Supplementary Material for "False Growth Mindsets: An Exploration"

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Correlations between student-level variables



Figure S1. Correlations between student-level variables. "stability" = student perception of teacher beliefs about ability; "smindset" = students' entity theory about intelligence; "steffort" = student perception of teacher beliefs about effort; "gpa_post" = end of year grade-point-average

Multilevel nonparametric LPA with restricted item sets

In developing the latent profile analyses, I initially tested three sets of models. One set,

described in the main text, used all the questions I deemed relevant. I also looked at profiles

generated from subsets of those questions to see if model fit and interpretability could be

improved. I ultimately decided that the profiles using all the questions were the most informative, but I present those alternate models below for comparison.

Just hypothetical students

In one set of models, I retained the questions about teachers' own mindsets and their advice to hypothetical students as well as coding of their free-response answers, dropping the questions about their specific practices.

In the solution that best fit my decision guidelines (aBIC = 15,281.30, AIC = 15,234.39, Entropy = .90), I fit a solution with three Level-1 profiles nested within 1 Level-2 profile. I found that 117 teachers (38.5%) were most likely classified within Profile 1; 124 teachers (40.8%) were most likely classified within Profile 2; and 63 teachers (20.7%) were most likely classified within Profile 3. See Figure S2 for a graphical representation of the best-fitting profile, and see Table S1 for fit statistics for all models.



Figure S2. Final profiles from non-parametric multi-level latent profile analysis for question-set restricted to just hypothetical students.

Just hypothetical failing students

In another set of latent profile analyses, I restricted the question set further, looking only at teachers' self-reported beliefs about mindsets and ability and at their responses, both Likert-scale and free-response, to hypothetical students who were struggling in their class.

No solution ended up fitting my decision guidelines, as the smallest profile within each solution contained less than 10% of the sample in all models tested. Trading off aBIC against the proportion of the sample within the smallest profile, the best solution is probably one with five

Level-1 profiles nested within one Level-2 profile (aBIC = 9,237.95, AIC = 9,193.21, Entropy = .89). Within this profile, 144 (47.4%) teachers most likely belong to Profile 1; 26 teachers (8.6%) to Profile 2; 42 teachers (13.8% to Profile 3); 61 teachers (20.0%) to Profile 4; and 31 teachers (10.2%) to Profile 5. See Figure S3 for a graphical representation of the best-fitting profile, and see Table S2 for fit statistics for all models.



Figure S3. Final profiles from non-parametric multi-level latent profile analysis for question-set restricted to just hypothetical failing students.

Alternate Grade Specifications

End of Spring Semester Grades

I reran all models in the main text using students' grades at the end of Spring semester as the DV of choice. My results were largely consistent, though they were impacted some by reduced power relative to the main-text analyses. As with total end-of-year GPA, I found no direct effect of teacher mindset on student grades (4608 students nested within 122 teachers): b =-0.12 [-.34, .094], t(109.81) = -1.11, p = .27; and no moderation by prior GPA (1401 students nested within 30 teachers): b = -0.0069 [-0.074, 0.060], t(1394.76) = -0.20, p = .84. In my SEM models (3835 students nested within 122 teachers), I found only marginal evidence for an indirect effect for teacher mindset predicting student grades through student entity theorizing: -0.40 [-0.90, 0.093], p = .11, while finding no significant evidence for an indirect effect through either measure of student perceptions of their teachers. See Figure S4 for path-coefficients. Finally, in a causal mediation framework, I again found evidence for the mediating effects of student entity theorizing on the relationship between teacher mindset and grades (4188 students nested within 122 teachers): average causal mediation effect = -0.039 [-0.062, -0.02], p < .001; and again found evidence for mediation through student perception of teacher mindset beliefs (3932 students nested within 122 teachers): average causal mediation effect = -0.015 [-0.029, 0.00], p = .004.



Figure S4. Path diagram for SEM analyses using Spring-semester grades.

