Journal of Learning Disabilities

Construct Validity of Reading Measures in Adults With Significant Reading Difficulties
Jack M. Fletcher

The online version of this article can be found at:

Additional services and information for *Journal of Learning Disabilities* can be found at:

Email Alerts: http://ldx.sagepub.com/cgi/alerts

Subscriptions: http://ldx.sagepub.com/subscriptions

Reprints: http://www.sagepub.com/journalsReprints.nav

Permissions: http://www.sagepub.com/journalsPermissions.nav

Citations: http://ldx.sagepub.com/content/43/2/166.refs.html

>> Version of Record - Feb 23, 2010

What is This?

Construct Validity of Reading Measures in Adults With Significant Reading Difficulties

Jack M. Fletcher, PhD[1]

Abstract

The four studies of adult literacy in this special issue of the *Journal of Learning Disabilities* address measurement issues in adult populations and the relation (by comparison) of similar studies of childhood literacy. Despite differences in selection criteria, tests, and research questions, there is some convergence across studies, especially on construct validity issues. It is reassuring to see evidence of construct invariance across children and adults. The examples of lack of convergence relative to childhood literacy studies are instructive, and investigators should be careful not to extrapolate directly from child to adult models.

Keywords

literacy, adults, construct validity, reading

Adult literacy is a major problem in many industrialized countries, including the United States. As Miller, McCardle, and Hernandez (2010) document in this special issue of the *Journal of Learning Disabilities,* low literacy levels have a significant impact on a variety of adaptive outcomes in adults. That the National Assessment of Adult Literacy reveals that about 11 million American adults are not literate in English and another 30 million American adults have only simple and concrete literacy skills is more than disconcerting; these findings represent the continuation of what for many years has been a major public health problem involving literacy in the United States (Lyon, 1999). Because low levels of parental literacy are clearly a factor in low levels of child literacy, there is great risk of continuing to perpetuate literacy problems across generations. There has been considerable focus on the role of effective instruction in preventing and remediating reading disabilities in children and adolescents. However, it is difficult to see how this chain of low literacy will be penetrated without some attention to parental levels of literacy. A concerted effort is clearly warranted, and it is gratifying to see different federal agencies working together on issues involving adult literacy.

The four studies that make up this special issue are all similar in that they address construct validity issues for assessments of reading and literacy skills in adults. Fundamental questions must consider whether the latent variables that are indicated by different observed measures can be validly ascertained, whether they are similar across different studies, and whether they are similar to these identified in studies of children. Of the four papers, Sabatini, Sawaki, Shore, and Scarborough (2010) and MacArthur, Konold, Glutting, and Alamprese (2010) directly address the issue of construct validity in adults. With some variation, these two studies focus primarily on measures of reading decoding, fluency, and comprehension. In a different approach, Nanda, Greenberg, and Morris (2010) and Mellard, Fall, and Woods (2010) focus on the issue of the relation of latent variables in reading and reading-related skills in children and adults. The conclusions from Sabatini et al. and MacArthur et al. are similar. Assessments of reading skills in adults parallel construct validity studies in children. In contrast, both Nanda et al. and Mellard et al. suggest that latent variable models derived from children cannot simply be applied to adults. The differences in these studies lie not only in the research questions that are asked but also in the assessment of reading and reading-related skills and factors such as selection criteria and sample size.

Sabatini et al. (2010) evaluated 476 adult learners with low literacy, defined on the basis of performance below the seventh-grade level on a measure of word reading. Based on the simple view of reading (Gough & Tumner, 1986), assessments were performed of word recognition, reading comprehension, listening comprehension, and fluency skills.

[1]University of Houston, Houston, TX, USA

Corresponding Author:
Jack M. Fletcher, University of Department of Psychology, University of Houston TMC Annex, 2151 West Holcombe Boulevard, 222 TMC Annex, Houston, TX 77204-5053
E-mail: jackfletcher@uh.edu

A series of measurement models was tested with confirmatory factor analysis to see how well different factors predict reading comprehension in a structural equation model. The models were derived from different variations of the simple view; in each model, nested variants were evaluated.

