

YSSF Scoring Based on Rasch Analysis

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Rasch analysis is becoming one of the most accepted methods for evaluating the psychometrics of measurement tools. In the last ten years the number of published studies referenced in MEDLINE using Rasch has increased 642% from 52 to 334. For any new measure to achieve credibility in the future, it will likely need to provide statistics based on Rasch modeling. This paper will describe Rasch analysis of the Youth Services Survey for Families and compare results from several years of Virginia's YSSF survey data using a traditional scoring methodology and one based on Rasch analysis.

A number of advantages of Rasch over traditional psychometric testing have been documented in the research literature. A primary advantage is that it yields equal interval units of measurement rather than the ordinal scales resulting from raw data, thus mathematical operations based on assumptions of interval scales (means, standard deviations) will be more valid. In addition, it provides estimates of person ratings freed from the sampling distribution of the items and it provides estimates of item difficulty that are free from the distribution of the sample. Therefore, assessments of reliability and validity are independent from the sample characteristics. When Rasch analysis is used to convert raw scores to Rasch measures, a "normed" measure results where 500 is the mean and 100 is the standard deviation. These new scores have the advantage of linear, interval properties as well as being relatively free of sample bias. This makes scoring based on Rasch analysis ideal for developing benchmarks.

Using its FY2005 survey data, the Virginia Department of Mental Health, Mental Retardation, and Substance Abuse Services conducted a series of Rasch analyses on each of the five YSSF subscales: Cultural Sensitivity, Outcome, Social Connectedness, Family Involvement and Satisfaction. In each of these analyses, principal components analysis of Rasch item residuals was used to examine the unidimensionality of the scale, overall fit and item fit to the Rasch model, rating scale structure, person and item reliability. In some cases, such as when the initial analyses revealed the presence of multidimensionality, poorly fitting items, or problems with the rating scale, a reassessment was undertaken.

The results indicated three factors in the principal component analysis of Rasch measures and in the scree plot of raw scores: satisfaction, outcomes, and social connectedness. Two of these, Outcomes and Social Connectedness conformed to original scales, but Satisfaction incorporated Family Involvement and Cultural Sensitivity. In addition, all of the YSSF items could be included in a single scale of Service Success. This scale could be treated as unidimensional, i.e., valid to use one total score, since it has a strong principal measurement dimension and high person reliability. Conversion tables were created to substitute Rasch measures for raw scores on the four scales supported by the Rasch analysis.

Virginia's data for the last three years will be used to calculate Rasch measures for the four scales supported by this analysis to demonstrate the utility of Rasch measures in comparing findings over time. In addition, the Rasch measures will be compared to traditionally calculated domain scores to illustrate differences that emerge from using different scoring techniques.