Chapter IV

RESULTS

Descriptive Statistics & Correlation Analyses

We begin with an overview of descriptive statistics and correlation analyses for measures. Descriptive statistics for the student-level variables and class-level variables are presented in Tables 3 and 4. In the study, there are 4,566 students, 449 teachers, and 221 schools. The modal number of teachers per school is 2.03. Sample sizes average about 20.66 students per school, and 10.17 students per teacher. Bivariate correlations among study variables are presented in Table 5.

Scale Reliabilities

Scale reliabilities for measures are presented. The number of items and the internal consistency for each scale are as follows: autonomy support - five items (α = .71); intrinsic motivation - three items (α = .78); external regulation - three items (α = .68); introjected regulation - five items (α = .68); and math self-concept - five items (α = .86). Most of the alpha coefficients ranged from .71 to .86, and were satisfactory by Nunnally's (1978) criterion of .70.

Table 1

Student-Level Descriptive Statistics

Variable	M	SD	Minimum Value	Maximum Value	Skewness	Kurtosis
Intrinsic Motivation	4.33	1.66	2.00	8.00	.50	-.39
External Regulation	5.89	1.86	3.00	12.00	.41	-.11
Introjected Regulation	8.38	2.13	5.00	20.00	.87	1.44
Self-Concept	13.49	3.79	5.00	20.00	-.21	-.65
First Plausible value	495.75	85.87	216.87	813.38	.04	-.95

N = 4,566

Table 2

Classroom-Level Descriptive Statistics

Variable	M	SD	Minimum Value	Maximum Value	Skewness	Kurtosis
Autonomy Support	11.37	2.00	5.00	20.00	1.08	3.20

N = 449

Table 3

Correlation Matrix for the Model Variables

	1	2	3	4	5	6	7	8
1. Autonomy support	1							
2. Intrinsic motivation	.03	1						
3. External regulation	-.01	-.51	1					
4. Introjected regulation	.03	.36	.52	1				
5. Math self concept	.10	-.56	-.30	-.14	1			
6. Gender	.03	-.03	-.08	.03	.11	1		
7. Mother's education	-.06	-.03	-.03	-.05	.17	.03	1	
8. Math achievement	.15	.15	-.10	-.07	.45	.08	.07	1

Note. All coefficients above .10 are significant at the .001 level.

Hierarchical Linear Modeling

The results reported in this section use "plausible value" scores as the measure of math achievement. Plausible value technology is based on item response theory, which is a measure of total score adjusted to make different booklets comparable. A plausible value is an estimate of how each student might have performed if they had been administered the entire test.

We fitted several types of HLM Models, as follows: the one-way ANOVA model with classroom as a random effect, the means-as-outcomes regression model, the random-intercept model, the random-coefficients regression model, and the intercept-and slopes-as-outcomes model. These models are presented and discussed in turn.

The One-way ANOVA Model

In the one-way ANOVA model with classroom as a random effect, we want to test if there are differences in math achievement among classes. This model provides an estimate of the proportion of between-class variance in math achievement, that is the intraclass correlation (ICC). The level-1 model for the one-way ANOVA with random effects is as follows:

$$Y_{ij} = \beta_{0j} + r_{ij}$$

where

β_{0j} is the mean outcome for the jth unit;

r_{ij} represents a Level-1 effect.

The level-2 model for the one-way ANOVA with random effects is as follows:

$\beta_{00} = \gamma_{00} + \mu_{0j}$

where

γ_{00} represents the grand-mean outcome in the population;

μ_{0j} represents the random effect associated with classroom unit j and is assumed to have a mean of zero and variance $\tau_{00.}$

We refer to the hierarchical model of these two equations as fully unconditional since no predictors are specified at both levels (Raudenbush and Bryk, 2002).

The combined model becomes

$Y_{ij} = \gamma_{00} + \mu_{0j} + r_{ij}$

where

γ_{00} represents the grand mean;

μ_{0j} represents the random effect associated with classroom unit j;

r_{ij} represents a Level-1 effect.

The variance components provided in Table 6 were used to determine the intraclass correlation (ICC), the proportion of the total variance that is between classes.

The intraclass correlation was calculated using these values, as follows:

$\text{ICC} = \tau_{00} / (\tau_{00} + \delta^2) = (4226.16) / (4226.16 + 3652.25) = 0.53$

The intraclass correlation value of .53 shows that a substantial proportion of the variance, around 53%, is between classes. There was significant variability in means among classes in math plausible value score (χ^2 = 5083.65; Table 6). Thus, classroom-variables might account for much of the variance in math achievement. This also suggests that a multi-level analysis is desirable. The grand mean of the first plausible value math score was 494.74, with a standard error of 3.38, giving a 95% confidence interval of 494.74 $\pm$ 1.96(3.38) = (48.11, 501.37).

Table 6 provides an estimate of the reliability of each class's intercept. The results are

Reliability (β_0) = 0.87

The results indicate that the intercept was reliable (0.87).

