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Abstract

INCREASING THE PRECISISION OF MOTOR ABILITY ESTIMATES

Key words: *Item Response Theory, German Motor Test, Ability Estimates*

INTRODUCTION

Woll (2007) concluded that many studies investigating the motor performance of teenagers and children appear to be questionable from a methodological point of view. By referencing to the analyses of six items of the German Motor Test (DMT6-18) (Bös, 2009) this study compares to what extent unidimensional analyses based on the classical test theory (CTT) and on the item response theory (IRT) allow for a precise calculation of ability estimates. At the same time, a recently proposed IRT model is presented that allows for the calculation of a unidimensional ability estimate even when the considered construct – in this case the motor performance – is assumed to be multidimensional.

METHOD

For 486 pupils unidimensional ability estimates of motor performance are calculated based on the six test items: endurance run, hopping sideways, push ups, sit-ups, squad jump, and 20m sprint. The used calculation methods are the mean method of the CTT and two IRT methods – one Rasch scale based on the partial credit model (Masters, 1982) and one based on the subdimension model (Brandt, 2008). Hereby, the subdimension model considers additional subtest specific factors depending on the underlying multidimensional structure of the test.

RESULTS AND DISCUSSION

The results in Table 1 show that the application of a Rasch model yields a more precise calculation of the ability estimates. By taking the multidimensional or subdimensional structure of the construct into account, the accuracy can be further improved and the calculation is also theoretically consistent with the assumed multidimensional structure of the construct.

Table 1. *Measurement Errors of the CTT and the IRT in Comparison*

Method (Analysis)	Mean Error of the Ability Estimates	Standard Deviation of the Ability Estimates	Mean Error in Percent Standard Deviation
CTT (Mean Method)	0.312	1.141	27.4%
IRT (Partial Credit Model)	0.215	1.461	14.7%
IRT (Subdimension Model)	0.222	1.728	12.9%

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