

## Introduction

The classroom experience is a highly influential setting that shapes students' understanding of the norms and values of the field.

As students come to know the culture of their particular program of study, these perceptions contribute to their feelings of belonging, their motivation to persist, and their sense of identity (Smith et al., 2014; Diekman et al., 2011).

Research tells us that what most students want are careers that allow them to work with and help other people (Diekman et al., 2011; Smith et al., 2014; Weisgram et al., 2010).

**Prosocial Beliefs** – The belief that a field affords you the opportunity to help others through the work.



**Agency Beliefs** – The belief that a field allows you to gain money and prestigious for yourself through the work.



A field's low prosocial value is identified as an explanation for the lack of broad participation (Thoman et al., 2014).

Students' prosocial concerns may decline over the course of their engineering education due to the culture of disengagement of the field (Cech, 2014).

Drawing from goal-congruency theory and expectancy-value theory, we cross-sectionally test the *prosocial value hypothesis* (Thoman et al., 2017).

## Questions & Hypotheses

We test the hypothesis that a classroom or field's perceived prosocial affordance will result in higher interest from students by comparing two applied fields in very different domains: applied psychology and electrical and computing engineering.

**Do prosocial traits and beliefs differ for novice versus advanced students? Is there an interaction present, such that there is a difference in prosocial traits and beliefs endorsement between level of study and field?**

## Methods

### Measures:

- Cech's Disengagement Survey (Cech, 2014)
  - Example item: Please indicate the personal importance to you of helping others in need
- Empathy (Davis, 1994)
  - Example Item: After seeing a play or movie, I have felt as though I were one of the characters.
- Agentic vs Communal Goal Affordance of STEM Jobs (Brown et al., 2015; Pohlmann, 2001)
  - Example Item: A degree in \_\_\_\_\_ would allow me to serve the community
- Society's Field Stereotypes (Allen & Smith, 2011; Devine & Elliot, 1995)
  - Example Item: A job in \_\_\_\_\_ allows for creative expression
- Future Persistence (Cabrera, 1992)
  - Example Item: It is important to me to finish a program of study within \_\_\_\_\_.
- Future Career Motivation (Carroll, Shepperd, & Arkins, 2009; Riley, 2008)
  - Example Item: I could see myself building a career as a \_\_\_\_\_.
- Intrinsic Motivation (Smith, Sansone, & White, 2007)
  - Example Item: I would describe the classwork as very interesting.
- Need for Closure (Kruglanski et al., 2013).
  - Example Item: I don't like situations that are uncertain.

## Participants:

Required introductory electrical engineering course (n=85)

**Ethnicity:** 73% White, 37% unreported  
**Gender:** 76% Men, 15% Women, 9% unreported

Required senior electrical engineering course (n=53)

**Ethnicity:** 74% White, 36% unreported  
**Gender:** 75% Men, 15% Women, 10% unreported

Required introductory psychology course (n=22)

**Ethnicity:** 90.9% White, 4.5% Hispanic, 4.5% more than one ethnicity  
**Gender:** 77.3% Women, 18.1% Men, 4.5% unreported

Required senior psychology course (n=15)

**Ethnicity:** 78.9% White, 5.3% Asian, 5.3% more than one ethnicity, 5.3% other  
**Gender:** 84.2% Women, 15.8% Men

## Results

### Trait Empathy:

Analyses of variances results indicated that the students in the senior level engineering course reported the lowest levels of trait empathy when comparing to all other groups.

- $F(3, 159) = 32.97, p < .001, \eta_p^2 = 0.38.$
- Tukey's post hoc analysis indicated a  $p < .001$  for comparison to all other groups.

Results illustrate lower endorsement of trait empathy,  $t(79.98) = 7.60, p < .001, d = 1.43$ , (but not psychology students) in later stages of their studies versus earlier students.

- Introductory psychology and senior level psychology students were equally (high) in trait empathy,  $t(35) = -.916, p = .37, d = -0.32$ ,

### Agency Beliefs:

Agency beliefs about the field were highest among both engineering students ( $M = 3.82, SD = .76$ ) compared to both groups of psychology students ( $M = 3.21, SD = .91$ ).

- $t(164) = 4.14, p < .001, d = 0.72.$

### Prosocial Beliefs:

The students in the senior level engineering course also reported the lowest levels of prosocial beliefs ( $M = 3.53, SD = .82$ ) about their field compared to all other students.

- $F(3, 163) = 18.68, p < .001, \eta_p^2 = 0.26.$
- Tukey's post hoc analysis indicated a p-value ranging from  $p = .001$  to  $p < .001$  when comparing to the other three groups.

Introductory psychology and senior level psychology students were equally (high) in prosocial beliefs about the field,  $t(38) = 0.28, p = .78, d = 0.09$ .

Results illustrate lower endorsement of prosocial beliefs,  $t(125) = 3.73, p < .001, d = 0.66$  for engineering students (but not psychology students) in later stages of their studies versus earlier students.

For only introductory engineering students: greater prosocial beliefs and values were significantly associated with increased in classroom motivation and motivation to pursue graduate work.

