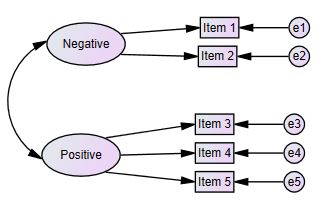
**Figure 1.** The diagram of the correlated factor model for the conscientiousness measurement

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*Note.* Negative = the negative factor. Positive stands for the positive factor; Items 1-5 = the 5 perseverance items in PISA 2012; Item 1 = Give up easily; Item 2 = Put off difficult problems; Item 3 = Remain interested; Item 4 = Continue to perfection; Item 5 = Exceed expectations; e1-e5 = errors of the indicators.

**Table 1.** The grouping of the 68 countries/regions participating in PISA 2012

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Southern Europe** | **The Middle East** | **Latin America** | **North America/**  **Oceania** | **Western Europe** | **Former Communist Countries** | **Nordic Countries** | **East Asia** | **Southeast Asia** |
| Albania | Israel | Argentina | Canada | Austria | Bulgaria | Denmark | Shanghai-China | Malaysia |
| Croatia | Jordan | Brazil | United States of America | Belgium | Czech Republic | Finland | Chinese Taipei | Thailand |
| Greece | Qatar | Chile | Connecticut | France | Hungary | Iceland | Hong Kong-China | Singapore |
| Montenegro | United Arab Emirates | Colombia | Florida | Germany | Poland | Norway | Macao-China | Indonesia |
| Portugal | Turkey | Peru | Massachusetts | Liechtensteina | Romania | Sweden | Korea | Vietnam |
| Serbia |  | Uruguay |  | Luxembourg | Russian Federation |  | Japan |  |
| Slovenia |  | Costa Rica |  | Netherlands | Slovak Republic |  |  |  |
|  |  | Mexico |  | Switzerland | Perm |  |  |  |
|  |  |  |  | Ireland | Estonia |  |  |  |
|  |  |  |  | UK | Latvia |  |  |  |
|  |  |  |  | Italy | Lithuania |  |  |  |
|  |  |  |  | Spain | Kazakhstan |  |  |  |

*Note.* aThe country was excluded from the analyses in the current study due not having enough participants for a random sample of 500 people.

**Table 2.** Means, Standard Deviations, and Zero-Order Correlations of Overall Math, Overall Truancy, and Perseverance, within each of the 9 groups

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Group & Variables | *N1* | *N2* | *Usage* | *M* | *SD* | *Math* | *Truancy* | *Perseverance* |
| **G1** | 3500 | 3450 | 98.57% |  |  |  |  |  |
| Math |  |  |  | .41 | .23 | 1 |  |  |
| Truancy |  |  |  | 1.39 | .52 | -.096\*\* | 1 |  |
| Perseverance |  |  |  | .23 | 1.06 | .102\*\* | -.117\*\* | 1 |
| **G2** | 3000 | 2940 | 98% |  |  |  |  |  |
| Math |  |  |  | .34 | .22 | 1 |  |  |
| Truancy |  |  |  | 1.49 | .56 | -.045\* | 1 |  |
| Perseverance |  |  |  | .33 | 1.08 | .192\*\* | -.131\*\* | 1 |
| **G3** | 4000 | 3928 | 98.2% |  |  |  |  |  |
| Math |  |  |  | .33 | .20 |  |  |  |
| Truancy |  |  |  | 1.41 | .50 | -.098\*\* | 1 |  |
| Perseverance |  |  |  | .27 | .95 | .155\*\* | -.153\*\* | 1 |
| **G4** | 3500 | 3410 | 97.43% |  |  |  |  |  |
| Math |  |  |  | .50 | .24 |  |  |  |
| Truancy |  |  |  | 1.30 | .43 | -.191\*\* | 1 |  |
| Perseverance |  |  |  | .25 | .99 | .206\*\* | -.166\*\* | 1 |
| **G5** | 5500 | 5278 | 95.96% |  |  |  |  |  |
| Math |  |  |  | .54 | .24 |  |  |  |
| Truancy |  |  |  | 1.23 | .39 | -.162\*\* | 1 |  |
| Perseverance |  |  |  | -.07 | .97 | .157\*\* | -.103\*\* | 1 |
| **G6** | 6000 | 5917 | 98.62% |  |  |  |  |  |
| Math |  |  |  | .47 | .23 | 1 |  |  |
| Truancy |  |  |  | 1.40 | .54 | -.174\*\* | 1 |  |
| Perseverance |  |  |  | .18 | .98 | .078\*\* | -.075\*\* | 1 |
| **G7** | 2500 | 2417 | 96.68% |  |  |  |  |  |
| Math |  |  |  | .51 | .23 |  |  |  |
| Truancy |  |  |  | 1.29 | .42 | -.210\*\* | 1 |  |
| Perseverance |  |  |  | -.12 | .99 | .332\*\* | -.193\*\* | 1 |
| **G8** | 3000 | 2968 | 98.93% |  |  |  |  |  |
| Math |  |  |  | .65 | .25 |  |  |  |
| Truancy |  |  |  | 1.12 | .28 | -.214\*\* | 1 |  |
| Perseverance |  |  |  | -.04 | .85 | .192\*\* | -.084\*\* | 1 |
| **G9** | 2500 | 2486 | 99.44% |  |  |  |  |  |
| Math |  |  |  | .43 | .27 |  |  |  |
| Truancy |  |  |  | 1.26 | .41 | -.217\*\* | 1 |  |
| Perseverance |  |  |  | .30 | .83 | .114\*\* | -.103\*\* | 1 |

