

EXAMINING FOREHAND SMASH OUTCOME AND DISCIPLINE DURING INTERNATIONAL BADMINTON MATCH PLAY USING HAWKEYE DATA

BWF



HAWKEYE

Idrees Ahmed Afzal^{1,4}, William Stanley Adkins², Mollie Ward², Andrew David Butterworth³, Joseph Antony Stone⁴

¹School of Education and Science, University of Gloucestershire, Gloucestershire, UK; ²Faculty of Science, University of Bath, Bath, UK; ³School of Life Sciences, University of Nottingham, Nottingham, UK; ⁴School of Sport and Physical Activity, Sheffield Hallam University, Sheffield, UK

Introduction

- The forehand smash is an aggressive attacking shot, considered a key skill for winning a point in badminton.
- Three-dimensional (3D) motion tracking technologies have the potential to provide a rich source of representative data.
- The aim of this study was to examine smash outcome differences between the following disciplines: men's doubles (MD); women's doubles (WD); men's singles (MS); women's singles (WS) and mixed doubles (XD).



Figure 1. Hawkeye 3D motion tracking camera calibration

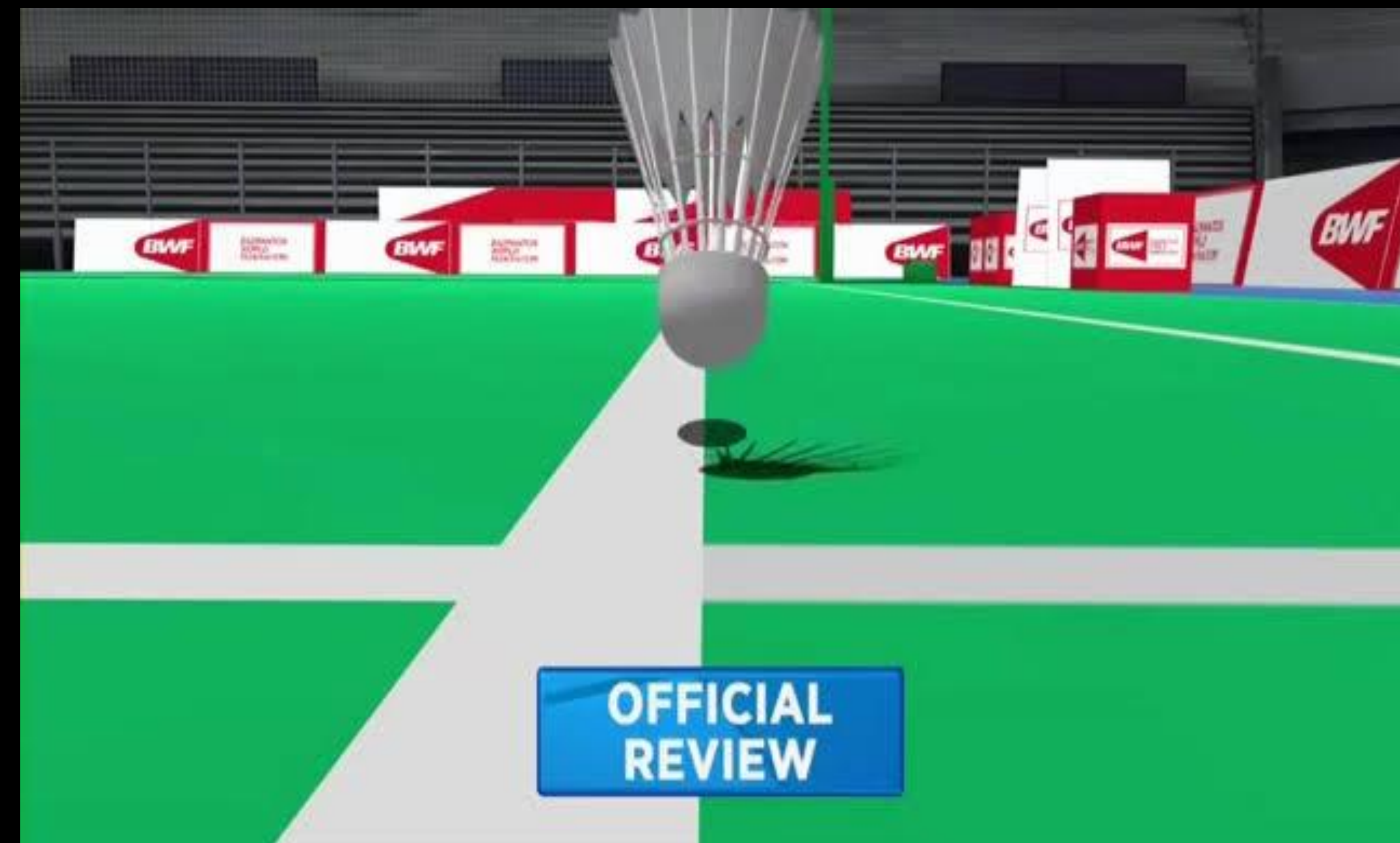


Figure 2. 3D XYZ shuttlecock landing location

Methods

- 201 badminton matches during nine Badminton World Federation (BWF) international tournaments (2017-18) were examined resulting in 18,904 forehand smash strokes.
- Hawkeye (innovations Ltd, Basingstoke, UK) provided the data for processing and analysis.
- Hawkeye technical operators calibrated the dimensions of each court and defined a court reference frame, with its origin at the base of the centre of the badminton court.
- The three-dimensional Cartesian coordinates (XYZ), relative to the reference frame of the shuttle-racket impact location, shuttlecock smash placement and smash outcome (winners, unreturned and returned) were obtained.
- One-Way Anova's were used to examine smash outcome differences between disciplines.

Results

- Significant differences were apparent between disciplines for smash winners' percentage ($p = 0.028$); unreturned smash percentage ($p = <0.001$) and returned smash percentage ($p = <0.001$).
- Tukey Post Hoc results revealed, WD ($p = <0.001$, 72.5 ± 10.6) had a significantly higher returned smash percentage in comparison to MD ($p = <0.001$, 63.5 ± 13.5).
- WD ($p = 0.009$, 13.4 ± 6.9) had a lower unreturned smash percentage in comparison to MD ($p = 0.009$, 17.8 ± 8.7) and XD ($p = <0.001$, 18.9 ± 8.7).

