Supplemental Material

CBE—Life Sciences Education

Estrada *et al.*

Supplemental Materials

The Influence of Micro Affirmations on Undergraduate Persistence in Science Career Pathways

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Overview

The following pages include the supplemental tables that were referenced in the main manuscript results sections. Methods, procedures and measures, in addition to approach to analyses, are all described in the main manuscript.

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Table S1

Means, SD, Skew, and Interitem Correlations among the Items from the Micro Affirmations Scale for Historically Underrepresented Students in Study 1 (n = 181)

					Interitem Correlations						
Item #	Mean	SD	Skew	Kurtosis	1	2	3	4	5	6	7
1	3.49	1.96	-.10	-1.30	-	.76*	.68*	.51*	.54*	.52*	.42*
2	3.42	1.89	-.16	-1.08	.76*	-	.72*	.59*	.52*	.51*	.47*
3	3.21	1.94	-.04	-1.19	.68*	.72*	-	.53*	.46*	.44*	.41*
4	3.54	2.03	-.29	-1.21	.51*	.59*	.53*	-	.68*	.66*	.69*
5	3.11	2.19	.02	-1.44	.54*	.52*	.46*	.68*	-	.90*	.61*
6	3.07	2.14	.08	-1.37	.52*	.51*	.44*	.66*	.90*	-	.63*
7	3.22	2.26	-.10	-1.47	.42*	.47*	.41*	.69*	.61*	.63*	-

* $p < .05$

Item 1: Affirmations that you can complete your degree

Item 2: Affirmations that you belong in the institution

Item 3: Affirmations that you are a scientist

Item 4: Affirmations that people of your gender are important contributors to advancing knowledge

Item 5: Affirmations that people of your ethnicity are important contributors to advancing knowledge

Item 6: Affirmations that people of your culture are important contributors to advancing knowledge

Item 7: Affirmations that people of your sexual orientation are important contributors to advancing knowledge

Table S2

Means, SD, Skew, and Interitem Correlations among the Items from the Micro Affirmations Scale for Historically Overrepresented Students in Study 1 (n = 281)

					Interitem Correlations						
Item #	Mean	SD	Skew	Kurtosis	1	2	3	4	5	6	7
1	3.71	1.90	-.25	-1.19	-	.77*	.62*	.59*	.54*	.51*	.49*
2	3.57	1.89	-.24	-1.16	.77*	-	.60*	.66*	.59*	.60*	.54*
3	3.28	1.77	.00	-1.01	.62*	.60*	-	.54*	.42*	.46*	.52*
4	3.66	1.99	-.35	-1.11	.59*	.66*	.54*	-	.83*	.78*	.82*
5	3.53	2.10	-.28	-1.27	.54*	.59*	.42*	.83*	-	.89*	.75*
6	3.42	2.10	-.27	-1.26	.51*	.60*	.46*	.78*	.89*	-	.77*
7	3.45	2.16	-.26	-1.30	.49*	.54*	.52*	.82*	.75*	.77*	-

* $p < .05$

Item 1: Affirmations that you can complete your degree
Item 2: Affirmations that you belong in the institution
Item 3: Affirmations that you are a scientist
Item 4: Affirmations that people of your gender are important contributors to advancing knowledge
Item 5: Affirmations that people of your ethnicity are important contributors to advancing knowledge
Item 6: Affirmations that people of your culture are important contributors to advancing knowledge
Item 7: Affirmations that people of your sexual orientation are important contributors to advancing knowledge

Table S3

Results of the Mediation Models Examining Whether Scientific Self-Efficacy and Scientific Identity Mediated the Relation between Micro Affirmations and Intentions to Persist in Science-Related Career Pathways Among Historically Underrepresented and Historically Overrepresented Students

	Group Identity Micro Affirmations					
	c	a	b	c’	Indirect Effect	
Mediator (sample size)	β	β	β	β	β	BC $CI_{95\%}$
Scientific Self-Efficacy						
HU (*n* = 38)	.01	.23	.29	-.06	.07	[-.03, .29]
HO (*n* = 34)	.23	.36*	.48**	.06	.17	[.02, .41]^
Scientific Identity						
HU (*n* = 39)	.04	.38*	.15	-.02	.06	[-.06, .40]
HO (*n* = 34)	.23	.18	.66***	.12	.12	[-.09, .32]
	Individual Micro Affirmations					
	c	a	b	c’	Indirect Effect	
Mediator (*n*)	β	β	β	β	β	BC $CI_{95\%}$
Scientific Self-Efficacy						
HU (*n* = 39)	.05	.36*	.29	-.06	.11	[-.02, .32]
HO (*n* = 34)	.27	.49**	.49*	.03	.24	[.01, .45]^
Scientific Identity						
HU (*n* = 40)	.08	.56***	.14	.01	.08	[-.12, .52]
HO (*n* = 34)	.27	.37*	.68***	.02	.25	[.02, .49]^

Note. c = direct effect of micro affirmations on intentions to persist in science-related career pathways; a = effect of micro affirmations on the mediator; b = effect of the mediator on intentions to persist in science-related career pathways controlling for micro affirmations; c’ = effect of micro affirmations on intentions to persist in science-related career pathways controlling for the mediator; BC $CI_{95\%}$ = Bootstrapped bias-corrected 95% confidence interval for the standardized indirect effect.

