**Principal Component Analysis**

A principal component analysis with orthogonal rotation (varimax) was used to ensure that the cognitive tasks could be grouped together into a memory composite (visuo-spatial and verbal short-term and working memory tasks) and a phonological abilities composite score (phonological abilities in L1 and FL and acoustic abilities). The sampling adequacy was verified (Kaiser-Meyer-Olkin = .791 and Bartlett’s test of sphericity showed sufficient correlations between tasks, χ2 (28) = 271.19, *p* < .001. The analysis revealed a 2-factor structure to the data with eigen values > 1 and 57.09% of the variance explained. Table 3 shows the factor loadings after rotation. All memory tasks loaded on Factor 1 and all the phonological abilities task loaded on Factor 2.

A z-score was calculated for the memory tasks and the phonological abilities tasks before calculating an averaged memory composite score and an average phonological abilities composite score to use in the mixed-effects model. The vocabulary knowledge task loaded highly on Factor 1, indicating that it shared variance with the memory tasks and the acoustic task, and as such, a residual score was calculated to discount this shared variance to use in the mixed-effects model.

Table 3: Rotated factor loading in the principal component analysis.

|  |  |  |
| --- | --- | --- |
|  | Factor 1  memory | Factor 2  Phonological abilities |
| VSTM | .757 | -.101 |
| SSTM | .746 | .133 |
| VWM | .823 | .119 |
| SWM | .751 | .207 |
| Acoustic | .344 | .594 |
| Phono L1 | .029 | .783 |
| Phono FL | .051 | .760 |
| Vocab | .605 | .285 |
| Eigenvalues | 2.86 | 1.71 |
| % variance | 35.72 | 21.38 |

*Note.* VSTM = verbal short-term memory, SSTM = visuo-spatial short-term memory, VWM = verbal working memory, SWM = visuo-spatial working memory, Phono = phonological, Vocab = vocabulary.