

# THE EFFECT OF CONTROLLED SURFACE PROPERTIES ON PLAYER LOADING FOR SOCCER

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# Introduction

- Purpose of study:
  - ▣ Investigate the effect of surface hardness and traction on player loading during a stop and turn
  - ▣ Control surface properties throughout tests



# Methods (Subjects)

- 16 players of Loughborough University teams
- Average age  $20 \pm 1$  years
- Average experience  $13.6 \pm 2.1$  years
- On artificial turf  $6.4 \pm 3.7$  years
  
- All players provided with same boots (Adidas Copa Mundial)



# Methods (Surfaces)

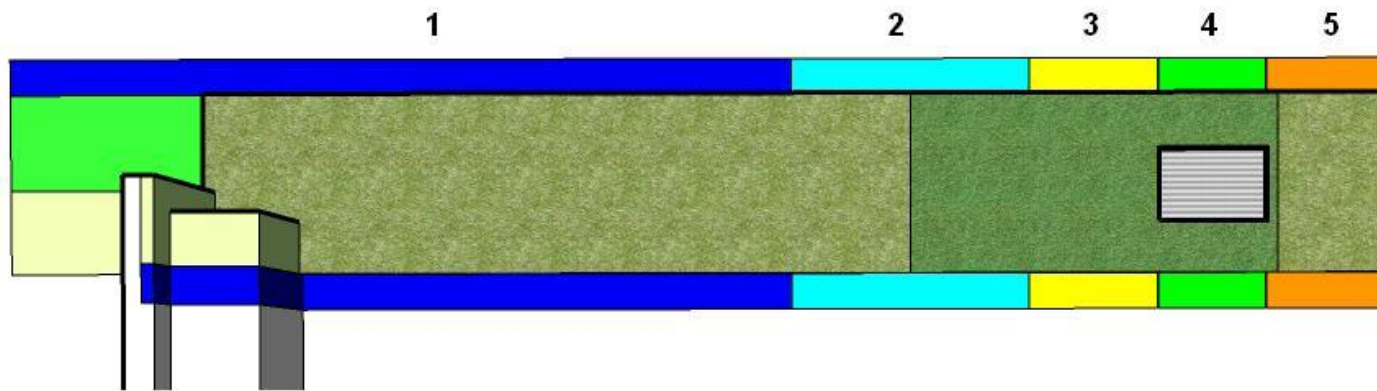
- All surfaces:
  - Tiger turf Real Soccer 50 MS carpet (50mm)
  - ~10mm sand infill
  - ~20mm SBR infill
  
- 2 Hard (FR ~70%) - No shockpad
- 2 Soft (Fr ~50%) - Recticel re-bounce<sup>®</sup> uni F82.1 6 shockpad
- 2 High traction (~40Nm) - 1 – 2.5mm grade rubber
- 2 Low traction (~30Nm) - 2 – 8mm grade rubber

# Methods (Surfaces)

- Surfaces were brushed at beginning of each test day
- Surface on top of force plate was rubbed by hand after each subject to make sure surface was even
- Advanced Artificial Athlete (AAA) and Rotational traction measurements were taken at the end of each test day

# Methods (Set-up)

- 11.5m x 1.5m runway
- 12 Vicon camera's (500Hz)
- 60x90cm Kistler force plate (1000Hz)
- High speed video
- Plug-in-Gait marker set

