Unpacking Motivational Culture: Diverging Emphasis on Communality and Agency Across STEM Domains

Supplemental Materials

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Summary of Findings. Across Studies 2A, 3, and 4 we conducted 2 Goal Type × 2 STEM Domain mixed-model ANOVAs to examine the emphasis of communal and agentic goals within STEM domains. As shown in table 1A, we find across these analyses a greater focus on perceived agentic content/affordances than communal content/affordances within engineering/physical sciences. In contrast, this goal imbalance does not emerge within the life sciences. Instead, life science majors provide a balance of agentic and communal goal content/affordances. These goal patterns are thus depicted within the environment (Study 2A) and within individuals (Study 3 & 4). In Table 1B, we present the consistent 2 Goal Type × 2 STEM interaction emerging on perceived goal affordances.

Table 1A. Summary Table of the 2 Goal Type × 2 STEM Domain interaction on Perceived Goal Affordances.

Current Studies	STEM Domain	
	Engineering/Physical Sciences	Life Sciences
Study 2A	Greater agentic focus, $F(1, 66) = 16.11$, $p < .001$, $d = 0.99$	Perceived goal balance, $F(1, 66) = 0.14$, $p = .714$, $d = 0.09$
Study 3	Greater agentic focus, $F(1, 322) = 70.18$, $p < .001$, $d = 0.93$	Attenuated agentic focus, $F(1, 322) = 29.82$, $p < .001$, $d = 0.61$
Study 4	Greater agentic focus at time 1, $F(1, 107) = 30.39$, $p < .001$, $d = -1.07$ Attenuated agentic focus at time 2, $F(1, 107) = 5.22$, $p = .024$, $d = 0.44$	Perceived goal balance at time 1, $F(1, 106) = 2.07$, $p = .154$, $d = 0.28$ Perceived goal balance at time 2, $F(1, 107) = 3.62$, $p = .060$, $d = 0.37$

Note. Study 2A measured goal content and Studies 3-4 measured perceived goal affordances. Study 1 ran a linear regression and Study 2B did not include STEM domain.

Table 1B. Table of Main Effects and Interactions on Perceived Goal Affordances

Current Studies	Main Effects	Interaction

Study 2A	Goal Type: $F(1, 66) = 8.41$, $p = .005$, $\eta_p^2 = .11$ STEM Domain: $F(1, 66) = 0.29$, $p = .593$, $\eta_p^2 < .01$	$F(1, 66) = 5.49$, $p = .022$, $\eta_p^2 = .08$
Study 3	Goal Type: $F(1, 322) = 13.18$, $p < .001$, $\eta_p^2 = .04$ STEM Domain: $F(1, 322) = 2.80$, $p = .095$, $\eta_p^2 = .01$	$F(1, 322) = 16.29$, $p < .001$, $\eta_p^2 = .05$
Study 4	Goal Type: $F(1, 107) = 0.09$, $p = .764$, $\eta_p^2 < .01$ STEM Domain: $F(1, 107) = 0.25$, $p = .616$, $\eta_p^2 < .01$	$F(1, 107) = 4.35$, $p = .039$, $\eta_p^2 = .04$

Note. Study 4 and Study 5 included the covariate participant gender.

