Online Supplement for:

Growth, fixed and mixed mindsets: Mindset system profiles in foreign language learners and

their role in engagement and achievement

Authors' note:

These online appendices are to be posted on the journal website and the Open Science

Framework (OSF).

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Appendix 1 – Supplementary Tables

Table S1

Engagement CFA: Standardized factor loadings and standard error

Items	Factor loading (Standard error)
Engagement1	0.814(0.031)
Engagement2	0.786(0.03)
Engagement3	0.803(0.03)
Engagement4	0.820(0.027)
Engagement5	0.859(0.024)
Engagement6	0.625(0.046)
Engagement7	0.798(0.041)
Engagement8	0.730(0.039)
Engagement9	0.881(0.018)
Engagement10	0.814(0.031)

Table S2

Standardized factor loadings (λ; target loadings are in bold in grey boxes) and standard error (SE) for the ESEM solution

Item	λ (SE)						
	Mindset	Perf_Apr Goals	Perf_Avoid Goals	Mastery Goals	Anxiety	Reappraisal	Persistence
Mindset1	**-0.471(0.085)**	0.164(0.068)	0.084(0.093)	-0.078(0.092)	0.115(0.079)	0.127(0.08)	0.132(0.081)
Mindset2	**-0.562(0.073)**	0.127(0.064)	-0.08(0.076)	-0.125(0.091)	0.127(0.068)	0.045(0.081)	-0.023(0.076)
Mindset3	**-0.593(0.08)**	0.08(0.064)	0.016(0.072)	-0.048(0.084)	-0.032(0.075)	-0.147(0.084)	0.084(0.06)
Mindset4	**0.546(0.07)**	0.053(0.079)	-0.039(0.08)	0.107(0.097)	0.19(0.068)	0.098(0.094)	0.011(0.064)
Mindset5	**0.782(0.061)**	0.059(0.05)	0.12(0.071)	-0.092(0.084)	0.004(0.063)	-0.009(0.063)	0.119(0.07)
Mindset6	**0.831(0.056)**	0.115(0.047)	0.065(0.065)	-0.136(0.075)	-0.015(0.06)	0.083(0.065)	0.072(0.065)
Goal1	-0.003(0.041)	**0.883(0.035)**	-0.051(0.051)	-0.098(0.045)	-0.002(0.039)	0.027(0.039)	0.053(0.036)
Goal2	-0.035(0.038)	**0.920(0.027)**	-0.035(0.038)	-0.011(0.041)	-0.022(0.034)	-0.001(0.035)	-0.051(0.036)
Goal3	0.015(0.079)	**0.556(0.07)**	0.145(0.074)	0.163(0.085)	-0.023(0.082)	0.036(0.081)	-0.015(0.067)
Goal4	0.029(0.043)	**0.834(0.036)**	-0.001(0.049)	0.031(0.056)	-0.035(0.047)	-0.058(0.05)	0.009(0.05)
Goal5	-0.009(0.046)	**0.837(0.05)**	-0.003(0.045)	0(0.071)	-0.013(0.045)	0.011(0.058)	-0.022(0.046)
Goal6	-0.046(0.092)	**0.450(0.082)**	0.279(0.08)	0.111(0.091)	0.021(0.083)	0.031(0.095)	0.172(0.079)
Goal7	-0.005(0.053)	-0.085(0.054)	**0.774(0.051)**	-0.057(0.06)	0.169(0.053)	0.003(0.062)	0.072(0.053)
Goal8	0.048(0.075)	-0.134(0.073)	**0.790(0.066)**	0.017(0.082)	0.105(0.089)	0.014(0.082)	-0.044(0.067)
Goal9	-0.032(0.068)	0.092(0.066)	**0.648(0.068)**	0.004(0.078)	0.065(0.079)	0.088(0.076)	-0.104(0.076)
Goal10	0.09(0.06)	0.073(0.059)	**0.676(0.068)**	0.1(0.066)	-0.069(0.058)	-0.105(0.059)	-0.125(0.058)
Goal11	-0.002(0.067)	0.017(0.057)	**0.328(0.064)**	-0.134(0.088)	0.322(0.06)	-0.092(0.076)	0.061(0.074)
