**On the interplay of motivational characteristics and academic achievement:   
The role of Need for Cognition**

Supplementary Material

Anja Strobel1§, Alexander Strobel2§, Franzis Preckel3, & Ricarda Steinmayr4

1 Department of Psychology, Chemnitz University of Technology, Chemnitz, Germany

2 Faculty of Psychology, Technische Universität Dresden, Dresden, Germany

3 Department of Psychology, University of Trier, Trier, Germany

4 Department of Psychology, Technical University Dortmund, Dortmund, Germany

Author Note

Anja Strobel: https://orcid.org/0000-0002-0313-0615

Alexander Strobel: https://orcid.org/0000-0002-9426-5397

Franzis Preckel: https://orcid.org/0000-0002-5768-8702

Ricarda Steinmayr: https://orcid.org/0000-0002-0294-1045

§ These authors contributed equally to this work.

Correspondence concerning this article should be addressed to Anja Strobel, Department of Psychology, Chemnitz University of Technology, 09120 Chemnitz, Germany. E-mail: anja.strobel@psychologie.tu-chemnitz.de

**Supplementary Methods**

We used *RStudio* (version 2023.6.1.524, Posit Team, 2023) with R (version 4.3.1; R Core Team, 2023) and the R-packages *lavaan* (version 0.6.-15; Rosseel, 2012), *naniar* (version 1.0.0; Tierney & Cook, 2023), *papaja* (version 0.1.0.9997; Aust & Barth, 2018), *psych* (version 2.3.6; Revelle, 2023), and *pwr* (version 1.3-0; Champely, 2020). We also employed the packages *haven* (version 2.5.3; Wickham et al., 2023) and *xlsx* (version 0.6.5; Dragulescu & Arendt, 2020) for reading/writing data, *here* (version 1.0.1; Müller, 2020) for file handling, and *shape* (version 1.4.6; Soetaert, 2021) for figure creation.

**Supplementary Tables**

Table S1 informs about the reliabilities of the variables of interest in the present study. Tables S2-5 provide the intercorrelations of the variables involved in the correlation analyses for grades in the subjects German, Math, Physics, and Chemistry. Results for specific grades can be found in the Supplementary Tables S2-5 with regard to intercorrelations (analogous to Table 1 in the main text) and S6-9 with regard to detailed statistics on these intercorrelations (analogous to Table 2 in the main text).

**Table S1**

*Reliabilities of the variables of interest*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | T1 | | T2 | | Retest |
|  | 𝛼 | 𝜔 | 𝛼 | 𝜔 | *rtt* |
| Grades |  |  |  |  |  |
| Overall |  |  |  |  | .79 |
| German |  |  |  |  | .59 |
| Math |  |  |  |  | .60 |
| Physics |  |  |  |  | .69 |
| Chemistry |  |  |  |  | .76 |
| *Ability Self-Concept* |  |  |  |  |  |
| Overall | .84 | .84 | .84 | .85 | .83 |
| German | .93 | .94 | .92 | .91 | .90 |
| Math | .95 | .95 | .95 | .94 | .85 |
| Physics | .95 | .95 | .96 | .97 | .77 |
| Chemistry | .96 | .96 | .96 | .97 | .81 |
| *Interest* |  |  |  |  |  |
| Overall | .88 | .89 | .87 | .89 | .81 |
| German | .92 | .92 | .91 | .91 | .79 |
| Math | .94 | .93 | .94 | .94 | .80 |
| Physics | .94 | .95 | .94 | .94 | .81 |
| Chemistry | .95 | .94 | .94 | .94 | .80 |
| *Motivational Traits* |  |  |  |  |  |
| Hope for Success | .86 | .87 | .87 | .87 | .72 |
| Fear of Failure | .88 | .88 | .90 | .91 | .75 |
| Need for Cognition | .88 | .88 | .90 | .89 | .88 |

