

Functional movement, maturation and physical performance in youth female Netball players

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Introduction

Functional movement competency is an important screening tool that has been used to determine and understand disparities and limitations in an individuals movement patterns. The link between maturation and functional movement in relation to physical performance has been demonstrated in youth males (Lloyd et al. 2015) but not youth females.

Netball is New Zealand's primary female competitive sport thus the need to understand how maturation and functional movement relate to physical performance in female netballers is important to aid in the facilitation of their performance enhancement.

The purpose of this study was to examine the relationship between movement competency, maturation and physical performance outcomes of youth female netball players.

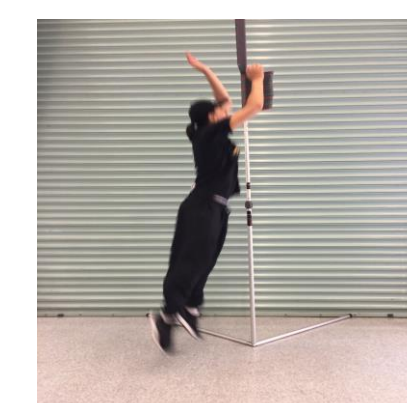


Physical performance tests

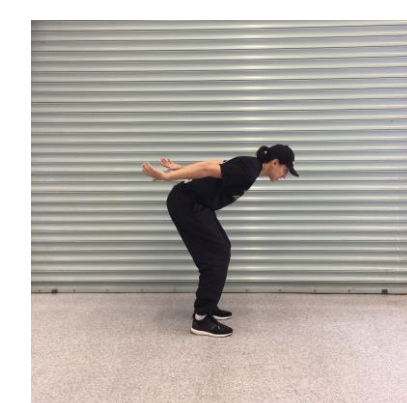
All tests adhered to the guidelines of the Netball NZ Physical Testing Protocols.

Jump testing: Bilateral vertical jump and bilateral broad jump tests were performed maximally 3 times each with 2 minutes rest in between each trial.

Locomotive testing: Three maximal sprints over 40m (20m out and back shuttle incorporating the 5-0-5 change of direction test) were performed with 2 minutes rest between each trial. Using timing gates 5m, 10m, 5-0-5 assessment and 40m shuttle sprint time were measured.



Vertical jump



Horizontal jump



Sprint

Results

- FMS scores demonstrated a very large ($r = 0.75$) and large ($r = 0.56$) relationship with horizontal Jump and vertical jump respectively.
- FMS competency was moderately correlated with maturation ($r = 0.41$) and locomotive tasks ($r = -0.37$ to -0.45).
- There were trivial to moderate relationships between maturation and physical performance test outcomes.
- There is a very large correlation between maturation and vertical jump height ($r = 0.72$).

| | Mean (SD) | Relationship with FMS score | | Relationship with Maturity offset | |
|-----------------------------|--------------|-----------------------------|------------|-----------------------------------|------------|
| | | r value | Inference | r value | Inference |
| Horizontal jump (cm) | 186.4 (21.1) | 0.75 | very large | 0.46 | moderate |
| Vertical jump (cm) | 44.1 (4.2) | 0.55 | large | 0.72 | very large |
| 5m sprint (s) | 1.15 (0.03) | -0.11 | trivial | -0.18 | trivial |
| 10m sprint (s) | 1.99 (0.05) | -0.41 | moderate | -0.32 | moderate |
| 40m shuttle sprint (s) | 7.85 (0.23) | -0.45 | moderate | -0.14 | trivial |
| 505 change of direction (s) | 2.61 (0.08) | -0.37 | moderate | 0.10 | trivial |
| FMS score | 15.4 (1.1) | | | 0.40 | moderate |
| Maturity offset (years) | 3.9 (0.5) | | | | |

Methods

Design: Cross sectional study design

Participants: A sample of 8 female senior high school Netball players completed the requirements for this study (see characteristics in Table 1).

Maturation was assessed using the non-invasive predictive methods of Mirwald et al. (2002). Anthropometrics allowed for maturity offset years from peak height velocity (PHV) to be estimated.

Table 1. Participant characteristics

| | Mean (SD) |
|-------------------------|-------------|
| Age (years) | 16.5 (0.6) |
| Height (cm) | 173.3 (7.2) |
| Mass (kg) | 73.8 (11.2) |
| Age @ PHV (years) | 12.6 (0.5) |
| Maturity offset (years) | 3.9 (0.5) |

Procedures: Participants performed a 10 minute warm-up involving dynamic activity and stretching.

