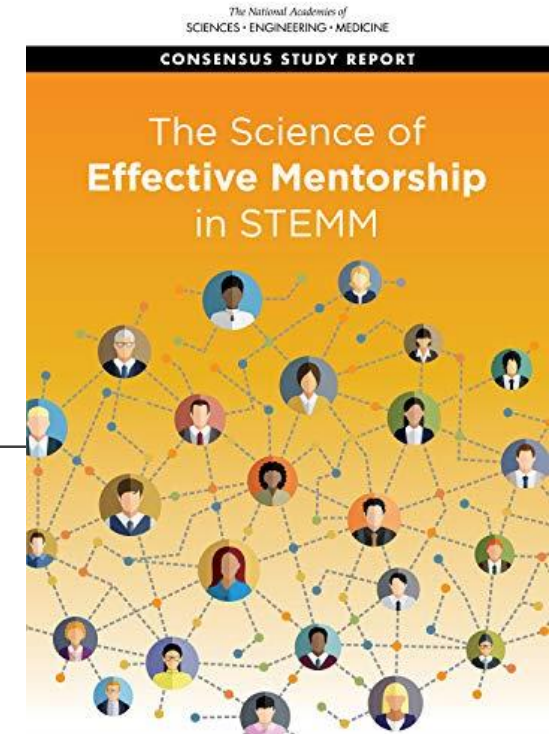# Commentary: The Science of Effective Mentoring in STEMM

Guan Saw
Claremont Graduate University

The Science of Effective Mentorship in STEMM (NASEM, 2019)

Why must everyone read the report?

- We are all a mentor and/or mentee

- State-of-the-art literature review

- Recommendations to improve and "formalize" mentoring

- Identified research gaps & directions of future research

Chapter 2. The Science of Mentoring Relationships

- Much mentorship literature is practice-driven

- Provides a working definition of mentorship

- Discusses 6 not mentoring-based theories for mentorship (e.g., integration model, social capital theory)

- Needs: A mentorship-centered framework/model?
  Theory-driven studies of mentorship?

Effective Mentorship for Inclusion
(Chapters 1, 3, & 5)

- "…promoting **diversity without inclusion** is not enough to create a diverse STEMM workforce…" (p. 21)

- "…**inclusive mentoring practices** in all contexts as central to effective mentorship…" (p. 22)

- Links to institutional inclusive excellence (e.g., AACU)

- Questions: What mentoring practices are inclusive?
  How to foster inclusive mentoring culture?
  How to measure inclusive mentorship?

Chapter 7. Individuals, Relationships, and Institutional Responsibility

- Advocates for a culture of mentorship

- Recognizes challenges and barriers

- Mentorship education: Mentor Induction Programs?

- Radical change: Add mentoring in the faculty workload policy?

	Research	Teaching	Service	Mentoring
FROM	40%	40%	20%	**+10%**
TO	40%	30%	20%	10%
OR	40%	40%	10%	10%

Chapter 4.
Mentorship Structures
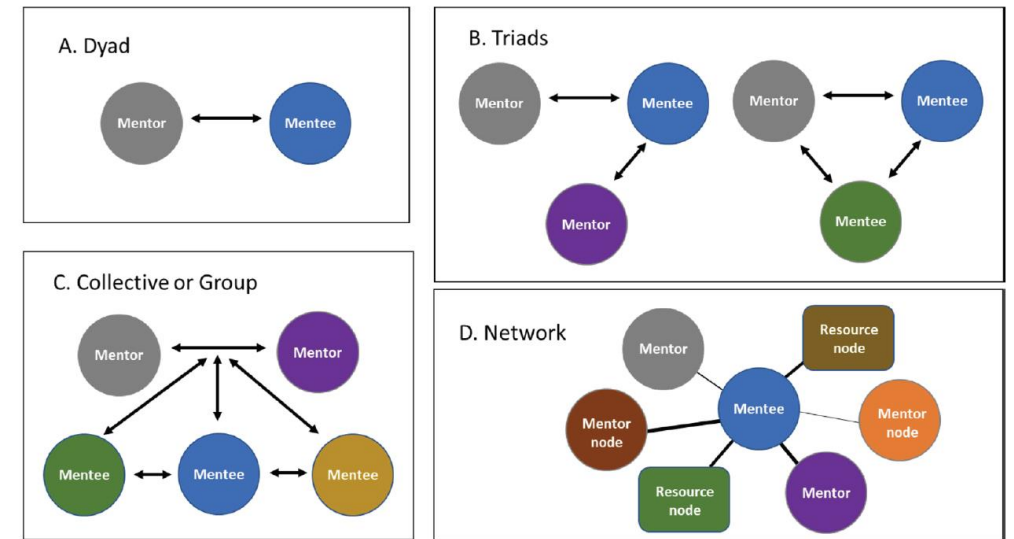
- Discusses diverse mentorship structures