In each case, the independent variable was micro affirmations at Time 1 and the dependent variable was intentions to persist in science-related career pathways at Time 3. All reported statistics are standardized.

* $p < .05$, ** $p < .01$, *** $p < .001$, ^ Significantly different from 0.

Table S4

The Micro Affirmations Scale (Omitting Item 5): Two-Factor Model Factor Loadings Observed from the Confirmatory Factor Analyses Conducted in Study 2

	Historically Underrepresented (n = 106)		Historically Overrepresented (n = 127)	
Micro Affirmations Scale Item	Group Identity Affirmation	Individual Affirmation	Group Identity Affirmation	Individual Affirmation
#6: Affirmations that people of your culture are important contributors to advancing knowledge	**.91**	-	**.94**	-
#7: Affirmations that people of your sexual orientation are important contributors to advancing knowledge	**.81**	-	**.87**	-
#4: Affirmations that people of your gender are important contributors to advancing knowledge	**.66**	-	**.77**	-
#1: Affirmations that you can complete your degree	-	**.90**	-	**.95**
#2: Affirmations that you belong in the institution	-	**.86**	-	**.82**
#3: Affirmations that you are a scientist	-	**.69**	-	**.61**

Note. All loadings were significant at the $p < .001$ level.

Table S5

Zero-Order Correlations Among All Psychosocial Variables Across All Students in Study 2

Psychosocial Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Group Identity MA (T1)	-	.56*	.16	.36*	.32*	.61*	.38*	.24*	.30*	.25*	.35*	.35*	.19	.17	.14
2. Individual MA (T1)	.56*	-	.35*	.55*	.47*	.44*	.63*	.38*	.48*	.35*	.32*	.53*	.32*	.33*	.16
3. Science Self-Efficacy (T1)	.16	.35*	-	.52*	.35*	.07	.12	.58*	.31*	.43*	.11	.20	.44*	.42*	.39*
4. Science Identity (T1)	.36*	.55*	.52*	-	.62*	.34*	.40*	.52*	.60*	.40*	.30*	.39*	.55*	.60*	.42*
5. Intent to Pursue (T1)	.32*	.47*	.35*	.62*	-	.25*	.33*	.42*	.51*	.52*	.12	.29*	.40*	.46*	.53*
6. Group Identity MA (T2)	.61*	.44*	.07	.34*	.25*	-	.61*	.20	.28*	.15	.48*	.49*	.20	.26*	.24*
7. Individual MA (T2)	.38*	.63*	.12	.40*	.33*	.61*	-	.42*	.41*	.30*	.43*	.67*	.27*	.36*	.27*
8. Science Self-Efficacy (T2)	.24*	.38*	.58*	.52*	.42*	.20	.42*	-	.55*	.64*	.22	.26*	.46*	.53*	.38*
9. Science Identity (T2)	.30*	.48*	.31*	.60*	.51*	.28*	.41*	.55*	-	.52*	.25*	.34*	.31*	.49*	.39*
10. Intent to Pursue (T2)	.25	.35*	.43*	.40*	.52*	.15	.30*	.64*	.52*	-	.19	.26*	.32*	.37*	.44*
11. Group Identity MA (T3)	.35*	.32*	.11	.29*	.17	.48*	.45*	.22	.27*	.19	-	.73*	.25*	.30*	.23*
12. Individual MA (T3)	.35*	.53*	.20	.39*	.29*	.49*	.67*	.26*	.34*	.26*	.72*	-	.34*	.43*	.32*
13. Science Self-Efficacy (T3)	.19	.32*	.44*	.55*	.40*	.20	.27*	.46*	.31*	.32*	.26*	.34*	-	.56*	.50*
14. Science Identity (T3)	.17	.33*	.42*	.60*	.46*	.26*	.36*	.53*	.49*	.37*	.31*	.43*	.56*	-	.57*
15. Intent to Pursue (T3)	.14	.16	.39*	.42*	.53*	.24	.27*	.38*	.39*	.44*	.23*	.32*	.50*	.57*	-

Note. MA = Micro affirmations; T1 = Time 1; T2 = Time 2; T3 = Time 3; Intent to Pursue = Intentions to pursue a science-related research career. These correlations pertain to all available data across the 3 time points. * $p < .05$

Table S6

Zero-Order Correlations Among All Psychosocial Variables Across Historically Underrepresented Students in Study 2