Goal12	0.144(0.065)	0.131(0.056)	**0.642(0.075)**	0.064(0.067)	-0.058(0.066)	-0.097(0.062)	-0.071(0.053)
Goal13	0.005(0.045)	-0.053(0.039)	0.056(0.041)	**0.708(0.07)**	0.002(0.042)	0.038(0.045)	0.201(0.063)
Goal14	0.045(0.054)	-0.004(0.041)	0.005(0.045)	**0.884(0.072)**	0.038(0.043)	-0.021(0.048)	-0.083(0.058)
Goal15	-0.004(0.065)	-0.017(0.042)	0.039(0.056)	**0.710(0.107)**	0.002(0.051)	0.131(0.078)	0.006(0.068)
Goal16	-0.003(0.059)	0.119(0.047)	0.009(0.047)	**0.649(0.082)**	-0.027(0.052)	0.019(0.064)	0.127(0.06)
Goal17	0(0.068)	-0.013(0.063)	0.006(0.066)	**0.625(0.109)**	0.032(0.064)	0.11(0.07)	-0.044(0.079)
Goal18	-0.046(0.056)	0.072(0.05)	-0.07(0.053)	**0.647(0.078)**	-0.054(0.05)	0.003(0.068)	0.133(0.064)
Anxi1	-0.064(0.052)	-0.048(0.049)	0.043(0.057)	-0.049(0.065)	**0.748(0.05)**	0.088(0.054)	-0.029(0.062)
Anxi2	-0.068(0.06)	0.016(0.052)	0.112(0.076)	-0.021(0.075)	**0.613(0.062)**	-0.117(0.067)	0.004(0.059)
Anxi3	0.002(0.068)	0.053(0.059)	0.274(0.077)	-0.116(0.085)	**0.472(0.067)**	0.03(0.068)	-0.064(0.071)
Anxi4	-0.081(0.052)	0.001(0.043)	-0.03(0.057)	0.054(0.046)	**0.858(0.053)**	0.014(0.046)	0(0.046)
Anxi5	-0.006(0.068)	0.002(0.057)	0.269(0.087)	0.044(0.085)	**0.470(0.076)**	-0.133(0.072)	0.037(0.072)
Anxi6	-0.032(0.072)	0.102(0.065)	-0.036(0.079)	0.055(0.082)	**-0.619(0.089)**	-0.041(0.074)	-0.017(0.07)
Anxi7	0.018(0.053)	0.082(0.04)	-0.042(0.049)	0.089(0.058)	**-0.805(0.041)**	-0.076(0.049)	0.062(0.042)
Anxi8	-0.01(0.048)	-0.099(0.038)	0.127(0.043)	-0.088(0.047)	**-0.918(0.034)**	0.089(0.044)	0.011(0.043)
Anxi9	-0.108(0.078)	0.073(0.07)	0.201(0.077)	-0.068(0.104)	**-0.469(0.072)**	0.148(0.088)	0.014(0.073)
Anxi10	-0.347(0.085)	0.049(0.071)	0.177(0.091)	-0.114(0.128)	**-0.432(0.097)**	0.133(0.09)	-0.035(0.092)
Reappr1	0.125(0.071)	-0.12(0.059)	0.178(0.06)	0.056(0.086)	-0.08(0.062)	**0.509(0.093)**	0.11(0.069)
Reappr 2	-0.066(0.052)	0.024(0.053)	-0.037(0.06)	-0.018(0.071)	0.007(0.051)	**0.787(0.074)**	0.02(0.048)
Reappr 3	-0.053(0.051)	-0.053(0.047)	-0.017(0.062)	0.089(0.074)	-0.075(0.055)	**0.696(0.072)**	0.042(0.053)
Reappr 4	0.035(0.065)	0.118(0.06)	-0.103(0.066)	0.222(0.085)	0.073(0.07)	**0.430(0.088)**	-0.059(0.07)
Reappr 5	0.209(0.063)	0.073(0.057)	-0.146(0.058)	-0.015(0.084)	-0.106(0.063)	**0.576(0.087)**	-0.005(0.06)
persist 1	0.051(0.055)	0.021(0.038)	-0.052(0.041)	-0.074(0.062)	0.187(0.044)	0.011(0.047)	**-0.733(0.062)**
persist 2	0.11(0.042)	0.033(0.044)	-0.049(0.045)	0.038(0.053)	0.141(0.048)	0.069(0.048)	**0.799(0.053)**
persist 3	0.084(0.044)	-0.02(0.028)	0.048(0.039)	-0.102(0.05)	0.03(0.035)	0.05(0.045)	**-0.803(0.053)**
persist 4	0.003(0.038)	-0.026(0.03)	-0.045(0.043)	0.036(0.055)	-0.063(0.038)	0.013(0.045)	**0.857(0.04)**
persist 5	0.073(0.033)	0.025(0.029)	-0.032(0.037)	-0.017(0.051)	0.04(0.038)	0.059(0.036)	**0.909(0.042)**

