Table 1

*Descriptive Statistics*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Type* | *Description* | *Grade* | *N* | *M* | *SD* |
| Items | I enjoy math | 7 | 3060 | 0.69 | 0.46 |
| 10 | 2259 | 0.63 | 0.48 |
| 12 | 1560 | 0.55 | 0.50 |
| Math is useful in everyday problems | 7 | 3001 | 0.70 | 0.46 |
| 10 | 2238 | 0.63 | 0.48 |
| 12 | 1547 | 0.64 | 0.48 |
| Math helps a person think logically | 7 | 2998 | 0.64 | 0.48 |
| 10 | 2232 | 0.66 | 0.47 |
| 12 | 1544 | 0.68 | 0.47 |
| It is important to know math to get a good job | 7 | 3008 | 0.76 | 0.43 |
| 10 | 2239 | 0.67 | 0.47 |
| 12 | 1538 | 0.59 | 0.49 |
| I will use math in many ways as an adult | 7 | 3010 | 0.74 | 0.44 |
| 10 | 2248 | 0.65 | 0.48 |
| 12 | 1540 | 0.64 | 0.48 |
| I enjoy science | 7 | 3042 | 0.61 | 0.49 |
| 10 | 2250 | 0.58 | 0.49 |
| 12 | 1540 | 0.53 | 0.50 |
| Science is useful in everyday problems | 7 | 2988 | 0.40 | 0.49 |
| 10 | 2235 | 0.43 | 0.50 |
| 12 | 1530 | 0.46 | 0.50 |
| Science helps a person think logically | 7 | 2992 | 0.49 | 0.50 |
| 10 | 2234 | 0.51 | 0.50 |
| 12 | 1531 | 0.54 | 0.50 |
| It is important to know science to get a good job | 7 | 3012 | 0.40 | 0.49 |
| 10 | 2238 | 0.42 | 0.49 |
| 12 | 1532 | 0.37 | 0.48 |
| I will use science in many ways as an adult | 7 | 3043 | 0.46 | 0.50 |
| 10 | 2250 | 0.42 | 0.49 |
| 12 | 1539 | 0.42 | 0.49 |
| Covariates | Female | --- | 3116 | 0.48 |  |
| Underrepresented minority | --- | 2958 | 0.23 |  |
| Outcomes | Mathematics achievement | 12 | 1168 | 68.74 | 15.00 |
| Science achievement | 12 | 1854 | 65.54 | 12.59 |
| Interest in social issues | 12 | 1629 | 0.34 | 0.47 |
| Science opinions and knowledge | 12 | 2317 | 0.53 | 0.50 |
| STEM career attainment | --- | 1912 | 0.08 |  |

Table 2

*Latent Class Analysis Fit Statistics for Grades 7, 10, and 12*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Grade* | *Classes* | *Log Likelihood* | *# of Parameters* | *BIC* | *ABIC* | *VLMR p-value* | *BLRT p-value* | *Entropy* |
| 7 | 1 | -19319.60 | 10 | 38719.49 | 38687.72 | --- | --- | --- |
| 2 | -17198.43 | 21 | 34565.46 | 34498.74 | 0.00 | 0.00 | 0.80 |
| 3 | -16782.26 | 32 | 33821.44 | 33719.76 | 0.00 | 0.00 | 0.75 |
| 4 | -16587.89 | 43 | 33521.03 | 33384.40 | 0.00 | 0.00 | 0.69 |
| 5 | -16479.34 | 54 | 33392.24 | 33220.66 | 0.00 | 0.00 | 0.73 |
| 10 | 1 | -14929.94 | 10 | 29937.12 | 29905.35 | --- | --- | --- |
| 2 | -12538.67 | 21 | 25239.55 | 25172.83 | 0.00 | 0.00 | 0.86 |
| 3 | -12014.10 | 32 | 24275.37 | 24173.71 | 0.00 | 0.00 | 0.83 |
| 4 | -11775.68 | 43 | 23883.50 | 23746.88 | 0.00 | 0.00 | 0.78 |
| 5 | -11694.37 | 54 | 23805.84 | 23634.28 | 0.00 | 0.00 | 0.79 |
| 12 | 1 | -10339.03 | 10 | 20751.59 | 20719.83 | --- | --- | --- |
| 2 | -8392.68 | 21 | 16939.79 | 16873.08 | 0.00 | 0.00 | 0.86 |
| 3 | -7928.52 | 32 | 16092.39 | 15990.73 | 0.00 | 0.00 | 0.86 |
| 4 | -7742.22 | 43 | 15800.68 | 15664.08 | 0.00 | 0.00 | 0.81 |
| 5 | -7661.56 | 54 | 15720.25 | 15548.70 | 0.00 | 0.00 | 0.84 |