*Note.* *N1* = the sample size including cases with missing values on either overall math performance, overall truancy, or both; *N2* = the sample size after cases with missing values on either overall math performance, overall truancy, or both were dropped; *Usage* = *N2*/*N1*, or the percentage of participants in *N1* kept in *N2*. G1 = Southern Europe; G2 = The Middle East; G3 = Latin America; G4 = North America/Oceania; G5 = Western Europe; G6 = Former Communist Countries; G7 = Nordic Countries; G8 = East Asia; G9 = Southeast Asia; *Math* = the average of the scores of the math problems, whose scale metrics ranged from 0 (no credit) to 2 (full credit); *Truancy* = the average of scores of the truancy items, the scale metrics of which ranged from 0 (None) to 4 (five times or more). Higher scores are associated with better math performance, or higher level of truancy.

\**p* < .05, two-tailed; \*\**p* < .01, two-tailed.

**Table 3.** Summary of unstandardized latent means for the constrained and the partial invariant models of the conscientiousness measurement

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | *The constrained model* | | | *The partial invariant model* | | | *ΔM* |
| Group | *M* | *SE*  *(p)* | *Ranking* | *M* | *SE*  *(p)* | *Ranking* |  |
| **The Negative factor** |  |  |  |  |  |  |  |
| Southern Europe | 0 | 0  (999.000) | 7 | 0 | 0  (999.000) | 6 | 0 |
| The Middle East | .321\*\* | .033  (.000) | 1 | .358\*\* | .033  (.000) | 1 | .037 |
| Latin America | .008 | .03  (.777) | 6 | .052 | .032  (.104) | 5 | .044 |
| Northern America/Oceania | -.201\*\* | .026  (.000) | 9 | -.164\*\* | .026  (.000) | 8 | .037 |
| Western Europe | .029 | .025  (.255) | 5 | .068 | .026  (.009) | 4 | .039 |
| Former Communist Countries | -.08\*\* | .024  (.001) | 8 | -.126\*\* | .028  (.000) | 7 | -.046 |
| Nordic Countries | .196\*\* | .031  (.000) | 2 | .301\*\* | .038  (.000) | 2 | .105 |
| East Asia | .153\*\* | .027  (.000) | 3 | .196\*\* | .028  (.000) | 3 | .043 |
| Southeast Asia | .076\*\* | .028  (.007) | 4 | -.629 | 1.367  (.645) | 9 | -.705 |
|  |  |  |  |  |  |  |  |
| **The Positive factor** |  |  |  |  |  |  |  |
| Southern Europe | 0 | 0  (999.000) | 4 | 0 | 0  (999.000) | 4 | 0 |
| The Middle East | .403\*\* | .027  (.000) | 1 | .459\*\* | .03  (.000) | 1 | .056 |
| Latin America | .139\*\* | .025  (.000) | 3 | .123\*\* | .026  (.000) | 3 | -.016 |
| Northern America/Oceania | -.035 | .026  (.179) | 5 | -.063\* | .029  (.028) | 5 | -.028 |
| Western Europe | -.372\*\* | .027  (.000) | 9 | -.269\*\* | .026  (.000) | 8 | .103 |
| Former Communist Countries | -.104\*\* | .024  (.001) | 6 | -.063\* | .024  (.01) | 5 | .041 |
| Nordic Countries | -.353\*\* | .03  (.000) | 8 | -.414\*\* | .033  (.000) | 9 | -.061 |
| East Asia | -.24\*\* | .028  (.000) | 7 | -.15\*\* | .028  (.000) | 7 | .09 |
| Southeast Asia | .259\*\* | .027  (.000) | 2 | .298\*\* | .027  (.000) | 2 | .039 |