Imputed Grades

To address the decrease in sample-size from using just end of Spring semester grades, I reran all models again using Spring semester grades when available, and otherwise using the post-intervention grades used in the main text. My results were largely consistent. As with total end-of-year GPA, I found no direct effect of teacher mindset on student grades (5457 students nested within 139 teachers): b = -0.10 [-.32, .11], t(128.47) = -0.94, p = .35; and no moderation by prior GPA (1403 students nested within 30 teachers): b = -0.0075 [-0.075, 0.060], t(1396.77) = -0.22, p = .83. In my SEM models (4511 students nested within 138 teachers), I again found marginal evidence for an indirect effect for teacher mindset predicting student grades through student entity theorizing: -0.35 [-0.72, 0.023], p = .066, while finding no significant evidence for

an indirect effect through either measure of student perceptions of their teachers. See Figure S5 for path-coefficients. Finally, in a causal mediation framework, I again found evidence for the mediating effects of student entity theorizing on the relationship between teacher mindset and grades (4917 students nested within 138 teachers): average causal mediation effect = -0.027 [-0.051, -0.01], p = .014; and again found evidence for mediation through student perception of teacher mindset beliefs (4622 students nested within 138 teachers): average causal mediation effect = -0.014 [-0.026, 0.00], p = .038.



Figure S5. Path diagram for SEM analyses using imputed grades.

Models Comparing Teachers with True Growth Mindsets to Those with Entity Theories

In an SEM framework, comparing teachers with true growth mindsets with those with entity theories (3309 students nested within 101 teachers), I found no evidence for an indirect effect of teacher mindset on end-of-year grades mediated through student perceptions of teacher mindset, -0.008 [-0.094, 0.077], p = .85; through student perceptions of teacher effort beliefs, 0.008 [-0.086, 0.10], p = .87, and marginal evidence for mediation through student's own mindset beliefs, 0.41 [-0.083, 0.91], p = .10. See Figure S6 for path-coefficients.



Figure S6. Path diagram for SEM analyses comparing teachers with true growth mindsets against those with entity theories.

Models Comparing Teachers with False Growth Mindsets to Those with Entity Theories

I also compared teachers with false growth mindsets to those with entity theories of intelligence. As with total end-of-year GPA, I found no direct effect of teacher mindset on student grades (4163 students nested within 102 teachers): b = -0.032 [-.33, .13], t(94.13) = -0.26, p = .84. In my SEM models (3456 students nested within 101 teachers), I found no

evidence for mediation through student mindsets (indirect effect = -0.011 [-0.50, 0.48], p = .97); through student beliefs about teacher's ability beliefs (indirect effect = 0.093 [-0.12, 0.31], p = .40); or through student beliefs about teacher's effort beliefs (indirect effect = 0.001 [-.042, 0.043], p = .97). See Figure S7 for path-coefficients



Figure S7. Path diagram for SEM analyses comparing teachers with true growth mindsets against those with entity theories.

Correlations Between Subscales and the Nomological Net



Figure S8. Correlations between all measures in Study 2 with the Effort Subscale of the False Growth Mindset Measure. Coefficients are printed below the diagonal, and all correlations with p-values > .05 (holm-corrected for multiple tests) are indicated with an X above the diagonal. FGM.E = False Growth Mindset - Effort Subscale, LOC = Locus of Control, PWE = Protestant Work Ethic, IPT = Implicit Person Theory, GM = Growth Mindset, LOT = Dispositional Optimism, MLQ = Meaning in Life.



Figure S9. Correlations between all measures in Study 2 with the Strategy Subscale of the False Growth Mindset Measure. Coefficients are printed below the diagonal, and all correlations with p-values > .05 (holm-corrected for multiple tests) are indicated with an X above the diagonal. FGM.S = False Growth Mindset - Strategy Subscale, LOC = Locus of Control, PWE = Protestant Work Ethic, IPT = Implicit Person Theory, GM = Growth Mindset, LOT = Dispositional Optimism, MLQ = Meaning in Life.

Prediction of Profile Membership in the Six-Profile Solution

In addition to the three-profile solution in the main text, I additionally ran prediction models using the next-best-fitting solution, which fit six profiles. The smallest profile size of the six-profile solution (Profile 2, 1.9% of the sample) was below my threshold of 10% of the sample, but it otherwise fit the data somewhat better than my primary three-profile solution, as Table 7 in the main text demonstrates. Within the six-profile solution, I again was able to identify a false-growth-mindset profile similar to that of the three-profile solution (Profile 4, 10.6% of the sample): one that was near-ceiling in believing in one's own self-efficacy, in the Protestant Work Ethic, in support for meritocracy, in just-world beliefs, in the idea of personal changeability, and in grit, while being generally more politically conservative and with more entity-like beliefs about intelligence. See Figure S10 for the parameters of all six profiles.



