

Supplementary Material

for Equitable Shifts in Youth Resilience? Distinguishing Normative Changes and Pandemic Effects on Academic Self-Efficacy and Cognitive Reappraisal

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Table 1*Number of Respondents by Cohort and Wave.*

Variable	N	T1	T2	T3	T4
Pre-pandemic, N	13372	9627.0	9111.0	9061.0	7786.0
Pre-pandemic, NA%	-	28.0	31.9	32.2	41.8
During-pandemic, N	14935	10584.0	8037.0	10102.0	8409.0
During-pandemic, NA%	-	29.1	46.2	32.4	43.7

Note. NA = missing values.**Table 2***Dropout Analysis. Comparison of Respondents by Completion of all Waves.*

Variable	<i>T1 – T4completed</i>			<i>T2 – T4missing</i>			t	d
	N	M	SD	N	M	SD		
Gender (1=female)	7007	0.49	0.50	13204	0.50	0.50	1.27	0.02
Aboriginal (1=yes)	7007	0.03	0.18	13204	0.06	0.25	10.64	0.14
Non-eng. bground (1=yes)	7007	0.24	0.43	13204	0.24	0.43	-0.64	-0.01
Parental educ.level	6480	1.36	0.85	11637	1.30	0.86	-5.15	-0.08
School SES (IOED)	7007	4.68	1.62	13204	4.53	1.81	-5.83	-0.08
School area (ARIA)	7007	0.46	0.86	13204	0.50	0.87	3.19	0.05
Academic Self-efficacy T1	6804	3.11	0.82	12715	3.04	0.86	-5.98	-0.09
Cognitive Reappraisal T1	6855	2.53	0.89	12823	2.48	0.92	-3.51	-0.05
Anxiety T1	6894	1.87	1.09	12924	1.95	1.08	4.65	0.07
Peer Belonging T1	6849	2.93	0.95	12816	2.85	0.99	-5.30	-0.08
Teacher Support T1	6796	2.18	0.56	12713	2.14	0.58	-4.22	-0.06

Table 2 compares those who responded in all four waves (“T1-T4 completed”) to those who responded only in the first wave (“T2-T4 missing”) in the full sample. Out of those who responded in T1, 85.0% responded in some subsequent wave and 34.7% in all subsequent waves. As shown in Table 2, four-wave respondents differed from one-wave (T1) respondents in several factors. Four-wave respondents had higher parental education level ($t=-5.15$, $d=-.08$) and were less likely to have Aboriginal or Torres Islander status ($t=10.64$, $d=.14$). In addition, they reported higher scores on academic self-efficacy ($t=-5.98$, $d=-.09$) and cognitive reappraisal ($t=-3.51$, $d=-.05$) at baseline, and less problems with anxiety ($t=4.65$, $d=.07$) as well as higher peer belonging ($t=5.30$, $d=.08$) and teacher support ($t=4.22$, $d=.06$) than the one-wave respondents. Examining the same comparisons separately in the pre-pandemic and during-pandemic cohorts, in Table 3 and Table 4, we can see that the patterns were similar across both cohorts. Taken together, the dropout rates and patterns of missing data seemed not to differ across the cohorts.

Table 3*Dropout Analysis for the Pre-Pandemic Cohort.*

Variable	<i>T1 – T4completed</i>			<i>T2 – T4missing</i>			t	d
	N	M	SD	N	M	SD		
Gender (1=female)	3883	0.49	0.50	5744	0.50	0.50	0.29	0.01
Aboriginal (1=yes)	3883	0.03	0.17	5744	0.06	0.24	7.46	0.15
Non-eng. bground (1=yes)	3883	0.23	0.42	5744	0.24	0.42	0.24	0.00
Parental educ.level	3543	1.35	0.86	4933	1.28	0.88	-3.83	-0.08
School SES (IOED)	3883	4.61	1.64	5744	4.52	1.80	-2.68	-0.06
School area (ARIA)	3883	0.48	0.86	5744	0.56	0.93	4.46	0.09
Academic Self-efficacy T1	3838	3.10	0.86	5637	3.03	0.92	-3.90	-0.08
Cognitive Reappraisal T1	3851	2.52	0.90	5671	2.48	0.93	-2.43	-0.05
Anxiety T1	3851	1.90	1.13	5667	1.95	1.13	2.38	0.05
Peer Belonging T1	3834	2.96	0.98	5639	2.88	1.04	-3.63	-0.07
Teacher Support T1	3833	2.14	0.58	5632	2.09	0.62	-3.54	-0.07