Table 3

*Item Probability Profiles by Grade Level and Latent Class Attitudinal Profile*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Positive* | *Qualified Positive* | *Indifferent* | *Dim* |
| **Grade 7** | **26%** | **27%** | **29%** | **18%** |
| I enjoy math | 0.85 | 0.73 | 0.66 | 0.44 |
| Math is useful in everyday problems | 0.96 | 0.88 | 0.62 | 0.20 |
| Math helps a person think logically | 0.97 | 0.71 | 0.58 | 0.17 |
| It is important to know math to get a good job | 0.98 | 0.91 | 0.70 | 0.32 |
| I will use math in many ways as an adult | 0.99 | 0.88 | 0.71 | 0.20 |
| I enjoy science | 0.87 | 0.42 | 0.73 | 0.35 |
| Science is useful in everyday problems | 0.90 | 0.10 | 0.46 | 0.07 |
| Science helps a person think logically | 0.94 | 0.25 | 0.56 | 0.11 |
| It is important to know science to get a good job | 0.87 | 0.08 | 0.50 | 0.07 |
| I will use science in many ways as an adult | 0.92 | 0.11 | 0.63 | 0.08 |
| **Grade 10** | **32%** | **23%** | **24%** | **21%** |
| I enjoy math | 0.82 | 0.75 | 0.52 | 0.32 |
| Math is useful in everyday problems | 0.94 | 0.86 | 0.45 | 0.14 |
| Math helps a person think logically | 0.95 | 0.81 | 0.57 | 0.16 |
| It is important to know math to get a good job | 0.96 | 0.87 | 0.54 | 0.16 |
| I will use math in many ways as an adult | 0.96 | 0.92 | 0.43 | 0.10 |
| I enjoy science | 0.89 | 0.37 | 0.67 | 0.20 |
| Science is useful in everyday problems | 0.90 | 0.11 | 0.44 | 0.03 |
| Science helps a person think logically | 0.93 | 0.28 | 0.58 | 0.04 |
| It is important to know science to get a good job | 0.91 | 0.09 | 0.42 | 0.02 |
| I will use science in many ways as an adult | 0.92 | 0.06 | 0.42 | 0.02 |
| **Grade 12** | **35%** | **21%** | **24%** | **20%** |
| I enjoy math | 0.80 | 0.64 | 0.40 | 0.19 |
| Math is useful in everyday problems | 0.96 | 0.88 | 0.46 | 0.04 |
| Math helps a person think logically | 0.98 | 0.79 | 0.61 | 0.11 |
| It is important to know math to get a good job | 0.89 | 0.81 | 0.38 | 0.06 |
| I will use math in many ways as an adult | 0.96 | 0.93 | 0.39 | 0.05 |
| I enjoy science | 0.89 | 0.28 | 0.60 | 0.10 |
| Science is useful in everyday problems | 0.93 | 0.14 | 0.45 | 0.00 |
| Science helps a person think logically | 0.97 | 0.29 | 0.58 | 0.04 |
| It is important to know science to get a good job | 0.81 | 0.06 | 0.32 | 0.00 |
| I will use science in many ways as an adult | 0.89 | 0.05 | 0.43 | 0.00 |