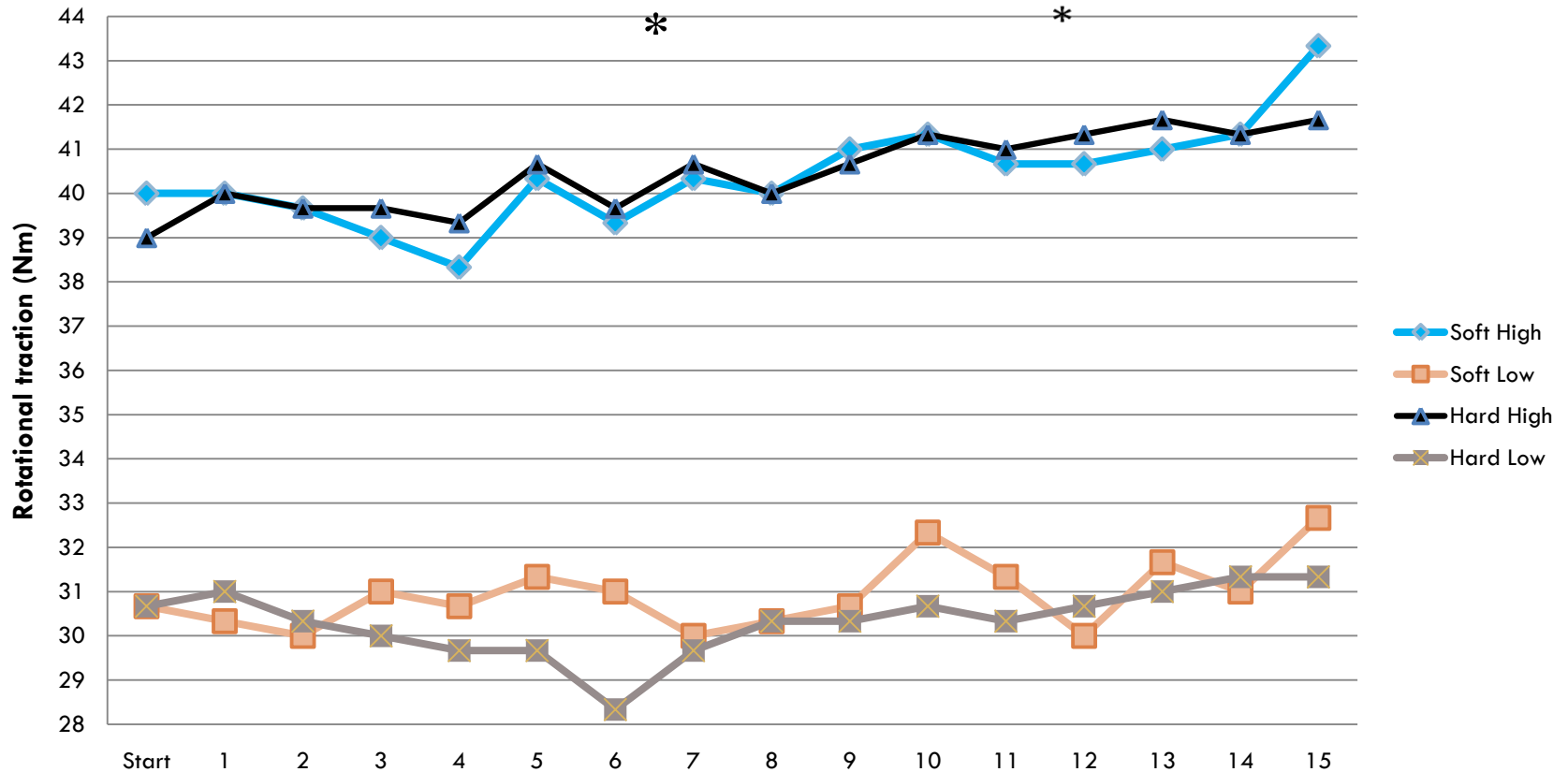


# Methods (Protocol)

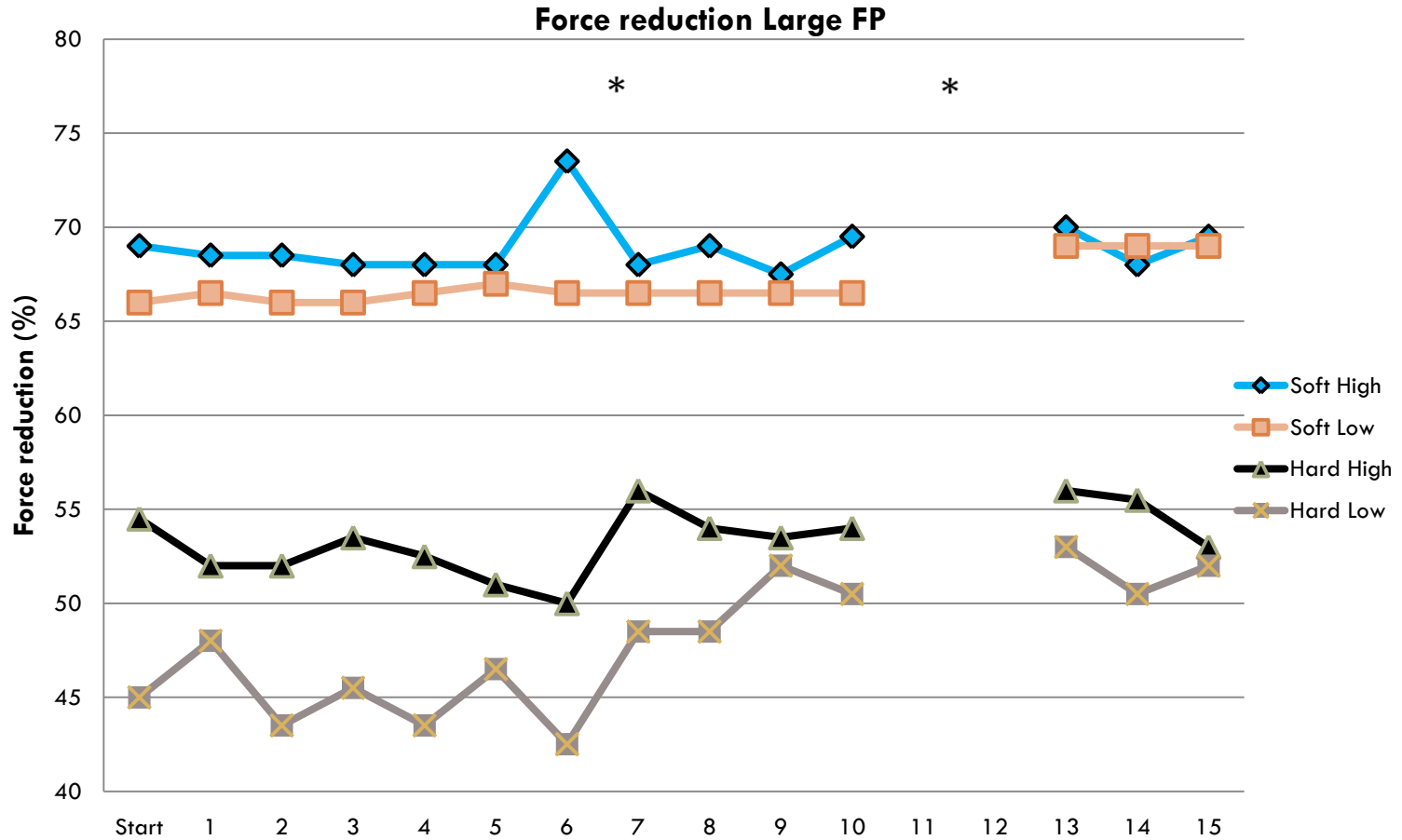
- Approach speed 12 – 14.5km/h
- 10 trials per surface
- 5 with simulated defender behind force platform to create an in-game scenario
  
