Knee Joint Position Sense does not Correlate with Front Knee Angles or Ball Release Speed in Cricket Pace Bowlers

Benita Olivier, Aimee Stewart, Andrew Green, Warrick McKinon
Physiotherapy Department, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa.

INTRODUCTION

One of the factors known to influence bowling speed is the front knee angle at the front foot placement and ball release positions during the cricket pace bowling action.[1] The greater the knee extension at these phases of bowling, the higher the ball release speed.[1] The ability to position the knee at a specific angle is dependent upon proprioception. Proprioception is defined as the sensation of joint movement (kinaesthesia) and joint position.[2] Joint position sense (a component of proprioception) is the ability to determine where a particular body part is in space. Joint position sense is crucial for skill-demanding activities.[3] If the knee angle is important in increasing bowling speed, then the ability of the elite bowler to position the knee in the desired, optimal position (joint position sense) may be a contributing factor in increasing performance (ball release speed).

AIM

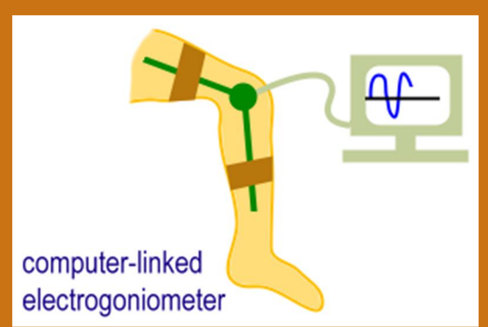
The aim of this study was to establish if knee joint position sense in pre-defined angles of 140˚ and 160˚ of knee extension as well as functional, reproduced, closed-chain positions of front foot placement and ball release, are correlated to release speed.

METHODS

Joint Reposition Error

1. Bowler's knee placed in a specific position; 2. bowler's knee removed from the position; 3. bowler repositioned his knee in the same position. Error from initial position = joint reposition error.

Standard Longarms Goniometer (n=21) in 140˚ and 160˚ knee extension



Electrogoniometer (Zebris®) (n=11) in bowling specific positions (front foot placement and ball release)

Injury free pace bowlers 18-26yrs of age

Pearson's correlation coefficient

Ball Release Speed

Hand-held Radar Gun (Stalker ATS®)

Kinematic Knee Angle

High speed cameras (PixeLINK®) capture knee angle at front foot placement and ball release positions of the pace bowling action

RESULTS

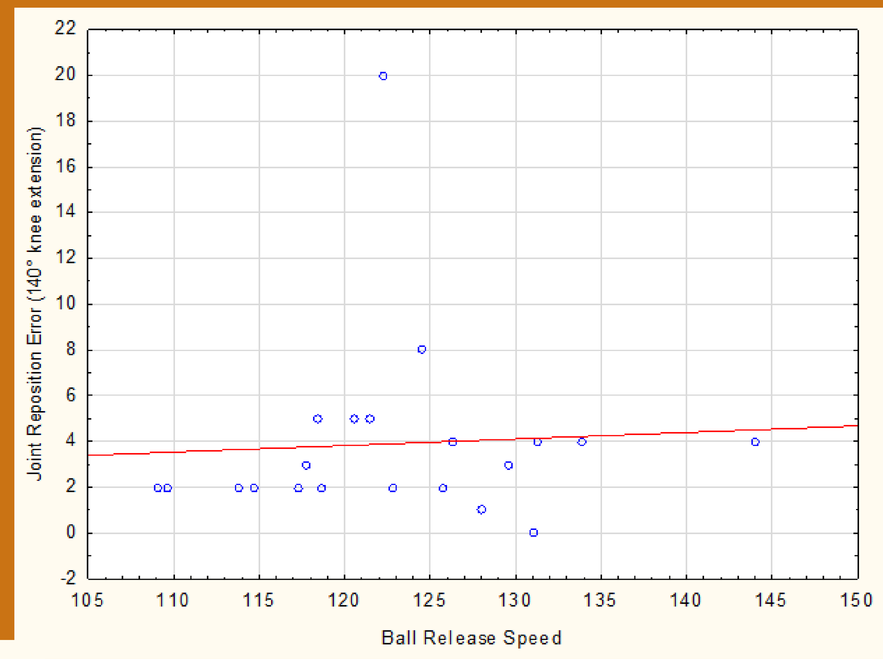


Figure 1 - The correlation between joint reposition error in the position of 140˚ knee extension and ball release speed (r=0.06) (n=21).

