Mindprint - Math

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Contents

From looking at correlations we found:

1. Overall Math Score significantly correlates with:

- spatial perception accuracy (r = 0.33, p = 0.008)
- WM efficiency (r = 0.26, p = 0.04)

2. Pre-Algebra/Elementary Algebra significantly correlates with:

- spatial perception accuracy (r = 0.41, p = 0.0009)

3. Plane Geometry/Trignometry significantly correlates with:

- spatial perception accuracy (r = 0.28, p=0.027)

4. Intermediate Algebra/Geometry significantly correlates with:

- WM efficiency (r = 0.3, p = 0.017)
- WM accuracy (r = 0.3, p = 0.018)

Regression models

Overall Math Score

```
##
## Call:
## lm(formula = ACTmathscore ~ SPA_Az + WM_EFFICIENCY, data = finalDF2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.45685 -0.06718  0.00348  0.09858  0.26897
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.55538    0.02221  25.008   <2e-16 ***
## SPA_Az         0.06111    0.02340   2.612   0.0114 *
## WM_EFFICIENCY  0.06277    0.03160   1.987   0.0516 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1374 on 59 degrees of freedom
## Multiple R-squared:  0.1649, Adjusted R-squared:  0.1366
## F-statistic: 5.825 on 2 and 59 DF,  p-value: 0.004912
```

Spatial perception accuracy is a stronger predictor of overall math score compared to working memory efficiency

Pre-Algebra/Elementary Algebra

```
##
## Call:
## lm(formula = EAscore ~ SPA_Az, data = EA_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.43422 -0.07867  0.02051  0.09524  0.22305
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.57133    0.02073  27.559  < 2e-16 ***
## SPA_Az       0.07897    0.02279   3.466 0.000983 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1343 on 60 degrees of freedom
## Multiple R-squared:  0.1668, Adjusted R-squared:  0.1529
## F-statistic: 12.01 on 1 and 60 DF,  p-value: 0.0009835
```

Spatial perception accuracy is a very strong predictor of Pre-Algebra/Elementary Algebra score.

Plane Geometry/Trignometry

```
##
## Call:
## lm(formula = GTscore ~ SPA_Az, data = GT_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.54840 -0.15357  0.02837  0.13625  0.38216
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.53957    0.02926  18.442   <2e-16 ***
## SPA_Az       0.07281    0.03216   2.264   0.0272 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1895 on 60 degrees of freedom
## Multiple R-squared:  0.07871,    Adjusted R-squared:  0.06335
## F-statistic: 5.126 on 1 and 60 DF,  p-value: 0.0272
```

Spatial perception accuracy is a strong predictor of plane geometry/trig.

Intermediate Algebra/Geometry

```
##
## Call:
## lm(formula = AGscore ~ WM_EFFICIENCY, data = AG_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.31576 -0.10671  0.00374  0.11141  0.32694
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.59352    0.02203  26.942   <2e-16 ***
## WM_EFFICIENCY  0.08937    0.03655   2.445   0.0174 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1595 on 60 degrees of freedom
## Multiple R-squared:  0.09059,    Adjusted R-squared:  0.07544
## F-statistic: 5.977 on 1 and 60 DF,  p-value: 0.01745
```

```
##
## Call:
## lm(formula = AGscore ~ WM_Az, data = AG_DF)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.34155 -0.09775  0.00655  0.11368  0.33590
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.57778    0.02535  22.790   <2e-16 ***
## WM_Az        0.08658    0.03571   2.425   0.0184 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1596 on 60 degrees of freedom
## Multiple R-squared:  0.08924,    Adjusted R-squared:  0.07406
## F-statistic: 5.879 on 1 and 60 DF,  p-value: 0.01835
```

Working memory accuracy and efficiency are not longer significant when you include both in the same model, but that's because efficiency is accuracy + RT averaged. So we can just look at efficiency.