Table 4

Results from HLM Unconditional One-way ANOVA Model

	Coefficient	SE		t
Fixed Effect				
Average class mean, γ_{00}	494.74	3.38		146.26*
Random Effect	Variance	Chi-square	df	p
Class means, u_{0j}	4226.16	5083.65	419	0.00
Level-1 effect, r_{ij}	3652.25			
Reliability of OLS Regression-Coefficient Estimates				
Class mean	0.87			

Note. Outcome variable = First math overall plausible value.

The Means-as-Outcomes Regression Model

In the means-as-outcomes regression model, we want to test if autonomy support in the classroom significantly affects mean math achievement. The student math achievement scores are assumed to vary around their class means. The Level-1 Model is as follows:

$Y_{ij} = \beta_{0j} + r_{ij}$

In the level-2 model, each class's mean is predicted by the autonomy support of the class as follows:

$\beta_{0j} = \gamma_{00} + \gamma_{01}(\textit{autonomy support}) + u_{0j}$

where

γ_{00} is the intercept;

γ_{01} is the effect of autonomy support on β_{0j};

We assume the u_{0j} is independently distributed as $N(0, \tau_{00})$.

The combined model becomes:

$Y_{ij} = \gamma_{00} + \gamma_{01}(\textit{autonomy support}) + u_{0j} + r_{ij}$

where

γ_{00} & γ_{01} are fixed effects;

u_{0j} & r_{ij} are random effects.

The results (Table 7) indicate that autonomy support in the classroom did not significantly affect mean math achievement. A confidence range of plausible value for class means was as follows: $468.33 \pm 1.96(4212.48)^{1/2} =$

(341.12, 595.54). The proportion of variance explained in B_{qj} was calculated as follows:

$$\frac{\tau_{00}\text{(random ANOVA)} - \tau_{00}\text{(means-as-outcomes)}}{\tau_{00}\text{(random ANOVA)}}$$

= (4226.16 -4212.48)/4226.16 = 0.002

Thus, 0.2 % of the true between-class variance in math achievement was accounted for by autonomy support. This is a trivial proportion of variance explained.

Table 5

Results from HLM Means-as-Outcomes Regression Model

Effect	Coefficient	SE		t
Fixed				
Class means, γ_{00}	468.33	17.81		26.29**
Autonomy support, γ_{01}	2.31	1.53		1.52
Random Effect	Variance	Chi-square	df	p
Class mean, u_{0j}	4212.48	5059.74	418	0.00
Level-1 effect, r_{ij}	3652.49			

Note. ** $p < .01$.

The Random-Intercept Model

In the random-intercept model, we want to test if intrinsic motivation, external regulation, introjected regulation, and math self-concept (student factors) significantly predict math achievement. In this model, only the intercept parameter in the Level-1 model, $\beta_{0j,}$ varies at level 2.

The Level-1 model is as follows:

$Y_{ij} = \beta_{0j} + \beta_{1j}$ (intrinsic motivation) + β_{2j} (external regulation) + β_{3j} (introjected regulation) + β_{4j} (math self concept) + r_{ij}

The level-2 model becomes

$\beta_{0j} = \gamma_{00} + \mu_{0j}$

$\beta_{1j} = \gamma_{10}$

$\beta_{2j} = \gamma_{20}$

$\beta_{3j} = \gamma_{30}$

$\beta_{4j} = \gamma_{40}$

where

γ_{00} represents the grand-mean outcome in the population of classes;

γ_{10} represents the average intrinsic motivation regression slope across those classes (the level-2 unit);

γ_{20} represents the average external regulation regression slope across those classes;

γ_{30} represents the average introjected regulation regression slope across those classes;

γ_{40} represents the average math self-concept regression slope across those classes;

μ_{0j} represents the random effect associated with unit j.

In this model, we allow only the intercept of math achievement to vary across classes. Table 8 provides the test statistics for the hypothesis that student intrinsic motivation, external regulation, introjected regulation, and math self-concept are not related to math achievement within classes:

H0: $r_{q0} = 0$ for q = 1, 2, 3, 4

where

γ_{q0} represents the average regression slope across the level-2 unit.

Table 8 indicates that the average class mean is γ_{00} = 494.59. The Level-1 results in Table 8 indicate that intrinsically motivated students were more likely to score higher on the test (γ_{10} = 3.03, SE = 0.79). Students who have a high external regulation were more likely to score lower on the test (γ_{20} = -1.56, SE = 0.79). Students who have a high math self-concept were more likely to score higher on the test (γ_{40} = 7.61, SE = 0.32). Thus, we conclude that intrinsic motivation, external regulation, and math self-concept are significantly related to math achievement.

The Level-2 results (Table 8) indicate that the estimated variance among the means was τ_{00} = 3351.97, with a χ^2 statistic of 4919.49. Thus, we conclude that there are significant differences among the class means.