- After each surface condition players rated surfaces on hardness and amount of grip

# Surface measurements (Rotational)

## Average rotational traction 3 test locations

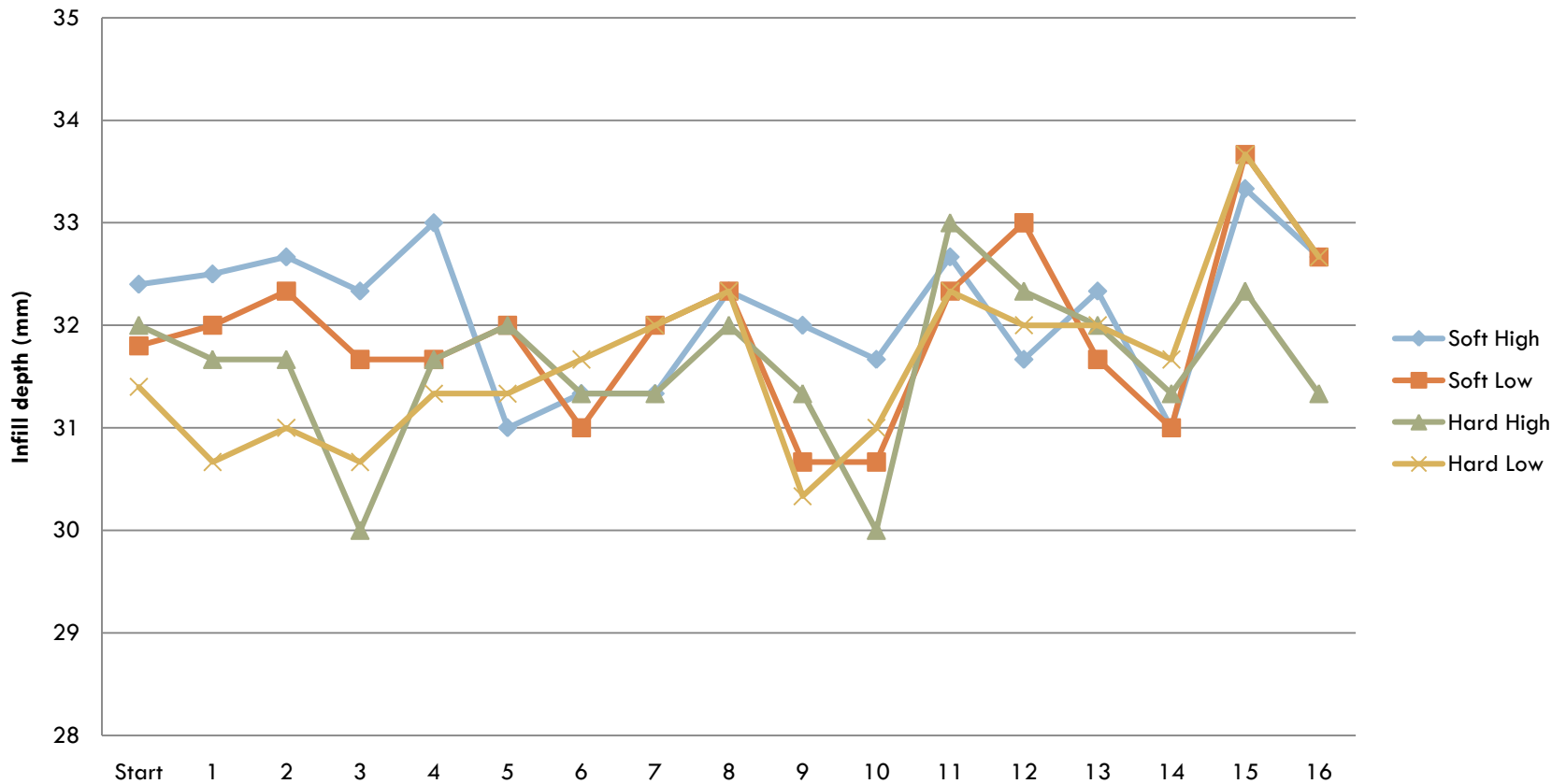


