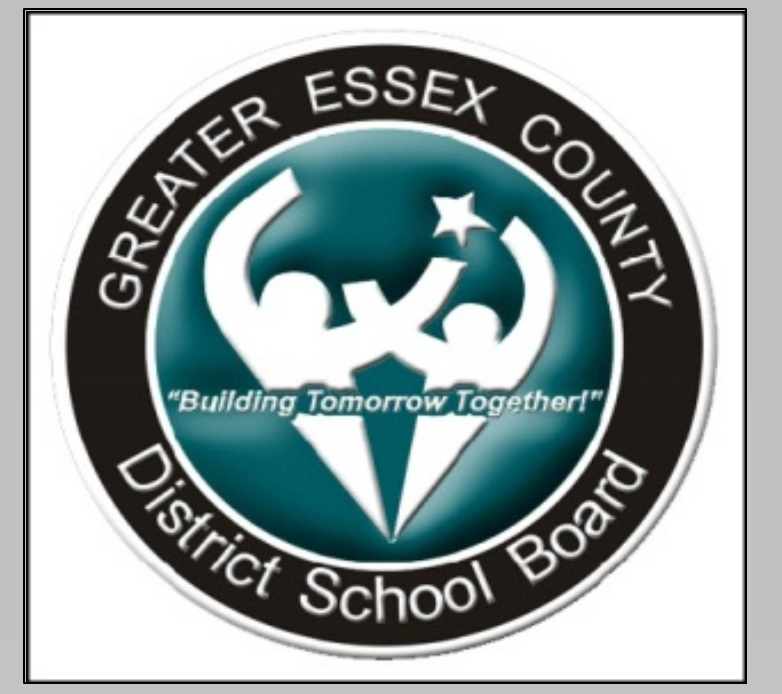# A Cluster Analytic Study of the WISC-IV in a Referred Sample of Children with Persistent Academic Difficulties

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Abstract

WISC-IV core subtest scores of 472 children referred for assessment due to academic difficulties were subjected to a 2-stage cluster analysis. The stability, reliability, and external validity of the derived typology were assessed. Three stable and reliable subgroups were identified. The mean profiles of the derived subgroups were reasonably consistent with those found in studies using previous WISC versions. Unexpectedly, a low PRI group did not emerge, and the Picture Concepts subtest represented the highest score in every profile, never falling below average.

Rationale

- Empirical clustering studies of referred children have identified distinct subtest profiles using earlier WISC editions.

- The WISC-IV represents the most substantial revision to any Wechsler scale.

- Understanding how the WISC-IV compares to its predecessors is important in that failure to do so may lead to spurious interpretations.

- To date, no published study has used cluster analysis to explore WISC-IV patterns in a referred sample.

- The present study was conducted to address this gap in the literature.

Hypotheses

- Stable and reliable clusters would emerge.

- Clusters would differ on WIAT-II subtests.

- The mean WISC-IV profiles characterizing the clusters would be comparable to those found using previous WISC editions.

- New profiles might also emerge.

Method

Participants
- 472 children referred for assessment due to persistent academic difficulties.

- Ages: 8 – 16   FSIQ: 70 – 130

Procedures
- Scaled core subtest scores were subjected to a Ward's hierarchical cluster analysis followed by K-means iterative partitioning.

- To promote solution stability, optimal input order was identified and used.

- Reliability of the final cluster solution was examined via multiple-method and split-half techniques.

- External validity was examined by comparing the final clusters on the basis of WIAT-II performance (Word Reading, Spelling and Numerical Operations) using MANOVA, univariate analyses with post hoc comparisons, and discriminant analysis.

Results

Initial Cluster Analyses

- A three-cluster solution was selected.

