**Supplementary material**

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| **Supplementary Table 1**  *Model Fit Indices for the Multilevel CFAs of the Different Models Tested* | | | | | | | |
| Model | Factors | χ² | RMSEA | CFI | TLI | SRMR-w | SRMR-b |
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| Hypothesised nine-factor model | 1. G-Intrinsic 2. L-Intrinsic 3. G-Identified 4. L-Identified 5. G-Introjected 6. L-Introjected 7. G-Extrinsic 8. L-Extrinsic 9. Amotivation | 1873.427(1208, 1143) | .028 | .971 | .968 | .049 | .138 |
| Unidimensional model | 1. All variables | 67356.028 (1208, 1224) | .211 | .649 | .638 | .222 | .502 |
| Two-factor model | 1. Gain-framed messages 2. Loss-framed messages | 45686.636 (1208, 1230) | .173 | .760 | .754 | .126 | .341 |
| Five-factor model (1) | 1. G-Intrinsic and L-Intrinsic 2. G-Identified and L-Identified 3. G-Introjected and L-Introjected 4. G-Extrinsic and L-Extrinsic 5. Amotivation | 45699.061 (1208, 1204) | .175 | .759 | .748 | .153 | .325 |
| Five-factor model (2) | 1. G-Intrinsic and G-Identified 2. G-Extrinsic and G-Introjected 3. L-Intrinsic and L-Identified 4. L-Extrinsic and L-Introjected 5. Amotivation | 9937.970 (1208, 1204) | .077 | .953 | .951 | .064 | .258 |
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| *Note*. χ² of all models was *p* <.001. G= Gain-framed; L= Loss-framed. | | | | | | | |

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| **Supplementary Table 2**  *Factor Loadings for the Teachers’ Engaging Messages Scale* | | |
| Factor | Item | Factor loadings |
| G-Intrinsic | **My teacher tells me that if I work hard…**   1. I will enjoy this subject | .691 |
| 1. I will appreciate new discoveries | .769 |
| 1. I will learn interesting facts | .807 |
| 1. I will have fun doing class work | .733 |
| G-Identified | 1. I will be able to choose what to study | .756 |
| 1. I will be prepared for high-qualified jobs | .765 |
| 1. I will be able to work on what I would like | .813 |
| 1. I will be prepared for my future studies | .810 |
| G-Introjected | 1. I will feel important | .762 |
| 1. I will feel proud of myself | .858 |
| 1. I will feel satisfied | .846 |
| 1. I will feel appreciated | .829 |
| G-Extrinsic | 1. I will have free time | .592 |
| 1. I will receive a reward (sticker, star, etc.) | .542 |
| 1. I will be able to do in class the activities I want | .583 |
| 1. I will receive compliments | .782 |
| L-Intrinsic | **My teacher tells me that unless I work hard …**   1. I will miss the opportunity to understand interesting issues | .651 |
| 1. I will miss the beauty of this subject | .720 |
| 1. I will miss the joy of finishing exercises | .783 |
| 1. I will miss the opportunity to increase my knowledge | .751 |
| L-Identified | 1. I will not get anywhere in life | .735 |
| 1. I will only be able to get low paid jobs | .840 |
| 1. I will have a tough life | .887 |
| 1. I will have to study the less demanded degrees | .843 |
| L-Introjected | 1. I will feel like a failure | .856 |
| 1. I will feel disappointed | .834 |
| 1. I will feel sad | .897 |
| 1. I will feel ashamed | .878 |
| L-Extrinsic | 1. I will get in trouble | .842 |
| 1. I will be punished | .723 |
| 1. I will miss my break | .681 |
| 1. I will get my parents angry | .820 |
| Amotivation | **My teacher tells me that it does not matter if…**   1. I work hard, I will fail anyway | .929 |
| 1. I come to class, I will fail anyway | .945 |
| 1. I do the homework, I will fail anyway | .957 |
| 1. I pay attention in class, I will fail anyway | .957 |
| *Note*. G= Gain-framed; L= Loss-framed. | | |

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| **Supplementary Table 3**  *Factor Loadings for the Échelle de Motivation en Éducation Scale* | | |
| Factor | Item | Factor loadings |
| Intrinsic motivation | **Why do you study?**   1. Because it is a pleasure and satisfaction for me to learn new things. | .791 |
| 1. For the pleasure of discovering new things | .830 |
| 1. For the pleasure of knowing more about the subjects I am attracted to. | .797 |
| 1. Because studying allows me to continue learning many things that interest me | .888 |
| Identified motivation | 1. Because I think that studying will help me in the future | .776 |
| 1. Because it will help me find a job I like. | .805 |
| 1. Because it will help me to make a better career choice | .760 |
| 1. Because studying will make me better at my job | .800 |
| Introjected motivation | 1. To prove to myself that I am capable of finishing my studies | .709 |
| 1. Because passing my studies will make me feel important | .683 |
| 1. To prove to myself that I am an intelligent person | .792 |
| 1. Because I want to prove to myself that I am capable of succeeding in my studies. | .895 |
| External  motivation | 1. Because without secondary I would not be able to find a well-paid job | .275 |
| 1. To be able to get a well-paid job in the future. | .864 |
| 1. Because in the future I want to have a "good life". | .869 |
| 1. To have a better salary in the future | .782 |
| Amotivation | 1. I honestly don't know, I think I'm wasting my time at school. | .872 |
| 1. I used to have good reasons to study, but now I wonder if it is worth continuing. | .711 |
| 1. I don't know why, honestly, I don't care. | .849 |
| 1. I don't know, I don't understand what I do at school. | .927 |