Table 4

*Unconditional Latent Transition Probabilities*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Conditional on Grade 7* | Transitioning to Grade 10 | | | |
|  | Positive | Qualified Positive | Indifferent | Dim |
| Positive | 0.52 | 0.18 | 0.20 | 0.10 |
| Qualified Positive | 0.24 | 0.39 | 0.16 | 0.22 |
| Indifferent | 0.26 | 0.14 | 0.37 | 0.23 |
| Dim | 0.13 | 0.17 | 0.21 | 0.50 |
| *Conditional on Grade 10* | Transitioning to Grade 12 | | | |
| Positive | 0.64 | 0.08 | 0.17 | 0.12 |
| Qualified Positive | 0.21 | 0.54 | 0.08 | 0.18 |
| Indifferent | 0.20 | 0.09 | 0.49 | 0.22 |
| Dim | 0.07 | 0.16 | 0.20 | 0.58 |

Table 5

*LTA Trajectories Based on Grades 7, 10 and 12 Latent Class Attitudinal Profiles*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *Grade 7* | | | | *Grade 10* | | | | *Grade 12* | | | |
| *LTA Trajectory* | *P* | *QP* | *I* | *D* | *P* | *QP* | *I* | *D* | *P* | *QP* | *I* | *D* |
| Stay High (19%) |  |  |  |  |  |  |  |  |  |  |  |  |
|  | X |  |  |  | X |  |  |  | X |  |  |  |
|  | X |  |  |  |  | X |  |  | X |  |  |  |
|  | X |  |  |  |  |  | X |  | X |  |  |  |
|  | X |  |  |  |  |  |  | X | X |  |  |  |
| Stay Medium (16%) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | X |  |  |  | X |  |  |  | X |  |  |
|  |  | X |  |  |  |  | X |  |  | X |  |  |
|  |  | X |  |  |  |  |  | X |  | X |  |  |
|  |  | X |  |  | X |  |  |  |  | X |  |  |
| Stay Low (25%) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | X |  | X |  |  |  |  |  | X |  |
|  |  |  | X |  |  | X |  |  |  |  | X |  |
|  |  |  | X |  |  |  | X |  |  |  | X |  |
|  |  |  | X |  |  |  |  | X |  |  | X |  |
|  |  |  | X |  | X |  |  |  |  |  |  | X |
|  |  |  | X |  |  | X |  |  |  |  |  | X |
|  |  |  | X |  |  |  | X |  |  |  |  | X |
|  |  |  | X |  |  |  |  | X |  |  |  | X |
|  |  |  |  | X | X |  |  |  |  |  | X |  |
|  |  |  |  | X |  | X |  |  |  |  | X |  |
|  |  |  |  | X |  |  | X |  |  |  | X |  |
|  |  |  |  | X |  |  |  | X |  |  | X |  |
|  |  |  |  | X | X |  |  |  |  |  |  | X |
|  |  |  |  | X |  | X |  |  |  |  |  | X |
|  |  |  |  | X |  |  | X |  |  |  |  | X |
|  |  |  |  | X |  |  |  | X |  |  |  | X |
| Start High and End Low (8%) | X |  |  |  | X |  |  |  |  |  | X |  |
|  | X |  |  |  |  | X |  |  |  |  | X |  |
|  | X |  |  |  |  |  | X |  |  |  | X |  |
|  | X |  |  |  |  |  |  | X |  |  | X |  |
|  | X |  |  |  | X |  |  |  |  |  |  | X |
|  | X |  |  |  |  | X |  |  |  |  |  | X |
|  | X |  |  |  |  |  | X |  |  |  |  | X |
|  | X |  |  |  |  |  |  | X |  |  |  | X |
| Start High and End Medium (4%) | X |  |  |  | X |  |  |  |  | X |  |  |
|  | X |  |  |  |  | X |  |  |  | X |  |  |
|  | X |  |  |  |  |  | X |  |  | X |  |  |
|  | X |  |  |  |  |  |  | X |  | X |  |  |
| Start Low and End High (6%) |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | X |  | X |  |  |  | X |  |  |  |
|  |  |  | X |  |  | X |  |  | X |  |  |  |
|  |  |  | X |  |  |  | X |  | X |  |  |  |
|  |  |  | X |  |  |  |  | X | X |  |  |  |
|  |  |  |  | X | X |  |  |  | X |  |  |  |
|  |  |  |  | X |  | X |  |  | X |  |  |  |
|  |  |  |  | X |  |  | X |  | X |  |  |  |
|  |  |  |  | X |  |  |  | X | X |  |  |  |
| Start Low and End Medium (4%) |  |  | X |  | X |  |  |  |  | X |  |  |
|  |  |  | X |  |  | X |  |  |  | X |  |  |
|  |  |  | X |  |  |  | X |  |  | X |  |  |
|  |  |  | X |  |  |  |  | X |  | X |  |  |
| Start Medium and End High (7%) |  | X |  |  | X |  |  |  | X |  |  |  |
|  |  | X |  |  |  | X |  |  | X |  |  |  |
|  |  | X |  |  |  |  | X |  | X |  |  |  |
|  |  | X |  |  |  |  |  | X | X |  |  |  |
| Start Medium and End Low (11%) |  | X |  |  | X |  |  |  |  |  | X |  |
|  |  | X |  |  |  | X |  |  |  |  | X |  |
|  |  | X |  |  |  |  | X |  |  |  | X |  |
|  |  | X |  |  |  |  |  | X |  |  | X |  |
|  |  | X |  |  | X |  |  |  |  |  |  | X |
|  |  | X |  |  |  | X |  |  |  |  |  | X |
|  |  | X |  |  |  |  | X |  |  |  |  | X |
|  |  | X |  |  |  |  |  | X |  |  |  | X |