Table S3

Post-hoc analysis of profile differences on all indicator variables (4-profile solution)

	Profile 1	Profile 2	Profile 3	Profile 4
% of participants	19.7%	7.3%	22.2%	50.9%
Growth (vs. fixed) mindsets	0.30[b]	0.04[b]	–0.57[a]	0.13[b]
Mastery Goal	0.62[c]	–2.06[a]	–0.74[b]	0.38[c]
Performance approach	–0.75[a]	–0.58[a]	–0.33[a]	0.52[b]
Performance avoidance	–1.21[a]	0.04[b]	0.08[b]	0.43[b]
Persistent	0.67[c]	–2.25[a]	–0.72[b]	0.38[c]
Reappraisal	0.51[c]	–1.10[a]	–0.59[b]	0.21[c]
Language Anxiety	–0.76[a]	0.80[c]	0.12[b]	0.13[b]

Note. [abc]Values with different superscripts in the same row represent significantly different values ($p < .05$). In the 4-profile solution, two profiles reflect very small differences in shape (the relative pattern of profiles 2 and 3 are similar, but differ slightly in elevation) and the other two profiles reflect small changes in overall (profiles 1 and 4 showed no significant difference on most indicator variables).

Table S4

One-way ANOVAs and post-hoc mean comparisons among the three profiles on fixed mindset and growth mindset items (using z-score).

	Fixed	Growth	Mixed		
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*F*	*p*
Fixed mindsets	0.33 (0.96)[a]	–0.40(1.10)[b]	0.04 (0.94)[a]	5.88	.003
Growth mindsets	–0.53(0.71)[b]	0.16 (0.77)[a]	0.12 (0.74)[a]	7.42	.001

Note. [ab]Values with different superscripts in the same row represent significantly different values ($p < .05$)

Table S5

Post-hoc analysis of profile differences all indicator variables (3-profile solution)

Profile name	Fixed	Growth	Mixed	Post-hoc tests		
				Fixed vs. Growth	Fixed vs. Mixed	Growth vs. Mixed
	M(SD)	*M(SD)*	*M(SD)*	*p*	*p*	*p*
Growth mindsets	–0.40(0.89)[a]	0.33(0.93)[b]	0.03(0.83)[b]	<.001	.003	.108
Mastery goal	–1.30(0.87)[a]	0.57(0.56)[c]	0.29(0.58)[b]	<.001	<.001	.030
Performance approach	–0.48(0.72)[a]	–0.82(0.88)[a]	0.47(0.77)[b]	.081	<.001	<.001
Performance avoidance	0.07(0.81)[b]	–1.17(0.67)[a]	0.39(0.70)[c]	<.001	.021	<.001
Persistence	–1.36(0.90)[a]	0.62(0.46)[c]	0.29(0.58)[b]	<.001	<.001	.008
Reappraisal	–0.88(0.76)[a]	0.55(0.67)[c]	0.14(0.80)[b]	<.001	<.001	.004
Language anxiety	0.37(0.89)[b]	–0.72(0.82)[a]	0.12(0.90)[b]	<.001	.201	<.001