# Surface measurements (AAA)



# Surface measurements (Infill depth)

Infill depth large FP during ST

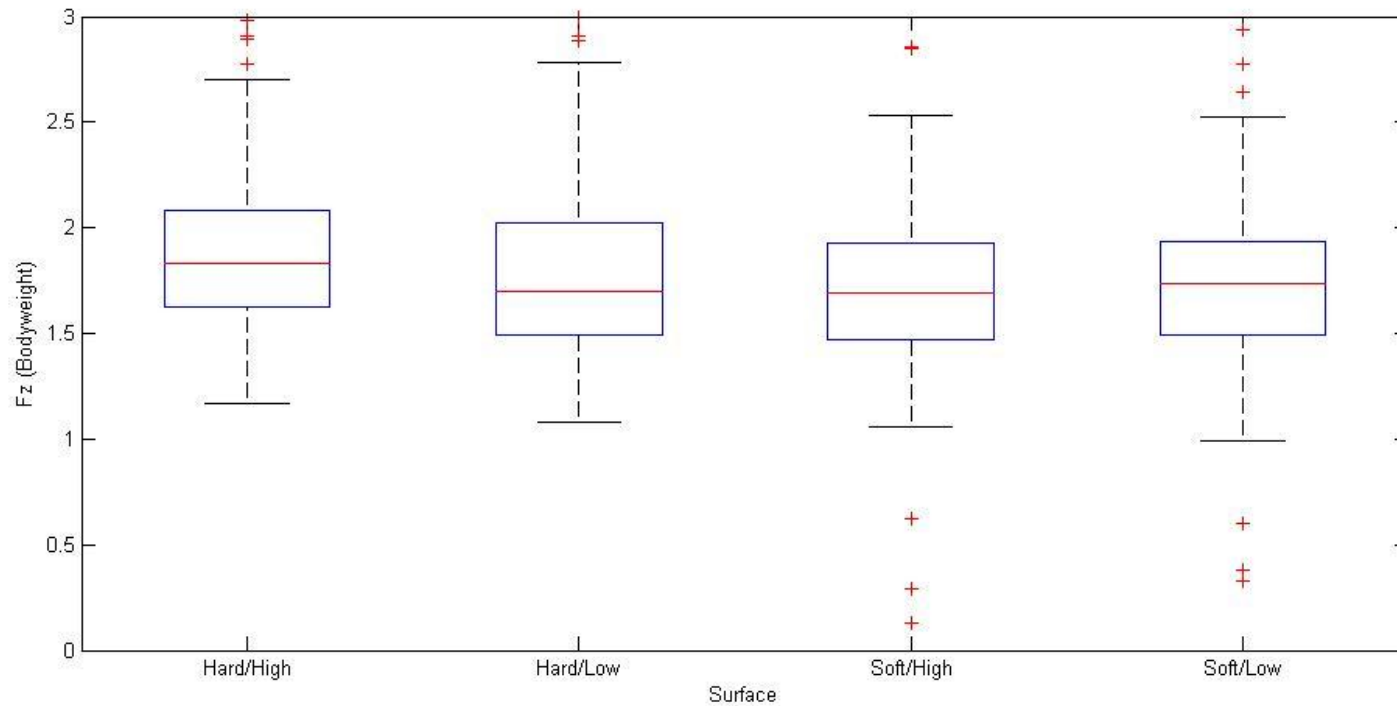


# High speed video



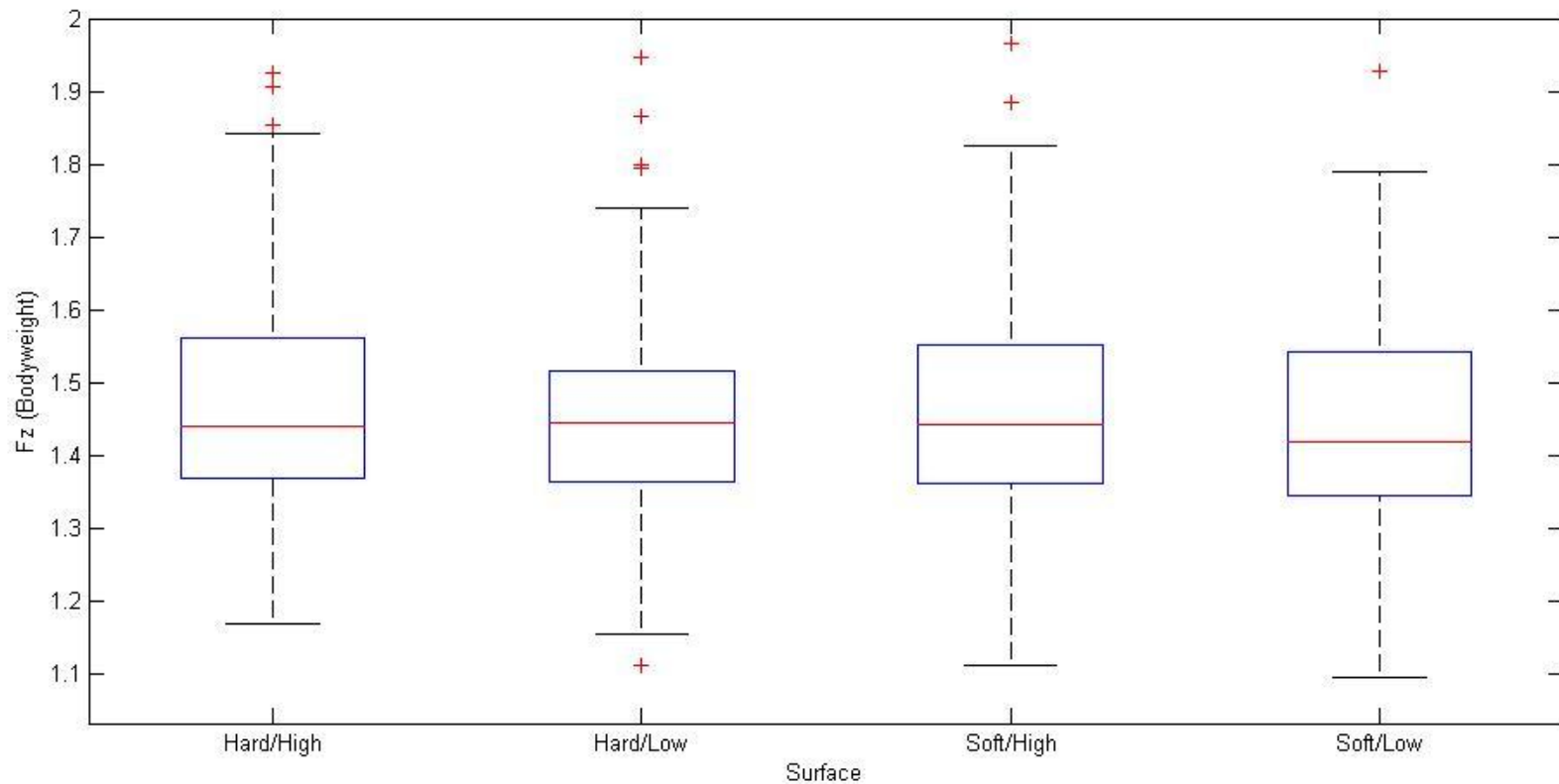
# Ground Reaction forces (Fz)