*Note*. P = Positive; QP = Qualified Positive; I = Indifferent; D = Dim

Table 6

*Percent of Students Classified in LTA Trajectory by Covariates*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Gender* | | *Ethnicity* | |
| *LTA Trajectory* | Female | Male | Underrepresented Minority | Not Underrepresented Minority |
| Stay High | 15 | 22 | 22 | 18 |
| Stay Medium | 20 | 13 | 18 | 15 |
| Stay Low | 23 | 26 | 25 | 24 |
| Start High and End Low | 7 | 9 | 7 | 9 |
| Start High and End Medium | 4 | 4 | 4 | 4 |
| Start Low and End High | 6 | 6 | 6 | 6 |
| Start Low and End Medium | 5 | 3 | 5 | 3 |
| Start Medium and End High | 8 | 6 | 5 | 8 |
| Start Medium and End Low | 12 | 10 | 8 | 13 |

Table 7

*Log Odds Coefficients and Odds Ratios for LTA Trajectory with Covariates*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Logit* | *SE* | *est/SE* | *Odds Ratio* |
| Stay Medium |  |  |  |  |
| Female | 0.76\*\*\* | 0.12 | 6.12 | 2.13 |
| Underrepresented Minority | -0.12 | 0.14 | 0.16 | 1.17 |
| Stay Low |  |  |  |  |
| Female | 0.25\* | 0.11 | 2.20 | 1.28 |
| Underrepresented Minority | -0.20 | 0.13 | -1.50 | 1.06 |
| Start High and End Low |  |  |  |  |
| Female | 0.12 | 0.15 | 0.81 | 1.13 |
| Underrepresented Minority | -0.50\*\* | 0.19 | -2.64 | 0.88 |
| Start High and End Medium |  |  |  |  |
| Female | 0.34 | 0.20 | 1.71 | 1.40 |
| Underrepresented Minority | -0.13 | 0.23 | -0.58 | 1.38 |
| Start Low and End High |  |  |  |  |
| Female | 0.24 | 0.17 | 1.38 | 1.27 |
| Underrepresented Minority | -0.22 | 0.20 | -1.08 | 1.19 |
| Start Low and End Medium |  |  |  |  |
| Female | 1.00\*\*\* | 0.21 | 4.75 | 2.73 |
| Underrepresented Minority | 0.24 | 0.22 | 1.07 | 1.97 |
| Start Medium and End High |  |  |  |  |
| Female | 0.71\*\*\* | 0.16 | 4.41 | 2.20 |
| Underrepresented Minority | -0.65\* | 0.21 | -3.06 | 0.79 |
| Start Medium and End Low |  |  |  |  |
| Female | 0.51\*\*\* | 0.14 | 3.76 | 1.67 |
| Underrepresented Minority | -0.66\*\*\* | 0.18 | -3.78 | 0.73 |

Note: Comparison group is “Stay High.”