Psychosocial Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Group Identity MA (T1)	-	.76*	.14	.45*	.43*	.66*	.46*	.21	.38*	.34*	.45*	.40*	.27	.20	.04
2. Individual MA (T1)	.76*	-	.38*	.70*	.63*	.48*	.66*	.37*	.57*	.46*	.42*	.52*	.33*	.30	.08
3. Science Self-Efficacy (T1)	.14	.38*	-	.64*	.34*	.15	.14	.72*	.31*	.56*	.20	.18	.52*	.43*	.34*
4. Science Identity (T1)	.45*	.70*	.64*	-	.51*	.40*	.47*	.55*	.57*	.58*	.52*	.53*	.51*	.57*	.41*
5. Intent to Pursue (T1)	.43*	.63*	.34*	.51*	-	.35*	.38*	.37*	.33*	.60*	.34*	.42*	.35*	.28	.43*
6. Group Identity MA (T2)	.66*	.48*	.15	.40*	.35*	-	.58*	.13	.35*	.21	.62*	.61*	.33*	.37*	.40*
7. Individual MA (T2)	.46*	.66*	.14	.47*	.38*	.58*	-	.31	.44*	.35*	.49*	.64*	.22	.30	.28
8. Science Self-Efficacy (T2)	.21	.37*	.72*	.55*	.37*	.13	.31	-	.39*	.78*	.17	.13	.45*	.44*	.27
9. Science Identity (T2)	.38*	.57*	.31*	.57*	.33*	.35*	.44*	.39*	-	.51*	.31	.33*	.20	.28	.14
10. Intent to Pursue (T2)	.34*	.46*	.56*	.58*	.60*	.21	.35*	.78*	.51*	-	.29	.24	.29	.30	.36*
11. Group Identity MA (T3)	.45*	.42*	.20	.52*	.34*	.62*	.49*	.17	.31	.29	-	.76*	.28	.32*	.28
12. Individual MA (T3)	.40*	.52*	.18	.53*	.42*	.61*	.64*	.13	.33*	.24	.76*	-	.33*	.36*	.27
13. Science Self-Efficacy (T3)	.27	.33*	.52*	.51*	.35*	.33*	.22	.45*	.20	.29	.28	.33*	-	.53*	.59*
14. Science Identity (T3)	.20	.30	.43*	.57*	.28	.37*	.30	.44*	.28	.30	.32*	.36*	.53*	-	.41*
15. Intent to Pursue (T3)	.04	.08	.34*	.41*	.43*	.40*	.28	.27	.14	.36*	.28	.27	.59*	.41*	-

Note. MA = Micro affirmations; T1 = Time 1; T2 = Time 2; T3 = Time 3; Intent to Pursue = Intentions to pursue a science-related research career. These correlations pertain to all available data across the 3 time points. * $p < .05$

Table S7

Zero-Order Correlations Among All Psychosocial Variables Across Historically Overrepresented Students in Study 2

Psychosocial Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Group Identity MA (T1)	-	.18	.26	.29	.23	.47*	.26	.36*	.18	.27	.23	.33	.24	.18	.23
2. Individual MA (T1)	.18	-	.42*	.45*	.36*	.33	.62*	.49*	.37*	.19	.12	.57*	.46*	.42*	.27
3. Science Self-Efficacy (T1)	.26	.42*	-	.38*	.26	.02	.11	.33	.32	.18	.13	.34	.31	.37*	.49*
4. Science Identity (T1)	.29	.45*	.38*	-	.70*	.31	.38*	.51*	.68*	.25	.20	.38*	.72*	.64*	.44*
5. Intent to Pursue (T1)	.23	.36*	.26	.70*	-	.18	.32	.44*	.77*	.47*	.03	.31	.56*	.64*	.63*
6. Group Identity MA (T2)	.47*	.33	.02	.31	.18	-	.64*	.36*	.20	.22	.30	.39*	.20	.19	.03
7. Individual MA (T2)	.26	.62*	.11	.38*	.32	.64*	-	.57*	.36*	.24	.34	.76*	.44*	.46*	.24
8. Science Self-Efficacy (T2)	.36*	.49*	.33	.51*	.44*	.36*	.57*	-	.78*	.49*	.41*	.52*	.47*	.62*	.51*
9. Science Identity (T2)	.18	.37*	.32	.68*	.77*	.20	.36*	.78*	-	.59*	.20	.41*	.57*	.78*	.69*
10. Intent to Pursue (T2)	.27	.19	.18	.25	.47*	.22	.24	.49*	.59*	-	.00	.23	.30	.49*	.62*
11. Group Identity MA (T3)	.23	.12	.13	.20	.03	.30	.34	.41*	.20	.00	-	.63*	.37*	.39*	.18
12. Individual MA (T3)	.33	.57*	.34	.38*	.31	.39*	.76*	.52*	.41*	.23	.63*	-	.52*	.60*	.42*
13. Science Self-Efficacy (T3)	.24	.46*	.31	.72*	.56*	.20	.44*	.47*	.57*	.30	.37*	.52*	-	.64*	.55*
14. Science Identity (T3)	.18	.42*	.37*	.64*	.64*	.19	.46*	.62*	.78*	.49*	.39*	.60*	.64*	-	.73*
15. Intent to Pursue (T3)	.23	.27	.49*	.44*	.63*	.03	.24	.51*	.69*	.62*	.18	.42*	.55*	.73*	-

Note. MA = Micro affirmations; T1 = Time 1; T2 = Time 2; T3 = Time 3; Intent to Pursue = Intentions to pursue a science-related research career. These correlations pertain to all available data across the 3 time points. * $p < .05$