Table 8 provides an estimate of the reliability of each class's intercept. The results are

Reliability (β_0) = 0.87

The results indicate that the intercept was reliable (0.87).

Table 6

Results from HLM Random-Intercept Model

Effect	Coefficient	SE	t	
Fixed				
Overall mean achievement, γ_{00}	494.59	3.02	163.74**	
Intrinsic Motivation, γ_{10}	3.03	0.79	3.82**	
External Regulation, γ_{20}	-1.56	0.64	-2.42**	
Introjected Regulation, γ_{30}	-0.07	0.60	-0.12	
Math Self-concept, γ_{40}	7.61	0.32	23.57**	
Random Effects	Variance	Chi-square	df	p
Class Mean achievement, u_{0j}	3351.97	4919.49	419	0.00
Level-1 effect, r_{ij}	3053.74			
Reliability of OLS Regression-Coefficient Estimates				
Mean achievement	0.87			

Note. Outcome variable = First math overall plausible value.

The Random-Coefficient Regression Model

In the random-coefficient regression model, we again include the relevant student characteristics measured by our defined composite variables as predictors of math performance, but we also want to test if the student-level slopes (i.e., the regression coefficients) vary from class to class. Since introjected regulation was not found to affect math achievement in the previous model, the Level-1 model used here is as follows:

$Y_{ij} = \beta_{0j} + \beta_{1j}$ (intrinsic motivation) + β_{2j} (external regulation) + β_{3j} (math self concept) + r_{ij}

Each of the coefficients in the Level-1 model is specified as random in the Level-2 model as follows:

$\beta_{qj} = \gamma_{q0} + \mu_{qj}$

where

q = 0, 1, 2, &3

γ_{00} represents the grand-mean outcome in the population of classes;

γ_{10} represents the average intrinsic motivation regression slope across those classes;

γ_{20} represents the average external regulation regression slope across those classes;

γ_{30} represents the average math self-concept regression slope across those classes;

μ_{qj} represents the random effect associated with unit j.

We refer to this equation as an unconditional level-2 model (Raudenbush and Bryk, 2002).

The estimated variance among the means was τ_{00} = 3337.14, with a χ^2 statistic of 3959.13 (Table 9). Thus, there was significant variability among the class means. The correlation between external regulation and math achievement within classes varied significantly across the population of classes (τ_{22} = 13.36, χ^2 = 485.77). The correlation between math self-concept and math achievement within classes varied significantly across the population of classes (τ_{22} = 4.61, χ^2 = 583.32).

The result indicates that the slope for some classes may be steep, but the slope for other classes may be flat. The correlation with achievement may be stronger in some classes. The variability among classes indicates that class-level variables may explain some of the differences.

The 95% plausible value range for the class means was

$494.34 \pm 1.96(3337.14)^{1/2} = (375.93, 618.57)$

Table 9 provides reliability estimates for the class intercept and slope parameters. The results are

Reliability (β_0) = .84

Reliability (β_1) = .07

Reliability (β_2) = .09

Reliability (β_3) = .11

The results indicate that the intercept was reliable (.84). Coefficient reliabilities above .05 are acceptable (Bryk & Raudenbush, 1992). The reason for the lack of reliability of the slopes is that the true slope variance across classes is much smaller than the variance of the true means (Raudenbush & Bryk, 2002).

In this example, the proportion of variance at the individual level was calculated as follows:

$$\frac{\delta^2(\text{random ANOVA}) - \delta^2(\text{random coefficient model})}{\delta^2(\text{random ANOVA})}$$

where

δ^2 is the variance of the Level-1 effect given in Tables 7 and 9.

= (3652.25–2948.62)/3652.25

= 0.19

Adding motivational resources as predictors of math achievement reduced the within-class variance by 19%.

Table 7

Results from HLM Random-Coefficient Regression Model

Effect	Coefficient	SE	t
Fixed			
Overall mean achievement, γ_{00}	494.34	3.01	163.88**
Intrinsic Motivation, γ_{10}	2.47	0.74	4.24**
External Regulation, γ_{20}	-0.87	0.57	-2.61**
Math Self-concept, γ_{30}	7.66	0.30	24.85**

Random Effect	Variance	Chi-square	df	p
Mean achievement, u_{0j}	3337.14	3959.13	347	0.00
Intrinsic Motivation, u_{1j}	16.14	466.63	347	0.08
External Regulation, u_{2j}	13.36	485.77	347	0.02
Math self-concept, u_{4j}	4.61	583.32	347	0.00
Level-1 effect, r_{ij}	2948.62			

Reliability of OLS Regression-Coefficient Estimates	
Mean achievement	0.84
Intrinsic Motivation	0.07
External Regulation	0.09
Math self-concept	0.11

Note. Outcome variable = First math overall plausible value.