*Note.* The constrained model = all parameters were constrained equal acorss the 9 groups; The partial invariant model = some paramters with large MI were allowed to be freely estimated for some of the groups; *M* = the unstandardized latent means; *SE* = standard error of the latent means; *ΔM* = the latent mean in the partial invariant model minus that in the constrained model; *ΔM% =* the percentage of change in latent means relative to the constrained model means; *Ranking* = the rank of the latent means among the 9 groups, in descending order.

\**p* < .05, two-tailed; \*\**p* < .01, two-tailed.

**Table 4.** Summary of multigroup SEM predicting the relationship between the two Conscientious factors with Math Performance

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Negative* | | | | *Positive* | | | |
| Group | *B* | *SE*  *(p)* | *β* | *SE*  *(p)* | *B* | *SE*  *(p)* | *β* | *SE*  *(p)* |
| Southern Europe | -.041\*\* | .004  (.000) | -.181\*\* | .018  (.000) | .006 | .004  (.128) | .028 | .019  （.128） |
| The Middle East | -.071\*\* | .004  (.000) | -.342\*\* | .018  (.000) | -.002 | .004  (.695) | -.008 | .020  (.694) |
| Latin America | -.055\*\* | .004  (0.000) | -.258\*\* | .017  (.000) | .006 | .004  (.118) | .027 | .017  (.118) |
| Northern America/Oceania | -.068\*\* | .005  (.000) | -.260\*\* | .019  (.000) | .011\* | .005  (.030) | .044\* | .020  (.030) |
| Western Europe | -.061\*\* | .005  (.000) | -.226\*\* | .017  (.000) | .002 | .004  (.654) | .008 | .018  (.654) |
| Former Communist Countries | -.037\*\* | .005  (.000) | -.138\*\* | .013  (.000) | .005 | .004  (.220) | .019 | .016  (.220) |
| Nordic Countries | -.077\*\* | .008  (.000) | -.329\*\* | .026  (.000) | .021\*\* | .007  (.001) | .082\*\* | .026  (.001) |
| East Asia | -.048\*\* | .007  (.000) | -.144\*\* | .020  (.000) | .036\*\* | .007  (.000) | .112\*\* | .022  (.000) |
| Southeast Asia | -.079\*\* | .013  (.000) | -.257\*\* | .027  (.000) | -.004 | .007  (.542) | -.013 | .022  (.541) |

*Note.* *Negative* = the Negative factor extracted from the 5 items on the Perseverance scale; *Positive* = the Positive factor extracted from the 5 items on the Perseverance scale; *B* = unstandardized regression coefficients; *β* = standardized regression coefficients; *SE* = standard error of the regression coefficients.

\**p* <.05, two-tailed; \*\**p* < .01, two-tailed.

**Table 5.** Summary of standardized multigroup SEM predicting the relationship between the two Conscientious factors with Truancy

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Negative* | | | | *Positive* | | | |
| Group | *B* | *SE*  *(p)* | *β* | *SE*  *(p)* | *B* | *SE*  *(p)* | *β* | *SE*  *(p)* |
| Southern Europe | .037\*\* | .012  (.002) | .071\*\* | .023  (.002) | -.059\*\* | .012  (.000) | -.112\*\* | .022  (.000) |
| The Middle East | .052\*\* | .012  (.000) | .097\*\* | .022  (.000) | -.057\*\* | .012  (.000) | -.106\*\* | .022  (.000) |
| Latin America | .060\*\* | .012  (.000) | .105\*\* | .021  (.000) | -.073\*\* | .011  (.000) | -.132\*\* | .020  (.000) |
| Northern America/Oceania | .051\*\* | .012  (.000) | .106\*\* | .024  (.000) | -.063\*\* | .012  (.000) | -.132\*\* | .024  (.000) |
| Western Europe | .027\*\* | .010  (.005) | .061\*\* | .022  (.005) | -.039\*\* | .009  (.000) | -.094\*\* | .202  (.000) |
| Former Communist Countries | .017 | .010  (.097) | .036 | .020  (.073) | -.037\*\* | .009  (.000) | -.066\*\* | .017  (.000) |
| Nordic Countries | .054\*\* | .011  (.000) | .149\*\* | .028  (.000) | .055\*\* | .012  (.000) | -.119\*\* | .026  (.000) |
| East Asia | .017 | .010  (.098) | .049 | .029  (.092) | -.023\* | .009  (.011) | -.068\* | .027  (.011) |
| Southeast Asia | .062\* | .024  (.011) | .160\*\* | .042  (.000) | .018 | .011 (.105) | .038 | .024  (.104) |