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| **Supplementary Table 4**  *Fit Indices for the Multilevel CFA of the Partially and Fully Mediated ML-SEM Models* | | | | | | | | |
| Model | | Mediation | χ² | RMSEA | CFI | TLI | SRMR-w | SRMR-b |
| 1 | G-intrinsic | Fully mediated | 163.626 (1208, 62) | .037 | .994 | .993 | .034 | .072 |
| Partially mediated | 159.516 (1208, 60) | .037 | .994 | .993 | .033 | .059 |
| 2 | G-Identified | Fully mediated | 101.668 (1208,62) | .023 | .993 | .992 | .039 | .311 |
| Partially mediated | 111.363(1208, 60) | .027 | .991 | .989 | .039 | .210 |
| 3 | G-Introjected | Fully mediated | 406.851 (1208, 62) | .068 | .980 | .977 | .049 | .143 |
| Partially mediated | 429.246 (1208, 60) | .071 | .978 | .974 | .049 | .144 |
| 4 | G-Extrinsic | Fully mediated | 193.288 (1208,62) | .042 | .980 | .977 | .048 | .244 |
| Partially mediated | 198.626 (1208, 60) | .044 | .979 | .975 | .048 | .213 |
| 5 | L-Intrinsic | Fully mediated | 169.319 (1202, 62) | .038 | .993 | .992 | .036 | .114 |
| Partially mediated | 175.448 (1202, 60) | .040 | .993 | .992 | .033 | .105 |
| 6 | L-Identified | Fully mediated | 83.510 (1202, 62) | .017 | .998 | .998 | .035 | .471 |
| Partially mediated | 86.569 (1202, 60) | .019 | .998 | .998 | .032 | .338 |
| 7 | L-Introjected | Fully mediated | 697.683 (1208, 62) | .092 | .950 | .942 | .085 | .205 |
| Partially mediated | Not identified | | | | | |
| 8 | L-Extrinsic | Fully mediated | 238.915 (1202, 62) | .049 | .979 | 976 | .060 | .218 |
| Partially mediated | 246.314 (1202, 60) | .051 | .978 | .973 | .058 | .224 |
| 9 | Amotivation | Fully mediated | 108.988 (1208, 62) | .025 | .998 | .998 | .040 | .105 |
| Partially mediated | 118.040 (1208, 60) | .028 | .998 | .997 | .039 | .106 |
| Note: CFA = confirmatory factor analysis; χ² = Chi-square; RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index; SRMRw = standardized root mean square residual within level; SRMRb = standardized root mean square residual between level; G= Gain-framed; L= Loss-framed. | | | | | | | | |

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| **Supplementary** **Table 5**  *Unstandardized Direct Effects from the ML-SEMs* | | | | | | | |
| Model | Level | Path 1 | | | Path 2 | | |
| TEM 🡪 MTL | | | MTL 🡪 Academic performance | | |
| ß | *SE* | 95% CI | ß | *SE* | 95% CI |
|  | | | | | | | |
| G-Intrinsic | L2 | 0.33 | 0.09 | .18, .48 | 0.42 | 0.25 | .01, .83 |
| L1 | 0.58 | 0.04 | .51, .65 | 0.15 | 0.03 | .10, .19 |
| L-Intrinsic | L2 | 0.25 | 0.22 | -.11, .61 | 0.54 | 0.26 | .12, .96 |
| L1 | 0.41 | 0.04 | .34, .48 | 0.13 | 0.03 | .09, .17 |
| G-Identified | L2 | 0.11 | 0.12 | -.08, .11 | -1.82 | 3.42 | -7.44, 3.80 |
| L1 | 0.48 | 0.05 | .40, .55 | 0.14 | 0.03 | .08, .19 |
| L-Identified | L2 | 0.05 | 0.13 | -.17, .26 | -13.93 | 40.21 | -80.07, 52.21 |
| L1 | 0.10 | 0.04 | .04, .15 | 0.13 | 0.04 | .08, .19 |
| G-Introjected | L2 | 0.36 | 0.09 | .21, .51 | -0.65 | 0.49 | -1.45, .16 |
| L1 | 0.41 | 0.04 | .35,.48 | 0.04 | 0.04 | -.03, .10 |
| L-Introjected | L2 | 0.73 | 0.21 | .39, 1.07 | -0.76 | 0.48 | -1.55, .03 |
| L1 | 0.34 | 0.03 | .28, .39 | 0.03 | 0.03 | -.02, .09 |
| G-Extrinsic | L2 | 0.18 | 0.07 | .07, .29 | -1.54 | 1.18 | -3.48, .41 |
| L1 | 0.20 | 0.03 | .14, .26 | 0.16 | 0.08 | .03, .28 |
| L-Extrinsic | L2 | 0.14 | 0.06 | .04, .24 | -3.18 | 1.98 | -6.43, .07 |
| L1 | 0.04 | 0.02 | .02, .06 | 0.15 | 0.08 | .03, .28 |
| Amotivation | L2 | 0.32 | 0.08 | .20, .45 | -0.77 | 0.24 | -1.15, -.38 |
| L1 | 0.30 | 0.04 | .24, .36 | -0.13 | 0.02 | -.17, -.10 |
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| *Note.* TEM= Teachers’ engaging messages; MTL=Motivation to learn; G= Gain-framed; L= Loss-framed; L2=Teacher level; L1=Student level. | | | | | | | |