

The multi-component structure of core strength

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Introduction



- Core strength is widely regarded as an important component of sports performance and injury prevention or rehabilitation. (Jeong et al., 2021; Saeterbakken et al., 2022)
- Core strength is defined as „the ability of a core muscle or a core muscle group to generate muscular force“. (Siff, 2000, S.111)
- The required expression of core strength depends on the demands within a specific sport or task. (Zemková, 2022)

- There is limited and conflicting scientific evidence regarding the efficacy of core strengthening and stabilization exercises in enhancing athletic performance or preventing injuries. (Saeterbakken et al., 2022; Zemková, 2022)
 - There is a lack of a standardized measurement system for assessing core strength. (Roth, 2019; Zemková, 2022)
 - The focus is on measuring core endurance rather than the maximal core strength or core power. (Zemková, 2022)



Determination of the components that constitute the core strength structure by a differentiated force measurement approach

Methods



N = 42 adult sports students ($n_{\text{female}} = 20$, $n_{\text{male}} = 22$, 24.0 ± 2.9 years, 179.0 ± 9.8 cm, 75.2 ± 12.7 kg)
No injuries in the core area

Testing session 1

Warm-up (5 min)

Holding time measurement

- 1 practice trial for a duration of 5 s in each position (a, b, c)
- 1 test trial in each position (a, b, c)
- Instruction: „Maintain the position as long as possible.“
- 5 min rest between test trials in each test position

Testing session 2

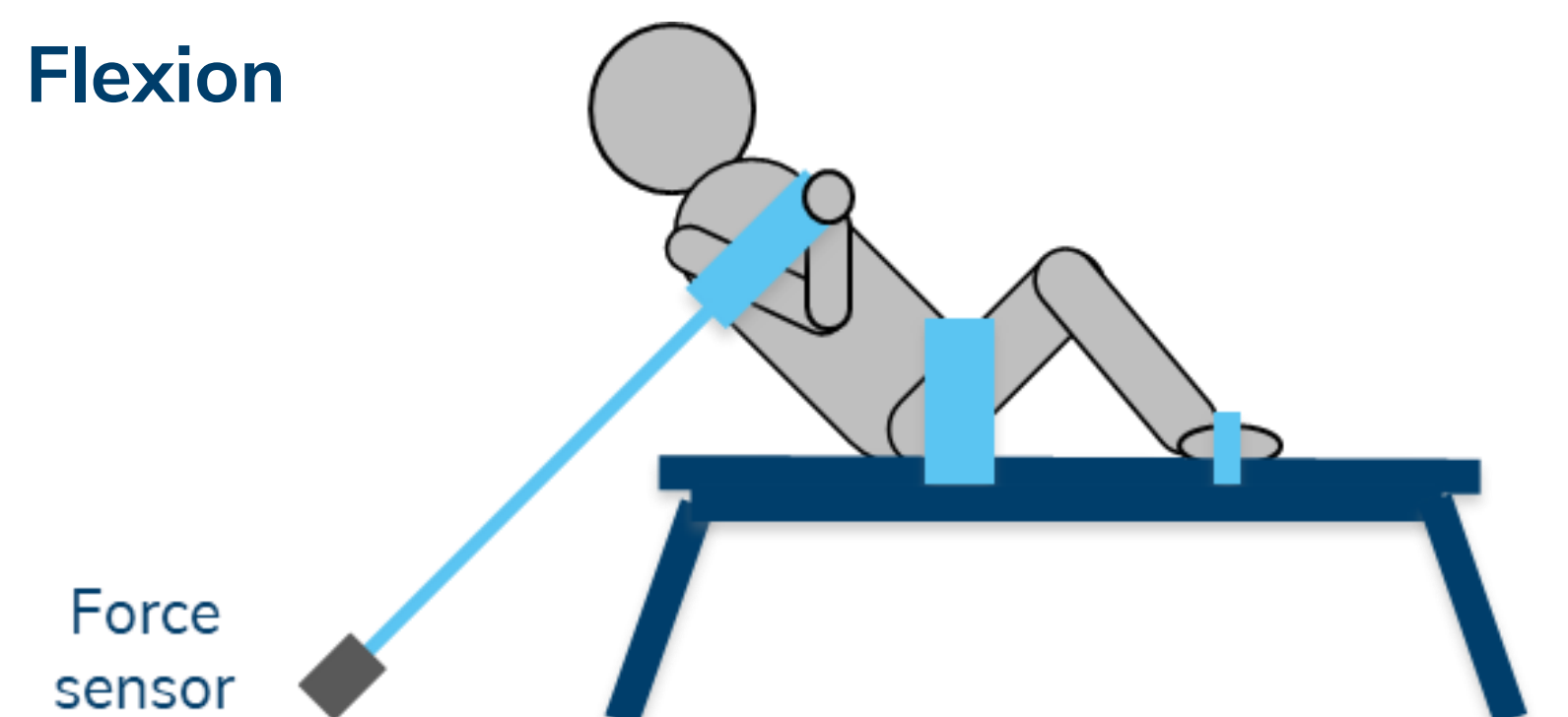
Warm-up (5 min)