Figure S10. Six-profile latent profile analysis solution. PWE = Protestant Work Ethic; LOT = Dispositional optimism; LOC = Locus of control; IPT = Implicit person theory; GM = Growth mindset. Error bars indicate 95% CIs.

I again find that the false growth mindset scale predicts membership in this profile well: (n = 2,317): OR = 1.054 [1.042, 1.066], $X^2(1) = 86.27$, p < .001, McFadden's pseudo-R² = .076. A first-quartile false growth mindset score predicted a 7.5% chance of belonging to this profile, while a median score predicted a 11.4% chance of belonging to this profile and a third-quartile score predicted a 14.0% chance of belonging to this profile (32% higher than the base-rate of membership in this profile, which was 10.6% of the total sample).

Table S1.

Fit statistics for non-parametric multi-level latent profile analyses - restricted to responses about hypothetical students

# of Level 1 Profiles	# of Level 2 Profiles	Paramet ers	LL	AIC	BIC	aBIC	Entropy	Smallest Profile Proportion
2	1	86	-7787.252	15746.505	16066.169	15793.42	1.00	0.09868
2	2	110	-7734.45	15688.9	16097.773	15748.909	0.867	0
2	3	134	-7499.961	15267.922	15766.003	15341.023	0.945	0
2	4	158	-7354.513	15025.026	15612.316	15111.22	0.723	0
2	5	182	-7349.581	15063.163	15739.662	15162.449	0.948	0
3	1	86	-7531.193	15234.387	15554.051	15281.302	0.895	0.20724
3	2	89	-7531.193	15240.386	15571.202	15288.939	0.587	0
3	3	92	-7531.193	15246.386	15588.353	15296.575	0.458	0
3	4	95	-7531.193	15252.386	15605.504	15304.212	0.401	0
3	5	98	-7531.193	15258.386	15622.655	15311.849	0.408	0
4	1	108	-7443.403	15102.806	15504.245	15161.723	0.915	0.07566
4	2	112	-7443.403	15110.806	15527.113	15171.906	0.727	0
4	3	116	-7443.403	15118.805	15549.98	15182.087	0.71	0
4	4	120	-7443.403	15126.806	15572.849	15192.27	0.631	0
4	5	124	-7443.402	15134.805	15595.716	15202.451	0.651	0
5	1	130	-7358.175	14976.349	15459.563	15047.268	0.925	0.04605
5	2	135	-7399.026	15068.051	15569.85	15141.698	0.688	0
5	3	140	-7372.24	15024.481	15544.865	15100.855	0.691	0
5	4	145	-7399.251	15088.501	15627.47	15167.604	0.591	0
5	5	150	-7346.91	14993.821	15551.375	15075.651	0.64	0

Note: LL = Log-likelihood, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, aBIC = Adjusted Bayesian Information Criterion

Table S2.

Fit statistics for non-parametric multi-level latent profile analyses - restricted to responses about hypothetical failing students

# of Level 1 Profiles	# of Level 2 Profiles	Paramet ers	LL	AIC	BIC	aBIC	Entropy	Smallest Profile Proportion
2	1	40	-4866.611	9813.223	9961.904	9835.044	0.998	0.08553
2	2	42	-4866.611	9817.223	9973.338	9840.135	0.613	0
2	3	44	-4866.611	9821.223	9984.772	9845.226	0.428	0
2	4	46	-4866.611	9825.223	9996.206	9850.317	0.336	0
2	5	48	-4866.611	9829.223	10007.64	9855.408	0.532	0
3	1	54	-4680.09	9468.18	9668.9	9497.639	1.00	0.08553
3	2	57	-4680.09	9474.18	9686.051	9505.275	0.632	0
3	3	60	-4680.09	9480.18	9703.202	9512.912	0.515	0
3	4	63	-4680.09	9486.18	9720.353	9520.549	0.457	0
3	5	66	-4680.09	9492.18	9737.504	9528.185	0.415	0
4	1	68	-4581.839	9299.678	9552.436	9336.774	0.902	0.08553
4	2	72	-4581.839	9307.677	9575.303	9346.956	0.671	0
4	3	76	-4581.839	9315.678	9598.172	9357.138	0.848	0
4	4	80	-4581.839	9323.678	9621.04	9367.321	0.815	0
4	5	84	-4581.839	9331.678	9643.908	9377.502	0.857	0
5	1	82	-4514.609	9193.218	9498.014	9237.951	0.889	0.08553
5	2	87	-4514.609	9203.219	9526.6	9250.68	0.859	0
5	3	92	-4514.609	9213.218	9555.185	9263.407	0.595	0
5	4	97	-4514.609	9223.218	9583.77	9276.135	0.713	0
5	5	102	-4514.609	9233.219	9612.356	9288.863	0.553	0
6	1	96	-4474.389	9140.779	9497.614	9193.15	0.905	0.02632
6	2	102	-4474.389	9152.778	9531.915	9208.423	0.684	0
6	3	108	-4474.389	9164.778	9566.217	9223.695	0.57	0