*Note.* *N* = 277 except for Grades (*N* = 276); T1 and T2 = measurement occasions, interval: 53-59 weeks, 𝛼 = Cronbach’s alpha and 𝜔 = MacDonald’s omega are not available for Grades, *rtt* = retest reliability (Spearman rank correlations)

**Table S2**

Robust correlations of the variables in the analyses on German grades

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | T1 intercorrelations | | | | | Self-feedback and cross-domain coupling | | | | | |
|  | ASC1 | INT1 | HFS1 | FOF1 | NFC1 | ΔGRD | ΔASC | ΔINT | ΔHFS | ΔFOF | ΔNFC |
| GRD1 | **.53** | **.46** | **.27** | **-.19** | **.33** | **-.58** | **.17** | .04 | .03 | **-.13** | **.13** |
| ASC1 | — | **.68** | **.17** | **-.15** | **.22** | **.32** | **-.48** | **.31** | -.14 | .12 | -.07 |
| INT1 |  | — | **.15** | -.11 | **.23** | -.05 | .03 | **-.55** | .07 | -.03 | -.03 |
| HFS1 |  |  | — | **-.39** | **.82** | **-.20** | -.07 | -.02 | **-.98** | **.26** | **-.22** |
| FOF1 |  |  |  | — | **-.52** | -.05 | -.11 | -.04 | .04 | **-.27** | **-.21** |
| NFC1 |  |  |  |  | — | **.32** | .13 | -.05 | **.94** | **-.27** | -.19 |
|  |  |  |  |  |  | Correlated change | | | | | |
| ΔGRD |  |  |  |  |  | — | .13 | **.18** | .06 | -.05 | **.20** |
| ΔASC |  |  |  |  |  |  | — | **.44** | -.01 | .02 | .08 |
| ΔINT |  |  |  |  |  |  |  | — | .08 | .04 | .14 |
| ΔHFS |  |  |  |  |  |  |  |  | — | **-.15** | **.49** |
| ΔFOF |  |  |  |  |  |  |  |  |  | — | -.14 |

*Note.* *N* = 276-277; bold-faced coefficients ; GRD = German grades, ASC = Ability Self-Concept German, INT = Interest in German, HFS = Hope for Success, FOF = Fear of Failure, NFC = Need for Cognition, suffix 1 indicates the respective score at measurement occasion 1, Δ denotes the respective change score

**Table S3**

Robust correlations of the variables in the analyses on Math grades

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | T1 intercorrelations | | | | | Self-feedback and cross-domain coupling | | | | | |
|  | ASC1 | INT1 | HFS1 | FOF1 | NFC1 | ΔGRD | ΔASC | ΔINT | ΔHFS | ΔFOF | ΔNFC |
| GRD1 | **.70** | **.58** | **.31** | **-.22** | **.35** | **-.56** | .04 | .00 | -.09 | .02 | **.20** |
| ASC1 | — | **.81** | **.32** | **-.22** | **.32** | .07 | **-.63** | **.22** | .18 | -.03 | -.02 |
| INT1 |  | — | **.35** | **-.21** | **.36** | .08 | **.22** | **-.59** | .06 | -.04 | -.06 |
| HFS1 |  |  | — | **-.39** | **.82** | -.12 | -.03 | -.05 | **-1.02** | **.27** | **-.21** |
| FOF1 |  |  |  | — | **-.52** | -.10 | -.06 | .04 | .06 | **-.27** | **-.21** |
| NFC1 |  |  |  |  | — | .17 | .02 | .16 | **.94** | **-.29** | -.21 |
|  |  |  |  |  |  | Correlated change | | | | | |
| ΔGRD |  |  |  |  |  | — | **.53** | **.45** | .07 | .04 | **.17** |
| ΔASC |  |  |  |  |  |  | — | **.65** | .05 | -.05 | .12 |
| ΔINT |  |  |  |  |  |  |  | — | .14 | .01 | **.22** |
| ΔHFS |  |  |  |  |  |  |  |  | — | **-.15** | **.51** |
| ΔFOF |  |  |  |  |  |  |  |  |  | — | **-.15** |