Table 4*Dropout Analysis for the During-Pandemic Cohort.*

Variable	<i>T1 – T4completed</i>			<i>T2 – T4missing</i>			t	d
	N	M	SD	N	M	SD		
Gender (1=female)	3124	0.48	0.50	7460	0.50	0.50	1.55	0.03
Aboriginal (1=yes)	3124	0.03	0.18	7460	0.07	0.25	7.33	0.14
Non-eng. bground (1=yes)	3124	0.25	0.43	7460	0.24	0.43	-1.31	-0.03
Parental educ.level	2937	1.38	0.84	6704	1.31	0.85	-3.83	-0.08
School SES (IOED)	3124	4.75	1.58	7460	4.54	1.82	-6.02	-0.12
School area (ARIA)	3124	0.45	0.84	7460	0.46	0.82	0.79	0.02
Academic Self-efficacy T1	2966	3.12	0.77	7078	3.04	0.81	-4.77	-0.10
Cognitive Reappraisal T1	3004	2.54	0.87	7152	2.48	0.92	-2.66	-0.06

Table 5
Scales and Items used in the Study.

Scale	Items
Academic self-efficacy	Even if the work in school is hard, I can learn it.
	I am certain I can learn the skills taught in school this year.
	If I have enough time, I can do a good job on all my school work.
Cognitive Reappraisal	When I want to feel happier about something, I change the way I'm thinking about it.
	When I want to feel less bad (e.g. sad, angry or worried), I change the way that I'm thinking about it.
	When I'm worried about something, I make myself think about it in a different way that helps me feel better.
Anxiety symptoms	I worry a lot about mistakes that I make.
	I worry a lot about things at home.
	I worry a lot about things at school.
	I worry about things.
Teacher support	I get along well with most of my teachers.
	If I need extra help, I will receive it from my teachers.
	Most of my teachers are interested in my well-being.
	Most of my teachers really listen to what I have to say.
	Most of my teachers treat me fairly.
Peer belonging	I feel part of a group of friends that do things together.
	I feel that I usually fit in with other kids around me.
	When I am with other kids my age, I feel I belong.

Table 6
Intercorrelations among Key Variables.

Variable	2	3	4	5	6	7	8	9	10
1 Gender	-.07	.01	-.01	-.03	.07	.02	.07	-.05	.10
2 Age		-.05	-.03	.04	-.01	.01	.00	.01	.00
3 Parental educ. level			.41	-.19	.13	.02	-.08	.09	.07
4 School SES (IOED)				-.31	.12	.06	-.12	.12	.06
5 School area (ARIA)					-.11	-.01	.06	-.09	-.08
6 Academic Self-efficacy						.46	-.31	.44	.61
7 Cognitive Reappraisal							-.34	.39	.44
8 Anxiety								-.40	-.30
9 Peer Belonging									.42
10 Teacher Support									

Note. Full sample with complete cases, N=16 555. Variables 6-11 measured at T1.

Table 7*Measurement Invariance for Academic Self-Efficacy and Cognitive Reappraisal across Cohorts and Time.*

Model	X2	df	CFI	RMSEA	SRMR	Decision
Academic Self-Efficacy						
Config (cohort)	1222.094	102	0.989	0.028	0.017	Accept
Metric (cohort)	1225.964	104	0.989	0.028	0.018	Accept
Scalar (cohort)	1255.952	106	0.989	0.028	0.018	Accept
Config (time)	456.303	88	0.996	0.017	0.013	Accept
Metric (time)	501.031	94	0.996	0.018	0.014	Accept
Scalar (time)	694.998	100	0.994	0.021	0.015	Accept
Strict (time)	1426.965	109	0.987	0.029	0.018	Reject
Cognitive Reappraisal						
Config (cohort)	2119.356	102	0.984	0.037	0.017	Accept
Metric (cohort)	2120.853	104	0.984	0.037	0.017	Accept
Scalar (cohort)	2156.464	106	0.984	0.037	0.017	Accept
Config (time)	372.497	88	0.998	0.015	0.012	Accept
Metric (time)	401.727	94	0.998	0.015	0.013	Accept
Scalar (time)	447.580	100	0.997	0.016	0.013	Accept
Strict (time)	2201.675	109	0.983	0.037	0.017	Reject

Measurement invariance

As for Academic Self-efficacy and Cognitive Reappraisal, latent measurement models were formed and the adequacy of the measurement models was tested with a series of confirmatory factor analyses. In longitudinal cohort data, there are two kinds of invariance to be tested. First, we tested invariance over time, keeping the parameters fixed between cohorts. Second, we tested invariance between cohorts, keeping the parameters fixed across time. Given that the chi-square test is known to be sensitive to sample size, testing was based on fit indices. To evaluate change in fit between nested models, the following criteria were used: change in $CFI < .01$, and change in $RMSEA < .015$ (Cheung & Rensvold, 2002). Results are shown in Tables 5. For both outcomes, scalar invariance was accepted. Thus, strong measurement invariance was shown over time as well as across cohorts. Thus, we could constrain the factor loadings and item intercepts equal across time and cohort in the following growth models.