<u>The Intercept-and Slopes-as-Outcomes Model</u>

In the intercept-and slopes-as-outcomes model, classroom characteristics predict outcome, adjusted for student factors included in the Level-1 model. We want to test if autonomy support in the classroom accounts for some of the variability in the student-level slopes. The Level-1 Model remains the same as follows:

Y_{ij} = β_{0j} + β_{1j} (intrinsic motivation) + β_{2j} (external regulation) + + β_{3j} (math self concept) + r_{ij}

The external regulation and math self-concept slopes varied significantly from class to class in the last model. Thus, we modeled the external regulation and math self-concept coefficient with class-level variables. The Level-2 models that include the level-2 predictor are as follows:

$\beta_{2j} = \gamma_{20} + \gamma_{21}(autonomy\ support) + u_{2j}$

$\beta_{3j} = \gamma_{30} + \gamma_{31}(autonomy\ support) + u_{3j}$

where

autonomy support represents the teacher's autonomy support in class j;

γ_{21} = differentiating effect of autonomy support on external regulation;

γ_{31} = differentiating effect of autonomy support on math self-concept;

U_{3j} = error or Level 2 random effect.

Autonomy support in the classroom did not explain some of the variability in the external regulation and math self-concept slopes (Table 10).

The proportion of variance explained in each of the variance components was calculated using the equation and values from Tables 8 and 10 as follows:

Proportion of variance explained in B_{qj} =

$$\frac{\tau_{qq}\text{(random regression)} - \tau_{qq}\text{(intercept-and slopes-as-outcome model)}}{\tau_{qq}\text{(random regression)}}$$

= (3337.140-3327.858)/3337.140 = .00028.

We saw a reduction in variance of the class means once external regulation and math self-concept are controlled, meaning that 0.028% of the parameter variation in math achievement was explained by external regulation and math self-concept.

Table 8

Results from HLM Intercept-and Slopes-as-Outcomes Model

	Coefficient	SE		t
Fixed effect				
Class means, γ_{00}	470.97	16.06		29.32*
Autonomy support, γ_{01}	2.05	1.38		1.48
Intrinsic motivation, γ_{10}	3.16	0.74		4.25*
External regulation, γ_{20}	-0.58	2.92		-0.20
Autonomy support, γ_{21}	-0.08	0.25		-0.32
Math self-concept, γ_{40}	7.66	1.43		5.34*
Autonomy support, γ_{41}	0.00	0.12		0.00
Random Effect	Variance	Chi-square	df	p
Mean achievement, u_{0j}	3327.85	3927.75	346	0.00
External regulation, u_{2j}	13.29	485.23	347	0.02
Math self-concept, u_{4j}	4.56	583.26	346	0.00
Level-1 effect, r_{ij}	2948.65		346	

Note. Outcome variable = First math overall plausible value.

Structural Equation Modeling

Structural equation modeling analysis was performed using the statistical program, Mplus (Muthen & Muthen, 1998). Two models were defined (Table 11). Models 2 is related to Model 1 as follows: In Model 2, the paths between autonomy support and intrinsic motivation, between gender and intrinsic motivation, and between gender and math performance were fixed to zero, because they were non-significant in the full model (Model 1). Diagram that shows other nesting relationships among models are shown in Figure 3.

Fit indices for each of the two models of math achievement appear in Table 12. To begin the nested models analysis, we tested to determine whether the full model (Model 1) fits the data well. Even though we did not attain the standards for the χ^2/df ratio (i.e., under 3.00), the fit of the full model (Model 1) was satisfactory by the other criterion: χ^2 (10) = 87.183, CFI = 0.951 (i.e., greater than .95), TLI = 0.901 (i.e., greater than .90), RMSEA = 0.058 (i.e., less than .08), SRMR = 0.043 (i.e., less than .08). We tested one restricted model (Model 2 nested within Model 1) to see whether a simpler conceptualization of math achievement might provide a better fit to the data than did Model 1 (the full model). The models that were compared are listed in Table 12, along with their fit statistics.

Table 9

Defined Models

Model	Description
SEM Model	
Model 1	Full Model
Model 2	Three paths (AS->IM, G->IM, and G-> MP) were fixed to zero.

Note. Model 2 is nested within Model 1. AS = Autonomy support; IM = Intrinsic motivation; G = Gender; MP = Math performance.

Table 10

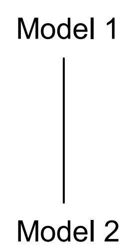
Fit Indices for Each of the Single-level SEM Models – Autonomy Support Treated as Level-1

Model	χ^2	df	CFI	TLI	RMSEA	SRMR	AIC	BIC
SEM Model								
Model 1	87.183	10	0.951	0.901	0.050	0.043	71416.771	71506.409
Model 2	92.170	13	0.959	0.951	0.049	0.044	71415.758	71488.589

Note. Models 2 is nested within Model 1. CFI = comparative fit index; TLI = NNFI = nonnormed fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root mean-square residual; AIC = Akaike information criterion; BIC = Bayesian information criterion; Model 1 = all free; Model 2 = Three paths (AS->IM, G->IM, and G-> MP) were fixed to zero.