*Note.* *N* = 276-277; bold-faced coefficients ; GRD = Math grades, ASC = Ability Self-Concept Math, INT = Interest in Math, HFS = Hope for Success, FOF = Fear of Failure, NFC = Need for Cognition, suffix 1 indicates the respective score at measurement occasion 1, Δ denotes the respective change score

**Table S4**

Robust correlations of the variables in the analyses on Physics grades

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | T1 intercorrelations | | | | | Self-feedback and cross-domain coupling | | | | | |
|  | ASC1 | INT1 | HFS1 | FOF1 | NFC1 | ΔGRD | ΔASC | ΔINT | ΔHFS | ΔFOF | ΔNFC |
| GRD1 | **.57** | **.46** | **.27** | **-.17** | **.31** | **-.62** | **.14** | .11 | .03 | -.02 | .09 |
| ASC1 | — | **.83** | **.25** | **-.13** | **.30** | .05 | **-.63** | .17 | .05 | .14 | .08 |
| INT1 |  | — | **.25** | -.10 | **.30** | -.04 | **.31** | **-.51** | .09 | -.19 | -.09 |
| HFS1 |  |  | — | **-.39** | **.82** | .00 | .15 | .08 | **-.98** | **.26** | **-.22** |
| FOF1 |  |  |  | — | **-.52** | .07 | -.08 | .03 | .04 | **-.26** | **-.21** |
| NFC1 |  |  |  |  | — | **.31** | -.10 | .09 | **.89** | **-.27** | -.19 |
|  |  |  |  |  |  | Correlated change | | | | | |
| ΔGRD |  |  |  |  |  | — | **.25** | **.21** | .10 | -.10 | .12 |
| ΔASC |  |  |  |  |  |  | — | **.72** | **.15** | **-.12** | .07 |
| ΔINT |  |  |  |  |  |  |  | — | **.18** | **-.10** | .12 |
| ΔHFS |  |  |  |  |  |  |  |  | — | **-.15** | **.49** |
| ΔFOF |  |  |  |  |  |  |  |  |  | — | **-.15** |

*Note.* *N* = 276-277; bold-faced coefficients ; GRD = Physics grades, ASC = Ability Self-Concept Physics, INT = Interest in Physics, HFS = Hope for Success, FOF = Fear of Failure, NFC = Need for Cognition, suffix 1 indicates the respective score at measurement occasion 1, Δ denotes the respective change score

**Table S5**

Robust correlations of the variables in the analyses on Chemistry grades

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | T1 intercorrelations | | | | | Self-feedback and cross-domain coupling | | | | | |
|  | ASC1 | INT1 | HFS1 | FOF1 | NFC1 | ΔGRD | ΔASC | ΔINT | ΔHFS | ΔFOF | ΔNFC |
| GRD1 | **.55** | **.49** | **.34** | **-.24** | **.36** | **-.67** | .05 | .05 | .11 | -.06 | .11 |
| ASC1 | — | **.84** | **.28** | **-.16** | **.25** | .10 | **-.67** | .16 | -.07 | .05 | -.04 |
| INT1 |  | — | **.24** | -.08 | **.26** | .01 | **.39** | **-.50** | .07 | -.05 | .05 |
| HFS1 |  |  | — | **-.39** | **.82** | -.08 | .10 | .05 | **-.99** | **.26** | **-.22** |
| FOF1 |  |  |  | — | **-.52** | .04 | -.04 | .02 | .05 | **-.27** | **-.21** |
| NFC1 |  |  |  |  | — | .23 | -.03 | .03 | **.91** | **-.27** | -.21 |
|  |  |  |  |  |  | Correlated change | | | | | |
| ΔGRD |  |  |  |  |  | — | **.26** | **.24** | .02 | -.11 | .01 |
| ΔASC |  |  |  |  |  |  | — | **.74** | .13 | -.01 | **.16** |
| ΔINT |  |  |  |  |  |  |  | — | .08 | .01 | **.17** |
| ΔHFS |  |  |  |  |  |  |  |  | — | **-.15** | **.48** |
| ΔFOF |  |  |  |  |  |  |  |  |  | — | **-.14** |