Table 8*Model Fit Analysis for Alternative Growth Patterns by Cohort.*

Model	<i>Pre – pandemic</i>				<i>During – pandemic</i>			
	AIC	BIC	CFI	RMSEA	AIC	BIC	CFI	RMSEA
Academic Self-Efficacy								
No growth	245482	245692	0.95	0.05	242697	242910	0.95	0.05
Linear	243957	244190	0.98	0.03	240850	241086	0.99	0.03
Quadratic	244023	244256	0.98	0.04	241017	241253	0.98	0.03
Linear month-specific	243894	244126	0.98	0.03	240828	241064	0.99	0.03
Cognitive Reappraisal								
No growth	245208	245418	0.98	0.04	251115	251328	0.98	0.04
Linear	244325	244558	1.00	0.02	250099	250334	0.99	0.03
Quadratic	244519	244752	0.99	0.02	250429	250664	0.99	0.03
Linear month-specific	244316	244549	1.00	0.02	250047	250282	0.99	0.02

Note. N = 13361 (Pre-pandemic cohort) and 14879 (During-pandemic cohort).**Table 9***Model Fit Analysis for Testing Cohort Differences in Latent Growth Estimates.*

	<i>Invariant parameters</i>			<i>Model fit</i>			
	Slope	Var(slope)	Cov(I,S)	AIC	BIC	CFI	RMSEA
Academic Self-Efficacy							
Model 1	x	x	x	476457	476902	0.976	0.030
Model 2	x		x	476445	476898	0.976	0.030
Model 3			x	476438	476900	0.976	0.030
Model 4				476359	476829	0.977	0.030
Cognitive Reappraisal							
Model 1	x	x	x	485628	486073	0.992	0.019
Model 2	x		x	485629	486082	0.992	0.020
Model 3			x	485615	486077	0.992	0.019
Model 4				485577	486047	0.99	

Table 10*Model Fit Analysis for Demographic Covariates Predicting Outcome Slopes*

Model	<i>Invariant parameters</i>			<i>Model fit</i>			
	Sex	Nesb	Pedu	AIC	BIC	CFI	RMSEA
Academic Self-Efficacy							
Model 1	x	x	x	476347	476800	0.977	0.029
Model 2		x	x	476349	476810	0.977	0.029
Model 3		x		476347	476808	0.977	0.029
Model 4			x	476346	476808	0.977	0.029
Model 5				476348	476826	0.977	0.030
Cognitive Reappraisal							
Model 1	x	x	x	485584	486038	0.992	0.019
Model 2		x	x	485576	486038	0.992	0.019
Model 3		x		485586	486048	0.992	0.019
Model 4			x	485586	486047	0.992	0.019
Model 5				485579	486058	0.992	0.019

Note. Nesb = Non-English Background, Pedu=Parental education level**Table 11***Model fit Analysis for Covariates Predicting Outcome Slopes.*

	<i>Invariant parameters</i>			<i>Model fit</i>			
	PB	EE	ANX	AIC	BIC	CFI	RMSEA
Academic Self-Efficacy							
Model1	x	x	x	406684	407237	0.971	0.031
Model2		x	x	406680	407240	0.971	0.031
Model3	x		x	406683	407244	0.971	0.031
Model4	x	x		406681	407241	0.971	0.031
Model5				406681	407258	0.971	0.031
Cognitive Reappraisal							
Model1	x	x	x	419222	419766	0.991	0.018
Model2		x	x	419223	419775	0.991	0.018
Model3	x		x	419212	419765	0.991	0.018
Model4	x	x		419220	419772	0.991	0.018
Model5				419214			

