**Abstract**

This study investigated associations between working memory (measured by complex memory tasks) and both reading and mathematics abilities, as well as the possible mediating factors of fluid intelligence, verbal abilities, short-term memory (STM), and phonological awareness, in a sample of 6- to 11-year-olds with reading disabilities. As a whole, the sample was characterized by deficits in complex memory and visuospatial STM and by low IQ scores; language, phonological STM, and phonological awareness abilities fell in the low average range. Severity of reading difficulties within the sample was significantly associated with complex memory, language, and phonological awareness abilities, whereas poor mathematics abilities were linked with complex memory, phonological STM, and phonological awareness scores. These findings suggest that working memory skills indexed by complex memory tasks represent an important constraint on the acquisition of skill and knowledge in reading and mathematics. Possible mechanisms for the contribution of working memory to learning, and the implications for educational practice, are considered.

Gathercole, S. E., Alloway, T. P., Willis, C., & Adams, A. M. (2006). Working memory in children with reading disabilities. *Journal of experimental child psychology*, *93*(3), 265-281.

**Dataset:**

* Dependent variable (Y)
  + Reading – reading skills of the 6 to 11 year olds
* Independent variables (X)
  + Verbal – a measure of verbal ability (spelling, phonetics, etc.)
  + Math – a measure of math ability
  + Work\_mem – working memory score

**Data screening:**

1. Assume the data is accurate with no missing values. You will want to screen the dataset using all the predictor variables to predict the outcome in a simultaneous multiple regression (all the variables at once). This analysis will let you screen for outliers and assumptions across all subsequent analyses/steps.
2. Outliers
   1. Leverage:
      1. What is your leverage cut off score?
      2. How many leverage outliers did you have?
   2. Cook’s:
      1. What is your Cook’s cut off score?
      2. How many Cook’s outliers did you have?
   3. Mahalanobis:
      1. What is your Mahalanobis *df*?
      2. What is your Mahalanobis cut off score?
      3. How many outliers did you have for Mahalanobis?
   4. Overall:
      1. How many total outliers did you have across all variables?
      2. Delete them!
3. Assumptions:
   1. Additivity:
      1. Include a correlation table of your **independent** variables.
      2. Do your correlations meet the assumption for additivity (i.e. do you have multicollinearity)?
   2. Linearity:
      1. Include a picture that shows how you might assess multivariate linearity.
      2. Do you think you’ve met the assumption for linearity?
   3. Normality:
      1. Include a picture that shows how you might assess multivariate normality.
      2. Do you think you’ve met the assumption for normality?
   4. Homogeneity:
      1. Include a picture that shows how you might assess multivariate homogeneity.
      2. Do you think you’ve met the assumption for homogeneity?
   5. Homoscedasticity:
      1. Include a picture that shows how you might assess multivariate homoscedasticity.
      2. Do you think you’ve met the assumption for homoscedasticity?

**Hierarchical Regression:**

1. Hypotheses
   1. In step 1, control for verbal ability of the participant predicting reading scores.
   2. In step 2, test if working memory is related to reading scores.
   3. In step 3, test if math score is related to reading scores.
2. Include:
   1. A summary of each step of the model.
   2. The ANOVA comparison of models.
   3. Fill in the following tables.

|  |  |  |  |
| --- | --- | --- | --- |
| Model Number | *F*(df,df) | *p* | *R2* |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | *b* | *t*(df) | *p* | *pr2* |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

* 1. Which steps were significant?
  2. Which predictors were significant?