- Describes various programs with mentoring experiences

- Wish: evidence from systematic reviews or meta-analyses

- Questions: Which mentorship programs are more effective? Which ones are more cost-effective?

- Emerging trends: Online or e-mentorship (p. 87-88)

e-Mentoring among STEM Faculty and Students During the COVID-19 Pandemic

Guan Saw, Claremont Graduate University
Chi-Ning Chang, University of Kansas

- 12-15 min online surveys (Qualtrics)

- June 3-22, 2020 (retrospect of experience in Spring 2020)

- Sample Size (157 institutions, 41 states)

   Undergraduates = 3,567
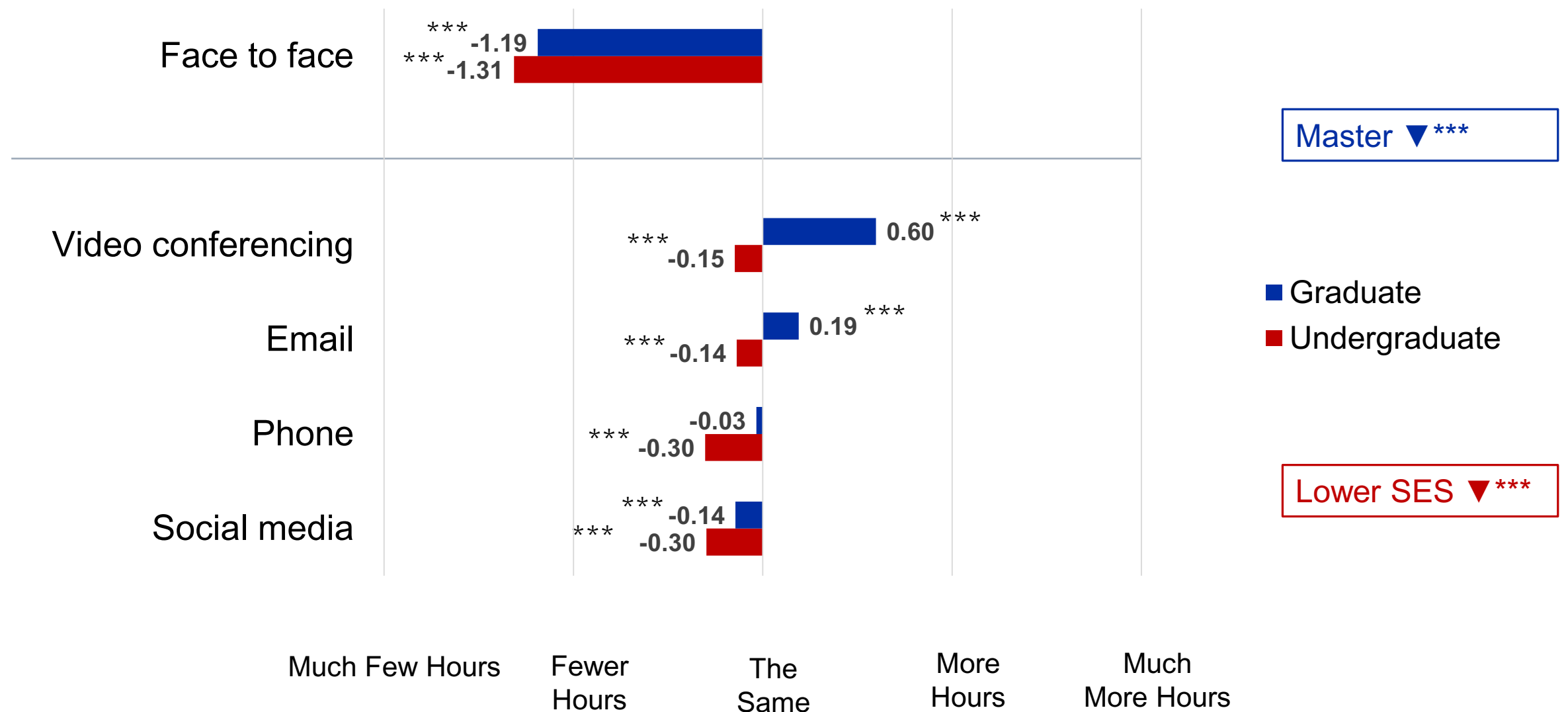   Graduate Students = 1,036
   Faculty = 1,087