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

Table 8

*Descriptives for LTA Trajectory by Distal Outcome*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | *Distal Outcome* | | | | |
| *LTA Trajectory* | *Mathematics Achievement* | *Science Achievement* | *STEM Career Attainmenta* | *Interest in Social Issues* | *Science Opinions and Knowledge* |
| Stay High | 74.80  (14.53) | 70.89  (12.78) | 16 | 0.46  (0.50) | 0.72  (0.45) |
| Stay Medium | 69.13  (11.58) | 64.80  (10.15) | 6 | 0.28  (0.45) | 0.53  (0.50) |
| Stay Low | 61.85  (15.75) | 61.60  (12.91) | 2 | 0.32  (0.47) | 0.52  (0.50) |
| Start High and End Low | 69.21  (14.77) | 65.67  (12.76) | 6 | 0.38  (0.49) | 0.41  (0.49) |
| Start High and End Medium | 68.76  (13.79) | 62.70  (12.63) | 7 | 0.22  (0.41) | 0.47  (0.50) |
| Start Low and End High | 69.80  (14.06) | 68.46  (12.44) | 17 | 0.38  (0.49) | 0.64  (0.48) |
| Start Low and End Medium | 63.29  (12.37) | 61.19  (11.51) | 3 | 0.20  (0.40) | 0.42  (0.50) |
| Start Medium and End High | 76.06  (12.90) | 69.15  (12.39) | 14 | 0.42  (0.49) | 0.61  (0.49) |
| Start Medium and End Low | 64.83  (15.33) | 63.62  (11.27) | 3 | 0.28  (0.45) | 0.35  (0.48) |

*a*Percent of students who attained STEM career.

*Note*. Standard deviation in parentheses.

