DEVELOPMENT OF A CONCISE LOWER EXTREMITY PHYSICAL PERFORMANCE TEST SET FOR A RETURN TO SPORT DECISION MAKING IN PEDIATRIC POPULATIONS

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Purpose/Hypothesis: Common physical performance tests (PPTs) used in return to sport decision-making include the Y-Balance LQ, stork balance, stork balance on BOSU, single leg squat (SLS), SLS on BOSU, clockwise and counterclockwise quadrant single leg hop (SLH), forward SLH, timed SLH, and triple crossover SLH. While each test assesses distinct characteristics of performance, the 10-item battery is not practical in clinical settings. The aims of this study are to 1) define which primary components of physical performance these 10 PPTs assess, and 2) derive a reduced item set of PPTs that efficiently and accurately measures performance on each component.

Number of Subjects: 63

Materials/Methods: Healthy volunteers ages 6-17 [10.7 ±3.2 years; 33 females (54.1%)] performed 10 PPTs in the same order with randomized starting test and limb. For analysis, we developed a composite score for each test by averaging trials. All Y-Balance, and hop tests were normalized to leg length. Item reduction was performed using principal components analysis (PCA). Kaiser Criterion (eigenvalue > 1) and scree plot visualization determined the optimal number of components to extract. Items with loadings > 0.55 were considered for the reduced item test. Cross-loaded items with < 0.25 absolute difference in loading between components were dropped. If two or more factors loading on the same component were highly correlated (r > 0.7), we dropped the item(s) with the lowest factor loading. The reduced item set was evaluated for internal consistency (Cronbach a) among the principal components, with a minimum criterion of 0.7 considered satisfactory.

Results: PCA extracted 2 components with a cumulative response variance of 67.7%. Component 1 (neuromuscular control) included all balance, SLS and quadrant hop tests. The two quadrant hop tests were highly correlated (r=0.94) and had the second and third lowest factor loadings (<0.78) and were not considered for the reduced-item set. The SLS had the lowest factor loading (0.69) and was also not considered. The Stork, Stork BOSU, and SLS BOSU had similar factor loadings (0.79, 0.90, and 0.88, respectively) and did not meet criteria for removal (all < 0.61). Component 2 (Power), forward SLH (0.94) and crossover SLH (0.79), demonstrated moderate correlation (r=0.56). Timed SLH and Y-Balance did not meet the loading criterion and were not considered. The final 5-item set had a cumulative response variance of 76.0%. The Cronbach a of the 3-item Component 1 (0.80), 2-item Component 2 (0.72) and overall 5-item set (0.70) were all satisfactory.

Conclusion: Neuromuscular control and power are most appropriately assessed with stork, stork BOSU, SLS BOSU, forward SLH and triple crossover SLH tests. Of these, the Stork BOSU and forward SLH may be most capable of evaluating components measured by the 10 PPTs.

Clinical Relevance: These findings provide clinicians with efficient options for measuring lower extremity performance for the purposes of return to sport decision making in pediatric populations.

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