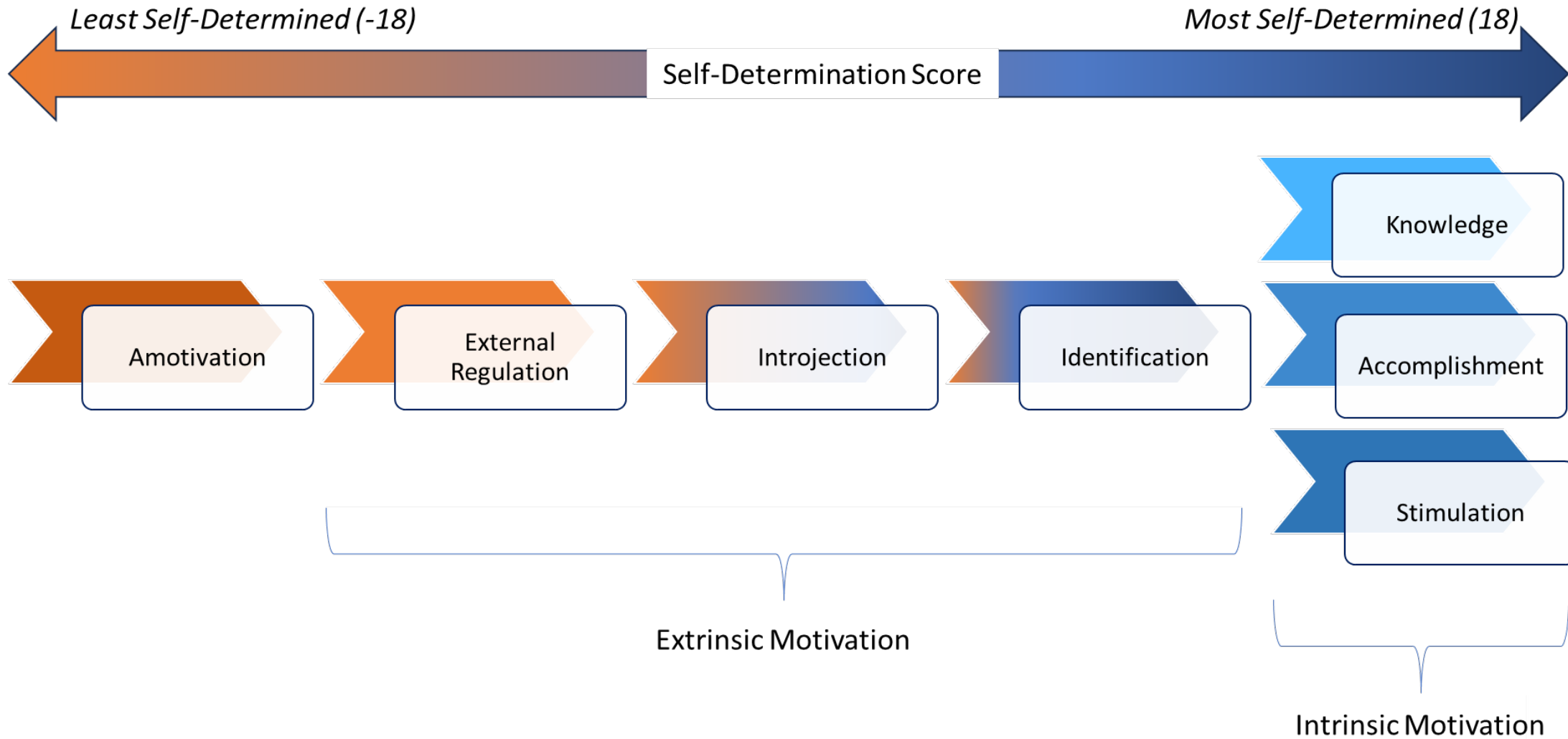
Students who are more intrinsically motivated in their academic and career goals have higher self-determination scores based on the Academic Motivation Scale questionnaire (figure adapted from Ryan and Deci (2000)).

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Group Differences

	Mean Score (SD)				95% Confidence Interval of the Difference		
	ASSET	Control	Mean Diff	*t* (df)	Lower	Upper	*p*-value
Self-determination	7.02 (3.85)	4.97 (4.38)	2.06	4.74* (313.7)	1.20	2.91	<.001
It is important for me to graduate from college	4.58 (0.87)	4.36 (0.92)	0.23	2.35* (297.3)	0.04	0.41	.02
I am confident I made the right decision in choosing this college	4.69 (0.67)	4.36 (0.85)	0.33	4.13* (334.9)	0.17	0.49	<.001
It is important for me to graduate from *this* college	4.57 (0.80)	4.33 (0.91)	0.25	2.74* (313.2)	0.07	0.43	.007
I have a firm idea of the field in which I want to receive training	4.63 (0.71)	4.38 (0.78)	0.26	3.20* (306.4)	0.10	0.41	.002
Institutional commitment (overall sum)	22.79 (3.29)	21.74 (3.51)	1.05	2.88* (298.2)	0.33	1.76	.004

Independent samples two-sided *t* test

SD = standard deviation

*Equal variances not assumed (significant Levene's test)

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Predicting Overall Motivation: Self-Determination