Table 9

*Log Odds Coefficients and Odds Ratios for LTA trajectory with Distal Outcomes*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *Logit* | *SE* | *est/SE* | *Odds Ratio* |
| Stay Medium |  |  |  |  |
| Mathematics Achievement | -0.03\*\*\* | 0.01 | -3.83 | 0.99 |
| Science Achievement | -0.05\*\*\* | 0.01 | -5.95 | 0.96 |
| Interest in Social Issues | -0.79\*\*\* | 0.20 | -3.92 | 0.67 |
| Science Opinions and Knowledge | -0.81\*\*\* | 0.16 | -5.10 | 0.45 |
| STEM Career Attainment | -1.14\*\*\* | 0.29 | -3.94 | 0.32 |
| Stay Low |  |  |  |  |
| Mathematics Achievement | -0.06\*\*\* | 0.01 | -8.60 | 0.95 |
| Science Achievement | -0.07\*\*\* | 0.01 | -9.32 | 0.94 |
| Interest in Social Issues | -0.61\*\*\* | 0.17 | -3.52 | 0.76 |
| Science Opinions and Knowledge | -0.84\*\*\* | 0.14 | -5.96 | 0.43 |
| STEM Career Attainment | -2.05\*\*\* | 0.35 | -5.82 | 0.13 |
| Start High and End Low |  |  |  |  |
| Mathematics Achievement | -0.03\*\*\* | 0.01 | -3.66 | 0.99 |
| Science Achievement | -0.04\*\*\* | 0.01 | -4.93 | 0.96 |
| Interest in Social Issues | -0.33 | 0.19 | -1.67 | 1.06 |
| Science Opinions and Knowledge | -1.28\*\*\* | 0.17 | -7.42 | 0.28 |
| STEM Career Attainment | -1.14\*\* | 0.36 | -3.19 | 0.32 |
| Start High and End Medium |  |  |  |  |
| Mathematics Achievement | -0.03\*\* | 0.01 | -3.07 | 0.99 |
| Science Achievement | -0.06 | 0.01 | -5.94 | 0.94 |
| Interest in Social Issues | -1.14\*\*\* | 0.30 | -3.80 | 0.57 |
| Science Opinions and Knowledge | -1.07\*\*\* | 0.23 | -4.73 | 0.34 |
| STEM Career Attainment | -0.91\* | 0.45 | -2.02 | 0.40 |
| Start Low and End High |  |  |  |  |
| Mathematics Achievement | -0.03\*\* | 0.01 | -3.03 | 0.99 |
| Science Achievement | -0.02\* | 0.01 | -2.17 | 0.98 |
| Interest in Social Issues | -0.32 | 0.22 | -1.45 | 1.12 |
| Science Opinions and Knowledge | -0.37 | 0.20 | -1.87 | 0.69 |
| STEM Career Attainment | 0.08 | 0.27 | 0.28 | 1.08 |
| Start Low and End Medium |  |  |  |  |
| Mathematics Achievement | -0.06\*\*\* | 0.01 | -5.37 | 0.96 |
| Science Achievement | -0.07\*\*\* | 0.01 | -6.64 | 0.93 |
| Interest in Social Issues | -1.25\*\*\* | 0.31 | -3.99 | 0.53 |
| Science Opinions and Knowledge | -1.24\*\* | 0.23 | -5.36 | 0.29 |
| STEM Career Attainment | -1.91\*\* | 0.73 | -2.61 | 0.15 |
| Start Medium and End High |  |  |  |  |
| Mathematics Achievement | 0.01 | 0.01 | 0.84 | 1.03 |
| Science Achievement | -0.01 | 0.01 | -1.66 | 0.99 |
| Interest in Social Issues | -0.18 | 0.21 | -0.88 | 1.25 |
| Science Opinions and Knowledge | -0.48\* | 0.19 | -2.58 | 0.62 |
| STEM Career Attainment | -0.18 | 0.28 | -0.65 | 0.84 |
| Start Medium and End Low |  |  |  |  |
| Mathematics Achievement | -0.05\*\*\* | 0.01 | -6.53 | 0.97 |
| Science Achievement | -0.05 | 0.01 | -7.11 | 0.95 |
| Interest in Social Issues | -0.77\*\*\* | 0.19 | -4.10 | 0.67 |
| Science Opinions and Knowledge | -1.54\*\*\* | 0.16 | -9.49 | 0.21 |
| STEM Career Attainment | -1.94\*\*\* | 0.44 | -4.43 | 0.14 |

Note: Comparison group is “Stay High.”

\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

|  |  |
| --- | --- |
| Positive in Grade 7 | Qualified Positive in Grade 7 |
| Indifferent in Grade 7 | Dim in Grade 7 |

*Figure 1*. Student trajectories. Numbers in circles refer to percent of students in each attitudinal profile. Numbers above arrows indicate the percentage of students who transition from one attitudinal profile to another. The numbers for the Grade 10 to Grade 12 trajectory indicate the most common transition.

|  |  |
| --- | --- |
| Positive in Grade 7 | Qualified Positive in Grade 7 |
| Indifferent in Grade 7 | Dim in Grade 7 |

*Figure 2*. Minority student trajectories. Numbers in circles refer to percent of students in each attitudinal profile. Numbers above arrows indicate the percentage of students who transition from one attitudinal profile to another. The numbers for the Grade 10 to Grade 12 trajectory indicate the most common transition.

|  |  |
| --- | --- |
| Positive in Grade 7 | Qualified Positive in Grade 7 |
| Indifferent in Grade 7 | Dim in Grade 7 |

*Figure 3*. Underrepresented minority student trajectories. Numbers in circles refer to percent of students in each attitudinal profile. Numbers above arrows indicate the percentage of students who transition from one attitudinal profile to another. The numbers for the Grade 10 to Grade 12 trajectory indicate the most common transition.