Mentoring Interaction During the COVID-19 Pandemic
(reported by students)

Chart: Mentoring interaction change by method, comparing Graduate (blue) and Undergraduate (red) students.

- Face to face: Graduate *** -1.19; Undergraduate *** -1.31
- Video conferencing: Graduate 0.60 ***; Undergraduate *** -0.15
- Email: Graduate 0.19 ***; Undergraduate *** -0.14
- Phone: Graduate -0.03; Undergraduate *** -0.30
- Social media: Graduate *** -0.14; Undergraduate *** -0.30

X-axis: Much Few Hours — Fewer Hours — The Same — More Hours — Much More Hours

Legend:
- Master ▼ ***
- ■ Graduate
- ■ Undergraduate
- Lower SES ▼ ***

Perceived Instrumental Support

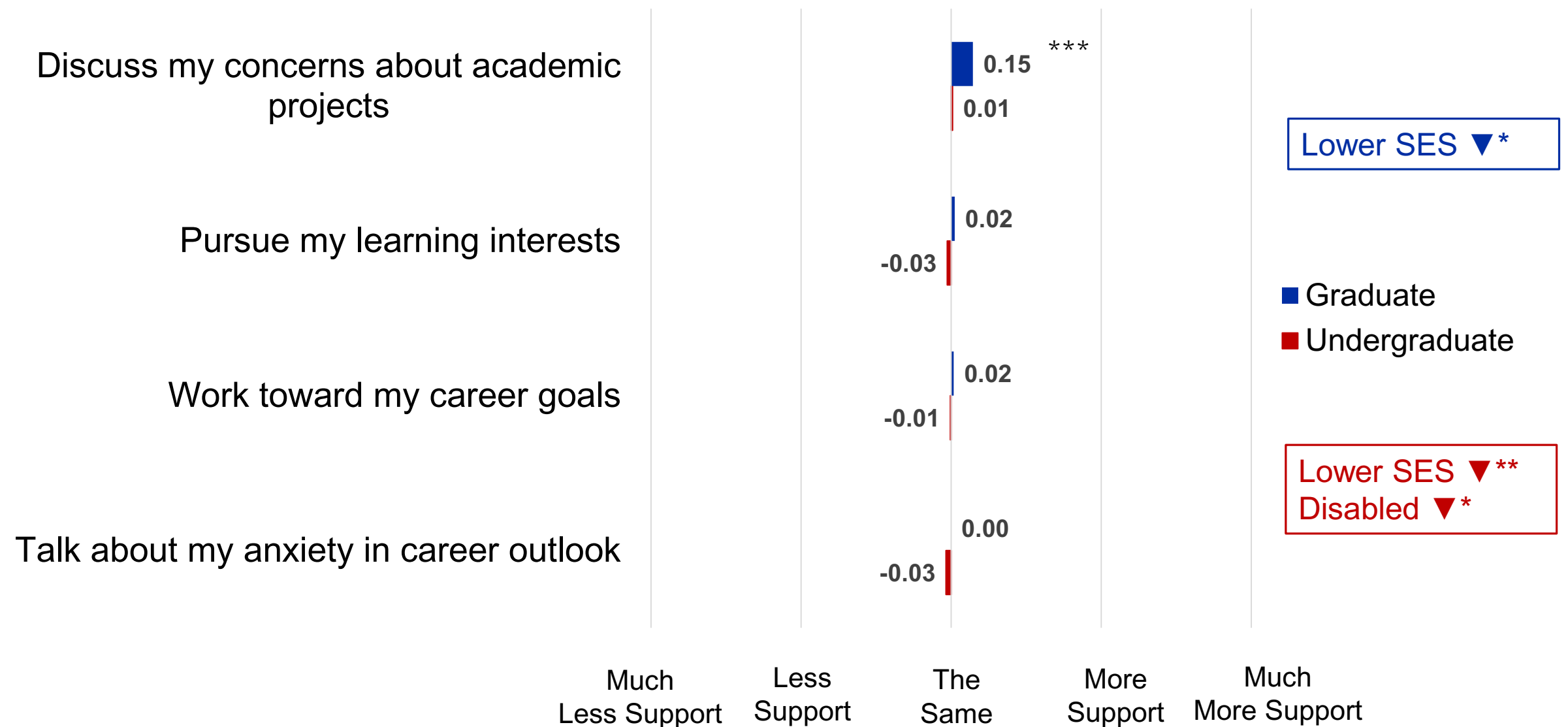After the COVID-19 outbreak, my primary mentor provided more/less support to help me…