	Adj. R2	Unstand. Reg. Coeff. B	95% Confidence Interval for B Lower Bound	95% Confidence Interval for B Upper Bound	Stand. Reg. Coeff. Beta	p-value
Overall	34.4%					<.001
Intercept		-7.62	-10.868	-4.372		<.001
ASSET Enrollment		1.602	0.794	2.41	0.18	<.001
Race = White		-0.325	-1.362	0.713	-0.031	0.539
Race = Multi		-0.787	-1.947	0.374	-0.061	0.183
Race = Other (non-Latine)		-0.685	-2	0.63	-0.048	0.306
Gender Identity (man = 1, non-man = 0)		-0.888	-2.257	0.481	-0.058	0.203
Family Income		-0.041	-0.231	0.148	-0.02	0.667
First-Generation Status		-0.218	-1.028	0.593	-0.025	0.598
Political leaning		0.175	-0.076	0.426	0.062	0.172
TIPI Extraversion score		-0.056	-0.373	0.261	-0.016	0.727
TIPI Agreeableness score		0.33	0.054	0.605	0.106	0.019
TIPI Conscientiousness score		1.007	0.616	1.398	0.277	<.001
TIPI Emotional Stability score		0.314	-0.025	0.653	0.09	0.07
TIPI Openness score		1.129	0.711	1.546	0.279	<.001

Predicting Students' Confidence in Choosing the Right College and Program

	Adj. R2	Unstand. Reg. Coeff. B	95% Confidence Interval for B Lower Bound	95% Confidence Interval for B Upper Bound	Stand. Reg. Coeff. Beta	p-value
Overall	23.0%					<.001
Intercept		3.615	2.953	4.277		<.001
ASSET Enrollment		0.215	0.052	0.378	0.132	0.01
Race = White		-0.129	-0.334	0.076	-0.067	0.216
Race = Multi		-0.026	-0.256	0.204	-0.011	0.823
Race = Other (non-Latine)		0.066	-0.194	0.326	0.025	0.618
Gender Identity (man = 1, non-man = 0)		0.021	-0.25	0.292	0.008	0.879
Family Income		0.031	-0.007	0.068	0.08	0.109
First-Generation Status		-0.112	-0.272	0.048	-0.071	0.169
Political leaning		-0.01	-0.06	0.04	-0.019	0.698
TIPI Extraversion score		0.001	-0.062	0.064	0.002	0.973
TIPI Agreeableness score		-0.051	-0.106	0.003	-0.091	0.066
TIPI Conscientiousness score		0.059	-0.022	0.139	0.088	0.151
TIPI Emotional Stability score		0.059	-0.009	0.126	0.092	0.087
TIPI Openness score		0.001	-0.085	0.087	0.001	0.983
Self-determination score		0.068	0.047	0.089	0.373	<.001

Predicting Students' Commitment to a Field of Training

	Adj. R2	Unstand. Reg. Coeff.	95% Confidence Interval for B		Stand. Reg. Coeff.	p-value
		B	Lower Bound	Upper Bound	Beta	
Overall	20.3%					<.001
Intercept		4.037	3.408	4.665		<.001
ASSET Enrollment		0.19	0.035	0.345	0.125	0.017
Race = White		-0.171	-0.366	0.023	-0.096	0.084
Race = Multi		-0.184	-0.402	0.034	-0.083	0.099
Race = Other (non-Latine)		-0.047	-0.295	0.2	-0.019	0.706
Gender Identity (man = 1, non-man = 0)		0.066	-0.191	0.323	0.025	0.614
Family Income		0.033	-0.002	0.069	0.094	0.065
First-Generation Status		-0.119	-0.272	0.033	-0.081	0.123
Political leaning		-0.043	-0.091	0.004	-0.09	0.072
TIPI Extraversion score		-0.018	-0.078	0.041	-0.03	0.549
TIPI Agreeableness score		-0.083	-0.135	-0.031	-0.157	0.002
TIPI Conscientiousness score		0.048	-0.028	0.124	0.077	0.217
TIPI Emotional Stability score		-0.02	-0.083	0.044	-0.033	0.548
TIPI Openness score		0.08	-0.002	0.161	0.116	0.055
Self-determination score		0.052	0.032	0.072	0.308	<.001

Predicting Students' Levels of Amotivation

	Adj. R2	Unstand. Reg. Coeff. B	95% Confidence Interval for B Lower Bound	Upper Bound	Stand. Reg. Coeff. Beta	p-value
Overall	30.1%					<.001
Intercept		1.655	-3.264	6.573		0.509
ASSET Enrollment		1.999	0.774	3.223	0.153	0.001
Race = White		0.197	-1.376	1.771	0.013	0.805
Race = Multi		0.038	-1.721	1.797	0.002	0.966
Race = Other (non-Latine)		-0.705	-2.699	1.29	-0.033	0.487
Gender Identity (man = 1, non-man = 0)		-0.969	-3.044	1.106	-0.043	0.359
Family Income		0.059	-0.227	0.346	0.019	0.685
First-Generation Status		0.28	-0.949	1.508	0.022	0.655
Political leaning		0.262	-0.117	0.642	0.063	0.174
TIPI Extraversion score		-0.17	-0.649	0.309	-0.033	0.486
TIPI Agreeableness score		0.787	0.37	1.204	0.173	<.001
TIPI Conscientiousness score		1.251	0.658	1.844	0.234	<.001
TIPI Emotional Stability score		0.382	-0.133	0.896	0.074	0.145
TIPI Openness score		1.607	0.976	2.237	0.271	<.001

Discussion-Initial Thoughts from Data

- The ASSET students describe the environment as contributing towards their retention, persistence, graduation, and desired workforce entrance.

- Students enrolled in ASSET tend to be more...
  - Intrinsically motivated
  - More confident in their choice of college and program
  - More confident in which specific field they want to receive career training

- ASSET enrollees are much *less* likely to exhibit amotivation

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Implications

Research:

More work to identify effective environments and HIPs that foster student success and motivate students to return semester to semester at community colleges

Practice:

Embedding HIPs within the community college experience

Developing academic programs that allow for faculty mentorship, paid internships, and a cohort-experience

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