*Note.* *N* = 276-277; bold-faced coefficients ; GRD = Chemistry grades, ASC = Ability Self-Concept Chemistry, INT = Interest in Chemistry, HFS = Hope for Success, FOF = Fear of Failure, NFC = Need for Cognition, suffix 1 indicates the respective score at measurement occasion 1, Δ denotes the respective change score

**Table S6**

Results of latent change score modeling of the interplay of German grades, German ability self-concept, interest in German, and motivational traits

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Criterion | T1 Predictor | *B* | *SE* | *CU.LB* | *CI.UB* | *beta* | *p* |
| ΔGrade | **Grade\*** | **-0.43** | **0.05** | **-0.53** | **-0.33** | **-.58** | **< .001** |
|  | **Ability Self-Concept** | **0.24** | **0.06** | **0.12** | **0.36** | **.32** | **< .001** |
|  | Interest | -0.03 | 0.05 | -0.12 | 0.06 | -.05 | .512 |
|  | **Hope for Success** | **-0.23** | **0.12** | **-0.45** | **0.00** | **-.20** | **.047** |
|  | Fear of Failure | -0.06 | 0.07 | -0.19 | 0.07 | -.05 | .359 |
|  | **Need for Cognition** | **0.23** | **0.08** | **0.07** | **0.38** | **.32** | **.005** |
| ΔAbility Self-Concept | **Grade** | **0.07** | **0.03** | **0.02** | **0.13** | **.17** | **.013** |
|  | **Ability Self-Concept\*** | **-0.21** | **0.04** | **-0.28** | **-0.14** | **-.48** | **< .001** |
|  | Interest | 0.01 | 0.03 | -0.04 | 0.06 | .03 | .683 |
|  | Hope for Success | -0.05 | 0.06 | -0.16 | 0.07 | -.07 | .450 |
|  | Fear of Failure | -0.07 | 0.04 | -0.14 | 0.01 | -.11 | .075 |
|  | Need for Cognition | 0.05 | 0.04 | -0.03 | 0.13 | .13 | .202 |
| ΔInterest | Grade | 0.03 | 0.05 | -0.06 | 0.12 | .04 | .468 |
|  | **Ability Self-Concept** | **0.24** | **0.07** | **0.10** | **0.38** | **.31** | **.001** |
|  | **Interest\*** | **-0.36** | **0.06** | **-0.46** | **-0.25** | **-.55** | **< .001** |
|  | Hope for Success | -0.03 | 0.12 | -0.27 | 0.21 | -.02 | .813 |
|  | Fear of Failure | -0.05 | 0.07 | -0.18 | 0.08 | -.04 | .458 |
|  | Need for Cognition | -0.03 | 0.08 | -0.18 | 0.12 | -.05 | .668 |
| ΔHope for Success | Grade | 0.02 | 0.03 | -0.04 | 0.07 | .03 | .551 |
|  | **Ability Self-Concept** | **-0.07** | **0.03** | **-0.14** | **0.00** | **-.14** | **.037** |
|  | Interest | 0.03 | 0.03 | -0.02 | 0.08 | .07 | .198 |
|  | **Hope for Success\*** | **-0.77** | **0.07** | **-0.92** | **-0.63** | **-.98** | **< .001** |
|  | Fear of Failure | 0.03 | 0.05 | -0.07 | 0.13 | .04 | .552 |
|  | **Need for Cognition** | **0.46** | **0.05** | **0.36** | **0.56** | **.94** | **< .001** |
| ΔFear of Failure | **Grade** | **-0.07** | **0.03** | **-0.14** | **0.00** | **-.13** | **.041** |
|  | Ability Self-Concept | 0.07 | 0.04 | -0.02 | 0.15 | .12 | .141 |
|  | Interest | -0.01 | 0.04 | -0.09 | 0.06 | -.03 | .721 |
|  | **Hope for Success** | **0.21** | **0.08** | **0.06** | **0.36** | **.26** | **.006** |
|  | **Fear of Failure\*** | **-0.21** | **0.07** | **-0.34** | **-0.08** | **-.27** | **.002** |
|  | **Need for Cognition** | **-0.14** | **0.06** | **-0.25** | **-0.02** | **-.27** | **.017** |
| ΔNeed for Cognition | **Grade** | **0.06** | **0.03** | **0.01** | **0.12** | **.13** | **.024** |
|  | Ability Self-Concept | -0.03 | 0.04 | -0.12 | 0.05 | -.07 | .421 |
|  | Interest | -0.01 | 0.03 | -0.08 | 0.05 | -.03 | .715 |
|  | **Hope for Success** | **-0.16** | **0.08** | **-0.32** | **-0.01** | **-.22** | **.038** |
|  | **Fear of Failure** | **-0.15** | **0.06** | **-0.27** | **-0.04** | **-.21** | **.008** |
|  | Need for Cognition\* | -0.09 | 0.06 | -0.20 | 0.02 | -.19 | .120 |