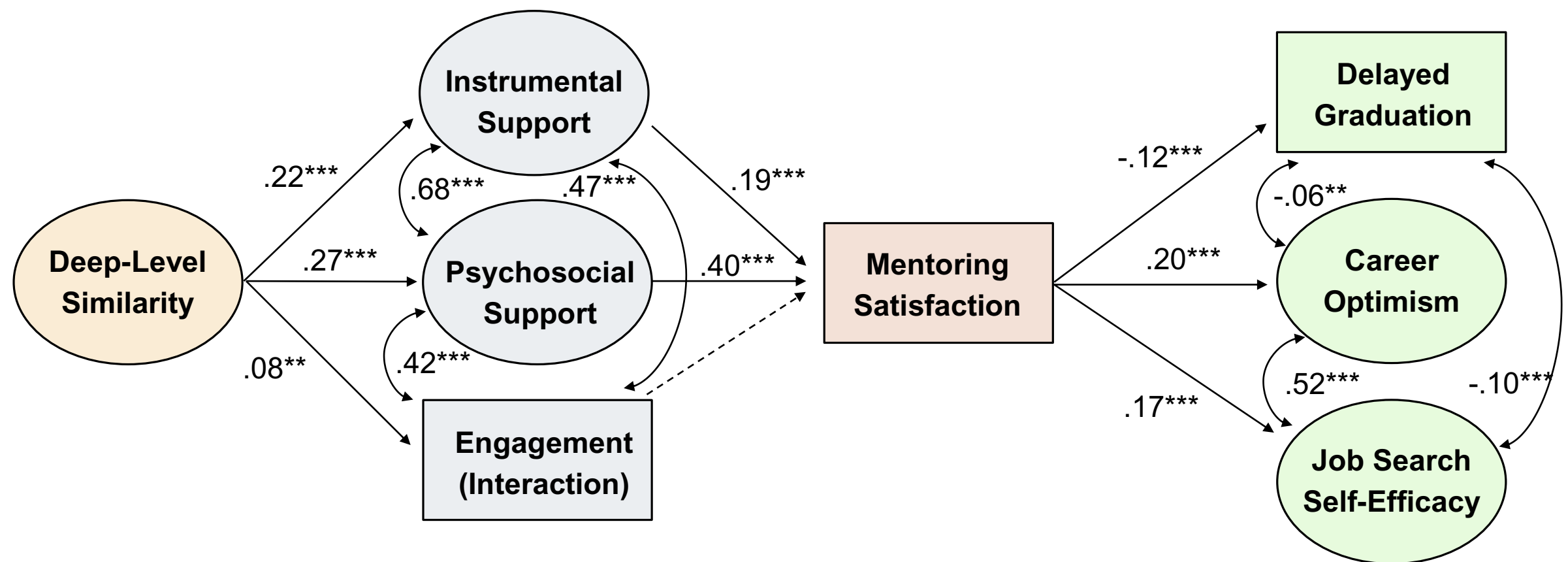Mentoring in Postsecondary STEM Programs during the COVID-19 Pandemic
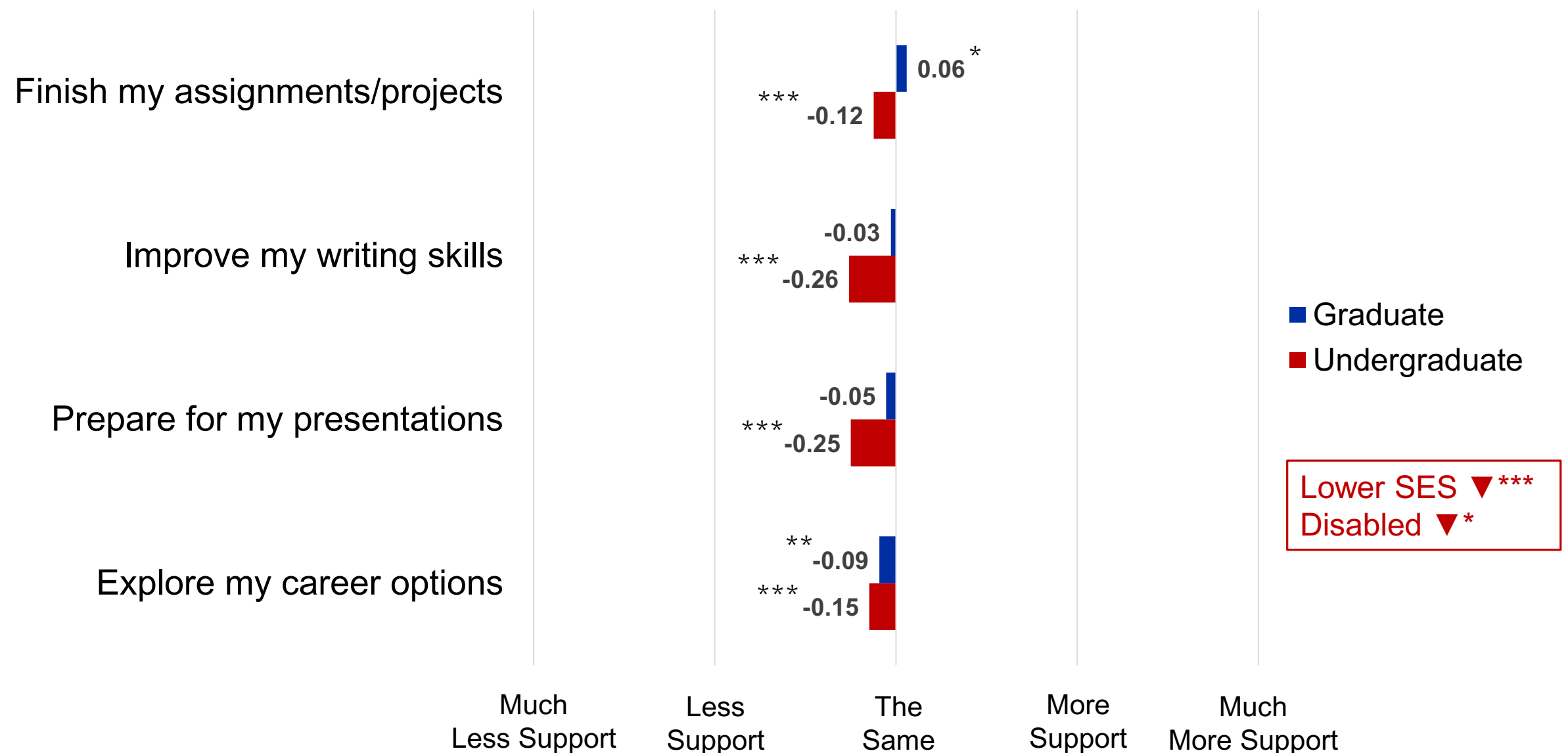
Perceived Psychosocial Support