## □ Initial peak



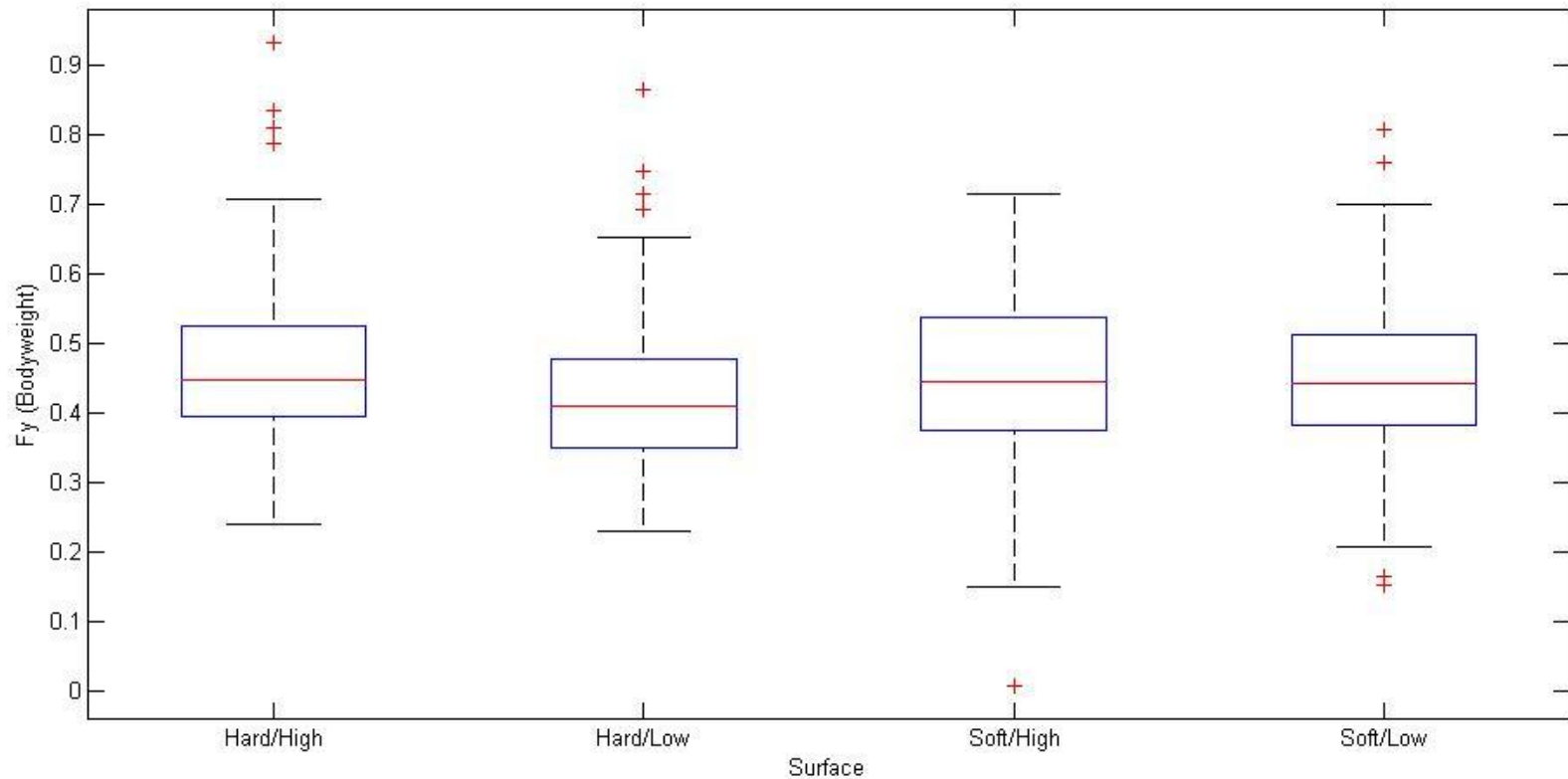
# Ground Reaction forces (Fz)