*Note.* = 276-277; coefficients indicate cross-domain coupling and self-feedback (\*); coefficients are unstandardized slopes with their standard errors and 95% confidence intervals ( = lower bound, = upper bound), is the standardized slope and the respective -value; bold-faced coefficients

**Table S7**

Results of latent change score modeling of the interplay of Math grades, Math ability self-concept, interest in Math, and motivational traits

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Criterion | T1 Predictor | *B* | *SE* | *CU.LB* | *CI.UB* | *beta* | *p* |
| ΔGrade | **Grade\*** | **-0.52** | **0.07** | **-0.66** | **-0.37** | **-.56** | **< .001** |
|  | Ability Self-Concept | 0.07 | 0.10 | -0.12 | 0.26 | .07 | .492 |
|  | Interest | 0.07 | 0.08 | -0.08 | 0.22 | .08 | .353 |
|  | Hope for Success | -0.22 | 0.17 | -0.56 | 0.12 | -.12 | .207 |
|  | Fear of Failure | -0.17 | 0.12 | -0.40 | 0.06 | -.10 | .138 |
|  | Need for Cognition | 0.20 | 0.12 | -0.04 | 0.44 | .17 | .099 |
| ΔAbility Self-Concept | Grade | 0.02 | 0.04 | -0.06 | 0.10 | .04 | .581 |
|  | **Ability Self-Concept\*** | **-0.33** | **0.06** | **-0.45** | **-0.20** | **-.63** | **< .001** |
|  | **Interest** | **0.11** | **0.04** | **0.02** | **0.19** | **.22** | **.013** |
|  | Hope for Success | -0.04 | 0.11 | -0.25 | 0.18 | -.03 | .742 |
|  | Fear of Failure | -0.06 | 0.07 | -0.20 | 0.08 | -.06 | .389 |
|  | Need for Cognition | 0.01 | 0.07 | -0.12 | 0.15 | .02 | .844 |
| ΔInterest | Grade | 0.00 | 0.06 | -0.11 | 0.11 | .00 | .974 |
|  | Ability Self-Concept | 0.15 | 0.07 | 0.00 | 0.29 | .22 | .043 |
|  | **Interest\*** | **-0.37** | **0.06** | **-0.49** | **-0.25** | **-.59** | **< .001** |
|  | Hope for Success | -0.07 | 0.15 | -0.35 | 0.22 | -.05 | .655 |
|  | Fear of Failure | 0.05 | 0.10 | -0.14 | 0.24 | .04 | .610 |
|  | Need for Cognition | 0.14 | 0.10 | -0.06 | 0.35 | .16 | .166 |
| ΔHope for Success | Grade | -0.03 | 0.03 | -0.09 | 0.02 | -.09 | .217 |
|  | Ability Self-Concept | 0.07 | 0.04 | -0.01 | 0.14 | .18 | .082 |
|  | Interest | 0.02 | 0.03 | -0.03 | 0.08 | .06 | .442 |
|  | **Hope for Success\*** | **-0.81** | **0.07** | **-0.95** | **-0.67** | **-1.02** | **< .001** |
|  | Fear of Failure | 0.05 | 0.05 | -0.05 | 0.14 | .06 | .351 |
|  | **Need for Cognition** | **0.46** | **0.05** | **0.37** | **0.55** | **.94** | **< .001** |
| ΔFear of Failure | Grade | 0.01 | 0.03 | -0.06 | 0.07 | .02 | .852 |
|  | Ability Self-Concept | -0.01 | 0.05 | -0.11 | 0.09 | -.03 | .825 |
|  | Interest | -0.01 | 0.04 | -0.09 | 0.06 | -.04 | .716 |
|  | **Hope for Success** | **0.22** | **0.08** | **0.07** | **0.38** | **.27** | **.005** |
|  | **Fear of Failure\*** | **-0.21** | **0.07** | **-0.35** | **-0.08** | **-.27** | **.002** |
|  | **Need for Cognition** | **-0.15** | **0.06** | **-0.26** | **-0.03** | **-.29** | **.011** |
| ΔNeed for Cognition | **Grade** | **0.08** | **0.03** | **0.02** | **0.13** | **.20** | **.010** |
|  | Ability Self-Concept | -0.01 | 0.05 | -0.10 | 0.08 | -.02 | .851 |
|  | Interest | -0.02 | 0.04 | -0.10 | 0.05 | -.06 | .579 |
|  | **Hope for Success** | **-0.16** | **0.08** | **-0.31** | **0.00** | **-.21** | **.044** |
|  | **Fear of Failure** | **-0.15** | **0.06** | **-0.26** | **-0.04** | **-.21** | **.008** |
|  | Need for Cognition\* | -0.10 | 0.05 | -0.21 | 0.01 | -.21 | .067 |