*Note.* *Negative* = the Negative factor extracted from the 5 items on the Perseverance scale; *Positive* = the Positive factor extracted from the 5 items on the Perseverance scale; *B* = unstandardized regression coefficients; *β* = standardized regression coefficients; *SE* = standard error of the regression coefficients.

\**p* <.05, two-tailed; \*\**p* < .01, two-tailed.

**Table 6.** Estimated correlations between the latent factors, math performance, and truancy.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Math* | | *Truancy* | | *Positive\_Math* | | *Positive\_Truancy* | |
| **The Negative factor** | *r* | *SE*  *(p)* | *r* | *SE*  *(p)* | *r* | *SE*  *(p)* | *r* | *SE*  *(p)* |
| Southern Europe | -.186\*\* | .017  (.000) | .092\*\* | .022  (.000) | -.184\*\* | .024  (.000) | -.190\*\* | .025  (.000) |
| The Middle East | -.341\*\* | .018  (.000) | .107\*\* | .022  (.000) | -.119\*\* | .026  (.000) | -.096\*\* | .029  (.001) |
| Latin America | -.261\*\* | .017  (.000) | .120\*\* | .020  (.000) | -.131\*\* | .024  (.000) | -.117\*\* | .026  (.000) |
| Northern America/Oceania | -.275\*\* | .017  (.000) | .155\*\* | .021  (.000) | -.336\*\* | .026  (.000) | -.374\*\* | .025  (.000) |
| Western Europe | -.229\*\* | .015  (.000) | .098\*\* | .018  (.000) | -.368\*\* | .021  (.000) | -.397\*\* | .021  (.000) |
| Former Communist Countries | -.140\*\* | .012  (.000) | .046\* | .019  (.017) | -.101\* | .043  (.017) | -.161\*\* | .019  (.000) |
| Nordic Countries | -.363\*\* | .022  (.000) | .197\*\* | .024  (.000) | -.420\*\* | .021  (.000) | -.402\*\* | .031  (.000) |
| East Asia | -.181\*\* | .018  (.000) | .073\*\* | .024  (.002) | -.329\*\* | .025  (.000) | -.348\*\* | .026  (.000) |
| Southeast Asia | -.255\*\* | .027  (.000) | .164\*\* | .041  (.000) | -.082\*\* | .030  (.006) | -.086\*\* | .028  (.002) |
|  |  |  |  |  |  |  |  |  |
| **The Positive factor** |  |  |  |  |  |  |  |  |
| Southern Europe | .062\*\* | .018  (.001) | -.125\*\* | .021  (.000) |  |  |  |  |
| The Middle East | .033 | .020  (.092) | -.115\*\* | .021  (.000) |  |  |  |  |
| Latin America | .061\*\* | .017  (.000) | -.144\*\* | .019  (.000) |  |  |  |  |
| Northern America/Oceania | .132\*\* | .018  (.000) | -.172\*\* | .021  (.000) |  |  |  |  |
| Western Europe | .091\*\* | .015  (.000) | -.118\*\* | .016  (.000) |  |  |  |  |
| Former Communist Countries | .033\* | .014  (.021) | -.071\*\* | .016  (.000) |  |  |  |  |
| Nordic Countries | .220\*\* | .021  (.000) | -.179\*\* | .022  (.000) |  |  |  |  |
| East Asia | .159\*\* | .020  (.000) | -.085\*\* | .021  (.000) |  |  |  |  |
| Southeast Asia | .008 | .021  (.720) | -.052\* | .023  (.026) |  |  |  |  |

*Note. Math* = the average of the scores of the math problems, whose scale metrics ranged from 0 (no credit) to 2 (full credit); *Truancy* = the average of scores of the truancy items, the scale metrics of which ranged from 0 (None) to 4 (five times or more). Higher scores are associated with better math performance, or higher level of truancy*. Positive\_Math* = the Positive factor when Math was the outcome variable. *Positive\_Truancy* = the Positive factor when Truancy was the outcome variable.

\**p* < .05, two-tailed; \*\**p* < .01, two-tailed.