- The clusters were labeled:
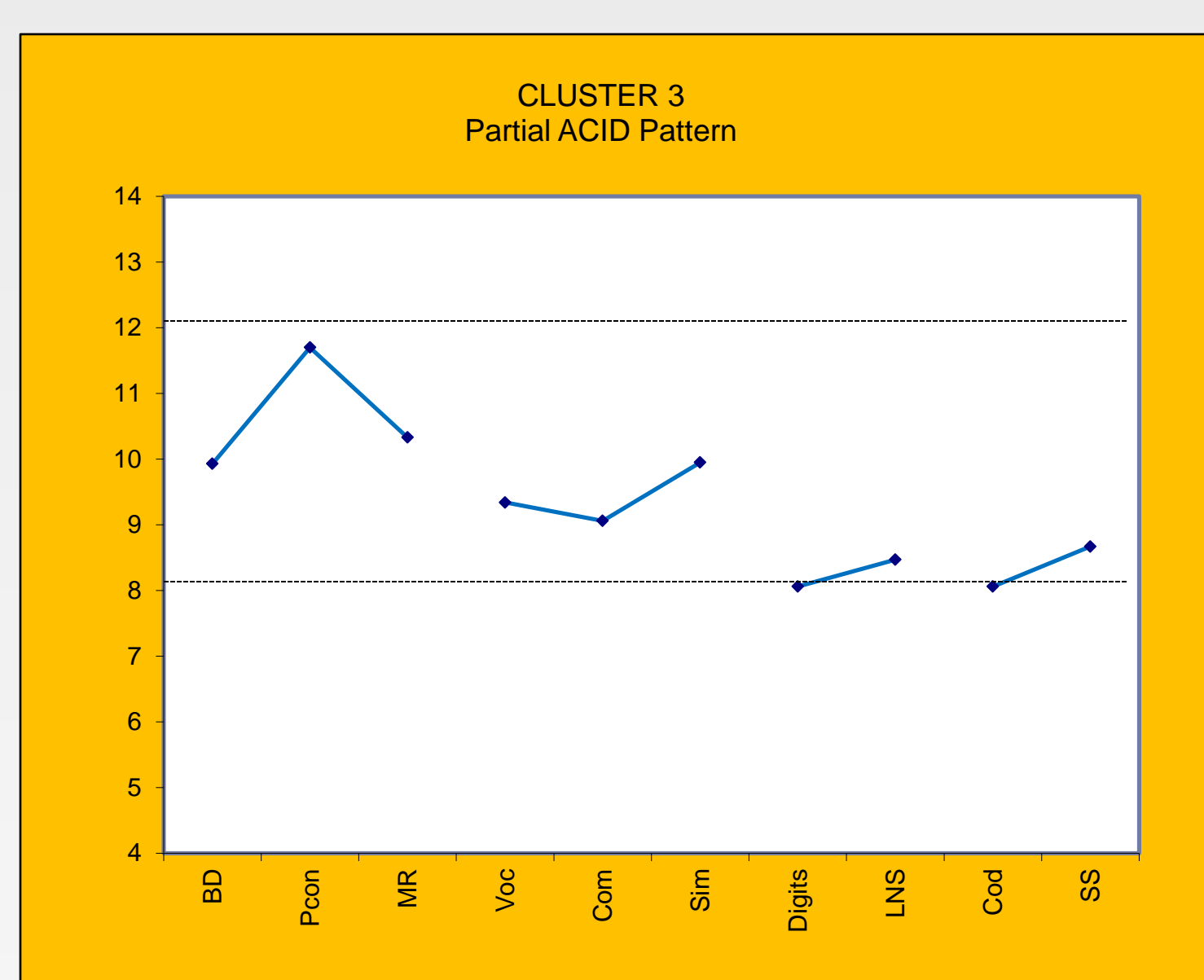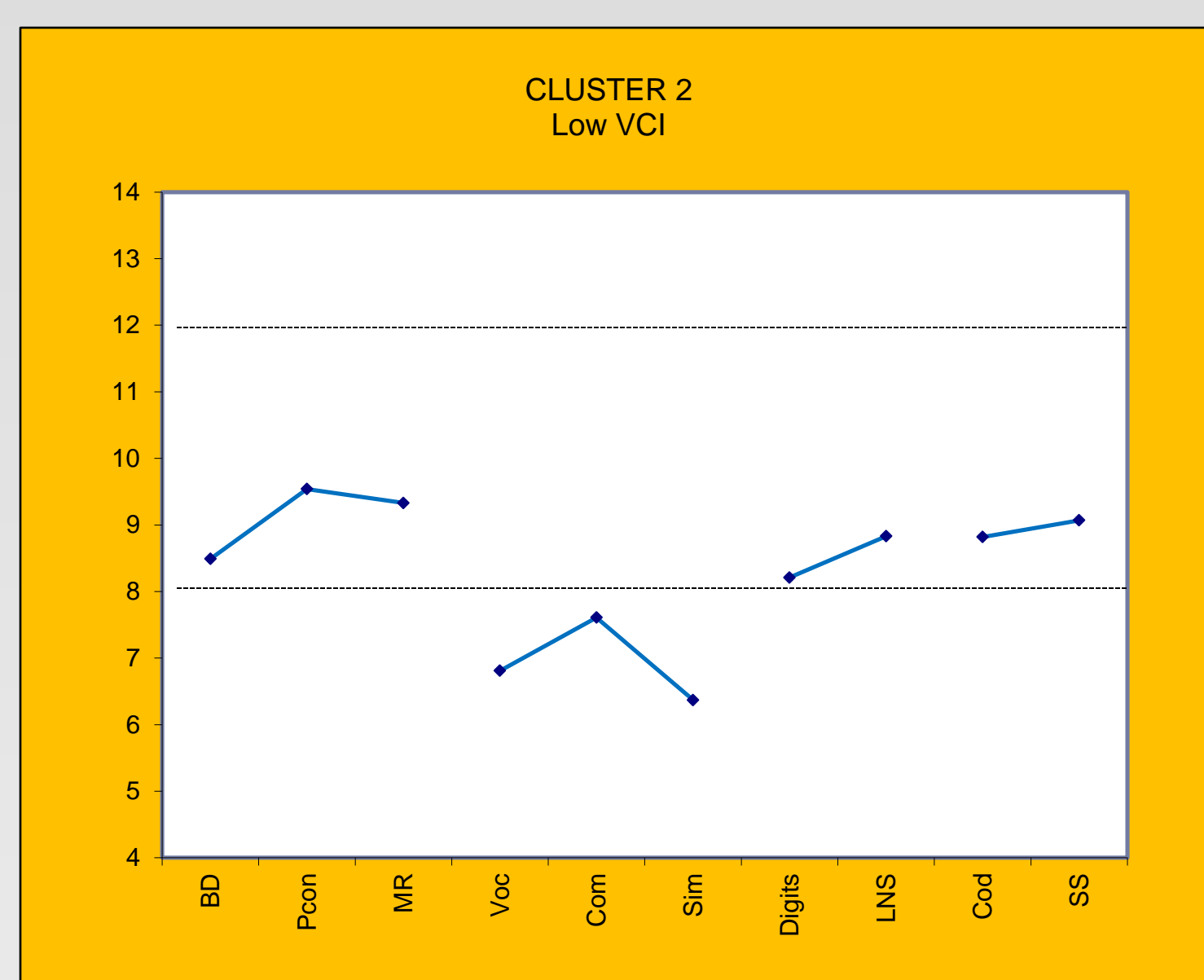