Figure 1

Nesting Relationships among Models



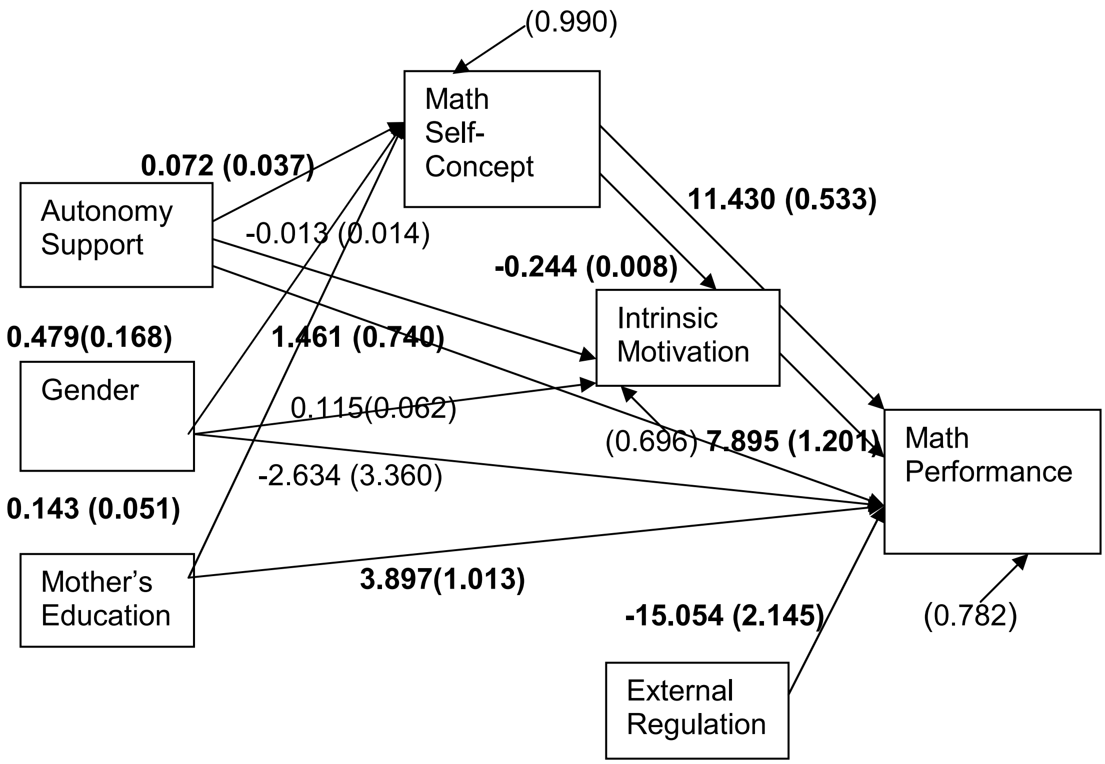
The model-fitting process suggested that Model 2 best fit the data (χ^2 (13) = 92.170, CFI=0.953, TLI=0.951, RMSEA=0.049, SRMR=0.044). The model with the lowest AIC is preferred (Kline, 1998). Model 2 had the lowest AIC. On this basis, we selected Model 2 as the best model of all the models and based further analyses on that model. Model 2 is called the trimmed full model (Figure 5).

The path diagram that shows the fully-unstandardized parameter estimates for Model 2 appears in Figure 5. These findings support the model. First, intrinsic motivation positively affected math performance (β=7.865), whereas external regulation negatively affected math performance (β= -15.196), consistent with the first hypothesis (*H1*). Math self-concept positively affected math performance (β=11.399), consistent with the second hypothesis (*H2*). Autonomy support positively affected math self-concept (β=0.072) and math performance (β=1.474), consistent with the third hypothesis (*H3*). Math self-concept significantly affected math performance through the mediator of intrinsic motivation, consistent with the fourth hypothesis (*H4*). Finally, autonomy support in the classroom significantly affected math performance through the mediator of math self-concept, consistent with the fifth hypothesis (*H5*).

The R^2 values were 0.303, and 0.218 for intrinsic motivation and math performance respectively. Model 2 (the trimmed full model) as a whole accounted for 22% of the variance in math performance.