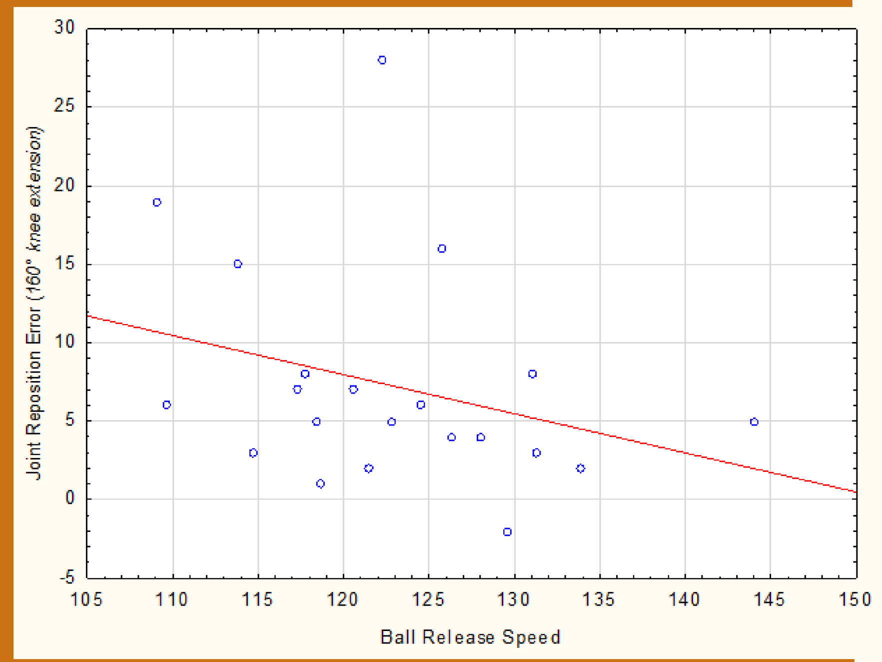


Figure 2 - The correlation between joint reposition error in the position of 160˚ knee extension and ball release speed (r=-0.30) (n=21).