After the COVID-19 outbreak, my primary mentor provided more/less support to encourage me to…

# Mentoring and Student Academic/Career Outcomes during the COVID-19 Pandemic

Note. STEM undergraduate sample size = 2,356; Structural Equation Modeling (SEM). Good model fit (RMSEA=.038; CFI=.961; SRMR=.037). Demographics were controlled. Values are standardized path coefficients. Dashed paths are not statistically significant. *p<.05, **p<.01, ***p<.001.

Perceived Effectiveness of e-Mentoring

STEM Doctoral Students (n = 428)

Instrumental Support

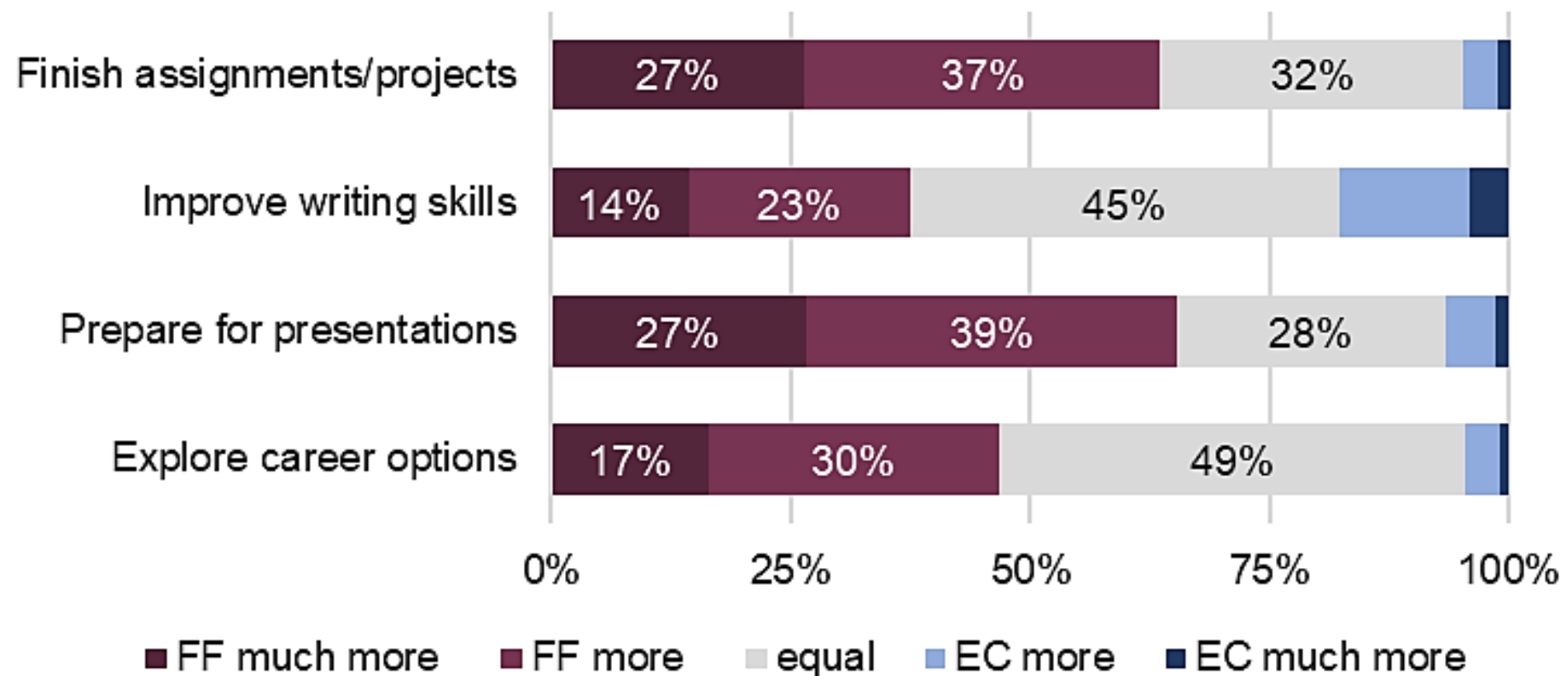FF = Face-to-face
EC = e-communication
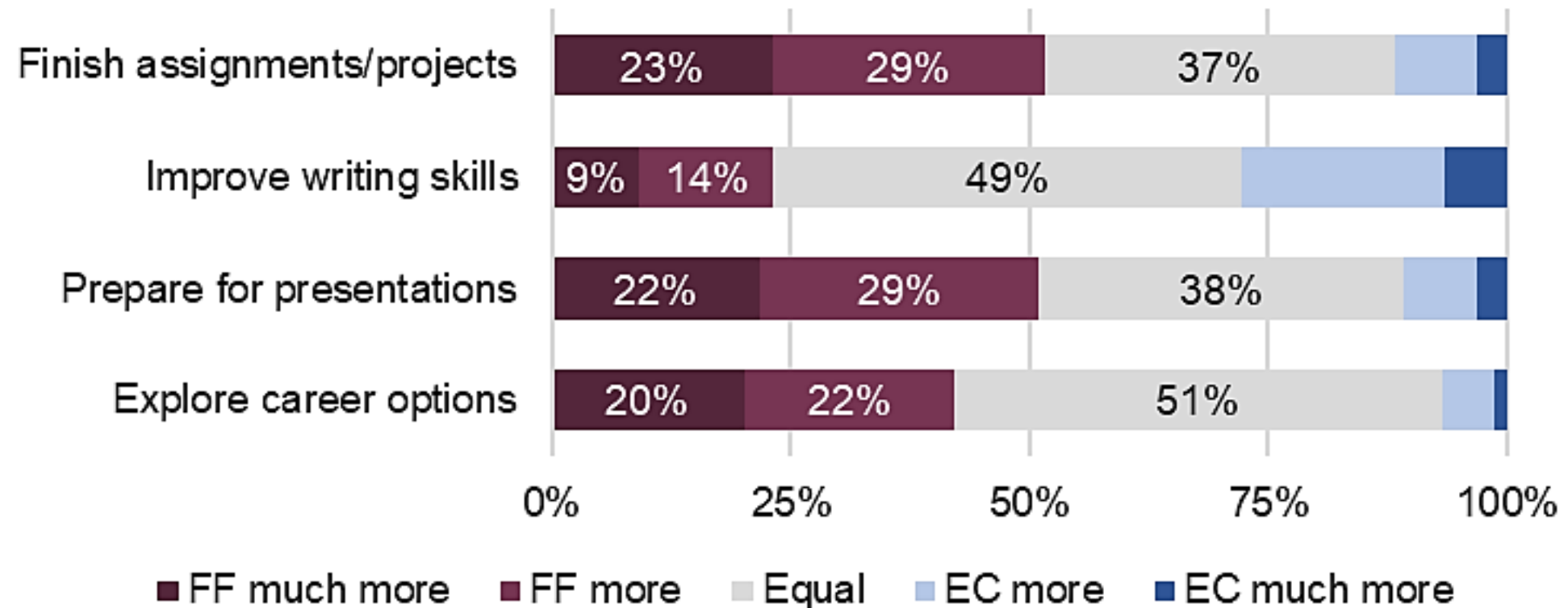
Perceived Effectiveness of e-Mentoring