Appendix 2 – Research Materials

Language mindsets

Instruction: Please rate how much you personally agree or disagree with these statements. There is no right or wrong answer. We are interested in your ideas.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree

*1. To a large extent, a person's biological factors (e.g., brain structures) determine his or her abilities to learn new languages.
*2. It is difficult to change how good you are at foreign languages.
*3. Many people never do well in foreign languages even if they try hard because they lack natural language intelligence.
4. You can always change your foreign language ability.
5. In learning a foreign language, if you work hard at it, you will always get better.
6. How good you are at using a foreign language will always improve if you really work at it.

Note. * These items are fixed mindset items. All items are randomized in the survey.

Classroom Achievement Goal Orientation (Elliot & Church, 1997)

Instruction: Think about your experience in your [language] class. Indicate the extent to which you believe each item to be true of you.

1	2	3	4	5	6	7
Not at all true of me		Not really true of me		Somewhat true of me		Very true of me

Performance-approach goals
1. It is important to me to do better than the other students in [the language] class.
2. My goal in [the language] is to get a better grade than most of the students.
3. I am striving to demonstrate my ability relative to others in this class.
4. I am motivated by the thought of outperforming my peers.
5. It is important to me to do well compared to others in [the language] class.
6. I want to do well in [the language] to show my ability to my family, friends, advisors, or others.
Performance-avoidance goals
7. I often think to myself, "What if I do badly in [the language]?"
8. I worry about the possibility of getting a bad grade in [the language].
9. My fear of performing poorly in [the language] is often what motivates me.
10. I just want to avoid doing poorly in this class.
11. I'm afraid that if I ask my TA or instructor a dumb question, they might not think I'm very smart.
12. My goal for this class is to avoid performing poorly.
Mastery goals
13. I want to learn as much as possible from this class.
14. It is important for me to understand the content of this course as thoroughly as possible.

15. I hope to have gained a broader and deeper knowledge of [the language] when I am done with this class.
16. I desire to completely master the material presented in my [the language] class.
17. In a language class, I prefer course material that arouses my curiosity, even if it is difficult to learn.
18. In a language class, I prefer course material that really challenges me so I can learn new things.

Note. [the language] is replaced with the target language (e.g., German, Chinese) for each participant. All items are randomized in the survey.

Persistence in Foreign Language Learning

Instruction: Thinking about your experiences in your language class, please choose the alternative that best describes your situation.

1 = Never   2= Rarely   3 = Sometimes 4 = Often 5 =Always

*1. I would like to give up learning [the language].
2. I intend to study [the language]a gain in the future, even if it's not required by my job or program of study.
*3. I intend to stop learning [the language] as soon as I can.
4. I want to keep on learning [the language] as long as possible.
5. I want to continue to learn [the language] after I finish this course

Note. * These are negatively worded items. [the language] is replaced with the target language (e.g., German, Chinese) for each participant. All items are randomized in the survey.

Language Anxiety *(Gardner, 2004)*

Instruction: Choose the answer that best corresponds to your experiences in your current [language] class

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

1. I never feel quite sure of myself when I am speaking in our [the language] class.
2. It embarrasses me to volunteer answers in our [language] class.
3. It worries me that other students in my class seem to speak [the language] better than I do.
4. I get nervous when I am speaking in my [the language] class.
5. I am sometimes anxious that the other students in class will laugh at me when I speak [the language].
*6. I don't get anxious when I have to answer a question in my [the language] class.
*7. I feel confident when asked to speak in my [the language] class.
*8. I am calm whenever I have to speak in my [the language] class.
*9. I don't understand why other students feel nervous about speaking [the language] in class.
*10. Students who claim to get nervous in [the language] class are just making excuses.

Note. * These are negatively worded items. [the language] is replaced with the target language (e.g., German, Chinese) for each participant. All items are randomized in the survey.