Study 1

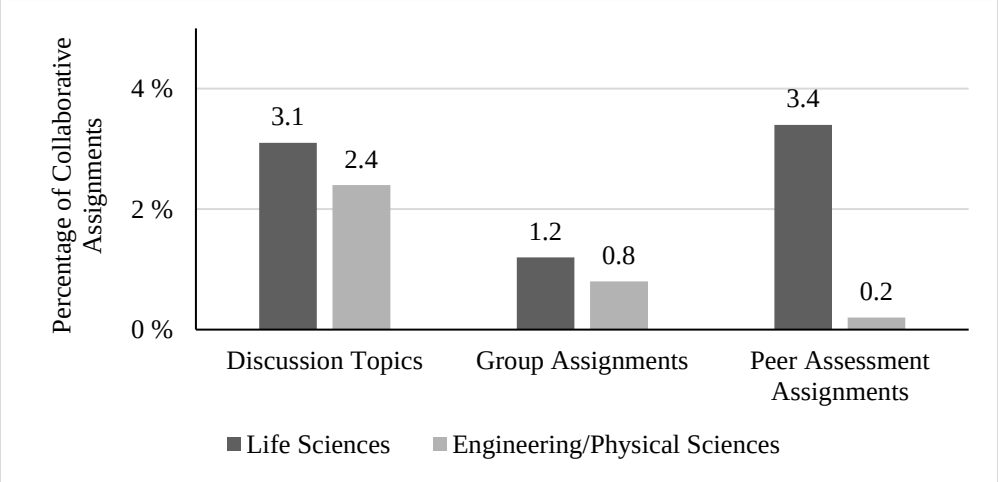
Supplemental Analyses

Here we provide descriptive information about each of the collaborative assignments between life sciences and engineering/physical sciences (see Table 2).

Table 2. Means and ranges of the number of collaborative assignments by STEM course domain.

	Discussion Topics		Group Assignments		Peer Assessment Assignments	
	M (*SD*)	*Range*	*M* (*SD*)	*Range*	*M* (*SD*)	*Range*
Life Sciences	0.17 (1.35)	0-21	0.09 (1.42)	0-37	0.09 (0.52)	0-8
Engineering/ Physical Sciences	0.10 (0.92)	0-28	0.02 (0.34)	0-12	0.00 (0.08)	0-5

Figure 1. Proportion of collaborative assignments by STEM course domain.

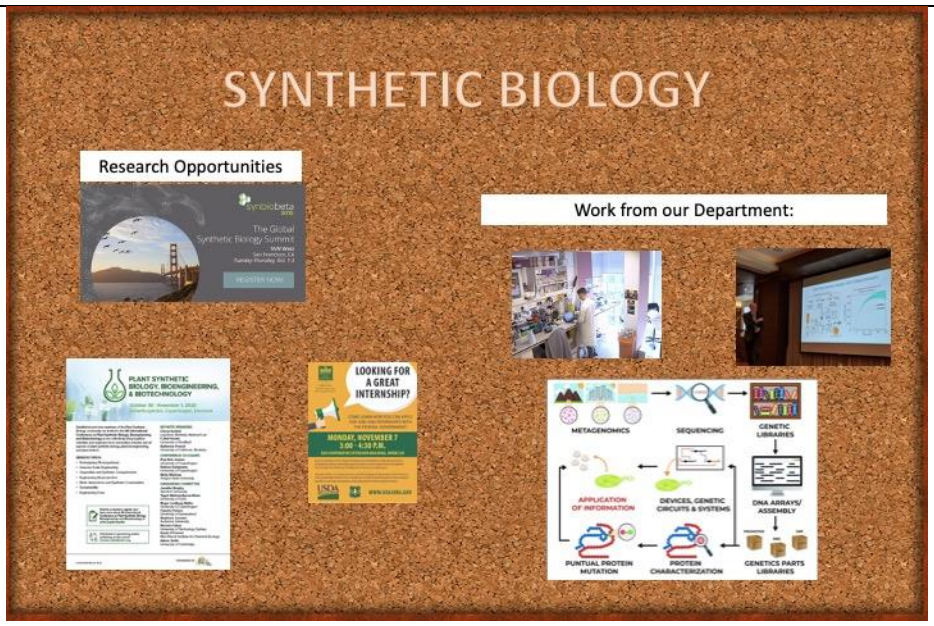


Note. The total number of assignments was 4388 in the life sciences and 6834 in the engineering/physical sciences.

Study 2B

Table 3. Example bulletin boards across Communal-cue and Agentic-cue conditions.

Condition	Example Bulletin Board
Communal-cue	

Agentic-cue	

Study 3

Supplemental Analyses

Relationships between Perceived Goal Affordances and Values. Here we present partial bivariate correlations to test the relationships between agentic and communal goal affordances and endorsements while controlling for gender (see Table 4).

Table 4. Relationships between Perceived Goal Affordances and Values, Controlling for Participant Gender.

	1.	2.	3.	4.
1. Agentic Affordances	--	.780***	.532***	.425***
2. Communal Affordances	.780***	--	.363***	.421***
3. Agentic Endorsement	.532***	.363***	--	.548***
4. Communal Endorsement	.425***	.421***	.548***	--

Note. *$p < .05$, **$p < .01$, ***$p < .001$.

Study 4

Supplemental Analyses

Relationships between Perceived Goal Affordances and Values. Here we present partial bivariate correlations to test the relationships between agentic and communal goal affordances and endorsements across time 1 and time 2 while controlling for gender (see Table 5).