STEM Faculty (n = 1,087)

Instrumental Support

FF = Face-to-face
EC = e-communication

	FF much more	FF more	equal	EC more	EC much more
Finish assignments/projects	27%	37%	32%		
Improve writing skills	14%	23%	45%		
Prepare for presentations	27%	39%	28%		
Explore career options	17%	30%	49%		

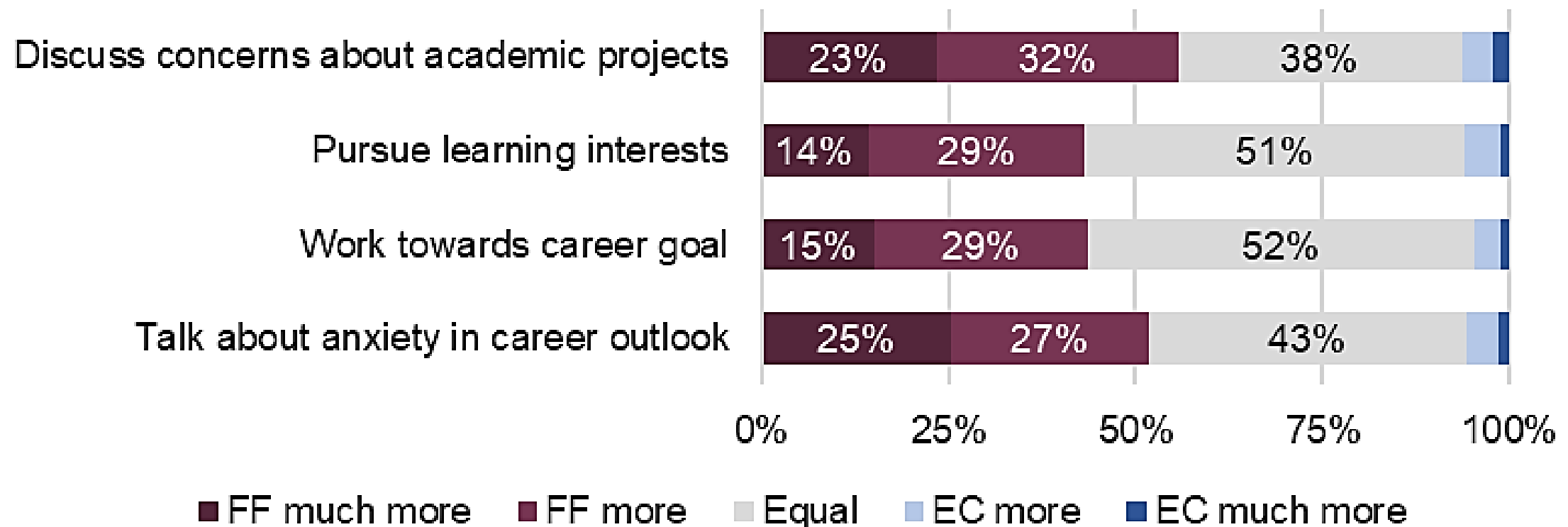Legend: ■ FF much more ■ FF more ■ equal ■ EC more ■ EC much more

