

Confirmatory Factor Analysis of the Assessment Index of Nonsymbolic Communication for Individuals with Disabilities

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Abstract. This study retests the factor structure by classifying the factor structure of the nonsymbolic communication behavior of students with disabilities based on the assessment index of nonsymbolic communication. As a result, the assessment index had 45 items in three areas: communication methods, communication functions, and discourse functions. There were significant causal relationships between latent and observed variables in the model based on the confirmatory factor analysis. The reliability of the model for students with disabilities had unidimensionality in all areas. The verified index items would lead to an on-line assessment system in the future study.

Keywords: Students with disabilities, Nonsymbolic communication, Confirmatory factor analysis, Cross-validity test

1 Introduction

Scholars and practitioners have made efforts to develop augmentative and alternative communication tools for the students who do not write, read, or speak. It is critical to evaluate nonsymbolic communication behaviors of individuals with severe disabilities and employ appropriate intervention methods for their future development of communication and social skills [1]; [2]; [3]. Park and Yook [14] developed the Assessment Index of Nonsymbolic Communication for persons with disabilities based on the scale in Park's previous study and validated and classified its constructs through an exploratory factor analysis.

The purpose of the study is to test construct validity by checking the constructs of the index and their combinations through a confirmatory factor analysis using a different sample. The research questions are as follow: What is the goodness of fit of the model for the scale? What causal relationships exist between latent and measured variables? What are each concept's unidimensionality and reliability?

2 Methods

The answers from 406 special education teachers in South Korea were analyzed. Among these, 286 were female, and respondent ages generally ranged from 25 to 40. Their tenure was well distributed, although a majority had less than 10 years of teaching experience. Most respondents were teaching at elementary and secondary schools.

The Assessment Index of Nonsymbolic Communication [14] was used. The questionnaire items were measured on a five-point Likert-type scale ranging from "not important at all" (1) to "very important" (5). Cronbach's α , employed to assess the internal consistency of these items, ranged from .7647 to .9325. A confirmatory factor analysis was conducted to analyze the data by using SAS 9.2 and LISREL 8.52.

3 Results

3.1 Fit Index Evaluation and Model Modifications

The χ^2 value was lower than that for the null model and thus close to an optimal model, although $\chi^2(df)$ was 2992.694 (912) at the $\alpha=.05$ level for the absolute fit index, again rejecting the null hypothesis. The GFI was .697, which was less than .90 but closer to an optimal model than that for the null model, and the SRMR was .0553, which was greater than .05 but closer to an optimal model than that for the null model. The RMSEA was also close to an optimal model because its value ranged from .05 to .10. Second, the TLI, NFI, IFI, and CFI values for incremental fit indices were all closer to 1 and thus were closer to an optimal model than those for the null model. Finally, the NC for the parsimonious fit index was 3.281, which was greater than 3.0 but less than that for the null model and thus closer to an optimal model. These fit indices were acceptable, and therefore the modified model was finally determined because all values except for the χ^2 and NC values were close to an optimum condition.

3.2 Causal Relationships between Factors and Variables

The causal relationships between the factors and variables based on the test of model modifications and the goodness of fit. R^2 values ranged from .302 to .677 for observed variables (items) for latent variables (factors). There were no squared multiple correlations less than .30 because these were eliminated earlier.

The causal relationships for observed variables for all latent variables were significant because critical values exceeded 2.0 for all observed variables ($p<.001$). The results of a statistical analysis indicate that each latent variable (factor) in the model had a significant causal relationship with each observed variable (item). That is, all variables appropriately measured each factor.

3.3 Latent Variables and Convergent Validity

All factors in the model had unidimensionality. The reliability of the latent variable ranged from .9698 to .9929, exceeding .70. The results of the confirmatory factor analysis verify the goodness of fit of the model, and causal relationships for measured items for each factor were significant. The convergent (construct) validity was verified through the unidimensionality of each concept. Figure 1 shows the path model.

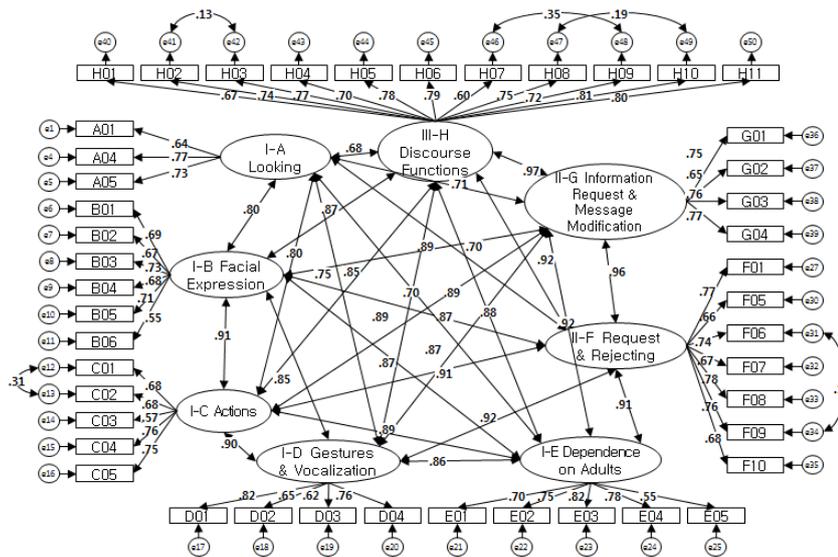


Fig. 1. The path model of nonsymbolic communication behavior

Note.

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|--------------------------------|--|
| I: Communication form | II: Communication function |
| I-A: Looking | II-F: Request and rejecting |
| I-B: Facial expression | II-G: Information request and message modification |
| I-C: Action | III: Discourse function |
| I-D: Gestures and vocalization | III-H: Discourse function |
| I-E: Dependence on adults | |

4 Discussion and Conclusion

This study tests the model fit of the Assessment Index of Nonsymbolic Communication scale for individuals with disabilities through a confirmatory factor analysis. The results verify construct validity based on the fact that causal relationships of measurement items for each factor were significant and that each concept had unidimensionality. Among a total of 45 items developed for the scale, factor 1 assessed communication discourse functions with 11 items; factor 2, communication forms of actions with 5 items; factor 3, communication functions for requesting and rejecting with 7 items; factor 4, communication forms of facial expressions with 6 items;

factor 5, communication forms of dependence on adults with 5 items; factor 6, communication forms of looking with 3 items; factor 7, communication functions with 4 items; and factor 8, communication forms of gestures and vocalization with 4 items.

In the future, research on nonsymbolic communication behavior in context should be investigated to identify the purpose of communication and the frequency of use and provide necessary insights for teaching communication behaviors in various contexts of education and daily living [4], [5]; [6]; [7]. This would lead to an on-line assessment system.

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