Table 5. Relationships between Perceived Goal Affordances and Values, Controlling for Participant Gender.

		1.	2.	3.	4.	**5.**	**6.**	**7.**	**8.**
1.	Agentic Affordances T1	--	.438***	.313***	.166	.423***	.211*	.389***	.124
2.	Communal Affordances T1	.438***	--	.157	.296**	.257**	.447***	.195*	.267**
3.	Agentic Endorsement T1	.313***	.157	--	.235*	.312***	.188	.615***	.097
4.	Communal Endorsement T1	.166	.296**	.235*	--	.222*	.249*	.264**	.675***
5.	Agentic Affordances T2	.423***	.257**	.312***	.222*	--	.575***	.513***	.399***
6.	Communal Affordances T2	.211*	.447***	.188	.249*	.575***	--	.303**	.401***
7.	Agentic Endorsement T2	.389***	.195*	.615***	.264**	.513***	.303**	--	.419***
8.	Communal Endorsement T2	.208	.267**	.097	.675***	.399***	.401***	.419***	--

Note. $*p < .05$, $**p < .01$, $***p < .001$.

Do Personally Valued Goals Vary by STEM Domain, Gender, and Time? Goal endorsement was submitted to a 2 Goal Type (communal, agentic) × 2 STEM Domain (life science, engineering/physical science) × 2 Time × 2 Gender mixed ANOVA, with gender and STEM domain as between-subject factors. The Goal Type × STEM Domain × Gender interaction, $F(1, 104) = 3.46$, $p = .066$, $\eta_p^2 = .03$, and Goal Type × Time × STEM domain × Gender interaction (See Table 6 for means), $F(1, 104) = 3.40$, $p = .068$, $\eta_p^2 = .03$, did not reach significance.

Table 6. Personal goal endorsement: Communality and agency by STEM domain and Gender over Time.

		Men		Women	
		Time 1	Time 2	Time 1	Time 2
Life Science	Agentic	4.78 (0.88)	4.58 (0.93)	4.60 (0.77)	4.57 (0.81)
	Communal	5.40 (0.75)	5.17 (1.11)	5.16 (1.05)	5.13 (0.91
Engineering & Physical Science	Agentic	4.95 (0.64)	4.78 (0.92)	4.75 (0.65)	4.98 (0.90)
	Communal	4.59 (0.99)	4.61 (1.33)	5.33 (0.63)	5.15 (0.83)

Note. Means with Standard deviations presented in parentheses, *M* (*SD*).

Does Attrition at time 1 Vary by STEM Domain on Perceived Major Affordances?

Major goal affordances were submitted to a 2 Goal type × 2 STEM type × 2 Attrition mixed model ANOVA with STEM type and Attrition as between-subject variables. Attrition status was coded as attrited for students who only completed time 1 but not time 2 and retained for students who completed both times of the survey. STEM students who attrited did not differ on perceived major goal affordances, $F(1, 153) = 0.24$, $p = .625$, $\eta_p^2 < .01$. No effects of attrition emerged except a 2 Goal × 2 Attrition interaction, $F(1, 153) = 8.52$, $p = .004$, $\eta_p^2 = .05$. Attrition status did not significantly differ on perceived communal affordances, $F(1, 153) = 1.54$, $p = .217$, $d = .20$, or perceived agentic affordances, $F(1, 153) = 3.08$, $p = .081$, $d = .29$. In Table 7, we present means in the nonsignificant three-way interaction, $F(1, 153) = 0.08$, $p = .776$, $\eta_p^2 = .001$.

Table 7. Major Goal Affordance: Communality and agency by STEM domain and attrition status.

		Attrition Status		
		Retained	Attrited	Pairwise-Contrasts
Life Science	Agentic	5.02 (0.96)	5.01 (1.19)	$d = 0.36$, $p = .028$
	Communal	4.74 (1.20)	5.35 (1.09)	$d < 0.01$, $p = .991$
Engineering & Physical Science	Agentic	5.61 (0.80)	5.48 (0.80)	$d < 0.01$, $p = .732$
	Communal	4.75 (1.11)	4.86 (1.21)	$d = 0.27$, $p = .095$

Note. Means with Standard deviations presented in parentheses, *M* (*SD*).