Maximal isometric voluntary contraction & peak rate of force development measurement

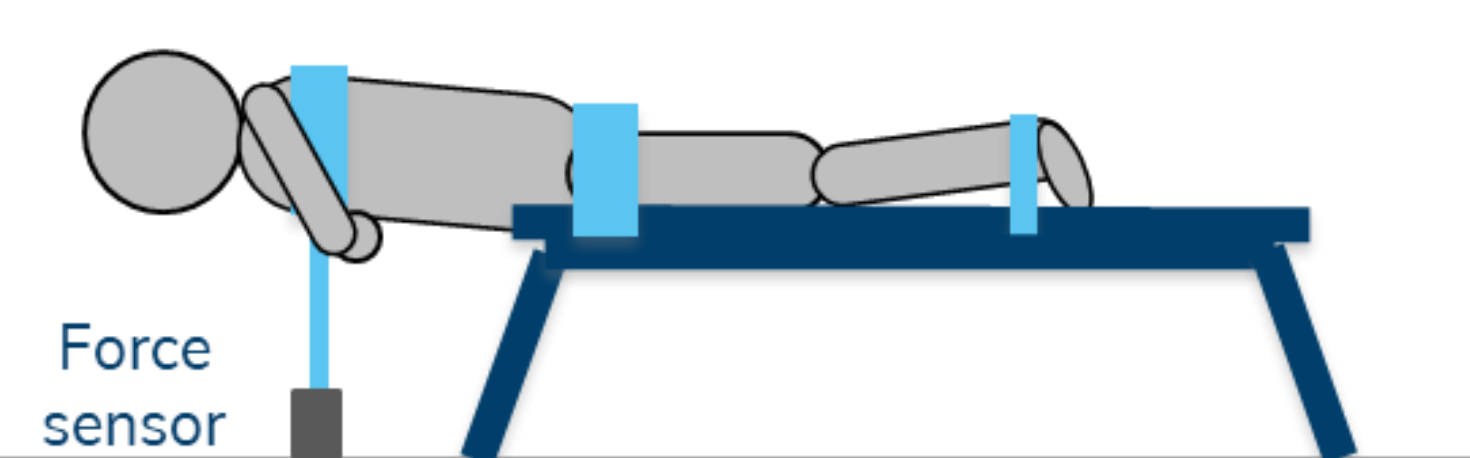
- 3 practice trials in each position with submaximal effort (a, b, c)
- 3 test trials in each position with maximal effort (a, b, c)
- Instruction: „Pull from a light preload as hard and fast as possible on the force sensor for a duration of five seconds.“
- 60 s rest between test trials
- 2 min rest during transition between test positions