Positive Reappraisal in Language Learning
Instruction: Below are some questions about how you feel in your language studies. Please select the answer that best fits how you feel in the context of your current [language] class.

1	2	3	4	5
Not at all		Neutral		A lot

1.When I am faced with a bad situation in my [the language] studies, it helps to find a different way of looking at things.
2.Even when everything seems to be going wrong in my [the language] studies, I can usually find a bright side to the situation.
3.In my [the language] studies, I can find something positive, even in the worst situations.
4.When things don't go how I want in my [the language] studies I try to be patient.
5. When things don't go my way in my [the language] studies, I am able to adapt to the situation.

Note. [the language] is replaced with the target language (e.g., German, Chinese) for each participant. All items are randomized in the survey.

Foreign Language Course Engagement (adapted from Salmela-Aro & Upadyaya, 2014)
Instruction: Thinking about your experiences in your language class, please choose the alternative that best describes your situation (estimation from the previous month)

1 = Never   2= Rarely   3 = Sometimes 4 = Often 5 =Always

1. In my [the language] studies I am bursting with energy.
2. I find my [the language] coursework full of meaning and purpose.
3. Time flies when I am studying [the language].
4. I feel strong and vigorous when I am studying [the language].
5. I am enthusiastic about my [the language] studies.
6. When I am working in my [the language] studies, I forget everything else around me.
7. My [the language] coursework inspires me.
8. I feel like going to my [the language] course.
9. I feel happy when I am working intensively at [the language] study.

Note. [the language] is replaced with the target language (e.g., German, Chinese) for each participant. All items are randomized in the survey.

Self-perception of foreign language competence

	Not at all	Poorly	Average	Well	Very well
I write [the language] …	1	2	3	4	5
I read [the language] …	1	2	3	4	5
I understand spoken [the language] ...	1	2	3	4	5
I speak [the language] …	1	2	3	4	5

Note. [the language] is replaced with the target language (e.g., German, Chinese) for each participant.