Figure 2

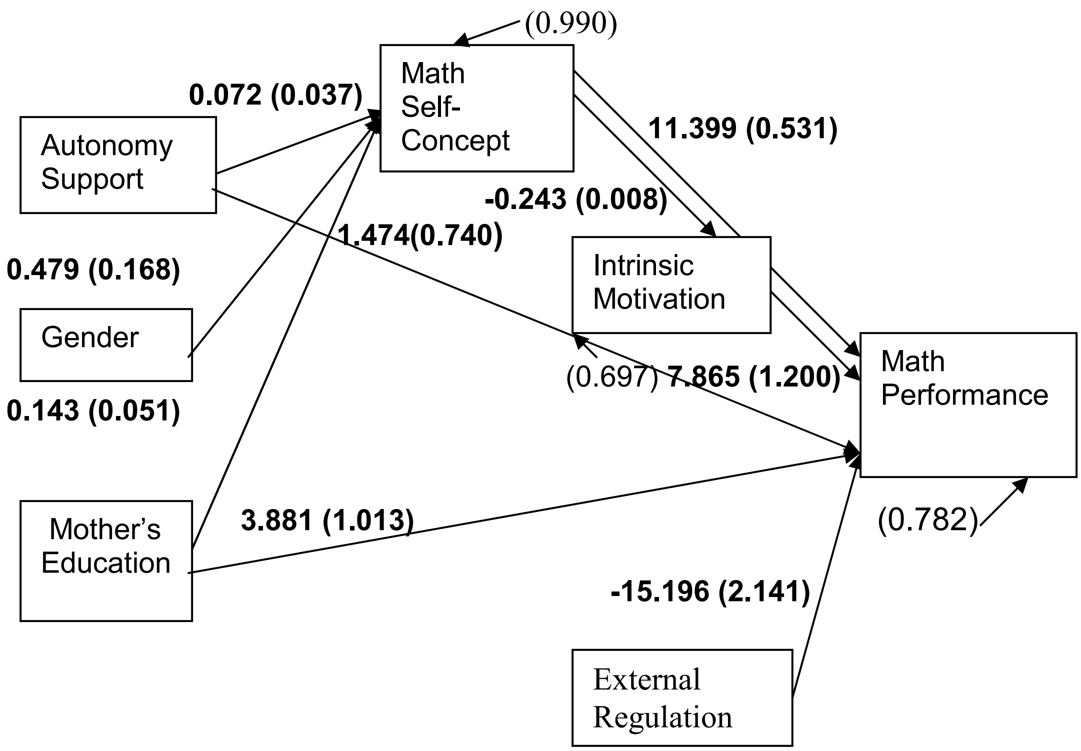
Results for the Full Model



Note. Unstandardized path coefficients in boldface are significant.

Figure 3

Results for the Trimmed Full Model



Note. Unstandardized path coefficients in boldface are significant.

Multilevel Path Modeling

As a first step, we constructed a single-level SEM model, and the model showed good fit to the data (see SEM section). Therefore, as a second step, we examined the intraclass correlation for the math first plausible value, which was .53. The intraclass correlation value of .53 shows that a substantial proportion of the variance, around 53%, is between classes. Thus, classroom-variables might account for the differences in math performance. This suggests that a multi-level analysis is desirable.

Third, we tested the within-level model separately. The model-fitting process suggested that the Within-level Model 2 best fit the data (χ^2 (7) = 132.855, CFI = 0.954 (i.e., greater than .95), TLI = 0.921 (i.e., greater than .90), RMSEA = 0.049 (i.e., less than .05), SRMR (B) = 0.015 (i.e., less than .08), SRMR (W) = 0.040 (i.e., less than .08), see Table 13).

Finally, we tested to see whether the complete multi-level models (multi-level versions of the trimmed full model and the full model) fit the data well. Even though we did not attain the standards for the χ^2/df ratio (i.e., under 3.00, Kline, 1998), the fit of the Multi-level Model 1 (multi-level version of the full model) was otherwise satisfactory: χ^2 (3) = 78.054, CFI = 0.961 (i.e., greater than .95), TLI = 0.901 (i.e., greater than .90), RMSEA = 0.064 (i.e., less than .08), SRMR (B) = 0.009 (i.e., less than .08), SRMR (W) = 0.038 (i.e., less than .08), see Table 13). Even though we did not attain the standards for the χ^2/df ratio (i.e., under

3.00, Kline, 1998), the fit of the Multi-level Model 2 (multi-level version of the trimmed full model) was otherwise satisfactory: χ^2 (5) = 91.665, CFI = 0.959 (i.e., greater than .95), TLI = 0.921 (i.e., greater than .90), RMSEA = 0.049 (i.e., less than .05), SRMR (B) = 0.001 (i.e., less than .08), SRMR (W) = 0.039 (i.e., less than .08), see Table 13).

The path diagram that shows the fully unstandardized parameter estimates for Multi-level Model 2 appears in Figure 6. At the within-class level, intrinsic motivation positively affected math performance (β = 2.530), whereas external regulation negatively affected math performance (β = -8.700), consistent with the first hypothesis (*H1*). Math self-concept positively affected math performance (β = 7.405), consistent with the second hypothesis (*H2*). Math self-concept significantly affected math performance through the mediator of intrinsic motivation, consistent with the fourth hypothesis (*H4*). For the between-class model, autonomy support positively affected math performance (β = 2.536), consistent with the third hypothesis (*H3a*), although it did not significantly affect math self-concept.

