Uncovering differences between parent and child completed Pediatric Symptom Checklists in Botswana

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Introduction

The Pediatric Symptom Checklist (PSC) is a screening tool designed to efficiently identify common psychosocial difficulties. Parents (PSC), or the young people themselves (Y-PSC) are asked to indicate how frequently (i.e., never=0, sometimes=1, often=2) each of 35 statements describes their child's/their behaviors. Points are summed to obtain a total score and a child scoring above an age and culturally specific cut-off score is considered to have overall psychological dysfunction.

To be used in combination, the PSC and Y-PSC should function the same way, including similar factor structure and item informativeness. Scholars have confirmed various factor models of a shortened version of the PSC (PSC-17), but the factor structure of the original PSC has not been as commonly studied. Moreover, the psychometric equivalence of parent-report (PSC) and youth-report (Y-PSC) versions has not been well-established, especially in non-U.S. settings.

This study compares the construct validity and psychometric properties of the PSC and Y-PSC among children affected by HIV in Botswana.

Furthermore, this study investigates how the PSC and Y-PSC could be made more efficient tools by shortening their numbers of items.

Project #1: PSC and Y-PSC factor structure

Typically, psychosocial screening tools are established to fit either a unidimensional or a correlated traits structure.

Image I displays the unidimensional structure. Item responses ("V1", "V2", etc.) are caused by only one common risk factor, i.e. psychosocial deficiency.

Image II shows the correlated traits model. Each item relates to one of several correlated subfactors, such as attention, internalizing, and externalizing problems.

Image I. Unidimensional Model

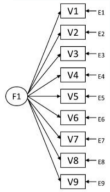
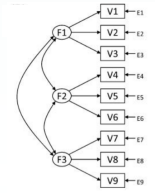


Image II. Correlated Traits Model

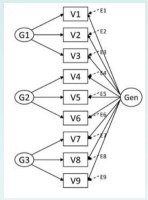


Reise, S.P., Moore, T. M., & Haviland, M. G. (2010)

Project #1: PSC and Y-PSC factor structure (cont.)

For the PSC: We tested a unidimensional model and a new factor structure using bifactor modeling (Image III). In bifactor models, each item loads onto a general factor *as well as* one of several orthogonal "group" factors. A bifactor model keeps the emphasis on a single factor—consistent with the original design of the PSC—while accounting for nuisance multidimensionality.

Image III. Bi-factor Model



Reise, S.P., Moore, T. M., & Haviland, M. G. (2010)

For the Y-PSC: We tested a unidimensional model (Image I).

Project #2: Creating a shorter tool

CAT sessions can be used to determine which items give the most information about an examinee, in terms of item difficulty and item discrimination, and therefore can be used to shorten tools. CAT updates information about examinees as they respond to items and information from each response is used to determine which item to administer next. Items are continually administered until a specified "stopping rule" is met – for example, a minimum standard error (SE). Once a CAT session has been simulated, one can determine the frequency at which each item was administered and create a shorter tool with the most used items.

Methods

- Children ages 7-17 years (n=1033) and their parents (n=1183) completed the Y-PSC/PSC in Gaborone, Francistown, and Maun, Botswana.

Project #1: PSC and Y-PSC factor structure

- Exploratory (EFA) and confirmatory factor (CFA) analyses were performed using multidimensional Item Response Theory with expectation-maximization estimation.
- Oblimin rotation was used in exploratory models, and the number of factors was determined by the minimum average partial method combined with scree plot evaluation.
- Model fit was assessed using CFI, RMSEA, and SRMR.

Methods (cont.)

Project #2: Creating a shorter tool

- CAT sessions were simulated with the software Firestar.
- 3 CAT sessions were simulated each for the PSC and Y-PSC, with a specific SE.
  - SEM's of 0.3 (very high precision), 0.4 (moderate precision), and 0.5 (minimum acceptable precision) were set as stopping rules for both the PSC and Y-PSC.
  - 1000 respondents were simulated for each session

Project #1 Results

Methods revealed clear differences between the PSC and Y-PSC.

- **Y-PSC**
  - Scree plot suggests a 1-factor model, with a steep drop after the first extraction (ratio of $1^{st}/2^{nd}$ eigenvalues=6.5).
  - This model was confirmed to have an acceptable fit with CFA (CFI=0.974, RMSEA=0.027, SRMR=0.043).
- **PSC**
  - Scree plot suggests a 2-factor model (ratio of $1^{st}/2^{nd}$ eigenvalues=3.2).
  - This is supported by CFA, which concluded that the 1-factor PSC did not have an acceptable fit (CFI=0.870, RMSEA=0.064, SRMR=0.067)/
  - The 2-factor bi-factor model for the PSC was confirmed with CFA (CFI=0.967, RMSEA=0.033,SRMR=0.049).

Image IV. Y-PSC Scree Plot

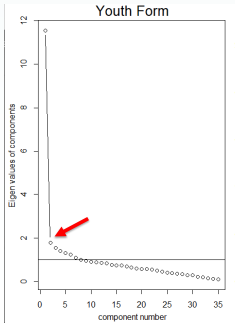
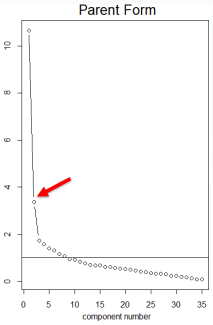


Image V. PSC Scree Plot



Project #2 Results

PSC

SEM	Average # Items Administered	Correlation with 35-item PSC (IRT Scores)
0.3	29.789	0.997
0.4	19.446	0.978
0.5	12.814	0.946

Y-PSC

SEM	Average # Items Administered	Correlation with 35-item Y-PSC (IRT Scores)
0.3	32.637	0.998
0.4	26.612	0.987
0.5	18.362	0.965

Conclusions

- Clear violations of measurement invariance across forms suggest that, perhaps, scores from the PSC and Y-PSC should be interpreted differently.
- Scree plot and fit of CFAs suggest that multidimensionality should be accounted for when using the PSC in Botswana and potentially in other non-US settings.
- To create a more efficient tool, the PSC can be shortened to have 19 items and the Y-PSC can be shortened to have 27 items

Acknowledgements

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References

Steven P. Reise , Tyler M. Moore & Mark G. Haviland (2010) Bifactor Models and Rotations: Exploring the Extent to Which Multidimensional Data Yield Univocal Scale Scores, Journal of Personality Assessment, 92:6, 544-559, DOI: 10.1080/00223891.2010.496477.