Establishing prediction intervals for the SpeedWheel acuity test

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Objective

The SpeedWheel Test (SW) is an objective Test of visual acuity (VA) using suppression of the optokinetic nystagmus (OKN). Here we established prediction intervals of the SW measures compared to Snellen acuity in adults and children.

Methods

Subjects aged at least 4 years underwent testing of visual acuity with SW, Landolt-C and Tumbling-E symbols (Freiburg acuity test: FrACT-C, FrACT-E).

Prediction intervals were established for SW compared to
1. FrACT-C
2. FrACT-E
3. for FrACT-E compared to FrACT-C.

Results

471 eyes from 241 patients were included: mean age 37.5, range 4-88 years. For each acuity step, there was no influence of age. Prediction intervals for SW to estimate FrACT-C or -E acuity showed a similar range compared to the prediction interval of FrACT -C for estimation of FrACT -E acuity.

Figure 1: For the different LogMAR acuity levels tested, figure 1 depicts the prediction intervals for SW acuity compared to FrACT-C (left), to FrACT-E (middle) and for FrACT-C acuity in relation to FrACT-E (right). The boxplots contain the 50%, lower 10% and upper 90% quantile. The respective LogMAR values for the range and the quantiles are given in the graphic while the description of the x and y axis also includes decimal Snellen acuity in grey for better relation to clinical practice.

Eyes with refractive error, cataract, visual field loss and retinal disease did not differ significantly from healthy eyes in contrast to eyes with amblyopia or multiple ophthalmic disorders.

Figure 2: Figure 2 depicts SW test compared to FrACT-C in groups of different SpeedWheel values and diagnostic subgroups. The boxplots contain 50% of the data. Lower limit is 25% and upper limit 75%, the thick line represents the median.

Conclusion

Our prediction intervals for SW acuity may be used to estimate Snellen acuity (FrACT- C and –E) in the clinic in adults and children unable to cooperate in other acuity testing. SW correlated well to FrACT tests and results of a previous study fell within our prediction estimates.

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Literature