*Note.* = 276-277; coefficients indicate cross-domain coupling and self-feedback (\*); coefficients are unstandardized slopes with their standard errors and 95% confidence intervals ( = lower bound, = upper bound), is the standardized slope and the respective -value; bold-faced coefficients

**Table S8**

Results of latent change score modeling of the interplay of Physics grades, Physics ability self-concept, interest in Physics, and motivational traits

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Criterion | T1 Predictor | *B* | *SE* | *CU.LB* | *CI.UB* | *beta* | *p* |
| ΔGrade | **Grade\*** | **-0.45** | **0.05** | **-0.54** | **-0.35** | **-.62** | **< .001** |
|  | Ability Self-Concept | 0.04 | 0.07 | -0.10 | 0.18 | .05 | .580 |
|  | Interest | -0.03 | 0.06 | -0.14 | 0.08 | -.04 | .607 |
|  | Hope for Success | 0.01 | 0.14 | -0.27 | 0.28 | .00 | .965 |
|  | Fear of Failure | 0.10 | 0.08 | -0.06 | 0.26 | .07 | .232 |
|  | **Need for Cognition** | **0.28** | **0.09** | **0.11** | **0.44** | **.31** | **.001** |
| ΔAbility Self-Concept | Grade | 0.10 | 0.05 | 0.00 | 0.19 | .14 | .049 |
|  | **Ability Self-Concept\*** | **-0.45** | **0.09** | **-0.62** | **-0.28** | **-.63** | **< .001** |
|  | **Interest** | **0.19** | **0.07** | **0.06** | **0.33** | **.31** | **.005** |
|  | Hope for Success | 0.21 | 0.15 | -0.09 | 0.50 | .15 | .166 |
|  | Fear of Failure | -0.10 | 0.09 | -0.27 | 0.07 | -.08 | .245 |
|  | Need for Cognition | -0.08 | 0.10 | -0.28 | 0.11 | -.10 | .397 |
| ΔInterest | Grade | 0.08 | 0.05 | -0.02 | 0.17 | .11 | .113 |
|  | Ability Self-Concept | 0.11 | 0.08 | -0.04 | 0.27 | .17 | .146 |
|  | **Interest\*** | **-0.31** | **0.06** | **-0.43** | **-0.19** | **-.51** | **< .001** |
|  | Hope for Success | 0.10 | 0.15 | -0.19 | 0.39 | .08 | .480 |
|  | Fear of Failure | 0.04 | 0.09 | -0.13 | 0.21 | .03 | .664 |
|  | Need for Cognition | 0.08 | 0.10 | -0.12 | 0.27 | .09 | .450 |