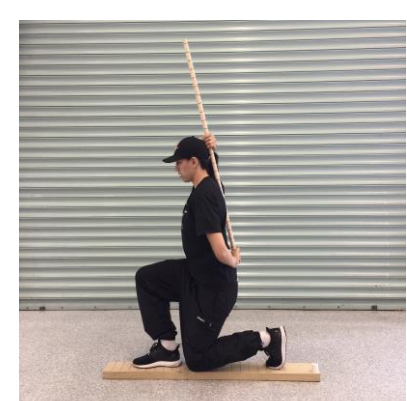
Analyses: Utilising SPSS statistical software Pearson correlations were employed to determine the associations between:

- FMS scores and physical performance tests
- Maturation (maturity offset) and FMS scores and physical performance tests

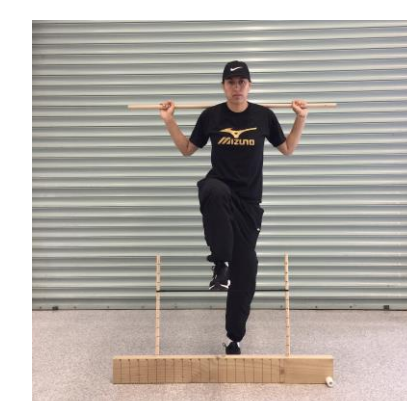
Functional movement screen (FMS)



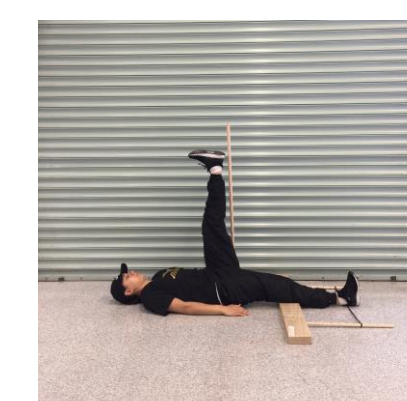
Deep overhead squat



In-line lunge



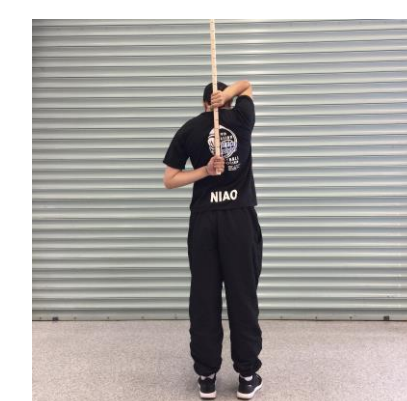
Hurdle step



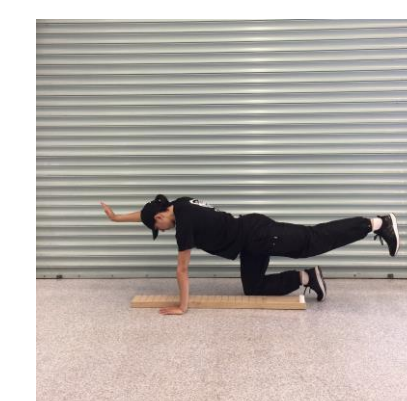
Active straight leg raise



Trunk stability push-up



Shoulder mobility



Rotary stability

Each movement was explained and briefly demonstrated by the administrator. Participants performed three consecutive attempts at each movement. Movement competency was assessed using the FMS protocols and scoring criteria of Cook et al. (2006a, 2006b).

Discussion

FMS competency appears beneficial in regards to effective performance of physical tests such as jumping and change of direction tasks for youth female netballers. Our links between maturation and FMS and power based assessment are in accordance with the findings of Lloyd et al. (2015), whom reported FMS capability to be associated with effective performance of physical tests such as squat jump and reactive agility for youth male athletes. Overall the trends appear similar between genders but what would extend our knowledge in this paradigm is the investigation of maturation categorisation (pre-PHV, circa-PHV and post-PHV) effects on FMS and physical performance tests and whether gender considerations exist.

Interestingly, maturation links were only meaningful with jump capability and FMS score. This indicates that the additional growth and associated neuromuscular development females experience with maturity are likely beneficial for function. Given our cohort were all post peak height velocity (PHV) ranging from 2.8 to 4.2 years the utilisation of a more diverse cohort in regards to stage of maturity may provide further insight.

Take Home Message

- Our findings demonstrate that physical performance may be influenced by functional movement competency more so than maturation in youth female netballers.
- Consideration of strategies that increase functional movement competency may be advantageous in improving physical performance in youth female netball players.

References

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