## □ Push off peak



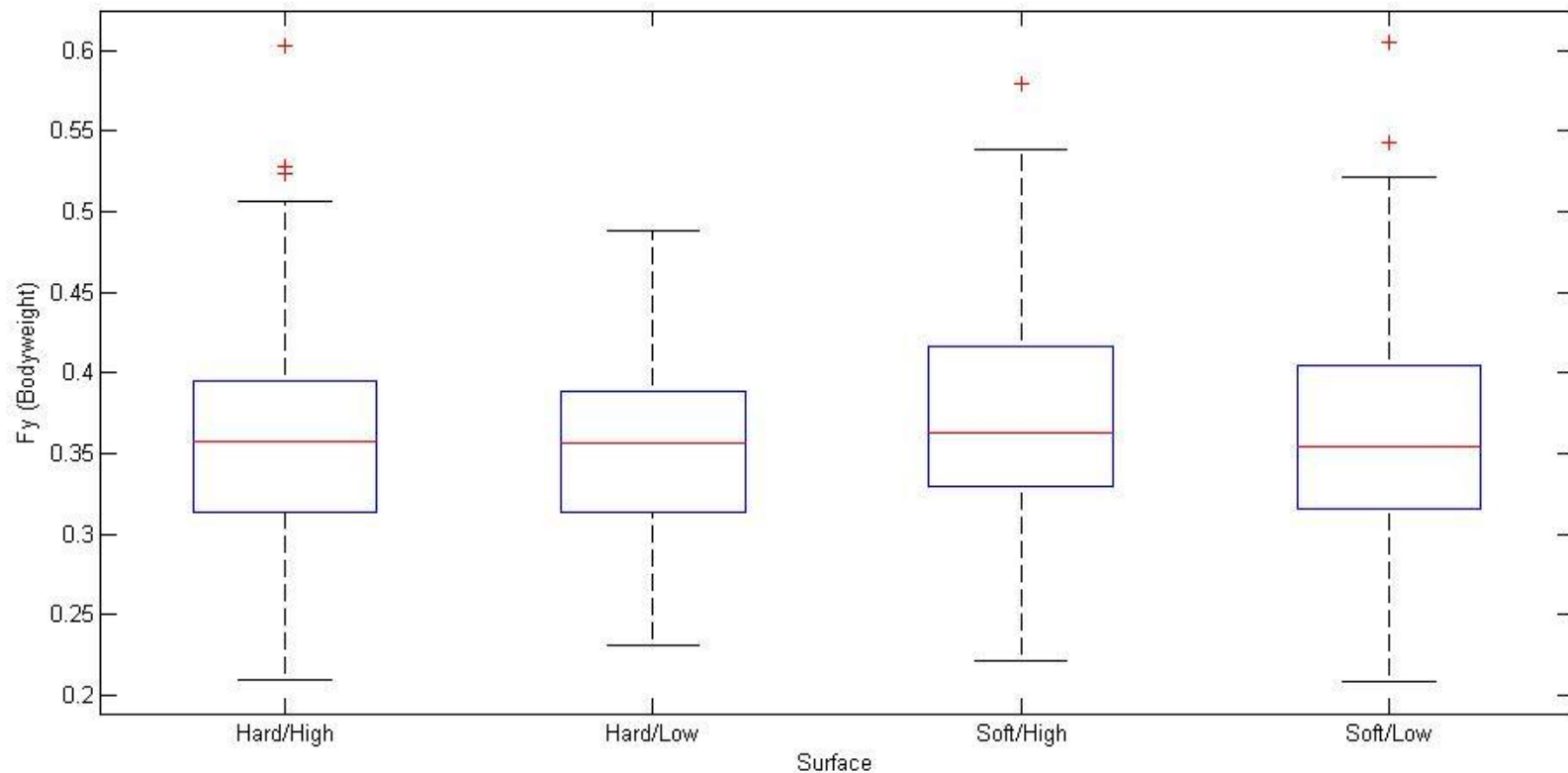
# Ground Reaction Forces (Fy)