Appendix 3 – Analysis code

1. Measurement Model: exploratory structural equation modelling model (ESEM)

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VARIABLE:  USEVAR ARE Mindset1-Mindset6 Anxiety1-Anxiety10  Repsl1- Repsl5   Goal_1- Goal_18
Read Write Speak Understand Persist1-Persist5
MISSING ARE ALL (-999);
ANALYSIS:
      ROTATION = TARGET (orthogonal);          ESTIMATOR = MLR;          ITERATIONS = 1500;
MODEL:
growth BY  Mindset1 Mindset2 Mindset3  Mindset4  Mindset5  Mindset6
      Goal_1~0 Goal_2~0 Goal_3~0 Goal_4~0 Goal_5~0 Goal_6~0  Goal_7~0 Goal_8 Goal_9~0 Goal_10~0
      Goal_11~0 Goal_12~0  Goal_13~0 Goal_14~0 Goal_15~0 Goal_16~0 Goal_17~0 Goal_18~0
      Anxiety1~0 Anxiety2~0 Anxiety3~0 Anxiety4~0 Anxiety5~0
      Anxiety6~0 Anxiety7~0 Anxiety8~0 Anxiety9~0 Anxiety10~0
      Repsl1~0 Repsl2~0  Repsl3~0   Repsl4~0  Repsl5~0
      Persist1~0 Persist2~0 Persist3~0 Persist4~0 Persist5~0 (*1);
apr BY Goal_1 Goal_2 Goal_3 Goal_4 Goal_5 Goal_6
      Mindset1~0 Mindset2~0 Mindset3~0  Mindset4~0  Mindset5~0  Mindset6~0
      Goal_7~0 Goal_8 Goal_9~0 Goal_10~0 Goal_11~0 Goal_12~0
      Goal_13~0 Goal_14~0 Goal_15~0 Goal_16~0 Goal_17~0 Goal_18~0
      Anxiety1~0 Anxiety2~0 Anxiety3~0 Anxiety4~0 Anxiety5~0
      Anxiety6~0 Anxiety7~0 Anxiety8~0 Anxiety9~0 Anxiety10~0
      Repsl1~0 Repsl2~0  Repsl3~0   Repsl4~0  Repsl5~0
      Persist1~0 Persist2~0 Persist3~0 Persist4~0 Persist5~0 (*1);
avo BY Goal_7 Goal_8 Goal_9 Goal_10 Goal_11 Goal_12
       Goal_1~0 Goal_2~0 Goal_3~0 Goal_4~0 Goal_5~0 Goal_6~0
      Goal_13~0 Goal_14~0 Goal_15~0 Goal_16~0 Goal_17~0 Goal_18~0
      Mindset1~0 Mindset2~0 Mindset3~0  Mindset4~0  Mindset5~0  Mindset6~0
      Anxiety1~0 Anxiety2~0 Anxiety3~0 Anxiety4~0 Anxiety5~0
      Anxiety6~0 Anxiety7~0 Anxiety8~0 Anxiety9~0 Anxiety10~0
      Repsl1~0 Repsl2~0  Repsl3~0   Repsl4~0  Repsl5~0
      Persist1~0 Persist2~0 Persist3~0 Persist4~0 Persist5~0 (*1);
mas BY Goal_13 Goal_14 Goal_15 Goal_16 Goal_17 Goal_18
      Goal_1~0 Goal_2~0 Goal_3~0 Goal_4~0 Goal_5~0 Goal_6~0
      Goal_7~0 Goal_8 Goal_9~0 Goal_10~0 Goal_11~0 Goal_12~0
      Mindset1~0 Mindset2~0 Mindset3~0  Mindset4~0  Mindset5~0  Mindset6~0
      Anxiety1~0 Anxiety2~0 Anxiety3~0 Anxiety4~0 Anxiety5~0
      Anxiety6~0 Anxiety7~0 Anxiety8~0 Anxiety9~0 Anxiety10~0
      Repsl1~0 Repsl2~0  Repsl3~0   Repsl4~0  Repsl5~0
      Persist1~0 Persist2~0 Persist3~0 Persist4~0 Persist5~0 (*1);
anxeity BY Anxiety1 Anxiety2 Anxiety3 Anxiety4 Anxiety5  Anxiety6 Anxiety7 Anxiety8 Anxiety9 Anxiety10
      Goal_1~0 Goal_2~0 Goal_3~0 Goal_4~0 Goal_5~0 Goal_6~0  Goal_7~0 Goal_8 Goal_9~0 Goal_10~0
      Goal_11~0 Goal_12~0  Goal_13~0 Goal_14~0 Goal_15~0 Goal_16~0 Goal_17~0 Goal_18~0
       Mindset1~0 Mindset2~0 Mindset3~0  Mindset4~0  Mindset5~0  Mindset6~0
       Repsl1~0 Repsl2~0  Repsl3~0   Repsl4~0  Repsl5~0
       Persist1~ 0 Persist2~0 Persist3~0 Persist4~0 Persist5~0 (*1);
reapl BY Repsl1  Repsl2  Repsl3   Repsl4   Repsl5
       Anxiety1~0 Anxiety2~0 Anxiety3~0 Anxiety4~0 Anxiety5~0
       Anxiety6~0 Anxiety7~0 Anxiety8~0 Anxiety9~0 Anxiety10~0
      Goal_1~0 Goal_2~0 Goal_3~0 Goal_4~0 Goal_5~0 Goal_6~0  Goal_7~0 Goal_8 Goal_9~0 Goal_10~0
      Goal_11~0 Goal_12~0  Goal_13~0 Goal_14~0 Goal_15~0 Goal_16~0 Goal_17~0 Goal_18~0
       Mindset1~0 Mindset2~0 Mindset3~0  Mindset4~0  Mindset5~0  Mindset6~0
       Persist1~0 Persist2~0 Persist3~0 Persist4~0 Persist5~0 (*1);
persist BY   Persist1 Persist2 Persist3 Persist4 Persist5
       Anxiety1~0 Anxiety2~0 Anxiety3~0 Anxiety4~0 Anxiety5~0
       Anxiety6~0 Anxiety7~0 Anxiety8~0 Anxiety9~0 Anxiety10~0
      Goal_1~0 Goal_2~0 Goal_3~0 Goal_4~0 Goal_5~0 Goal_6~0  Goal_7~0 Goal_8 Goal_9~0 Goal_10~0
      Goal_11~0 Goal_12~0  Goal_13~0 Goal_14~0 Goal_15~0 Goal_16~0 Goal_17~0 Goal_18~0
       Mindset1~0 Mindset2~0 Mindset3~0  Mindset4~0  Mindset5~0  Mindset6~0
       Repsl1~0 Repsl2~0  Repsl3~0   Repsl4~0  Repsl5~0   (*1);
OUTPUT: SAMPSTAT RESIDUAL STDYX mod res svalues; !MODINDICES(3.84) TECH1 TECH4;
SAVEDATA: FILE IS FACTOR.csv; SAVE IS fscores;
```

2. Latent Profile Analysis

