Scale Validation Using Rasch Analysis: Application in Sport Management

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Because of the prevalence of psychometric survey research in the discipline, sport management scholars remain heavily interested in scale development and validation (Andrew, Petersen, & McEvoy, 2011). Under classical test theory, the prevailing method is a combination of exploratory and confirmatory factor analysis (EFA and CFA; DeVellis, 2016). However, these approaches may not suit ordinal data typically collected in survey research, and their results are often sample-dependent (Boone, Staver, & Yale, 2014).

A less common but powerful technique that can address these limitations is Rasch analysis (Rasch, 1960). Using the logistic ogive, Rasch analysis translates ordinal scores to linear measures and produces “an objective, sample-free, test-free measurement model” (Wright, 1997, p. 37). Other benefits of Rasch analysis include its treatment of missing data, ability to overcome method effects due to item wording, and use of graphical analysis to ease interpretability (Bond & Fox, 2015). While the Rasch family of models have gained prominence in psychology and educational testing, they have yet to be widely used in sport management. Therefore, the purpose of this study was to demonstrate how Rasch analysis can be used in tandem with traditional factor analytic methods to validate a previously developed measure.

The 17-item Self-Efficacy Scale (SES; Sherer et al., 1982) is an often-used measure that has been subjected to numerous psychometric analyses, with mixed results regarding its reliability and dimensionality (Choi, 2003). Here, the SES was adapted to assess college students’ self-efficacy regarding their recreational sports participation. The sample (N=959) included students from a large public university. The scale contained 11 negatively-worded items and 6 positively-worded items (on 6-point scales), so the negatively-worded items were reverse-coded. Latent parallel analysis indicated two factors to be extracted from the data. In the following EFA, all 11 negatively-worded items loaded on one factor, while all 6 positively-worded items loaded on a second factor, suggesting a method effect (Gu, Wen, & Fan, 2017).

The scale was then subjected to Rasch analysis (specifically, the rating scale model) using Winsteps 3.92.1 software. Various statistics (i.e., infit, outfit, mean-square values, person scores, item difficulty estimates, item thresholds, and reliabilities) were examined to determine model fit (Linacre, 2017). Examination of item probability curves suggested to collapse the response categories from six to four, and pivot anchoring was used to preserve the unidimensionality of the measure. Although several fit statistics indicated the data were a good fit for the model, others suggested item difficulties may not be well-targeted to the ability of the population. Visual inspection of the Wright-Andrich map also revealed item clustering and redundancy. Although the modified SES measured many recreational sports participants’ self-efficacy well, more high- and low-difficulty items should be added to better capture those at the upper and lower ends.

Thus, Rasch analysis can be used both to improve the psychometric properties of measures and to reveal their deficiencies, in ways that factor analysis alone may not. Advanced Rasch applications, including Wright-Andrich mapping, threshold collapsing, pivot anchoring, and differential item functioning, will be demonstrated during the presentation.