## □ Initial peak



# Ground Reaction Forces (Fy)

## □ Push off peak



# Ground Reaction Forces (Fz)

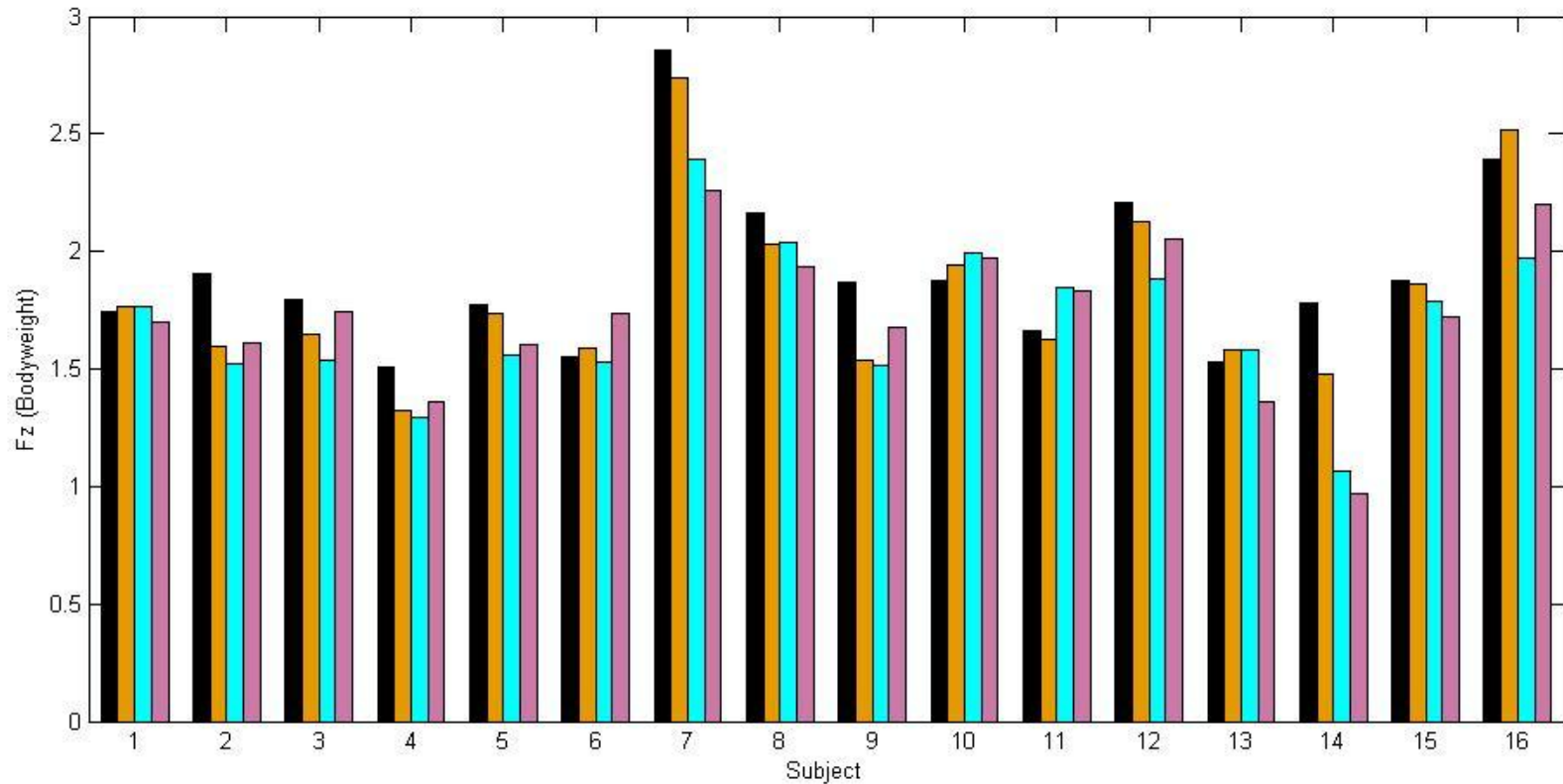
□ Initial peak

Hard/High

Hard/Low

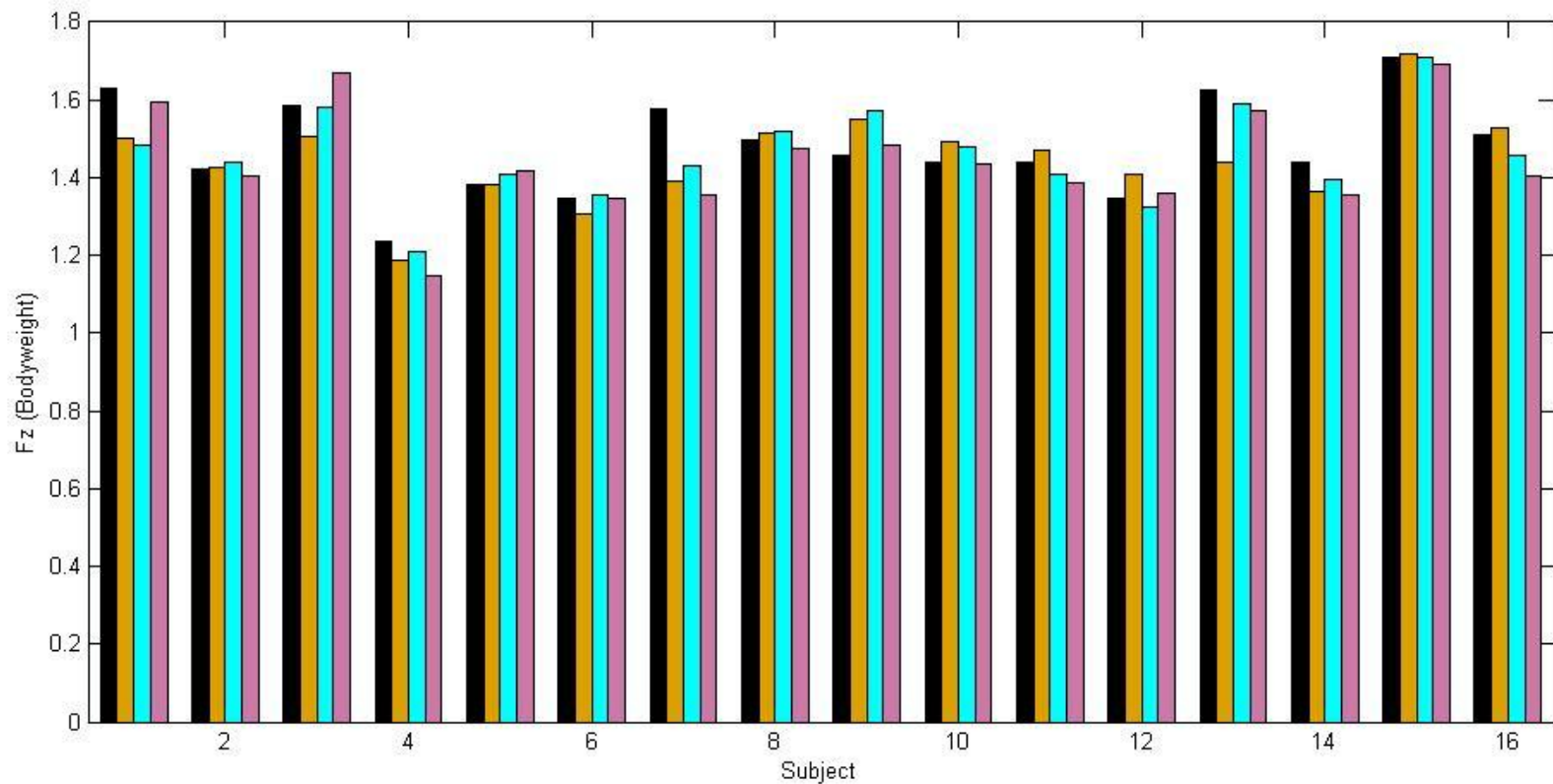
Soft/High