The results indicated that a two-factor model derived directly from the simple view, which involved latent variables representing word recognition and language comprehension, was sufficient to account for variation in reading comprehension in adults with severe decoding problems. Interestingly, the article did not find that vocabulary had a strong relation with reading comprehension and also did not find strong coupling of sight-word reading skills and pseudoword decoding skills. For the latter finding, the sample was selected for word recognition deficits, which may reduce variability on correlated skills.

Missing from Sabatini et al.'s (2010) article is a discussion of methodological issues with confirmatory factor analysis involving method variance and correlated errors of measurement (see Francis, 1988). These issues are nicely addressed by MacArthur et al. (2010), who studied 486 adults enrolled in basic education courses. The participants were selected because they were receiving reading instruction and had low levels of reading comprehension that were between Grades 4 and 7. A series of nested models testing hypotheses about latent variable structure from a battery of 11 measures assessing decoding, word recognition, spelling, fluency, and comprehension were tested.

A five-factor solution with restrictions for correlated errors of measurement best fit the data. The five latent variables reflected the five underlying constructs. However, some of the latent variable correlations were so high that the meaningfulness of separating the constructs could be questioned. Interestingly, the five-factor model fit equally well for native and nonnative speakers of English. It is possible that more factors were needed in this study than in that by Sabatini et al. (2010) because selection on the basis of a comprehension measure may identify a more heterogeneous group of poor readers. The results from MacArthur et al. (2010) are similar to a confirmatory factor analysis of second- to third-grade students with reading disabilities and controls in Fletcher et al. (1996).

In the other two studies, the sample sizes were smaller, and it was more difficult to fit measurement and structural models. Nanda et al. (2010) used a sample of 371 adult readers who showed word reading skills at a Grade 3 to 5 level. The authors fit models based on a battery of achievement tests assessing word recognition, fluency, and reading comprehension skills as well as a test battery addressing cognitive skills, including phonological awareness, rapid naming, and oral vocabulary. They tested models based on the achievement battery, cognitive battery, and an integrated battery. The models that were tested were established based on prior research in children and were run separately for native and nonnative English speakers, which reduced the sample sizes for the modeling.

From the achievement battery, a model involving latent constructs of reading comprehension, word reading, fluency, and nonword reading yielded an adequate fit of the data for the nonnative speakers of English. However, this model did not fit well for the native English speakers. Similarly, a cognitive model with latent variables for vocabulary, rapid naming, and phonological awareness fit well for nonnative speakers but not for native speakers. Finally, an integrated model with factors for vocabulary, comprehension, word reading, fluency, pseudoword decoding, and phonological awareness fit for the nonnative English speakers but not for native English speakers. The authors report that few of the models were a good fit and that they were unable to compare native and nonnative English speakers because of poor convergence of models for the native English speakers. However, it is surprising that they decided to run the models separately given the reduction in sample size that occurred. Model fit may have been enhanced with all 371 participants simply because of the larger sample size and the more stable covariance estimates that should have been obtained. With reasonably fitting models, the factor correlations could have been compared for the native and nonnative subgroups as in the article by MacArthur et al. (2010). In addition, the presentation of efforts to evaluate the bases for poor model fit would have seemed reasonable.

Mellard et al. (2010) used a stratified sample of 309 adults who read at six different literacy levels. It is unclear whether all these individuals would be considered poor readers, and the identification method may differ from that employed in the other three studies, which used either word reading or reading comprehension measures. They randomly selected 174 cases at these different levels. A path model involving 8 reading components was developed and tested. The final model with 11 paths shows significant parameters from reading-related skills mediated by word reading and predictive of reading comprehension. There are clear paths from pseudoword decoding to word reading and to reading fluency, which would be expected. There are also significant paths from word reading to vocabulary and reading comprehension. Vocabulary influenced language and reading comprehension, and reading fluency had an effect on reading comprehension. Although Mellard et al. emphasize differences in models for adult learners relative to younger readers, the significant paths are not unlike those observed in similar modeling studies of children. It would have been interesting to see a confirmatory model like that tested in other three studies from Mellard et al. so that comparisons could have been made of the latent variables assessed in the article. The sample size was small for evaluation of a model with 25 paths.