We can determine the variance accounted for at each level in Multi-level Model 2 (Figure 6). For the between-class model, the variables in the model accounted for 0.6% of the between-class variance in math performance, with the 99.4% representing the errors in the equations, (i.e., residual variance = 0.994). The within-class variables accounted for 17% of the within-class variance in math performance, with 82.8% representing the errors in the equations (i.e., residual variance = 0.828).

Finally, for Multi-level Model 2 with random slopes (see Appendix D), we obtain the estimated equation predicting intrinsic motivation as follows:

Math Performance = 386.457 + 0.849(Autonomy Support) + 1.074(Intrinsic Motivation) + 0.141(Intrinsic Motivation*Autonomy Support)

We obtain the estimated equation predicting math self-concept as follows:

Math Performance = 386.457 + 0.849(Autonomy Support) + 6.690(Math Self-Concept) + 0.058(Math Self-Concept*Autonomy Support)

Table 11

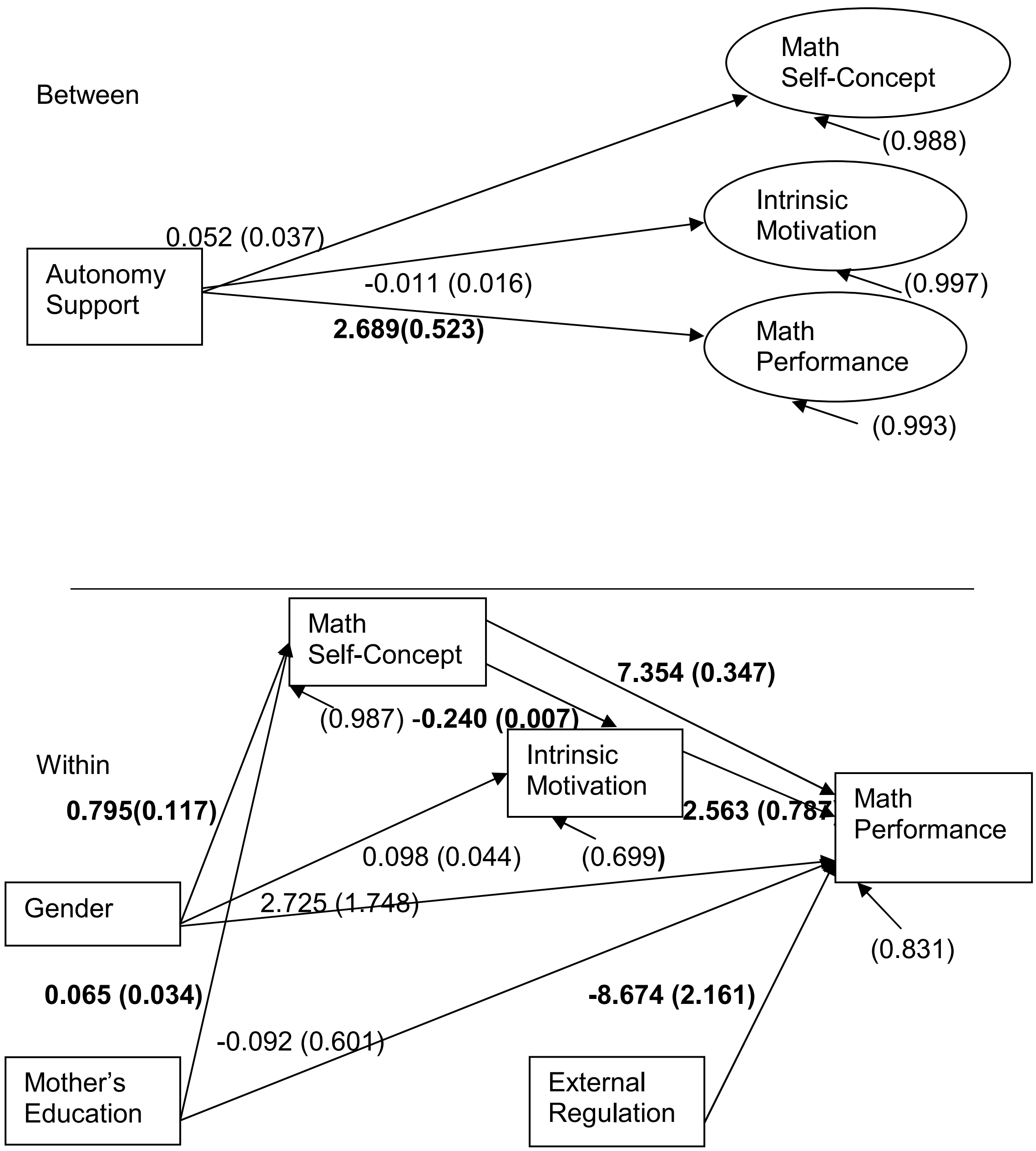
<u>Fit Indices for Each of the Multilevel Path Models</u>

Model	χ^2	df	CFI	TLI	RMSEA	SRMR(B)	SRMR(W)	AIC	BIC
WL1	134.712	5	0.942	0.825	0.081	0.016	0.039	79996.935	80091.316
WL2	132.855	7	0.954	0.921	0.049	0.015	0.040	79995.384	80108.641
ML1	78.054	3	0.961	0.901	0.064	0.009	0.038	79766.615	79917.624
ML2	91.665	5	0.959	0.941	0.049	0.001	0.039	79945.210	80058.467

Note. WL etc = Within-level Model; ML etc = Multi-level Model; WL Model 1 = Within-level version of the full model; WL Model 2 = Within-level version of the trimmed full model; ML Model 1 = Multi-level version of the full model; ML Model 2 = Multi-level version of the trimmed full model.