| ΔHope for Success | Grade | 0.01 | 0.02 | -0.03 | 0.06 | .03 | .557 |
|  | Ability Self-Concept | 0.02 | 0.04 | -0.06 | 0.10 | .05 | .615 |
|  | Interest | 0.03 | 0.03 | -0.02 | 0.09 | .09 | .232 |
|  | **Hope for Success\*** | **-0.78** | **0.07** | **-0.92** | **-0.64** | **-.98** | **< .001** |
|  | Fear of Failure | 0.03 | 0.05 | -0.07 | 0.13 | .04 | .549 |
|  | **Need for Cognition** | **0.44** | **0.05** | **0.34** | **0.53** | **.89** | **< .001** |
| ΔFear of Failure | Grade | -0.01 | 0.03 | -0.08 | 0.06 | -.02 | .768 |
|  | Ability Self-Concept | 0.06 | 0.05 | -0.03 | 0.15 | .14 | .211 |
|  | Interest | -0.07 | 0.04 | -0.15 | 0.01 | -.19 | .074 |
|  | **Hope for Success** | **0.21** | **0.08** | **0.06** | **0.37** | **.26** | **.006** |
|  | **Fear of Failure\*** | **-0.21** | **0.07** | **-0.34** | **-0.08** | **-.26** | **.002** |
|  | **Need for Cognition** | **-0.14** | **0.06** | **-0.25** | **-0.03** | **-.27** | **.012** |
| ΔNeed for Cognition | **Grade** | 0.04 | 0.03 | -0.02 | 0.09 | .09 | .192 |
|  | Ability Self-Concept | 0.03 | 0.04 | -0.05 | 0.12 | .08 | .460 |
|  | Interest | -0.03 | 0.04 | -0.10 | 0.04 | -.09 | .389 |
|  | **Hope for Success** | **-0.16** | **0.08** | **-0.32** | **-0.01** | **-.22** | **.036** |
|  | **Fear of Failure** | **-0.15** | **0.06** | **-0.26** | **-0.04** | **-.21** | **.007** |
|  | Need for Cognition\* | -0.09 | 0.06 | -0.20 | 0.02 | -.19 | .107 |

*Note.* = 276-277; coefficients indicate cross-domain coupling and self-feedback (\*); coefficients are unstandardized slopes with their standard errors and 95% confidence intervals ( = lower bound, = upper bound), is the standardized slope and the respective -value; bold-faced coefficients

**Table S9**

Results of latent change score modeling of the interplay of Chemistry grades, Chemistry ability self-concept, interest in Chemistry, and motivational traits