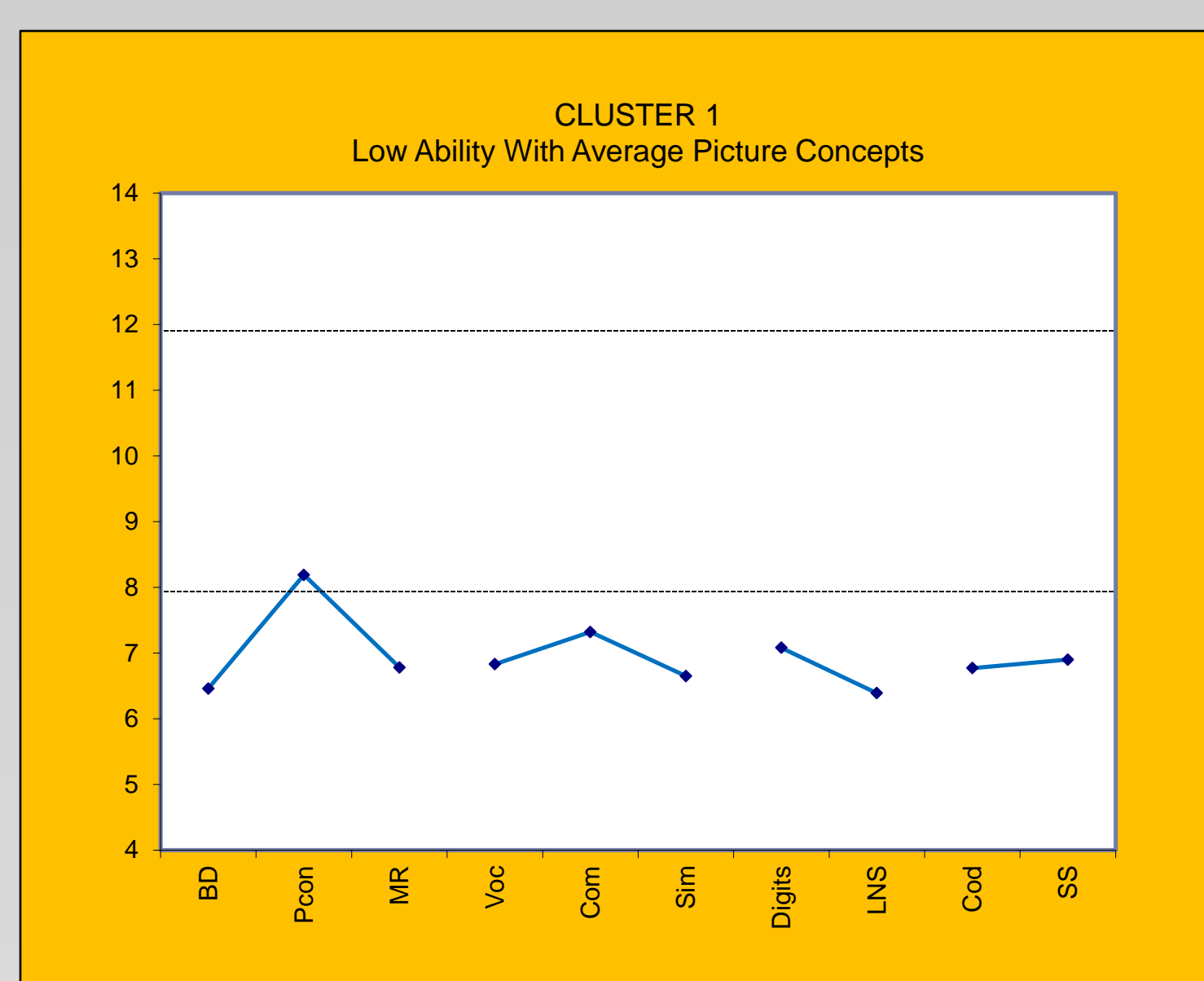
- Clusters were stable across hierarchical and K-means analyses as measured by Cohen's Kappa ($k = .541$, $p < .001$) and Intraclass Correlation Coefficients (ICCs = .877 - .954; $p < .01$).

