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## Side-to-Side Asymmetry of Single-Leg Repeated Deceleration-Acceleration Performance is Related to Deterioration of Running Change-of-Direction Performance in Amateur Adult Female Netball Players.

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## Background

- **Asymmetry and effects on human performance**
  - Side-to-side comparison of the quantity of a variable = between-limb symmetry analysis
    - (Clark & Mullally 2019; Clark & Clacher 2020)
  - **Symmetry:** when the variable is equal in magnitude in both limbs
    - (Clark & Mullally 2019; Clark & Clacher 2020)
  - **Asymmetry:** when the variable is unequal in magnitude in both limbs
    - (Clark & Mullally 2019; Clark & Clacher 2020)



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## Background

- **Asymmetry and effects on human performance**
  - Gait (walking) between-limb asymmetry has been studied for decades - **amputees**
    - (Lamoreux 1971)
  - Lower-limb motor performance asymmetry in sports medicine has also been studied for decades – **knee ligament injury**
    - (Daniel et al 1982)
  - Lower-limb asymmetry and athletic performance in uninjured individuals – **linear running efficiency**
    - (Belli et al 1995)



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## Background

- **Asymmetry and effects on human performance**
  - Side-to-side asymmetry of single-leg motor performance (e.g. strength, dynamic balance, power) linked to deterioration of running change-of-direction performance in uninjured games-players
  - Most performance asymmetry research to date in **elite male and female athletes**
  - No performance asymmetry research in **uninjured amateur adult female games-players**



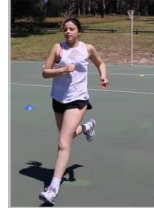
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## Aim and Null Hypothesis

- **Aim**
  - To determine the relationships between:
    - Triple hop for distance (THD) absolute-asymmetry (THD-AA) and Illinois agility test (IAT) performance in amateur adult female netball players
    - Single hop for distance (SHD) absolute-asymmetry (SHD-AA) and IAT performance in amateur adult female netball players
- **Null Hypothesis**
  - There would be no significant relationship between the THD-AA and IAT or between the SHD-AA and IAT



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## Methods

- **Cross-sectional study**
  - One English amateur club
  - London and South East Regional League
  - Surrey County League
- **23 adult female players volunteered**
  - Age  $28.7 \pm 6.2$ yr; height  $171.6 \pm 7.0$ cm; mass  $68.2 \pm 9.8$ kg
- **Data collected in one session**
  - Outdoor training site (concrete netball court)



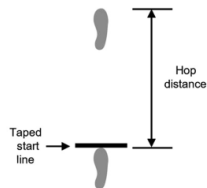
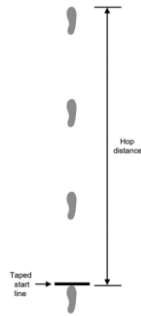
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## Methods

- **Triple hop for distance:** sagittal plane single-leg repeated deceleration-acceleration performance
- **Single hop for distance:** sagittal plane single-leg power and dynamic balance performance

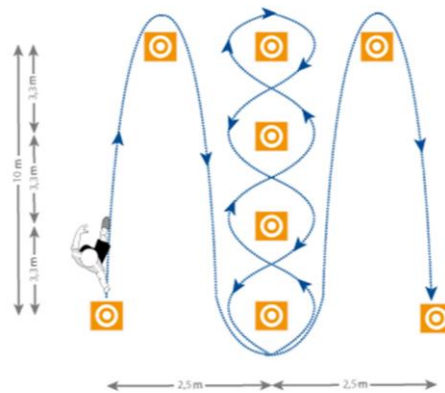


Clark & Mullally 2019; Noyes et al 1991



## Methods

- **Illinois agility test:** running repeated change-of-direction



Getchell 1979; Vescovi et al 2011



## Methods

- **Data management**
  - Triple hop for distance, single hop for distance: cm
  - Limb symmetry index (LSI, %)
    - $(\text{right mean} \div \text{left mean}) \times 100$
  - Absolute-asymmetry (%)
    - $100 - \text{LSI}$  (-ve signs removed)
  - Illinois agility test: s
  
- **Data analysis**
  - Normality assessment
    - Histogram inspection, Shapiro-Wilk
  - Spearman's correlation ( $r_s$ )
  - Coefficient of determination ( $r_s^2$ )
  - Alpha set *a priori* at 0.05



## Results

- **Raw data and relationships**
  - Absolute-asymmetry variables not normally distributed ( $P < 0.01$ )
  
  - THD absolute-asymmetry vs. Illinois Agility Test
    - $r_s = 0.54$
    - $r_s^2 = 0.29$  (29%)
    - $P = 0.01$
  
  - SHD absolute-asymmetry vs. Illinois Agility Test
    - $r_s = 0.31$
    - $r_s^2 = 0.10$  (10%)
    - $P = 0.07$

**Table 1.** Descriptive Statistics ( $n = 23$ )

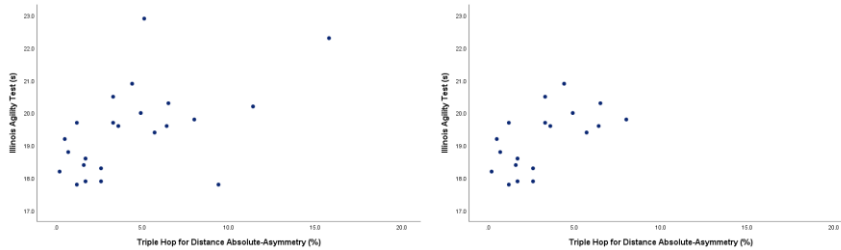
	Illinois Agility Test (s)	Triple Hop for Distance A-A (%)	Single Hop for Distance A-A (%)
Minimum	17.8	0.2	0.0
Maximum	22.9	15.8	17.3
<b>Median</b>	<b>19.6</b>	<b>3.3</b>	<b>2.4</b>
Mean	19.5	4.4	3.8
SD	1.4	3.9	4.4

s = seconds

A-A = absolute-asymmetry

SD = standard deviation

## Results – Sensitivity Analysis



- THD absolute-asymmetry vs. Illinois Agility Test ( $n = 23$ )

- $r_s = 0.54$
- $r_s^2 = 0.29$  (29%)
- $P = 0.01$

- THD absolute-asymmetry vs. Illinois Agility Test ( $n = 19$ )

- $r_s = 0.62$
- $r_s^2 = 0.38$  (38%)
- $P = 0.00$

## Conclusion

- As **triple hop for distance absolute-asymmetry increased**, Illinois agility test performance deteriorated (i.e. **performance time also increased**)
- To enhance repetitive running change-of-direction performance in amateur adult female netball players, **training efforts may need to consider mitigating right-left asymmetries in sagittal plane single-leg repeated deceleration-acceleration performance** as represented by the triple hop for distance



## References - See ResearchGate Page

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## Thank You

