## Regression Models

***SPSS* Regression** MathAchievement*i* = β0 + β1[TCHRsex]*i* + r*i*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summary** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .050a | .003 | .002 | .92879 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | | | | | | |
| Model | | Sum of Squares | | df | | Mean Square | | F | | Sig. | |
| 1 | Regression | | 15.105 | | 1 | | 15.105 | | 17.510 | | .000b | |
| Residual | | 5916.047 | | 6858 | | .863 | |  | |  | |
| Total | | 5931.152 | | 6859 | |  | |  | |  | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa** | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| B | Std. Error | Beta |
| 1 | (Constant) | -.015 | .020 |  | -.768 | .442 |
| btbgsex SEX OF TEACHER | .101 | .024 | .050 | 4.184 | .000 |

**HLM**

Level-1 Model *SCORESij* = β*0j* + *rij*

Level-2 Model β*0j* = γ*00* + γ*01*\*(*BTBGSEXj*) + *u0j*

Mixed model *SCORESij* = γ*00* + γ*01*\**BTBGSEXj* + *u0j*+ *rij*

**Final estimation of fixed effects (with robust standard errors)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Fixed Effect | Coefficient | Standard error | *t*-ratio | Approx. *d.f.* | *p*-value | |
| For INTRCPT1, *β0* | | | | | |
| INTRCPT2, *γ00* | -0.038489 | 0.066961 | -0.575 | 318 | 0.566 | |
| BTBGSEX, *γ01* | 0.086812 | 0.082355 | 1.054 | 318 | 0.293 | |

**Final estimation of variance components**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Random Effect | SD | Variance Component | *d.f.* | χ2 | *p*-value |
| INTRCPT1, *u0* | 0.68480 | 0.46895 | 318 | 8344.24201 | <0.001 |
| level-1, *r* | 0.62721 | 0.39339 |  |  |  |

***SPSS* Regression** MathAchievement*i* = β0 + β1[STDTsex]*i* + β2[TCHRsex]*i* + r*i*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model Summary** | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .059a | .004 | .003 | .92841 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ANOVAa** | | | | | | | | | | | |
| Model | | Sum of Squares | | df | | Mean Square | | F | | Sig. | |
| 1 | Regression | | 20.817 | | 2 | | 10.409 | | 12.076 | | .000b | |
| Residual | | 5910.335 | | 6857 | | .862 | |  | |  | |
| Total | | 5931.152 | | 6859 | |  | |  | |  | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Coefficientsa** | | | | | | | | | | | | |
| Model | | Unstandardized Coefficients | | | | Standardized Coefficients | | t | | Sig. | |
| B | | Std. Error | | Beta | |
| 1 | (Constant) | | .014 | | .023 | |  | | .605 | | .545 | |
| gender Gender | | -.058 | | .022 | | -.031 | | -2.574 | | .010 | |
| btbgsex SEX OF TEACHER | | .102 | | .024 | | .051 | | 4.231 | | .000 | |

**HLM**

Level-1 Model *SCORESij* = β*0j* + β*1j*\*(*GENDERij*) + *rij*

Level-2 Model β*0j* = γ*00* + γ*01*\*(*BTBGSEXj*) + *u0j*  
β*1j* = γ*10* + *u1j*

Mixed model *SCORESij* = γ*00* + γ*01*\**BTBGSEXj* + γ*10*\**GENDERij* + *u0j* + *u1j*\**GENDERij* + *rij*

**Final estimation of fixed effects (with robust standard errors)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed Effect | Coefficient | Standard error | *t*-ratio | Approx. *d.f.* | *p*-value |
| For INTRCPT1, *β0* | | | | | | |
| INTRCPT2, *γ00* | 0.009934 | 0.067829 | 0.146 | 318 | 0.884 |
| BTBGSEX, *γ01* | 0.087671 | 0.081287 | 1.079 | 318 | 0.282 |
| For GENDER slope, *β1* | | | | | | |
| INTRCPT2, *γ10* | -0.094438 | 0.017037 | -5.543 | 319 | <0.001 |

**Final estimation of variance components**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Random Effect | SD | Variance Component | *d.f.* | χ2 | *p*-value |
| INTRCPT1, *u0* | 0.71079 | 0.50522 | 316 | 4520.30200 | <0.001 |
| GENDER slope, *u1* | 0.11737 | 0.01378 | 317 | 388.00233 | 0.004 |
| level-1, *r* | 0.62264 | 0.38768 |  |  |  |

## **Unconditional HLM Model**

Level-1 Model *SCORESij* = β*0j* + *rij*

Level-2 Model β*0j* = γ*00* + *u0j*

Mixed model *SCORESij* = γ*00* + *u0j*+ *rij*

**Final estimation of fixed effects (with robust standard errors)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Fixed Effect | Coefficient | Standard error | *t*-ratio | Approx. *d.f.* | *p*-value |
| For INTRCPT1, *β0* | | | | | |
| INTRCPT2, *γ00* | 0.019606 | 0.039055 | 0.502 | 319 | 0.616 |

**Final estimation of variance components**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Random Effect | Standard  Deviation | Variance  Component | *d.f.* | χ2 | *p*-value |
| INTRCPT1, *u0* | 0.68491 | 0.46911 | 319 | 8380.75282 | <0.001 |
| level-1, *r* | 0.62721 | 0.39339 |  |  |  |

# *SPSS* GLM Variance Components Estimation [Random Effects ANOVA]

|  |  |  |  |
| --- | --- | --- | --- |
| **ANOVA** | | | |
| Source | Type I Sum of Squares | df | Mean Square |
| Corrected Model | 3464.364 | 327 | 10.594 |
| Intercept | 18.573 | 1 | 18.573 |
| idteach | 3464.364 | 327 | 10.594 |
| Error | 2587.884 | 6635 | .390 |
| Total | 6070.822 | 6963 |  |
| Corrected Total | 6052.249 | 6962 |  |

|  |  |
| --- | --- |
| **Variance Estimates** | |
| Component | Estimate |
| Var(idteach) | .481 |
| Var(Error) | .390 |
| Dependent Variable: scores  Method: ANOVA (Type I Sum of Squares) | | |