6	4	114	-4474.389	9176.779	9600.52	9238.969	0.544	0
6	5	120	-4474.39	9188.78	9634.823	9254.244	0.502	0

Note: LL = Log-likelihood, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, aBIC = Adjusted Bayesian Information Criterion

Fixed Effects						
	Estimate	SE	df	t	р	
Intercept	2.56	0.078	129.32	33.00	< .001	
False Growth Mindset Dummy	-0.10	0.11	128.55	-0.91	.37	
Random Effect	S					
		Variance	SD			
Math Teacher ID	Intercept	0.36	0.60			
Residual		1.21	1.10			

Table S3. *Regression output for direct relationship between teacher false growth mindset and student grades*

Table S4. *Regression output for relationship between teacher false growth mindset and student grades moderated by prior-semester grades*

Fixed Effects					
	Estimate	SE	df	t	p
Intercept	0.38	0.088	79.45	4.28	< .001
False Growth Mindset Dummy	-0.089	0.15	57.91	-0.61	.54
Prior-Semester Grades	0.83	0.020	1,399	41.36	< .001
Interaction	0.00029	0.031	1,399	0.009	.99
Random Effects					
		Variance	SD		
Math Teacher ID	Intercept	0.079	0.28		
Residual		0.41	0.64		

	Dependent variable:			
	Just World Beliefs	Meritocracy Support		
	(1)	(2)		
False Growth Mindset	0.306***	0.049**		
	(0.272, 0.339)	(0.015, 0.082)		
	p = 0.000	p = 0.005		
Locus of Control	0.244***	0.158***		
	(0.200, 0.289)	(0.112, 0.203)		
	p = 0.000	p = 0.000		
Self-Efficacy	0.040	0.051		
	(-0.016, 0.095)	(-0.005, 0.107)		
	p = 0.164	p = 0.077		
Free Will	0.091***	0.130***		
	(0.045, 0.137)	(0.084, 0.177)		
	p = 0.0002	p = 0.00000		

Protestant Work Ethic	0.374***	0.416***
	(0.323, 0.425)	(0.364, 0.468)
	p = 0.000	p = 0.000
Grit	0.035	0.038
	(-0.020, 0.090)	(-0.017, 0.093)
	p = 0.208	p = 0.176
Implicit Person Theory	-0.058**	-0.075***
	(-0.099, -0.017)	(-0.116, -0.034)
	p = 0.006	p = 0.0004
Growth Mindset	-0.159***	-0.114***
	(-0.185, -0.134)	(-0.140, -0.088)
	p = 0.000	p = 0.000
Optimism	0.063***	-0.044*
	(0.028, 0.098)	(-0.080, -0.009)
	p = 0.0005	p = 0.015
Politics	0.011	0.035***
	(-0.008, 0.031)	(0.015, 0.054)
	p = 0.244	p = 0.0005
Constant	1.112***	1.626***

(0.842, 1.382)	(1.354, 1.899)
p = 0.000	p = 0.000

Observations	2,317	2,317
R ²	0.613	0.506
Adjusted R ²	0.611	0.504
Residual Std. Error (df = 2306)	0.817	0.824
F Statistic (df = 10; 2306)	364.813***	236.481***

Note:

*p<0.05; **p<0.01; ***p<0.001