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Criterion | T1 Predictor | *B* | *SE* | *CU.LB* | *CI.UB* | *beta* | *p* |
| ΔGrade | **Grade\*** | **-0.43** | **0.04** | **-0.51** | **-0.36** | **-.67** | **< .001** |
|  | Ability Self-Concept | 0.06 | 0.05 | -0.04 | 0.16 | .10 | .235 |
|  | Interest | 0.01 | 0.05 | -0.08 | 0.10 | .01 | .889 |
|  | Hope for Success | -0.09 | 0.10 | -0.28 | 0.11 | -.08 | .368 |
|  | Fear of Failure | 0.04 | 0.07 | -0.09 | 0.17 | .04 | .536 |
|  | **Need for Cognition** | **0.17** | **0.06** | **0.04** | **0.30** | **.23** | **.009** |
| ΔAbility Self-Concept | Grade | 0.03 | 0.05 | -0.06 | 0.13 | .05 | .485 |
|  | **Ability Self-Concept\*** | **-0.44** | **0.08** | **-0.59** | **-0.29** | **-.67** | **< .001** |
|  | **Interest** | **0.23** | **0.06** | **0.11** | **0.35** | **.39** | **< .001** |
|  | Hope for Success | 0.14 | 0.12 | -0.09 | 0.37 | .10 | .241 |
|  | Fear of Failure | -0.05 | 0.09 | -0.21 | 0.12 | -.04 | .593 |
|  | Need for Cognition | -0.03 | 0.08 | -0.19 | 0.13 | -.03 | .730 |
| ΔInterest | Grade | 0.04 | 0.05 | -0.06 | 0.14 | .05 | .445 |
|  | Ability Self-Concept | 0.11 | 0.09 | -0.07 | 0.30 | .16 | .225 |
|  | **Interest\*** | **-0.32** | **0.08** | **-0.48** | **-0.17** | **-.50** | **< .001** |
|  | Hope for Success | 0.07 | 0.14 | -0.20 | 0.33 | .05 | .626 |
|  | Fear of Failure | 0.03 | 0.10 | -0.16 | 0.22 | .02 | .734 |
|  | Need for Cognition | 0.03 | 0.09 | -0.15 | 0.21 | .03 | .773 |
| ΔHope for Success | **Grade** | **0.05** | **0.02** | **0.00** | **0.09** | **.11** | **.033** |
|  | Ability Self-Concept | -0.03 | 0.04 | -0.10 | 0.04 | -.07 | .457 |
|  | Interest | 0.03 | 0.03 | -0.03 | 0.08 | .07 | .397 |
|  | **Hope for Success\*** | **-0.78** | **0.07** | **-0.93** | **-0.63** | **-.99** | **< .001** |
|  | Fear of Failure | 0.04 | 0.05 | -0.06 | 0.14 | .05 | .475 |
|  | **Need for Cognition** | **0.45** | **0.05** | **0.35** | **0.54** | **.91** | **< .001** |
| ΔFear of Failure | Grade | -0.03 | 0.04 | -0.10 | 0.04 | -.06 | .428 |
|  | Ability Self-Concept | 0.02 | 0.05 | -0.08 | 0.12 | .05 | .702 |
|  | Interest | -0.02 | 0.04 | -0.10 | 0.07 | -.05 | .678 |
|  | **Hope for Success** | **0.22** | **0.08** | **0.06** | **0.37** | **.26** | **.005** |
|  | **Fear of Failure\*** | **-0.21** | **0.07** | **-0.34** | **-0.08** | **-.27** | **.001** |
|  | **Need for Cognition** | **-0.14** | **0.06** | **-0.25** | **-0.03** | **-.27** | **.011** |
| ΔNeed for Cognition | **Grade** | 0.04 | 0.03 | -0.01 | 0.10 | .11 | .090 |
|  | Ability Self-Concept | -0.01 | 0.05 | -0.10 | 0.08 | -.04 | .753 |
|  | Interest | 0.02 | 0.04 | -0.06 | 0.09 | .05 | .637 |
|  | **Hope for Success** | **-0.17** | **0.08** | **-0.32** | **-0.01** | **-.22** | **.033** |
|  | **Fear of Failure** | **-0.15** | **0.06** | **-0.27** | **-0.04** | **-.21** | **.008** |
|  | Need for Cognition\* | -0.10 | 0.06 | -0.21 | 0.02 | -.21 | .091 |

*Note.* = 276-277; coefficients indicate cross-domain coupling and self-feedback (\*); coefficients are unstandardized slopes with their standard errors and 95% confidence intervals ( = lower bound, = upper bound), is the standardized slope and the respective -value; bold-faced coefficients

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