Conclusions

There are a number of convergent findings across these studies. Using assessments that are similar to those used with children, literacy skills can be measured in adults. In addition, these measures are reliable and identify differences in reading proficiency in different segments of the adult literacy population. Because three of the studies explicitly address all construct validity issues, it is not surprising that the studies that use larger samples (MacArthur et al., 2010; Sabatini et al., 2010) tended to obtain models that had better convergence. As Nunnally (1978) indicated, there are few problems in construct validity research that are not addressed by large samples. In this regard, it is surprising that Mellard et al. (2010) and Nanda et al. (2010) chose to limit the size of their samples without an initial pass through the data for the largest possible sample.

Although the cautions about simply extrapolating from adult models to child models are well taken, there are also differences in findings across studies in childhood populations that reflect sampling and assessment variations. As Sabatini et al. (2010) pointed out, if the simple view is used to develop and test a construct validity model, some studies of children find support for the simple model, whereas others find that more complex models are needed. The lack of convergence across this set of studies does not seem that different from the childhood studies. It is somewhat reassuring to see the evidence for construct in variance across ages that emerges when comparing these studies to studies of children.

A potential limitation for psychometric studies is that the study groups are predominantly poor readers. However, a range of reading ability was involved, although it is not clear whether similar results would have been obtained in a more representative population. In a sample of this sort, it is possible that there were floor effects for some of the measures, but this seems an unlikely explanation of the findings across studies. More attention to the distribution of measures would have been an interesting addition to the findings.

The most important contribution of these studies is the focus on adult learners and the attempt to address similar questions. It would be interesting to see the four centers in this network agree on common questions and methods that could be used to evaluate measurement and structural models across these studies. As different laboratories interested in the issue of adult literacy begin to work together and share interesting results, the field will benefit from the diversity of samples and results exemplified by the studies presented in this special issue.

References

Fletcher, J. M., Francis, D. J., Stuebing, K. K., Shaywitz, B. A., Shaywitz, S. E., Shankweiler, D. P., et al. (1996). Conceptual and methodological issues in construct definition. In G. R. Lyon & N. A. Krasnegor (Eds.), *Attention, memory, and executive functions* (pp. 17-42). Baltimore: Paul H. Brookes.

Francis, D. J. (1988). An introduction to structural equation models. *Journal of Clinical and Experimental Neuropsychology, 10,* 623-639.

Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7,* 6-10.

Lyon, G. R. (1999). In celebration of science in the study of reading development, reading difficulties, and reading instruction: The NICHD perspective. *Issues in Education: Contributions from Educational Psychology, 5,* 85-115.

MacArthur, C. A., Konold, T. R., Glutting, J. J., & Alamprese, J. A. (2010). Reading component skills of learners in adult basic education. *Journal of Learning Disabilities, 43,* 108-121.

Mellard, D. F., Fall, E., & Woods, K. L. (2010). A path analysis of reading comprehension for adults with low literacy. *Journal of Learning Disabilities, 43,* 154-165.

Miller, B., McCardle, P., & Hernandez, R. (2010). Advances and remaining challenges in adult literacy research. *Journal of Learning Disabilities, 43,* 101-107.

Nanda, A. O., Greenberg, D., & Morris, R. (2010). Modeling child-based theoretical reading constructs with struggling adult readers. *Journal of Learning Disabilities, 43,* 139-153.

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Sabatini, J. P., Sawaki, Y., Shore, J. R., & Scarborough, H. S. (2010). Relationships among reading skills of adults with low literacy. *Journal of Learning Disabilities, 43,* 122-138.

About the Author

Jack M. Fletcher, PhD, is Hugh Roy and Lillie Cranz Cullen Distinguished Professor of Psychology in the Department of Psychology at the University of Houston, Houston, Texas, USA.