Figure 4

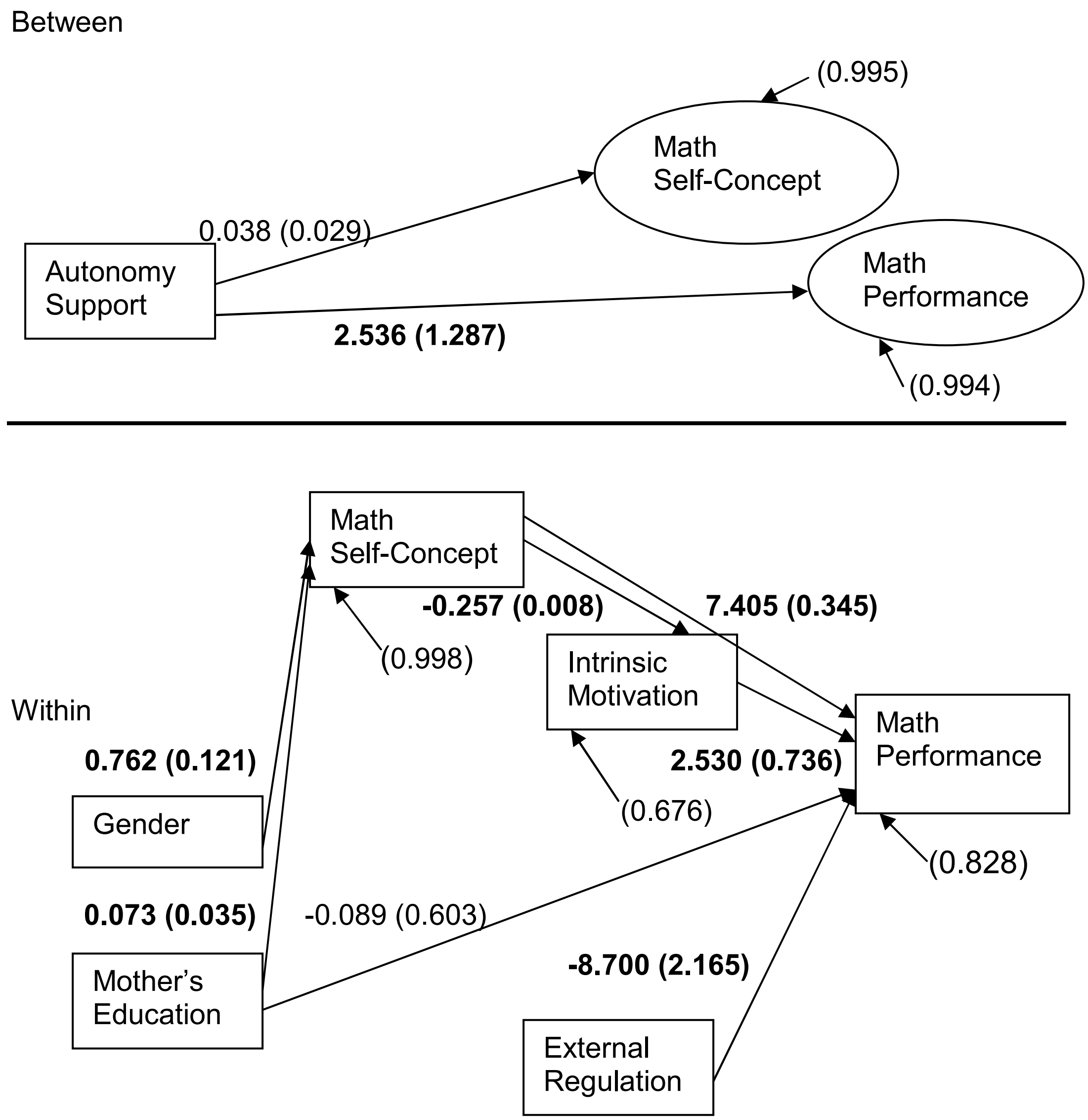
<u>Multi-level Model 1 (ML1): Multi-level Version of the Full Model</u>



Note. Unstandardized path coefficients in boldface are significant.

Figure 5

Multi-level Model 2 (ML2): Multi-level Version of the Trimmed Full Model



Note. Unstandardized path coefficients in boldface are significant.