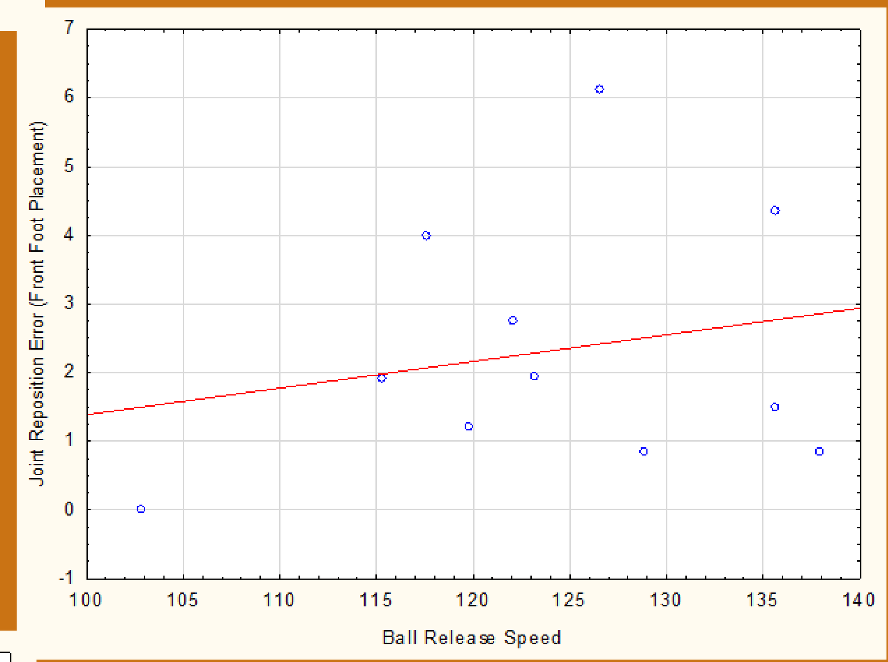


Figure 3 - The correlation between joint reposition error in the front foot placement position and ball release speed (r=0.22) (n=11).

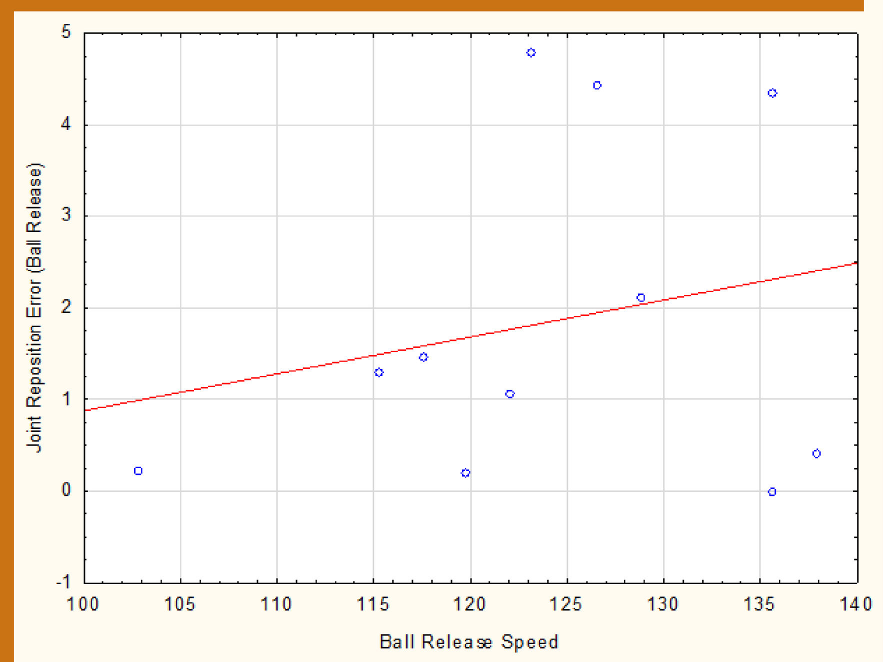


Figure 4 - The correlation between joint reposition error in the ball release position and ball release speed (r=0.23) (n=11).

The mean ball release speed was 124.09 km/hr (±7.47 km/hr). There was no statistically significant relationship between knee joint reposition error as measured in reproduced, static positions and ball release speed (figures 1-4).

RESULTS CONTINUED...

Table 1 - The correlation between knee position error and knee angles during the bowling action (n=11).

Reproduced position	Front foot placement knee angle (r-value)	Ball release knee angle (r-value)
Front foot placement	-0.08	0.09
Ball release	-0.20	-0.19
140˚ knee extension	-0.05	0.19
160˚ knee extension	-0.35	-0.04

Knee joint reposition error measured in reproduced, static positions and kinematic knee angles did not show any statistically significant correlations (Table 1).

CONCLUSIONS

Data from the present study show that joint position sense in static arbitrary and even action specific joint positions do not correlate with performance in a similar way to what has been found for other sporting disciplines.[3] Despite this, is it possible that a more dynamic form of proprioception may yet contribute to knee poisoning in cricket pace bowlers.[4] Individual anatomical variety in mobility of ligaments, muscles and tendons, as well as functioning of the different proprioceptors should be taken into consideration.[5] To this end attention should be given to the exact proprioceptive role that is required during the specific requirements of the sport under review. Future studies may develop dynamic methods of assessing action specific proprioception, which may be able to better assess involuntary proprioception.

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