Perceived Effectiveness of e-Mentoring

STEM Doctoral Students (n = 428)

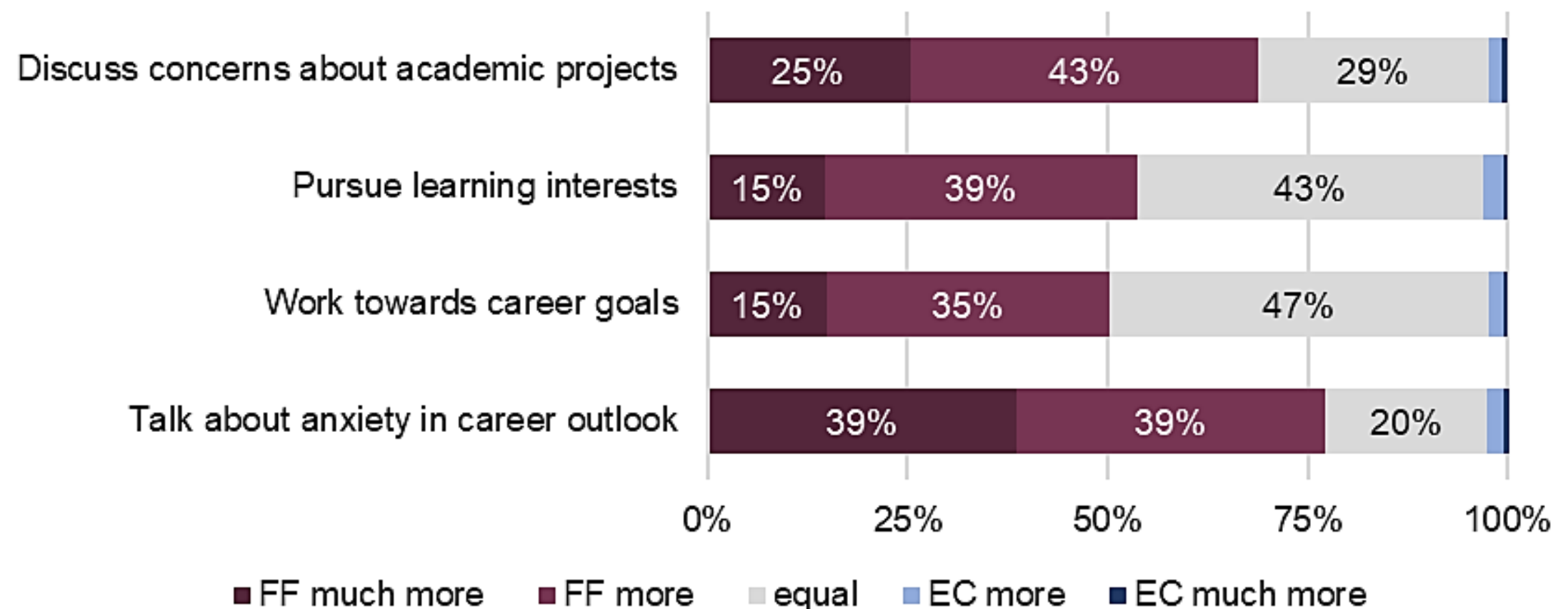**Psychosocial Support**

FF = Face-to-face
EC = e-communication

Perceived Effectiveness of e-Mentoring

STEM Faculty (n = 1,087)

Psychosocial Support

FF = Face-to-face
EC = e-communication

	FF much more	FF more	equal	EC more	EC much more
Discuss concerns about academic projects	25%	43%	29%		
Pursue learning interests	15%	39%	43%		
Work towards career goals	15%	35%	47%		
Talk about anxiety in career outlook	39%	39%	20%		

Intelligent Mentoring Systems

Claremont
Graduate
University

Guan Saw
guan.saw@cgu.edu