Introduction

STEM courses have long-term impacts on students’ motivation and persistence in STEM majors. STEM major attrition occurs early in college, especially among students from underrepresented backgrounds. Students’ STEM-related motivational beliefs, i.e., Expectancy for Success and Subjective Task Values, predict persistence behavior. Evidence underscores the need to investigate multivariate patterns of Expectancy-Value beliefs.

Research Questions

RQ1: What are the patterns of Expectancy-Value beliefs among freshman biological students?

- Three distinct motivational profiles were found via latent profile analysis.
- Majority of students (75%) were passionate about majoring in Biology.

RQ2: In what ways do Expectancy-Value (E-V) beliefs profiles predict a) course enrollment plan and b) certainty in major choice?

Method

- Sample: 719 undergraduate freshmen
- Introductory Biology class, Fall 2016
- 74% Female; Mage = 18.05 yrs (SD = 0.92)
- 37% Latino/a, 25% Southeast Asian, 17% East Asian, 11% White
- 46% first-generation college-going students
- 94% planned to major in Biology

Motivation (Expectancy-Values): 7-point Likert; beginning of term
- Expectancy for Success: 2 items; E.g., “I am confident that I will do well in (course number)” (α = .76)
- Interest: 5 items; E.g., “I think the field of biology is very interesting” (α = .90)
- Attainment: 3 items; E.g., “The study of biology is personally meaningful to me” (α = .80)
- Utility: 5 items; E.g., “The material we are studying in this course is useful to know” (α = .80)

Outcomes: End of term before receiving course grade
- Course Enrollment Plan: two 7-point Likert scale items; E.g., “How motivated are you to continue taking courses in biology?” (α = .72)
- Certainty about Major Plan: 1 item; “How did this course affect your major choice?” (1 = “more certain”, 2 = “no change”, 3 = “less certain”)
- Analyses: Latent Profile Analysis in Mplus 7.4 (RQ1) and One-way ANCOVA with planned comparison & linear regression in SPSS 25 (RQ2)

Results

RQ1: What are the patterns of Expectancy-Value beliefs among freshman biological students?

- Profile 1 (N = 51): “Bio is not my thing”
- Profile 2 (N = 538): “Bio is my passion”
- Profile 3 (N = 130): “Bio is useful”

RQ2a: In what ways do E-V profiles predict course enrollment plan?

- One-way ANCOVA: gender, ethnicity, first-generation college-going status, SAT math and reading score as covariates.
- E-V profiles at beginning of class predicted the plan to take future biology courses at end of class. Group 2 > group 3 > group 1.

RQ2b: In what ways do E-V profiles predict certainty in current major choice?

- Linear regression predicted certainty in major plan using LPA class membership
- E-V profiles predicted change in certainty about major plan. Profiles 1 “Bio is not my thing” and 3 “Bio is useful” were more likely to become less certain about current major choice than profile 2 “Bio is my passion.”

Notes.

- **p < .05, ***p < .001
- CI = confidence interval
- Notes: CI = confidence interval. * p < .05. ** p < .01. *** p < .001.

Discussion

- Actual course enrollment and long-term persistence in major to be examined with ongoing data collection
- Beliefs about relative cost to be included in E-V profiles
- Profiles in E-V beliefs suggest level differences rather than unique types of E-V beliefs
- Future research could examine
  - LPA classifications with gender, race/ethnicity, and college-going generation factors
  - how gender, ethnicity, and college-going generational status moderate associations of motivation and persistence in STEM

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