Table 12*Adherence to Pre-registration*

Component	Section	Pre-registration	Deviation
Measured variables	M12	Multiple-item measures described below are identical across waves. For all of them, the response items range from 1 ‘disagree a lot’ to 5 ‘agree a lot.’ Perseverance is measured using a 4-item scale with a sample item ‘I keep at my school work until I am done with it.’	Perseverance was omitted from the study outcomes due to inconsistencies in measurement across years identified after accessing the data. The response scale differed during the years, ranging from ‘Almost always’ to ‘Almost never’ in years 2016-2018 and from ‘All of the time’ to ‘None of the time’ in years 2019-2022’. Probably related to these inconsistencies, we identified a significant cohort difference in baseline both in mean and in standard deviation, which made cohort comparison unreliable (during-pandemic: M=2.79, SD=0.70, pre-pandemic: M=2.49, SD=0.92, t=-25.35, d=-0.36). In addition, measurement invariance testing across cohorts did not indicate a good model fit (CFI=0.948, SRMR=0.042)). We concluded not to consider cohort comparison in perseverance reliable for analysis.
Introduction	I1	More specifically, the study focuses on academic resilience factors, namely on academic self-efficacy, perseverance, and positive appraisal (emotion regulation). These noncognitive outcomes relate to resilience in three ways.	Perseverance was omitted from the study outcomes (see above). Thus, the introduction in the manuscript was made conceptually clearer. Instead of framing the outcomes as ‘academic resilience factors’, we discuss the outcomes as such (academic self-efficacy and cognitive reappraisal).
Statistical models	AP6	Multilevel modeling will account for the nested structure of the data (individuals in schools). /// Continuing with the specified growth models (one for each outcome), we will estimate slope variances, intercept-slope covariances, and intra-class correlations in individual and school level and test the group (cohort) differences in these to examine whether the pandemic widened the differences between individuals and schools (E3).	Multilevel modeling was not conducted due to issues with model convergence, and thus, the planned school-level analyses are missing. However, all models were specified with adjusting standard errors for the non-independence of observations due to a hierarchical data structure (students clustered in schools)

Figure 1

Cognitive Reappraisal Trajectories by Levels of Teacher Support. Cohort Comparison.

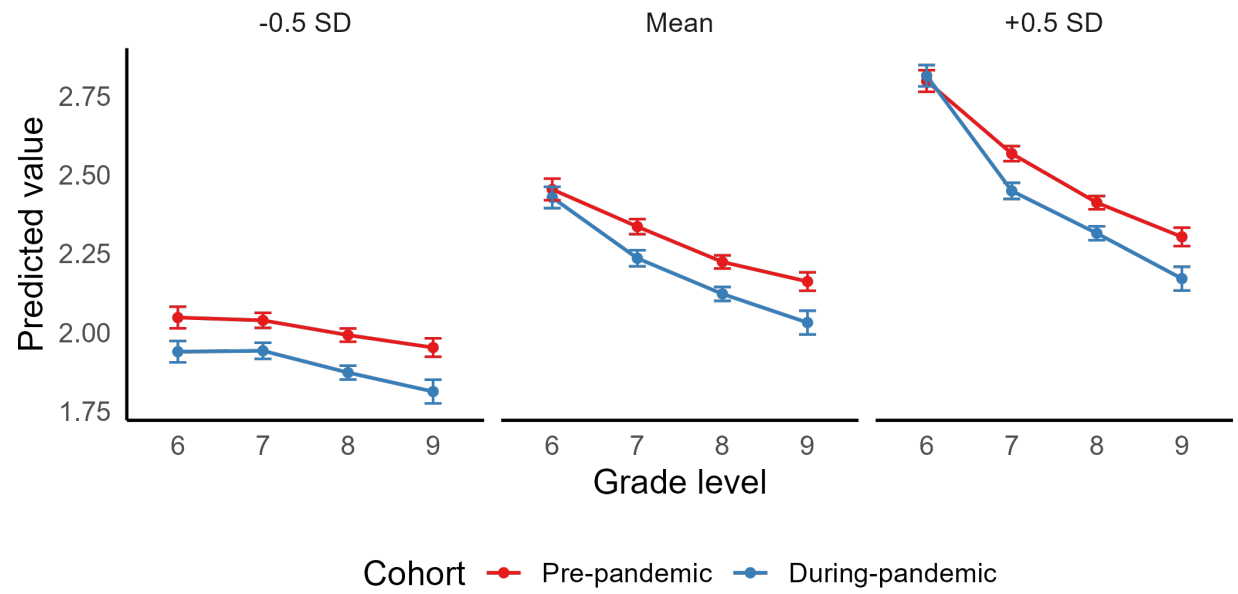


Figure 2
Raw Mean Trajectories by Outcome. Cohort Comparison.