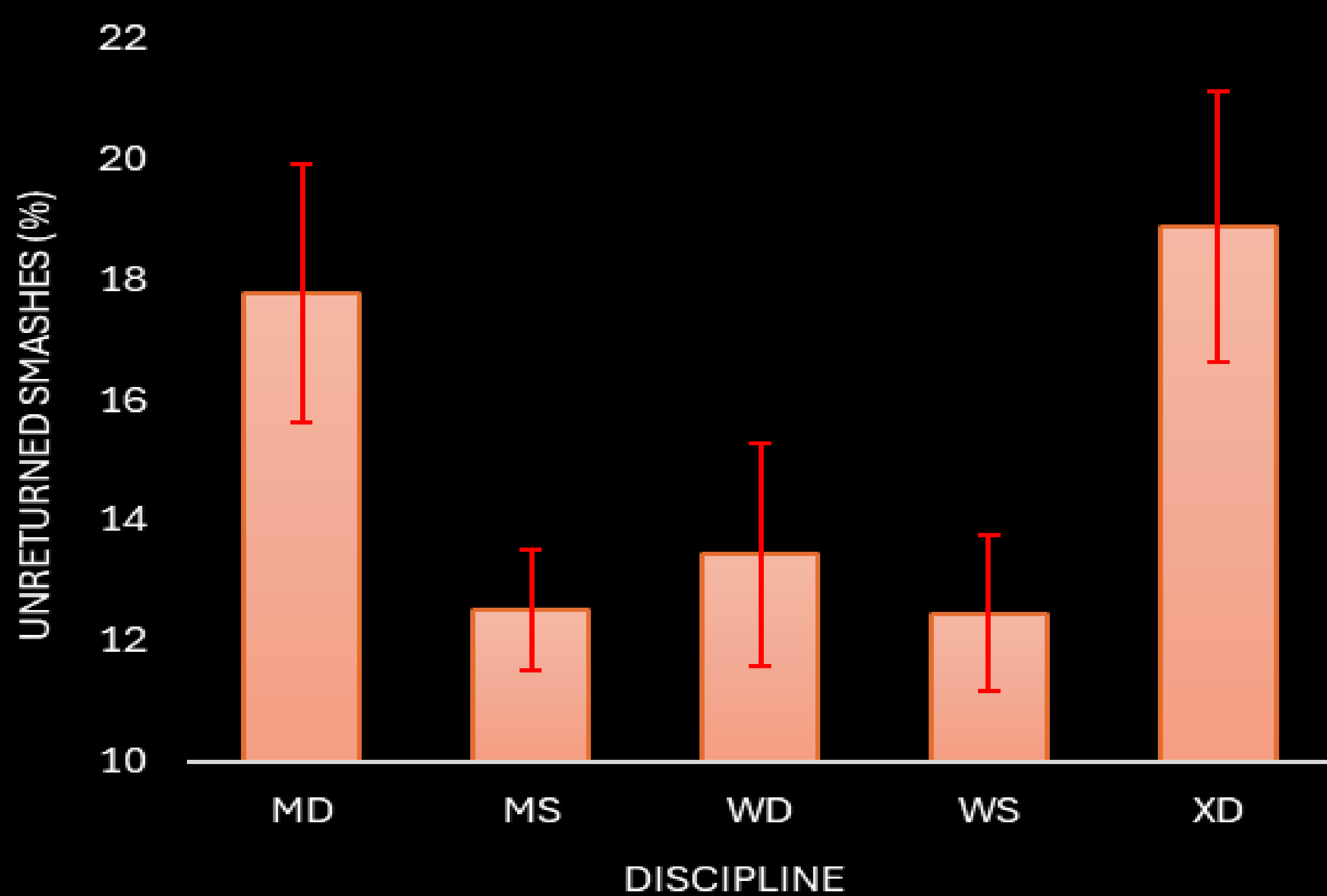


Figure 3. Mean Unreturned smash (%) per discipline

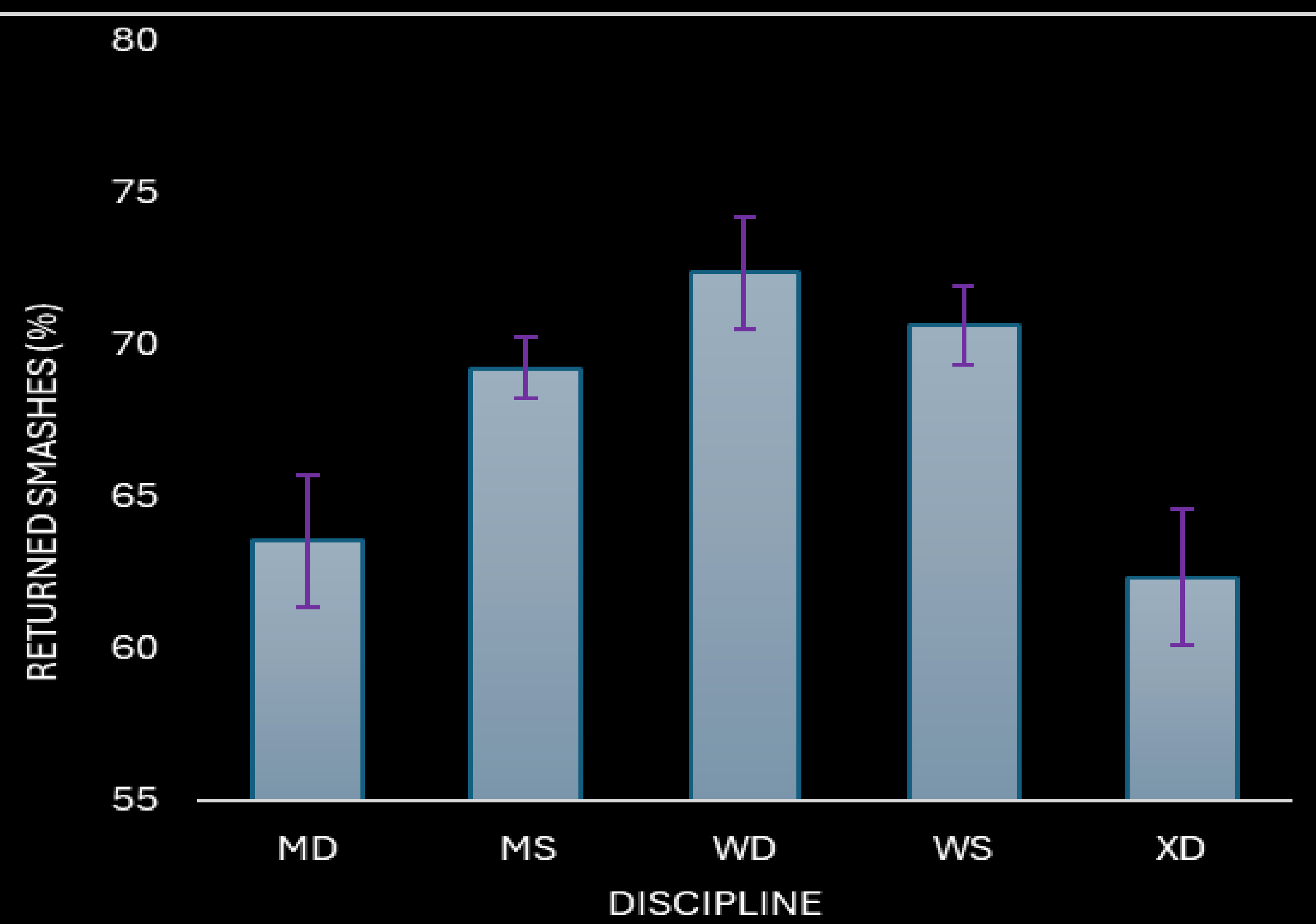


Figure 4. Mean returned smash (%) per discipline

Acknowledgements

The authors would like to thank the BWF for funding this research and thank Hawkeye Innovations for providing the data.

Conclusion and Recommendations for Coaches

- Results show significant differences between badminton disciplines, eliciting varying differences in the amount of returned and unreturned smashes.
- This suggests that elite BWF tour players should continually develop technical and tactical prowess for the use of the smash in line with discipline specificities.
- Whilst also considering other correlating factors such as physical exertion and opposition effect, players may seek to develop strategies that result in increased volume of unreturned smash winners, correlating to an increase in points won.
- Future research will examine the relationship between smash outcome and shuttlecock speed.