- Clusters were replicated across four hierarchical methods ($k = .263 - .958$, $p < .01$; ICCs .75 - .945, $p < .01$).

- Clusters were replicated across split-half samples (ICCs = .738 .908, $p < .05$).

External Validation

- Cluster 1 performed poorly relative to Clusters 2 and 3 on all WIAT-II subtests evaluated ($p < .05$)

- Numerical Operations played the largest role in separating the groups.
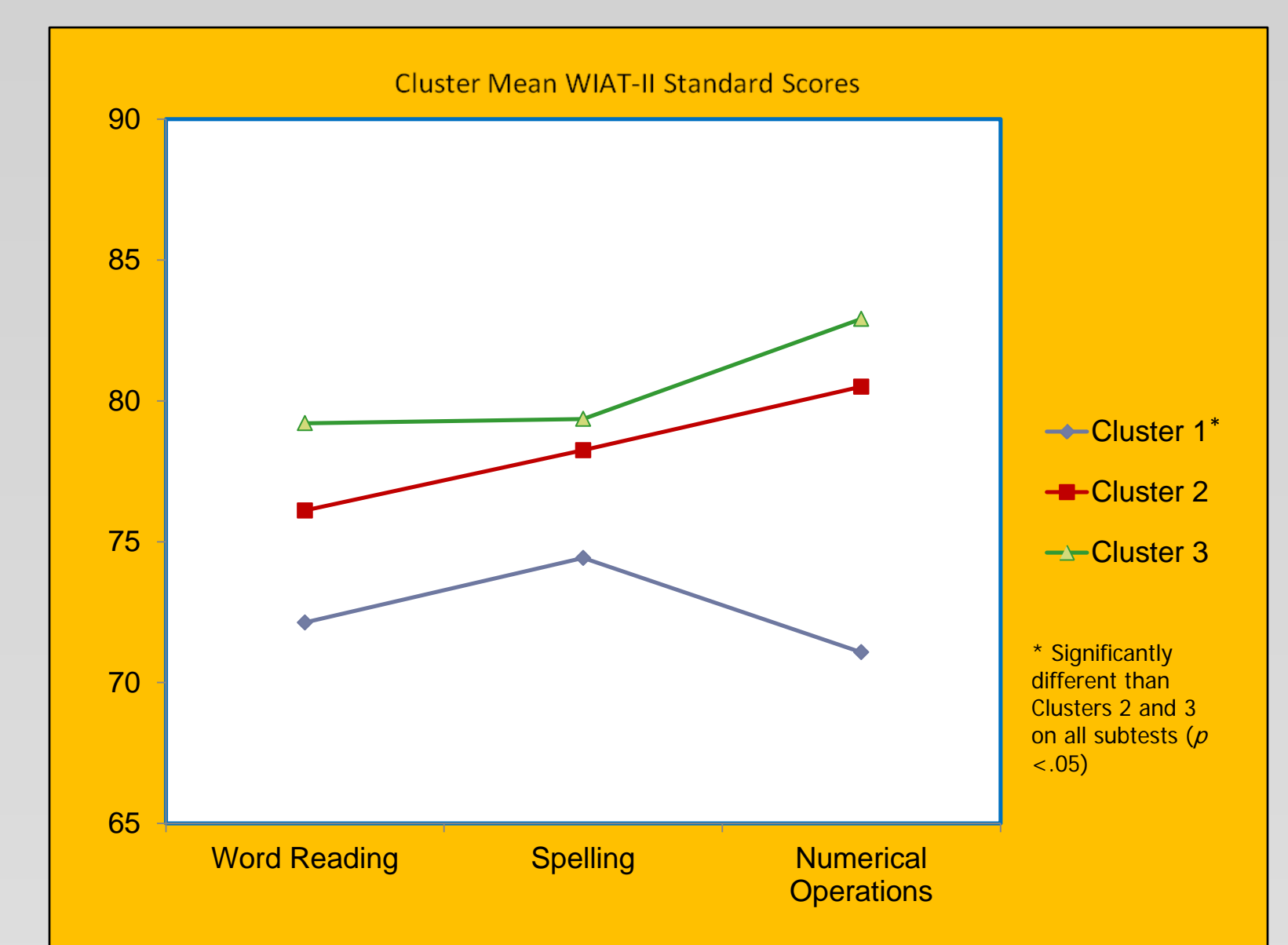
Conclusions

- Stable and reliable patterns of WISC-IV core subtest scores can be empirically derived using cluster analysis in children referred for psychoeducational assessment.

- The subtest patterns identified are reasonably consistent with those derived using previous WISC versions.

- Cluster 1 was externally valid. Additional research is needed to assess the externally validity of this solution using other variables.

- A low PRI group did not emerge, leading to questions regarding the constructs measured by this Index.

- Picture Concepts represented the highest score in every cluster, indicating a need to explore the cognitive processes tapped by this subtest.

- The extent to which Cluster 3 represents a full ACID pattern remains unclear. This implies the need to include supplemental subtests (e.g., Arithmetic and Information) into future cluster analytic studies of the WISC-IV.