Randomized order of testing sessions
7 days between testing sessions

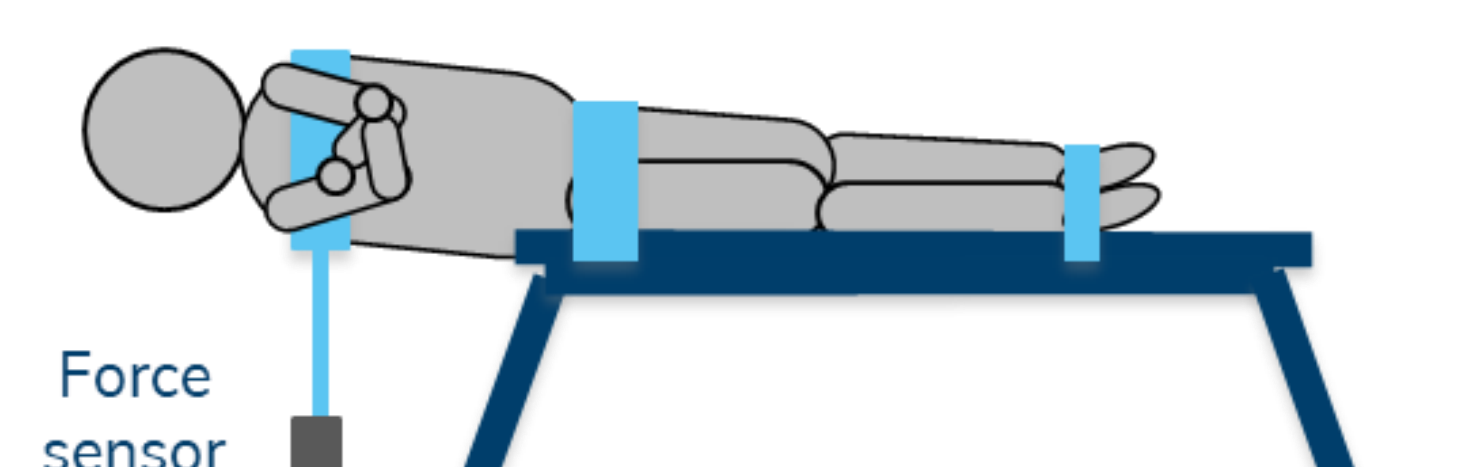
(a) Flexion



(b) Extension

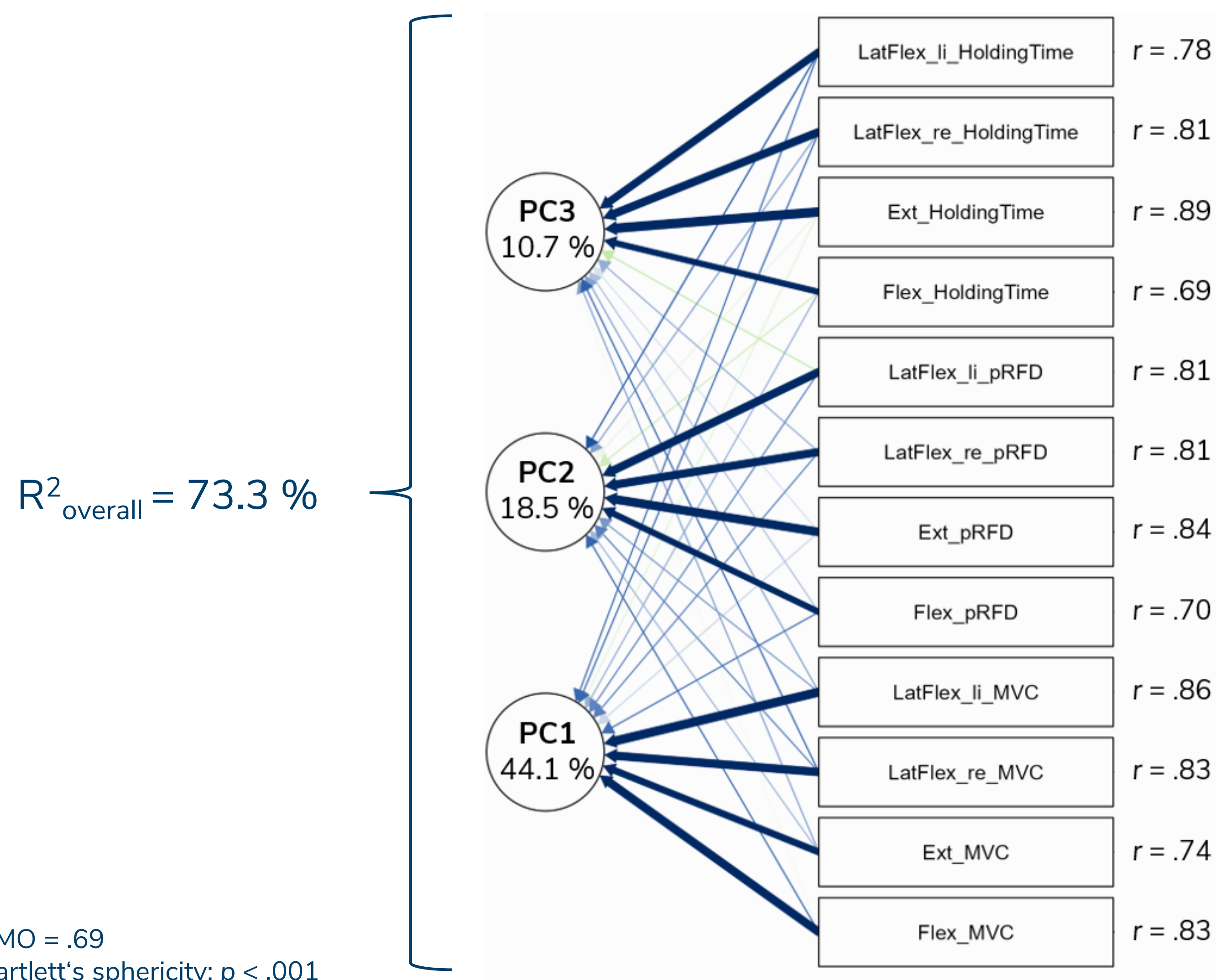


(c) Lateral flexion



Principal component analysis with Varimax rotation

Results



Discussion

- Three identified independent principal components predominantly constitute the core strength structure
 - PC1 = **maximal core strength**
 - PC2 = **core power**
 - PC3 = **core endurance**
- First study that indicated core strength components in the same exercise position!
- Study examined core power and maximal core strength of different core muscle groups in addition to the commonly tested core endurance.
- Direct comparisons with other studies are challenging due to methodological differences. (Roth et al., 2016; Saeterbakken et al., 2015; Tomčić et al., 2021)
- Isometric measurement does not fully reflect the demands of core strength in sporting movements. However, it provides for a higher degree of standardization of the test conditions.

References

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e-Poster