```
  VARIABLE:
  CLASSES = C(3);
  USEVARIABLES = growth apr avo mas reapl anxeity persist;
  MISSING ARE ALL (-999);

 ANALYSIS:    TYPE = MIXTURE;
   ESTIMATOR = MLR;

 MODEL:
 %OVERALL%

  %c#1%
       [growth apr avo mas reapl anxeity persist];

  %c#2%
       [growth apr avo mas reapl anxeity persist];

  %c#3%
       [growth apr avo mas reapl anxeity persist];

  !%c#4%
        ![ growth apr avo mas reapl anxeity persist];

 OUTPUT:
   RESIDUAL SAMPSTAT CINTERVAL MOD TECH1 TECH7;
```

3. 3 step - BCH approach -- Outcome Model (with Control Variable)
Step 1 – See Latent Profile Analysis (2)
Step 2 –BCH weights -- save bcweights (using grade as an example)

VARIABLE:
CLASSES = C(3);
USEVARIABLES = growth apr avo mas reapl anxeity persist;
Auxiliary = Grade Experience Competence Gender ESL Level;
MISSING ARE ALL (-999);
ANALYSIS: TYPE = MIXTURE;
          STARTS = 2000 500;
MODEL:
Savedata:
    File IS Grade.dat; SAVE = bchweights;

Step 3 – compare group differences on grade with control variables

VARIABLE:
USEVARIABLES = Grade Experience Competence Gender ESL Level W1-W3 ;
          ! W1-W3 are new variables based on Step 2

CLASSES = C(3);
Training = W1-W3(bch);
MISSING = *;

DATA: FILE IS Grade.dat;   ! Grade.dat is saved from Step 2

 ANALYSIS: TYPE = MIXTURE;
   ESTIMATOR = MLR;   STARTS = 0;
MODEL:
 %OVERALL%
      Grade ON Experience Competence Gender ESL Level;
 %C#1%
        [Grade](a);
 %C#2%
       [Grade](b);
  %C#3%
        [Grade](c);

MODEL CONSTRAINT:
   new(ab, ac, bc);
   ab = a - b;
   ac = a - c;
   bc = b - c;
OUTPUT:
       !TECH1 TECH8 TECH11 TECH14;

4. Predictor Model (R3STEP command)
VARIABLE:

CLASSES = C(3);

USEVARIABLES = growth apr avo mas reapl anxeity persist;

Auxiliary = Experience (R3STEP) Competence (R3STEP) Gender (R3STEP)
             ESL(R3STEP) Level(R3STEP);
MISSING ARE ALL (-999);

ANALYSIS:
  TYPE = MIXTURE;
  ESTIMATOR = MLR;

MODEL:
  %OVERALL%

  %c#1%
       [growth apr avo mas reapl anxeity persist];
  %c#2%
       [growth apr avo mas reapl anxeity persist];
  %c#3%
       [growth apr avo mas reapl anxeity persist];

OUTPUT:
    CINTERVAL RESIDUAL MOD SAMPSTAT TECH1 TECH7;