	Intro Psych	Senior Psych	Intro EE	Senior EE
Prosocial Affordance	4.66(.70)	4.60(.55)	4.01(.64)	3.53(.82)
Agency Affordance	3.30(.98)	3.10(.83)	3.79(.72)	3.86(.83)
Trait Empathy	4.09(.91)	4.34(.64)	3.85(.78)	2.46(1.13)

Table 1. Means and standard deviations for each group on our three measures.

All items are on a 1 to 5 scale (midpoint value = 3.0) except empathic concern, which was on a 1 to 6 scale (midpoint value = 3.5). Greater numbers indicate stronger endorsement.

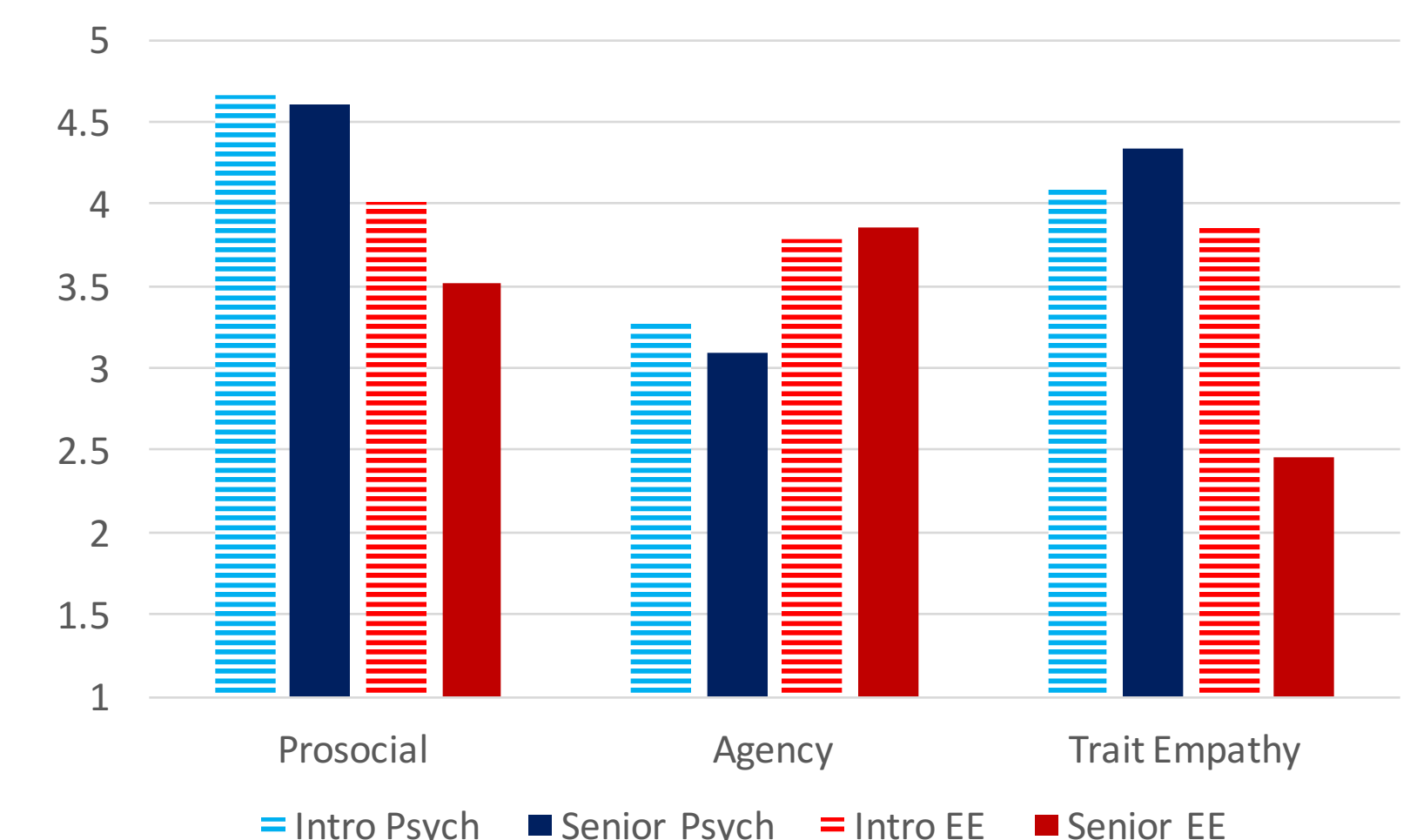


Figure 1. Means for each of our groups on our three measures.

## Conclusions

### Summary:

- The comparison to psychology illustrates that lower endorsement of prosocial affordances is not uniform across all fields of study.
- Novice engineering students' initial beliefs about the prosocial value of their field of study start off high and are motivating, whereas advanced engineering students do not believe their field involves working with and helping others.

### Limitations:

- The study is cross sectional and not longitudinal.
- It is unclear whether the students that believe electrical engineering affords prosocial value leave the program before entering their senior year or if students' beliefs about prosocial affordance are altered during their time in the program.

### Implications:

- Results of this study can be used to improve recruitment and retention of all students.
- These results may be particularly impactful for women, first generation college students, and underrepresented racial minorities students. Since these student groups especially endorse prosocial traits, they are more motivated to pursue careers that afford prosocial values.
- The field may be unintentionally driving students away from the profession through promotion of an inaccurate stereotype.