Soft/Low



# Ground Reaction Forces (Fz)

□ Push off peak    Hard/High    Hard/Low    Soft/High    Soft/Low



# Ground Reaction Forces (F<sub>y</sub>)

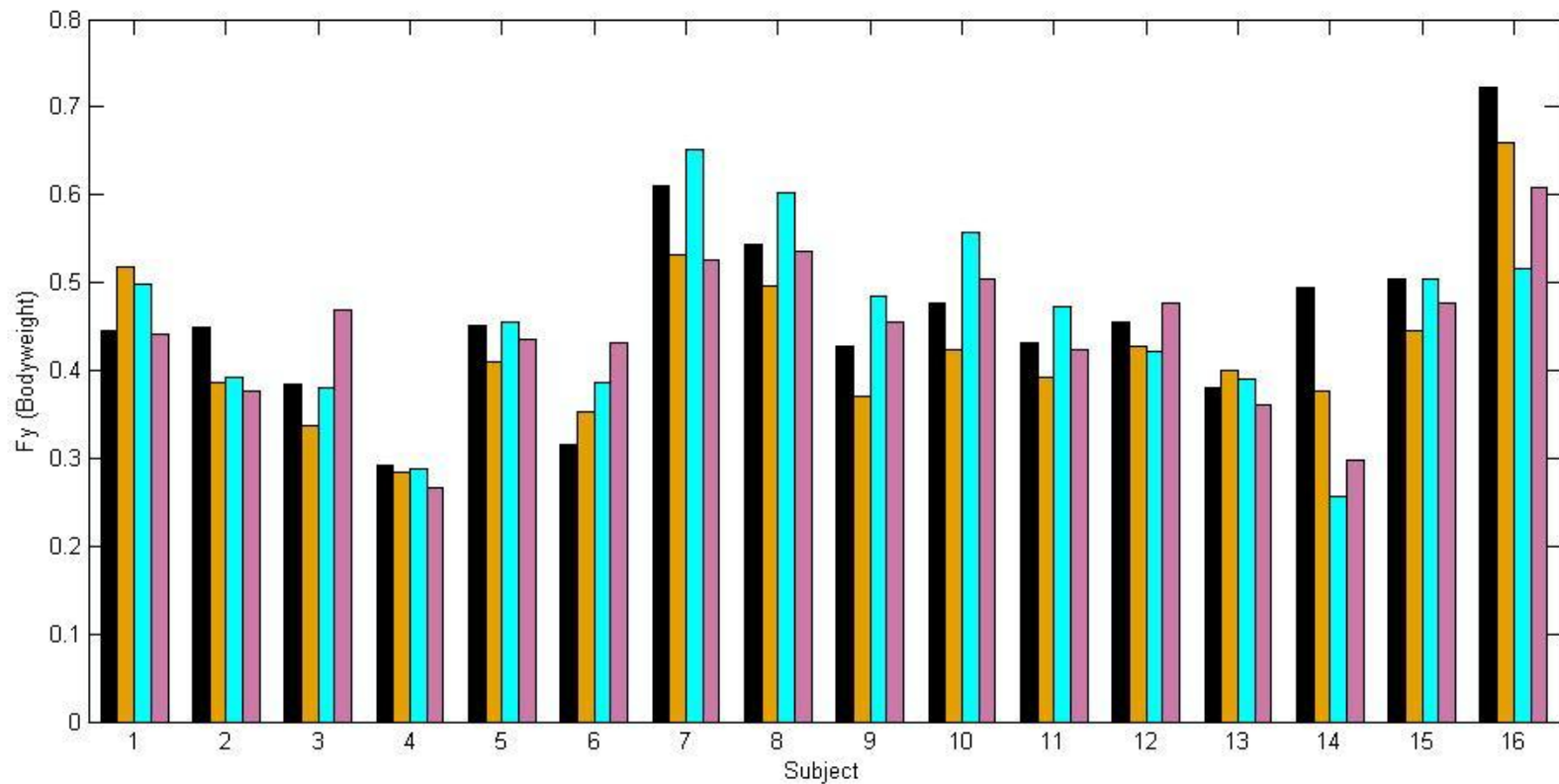
□ Initial peak

Hard/High

Hard/Low

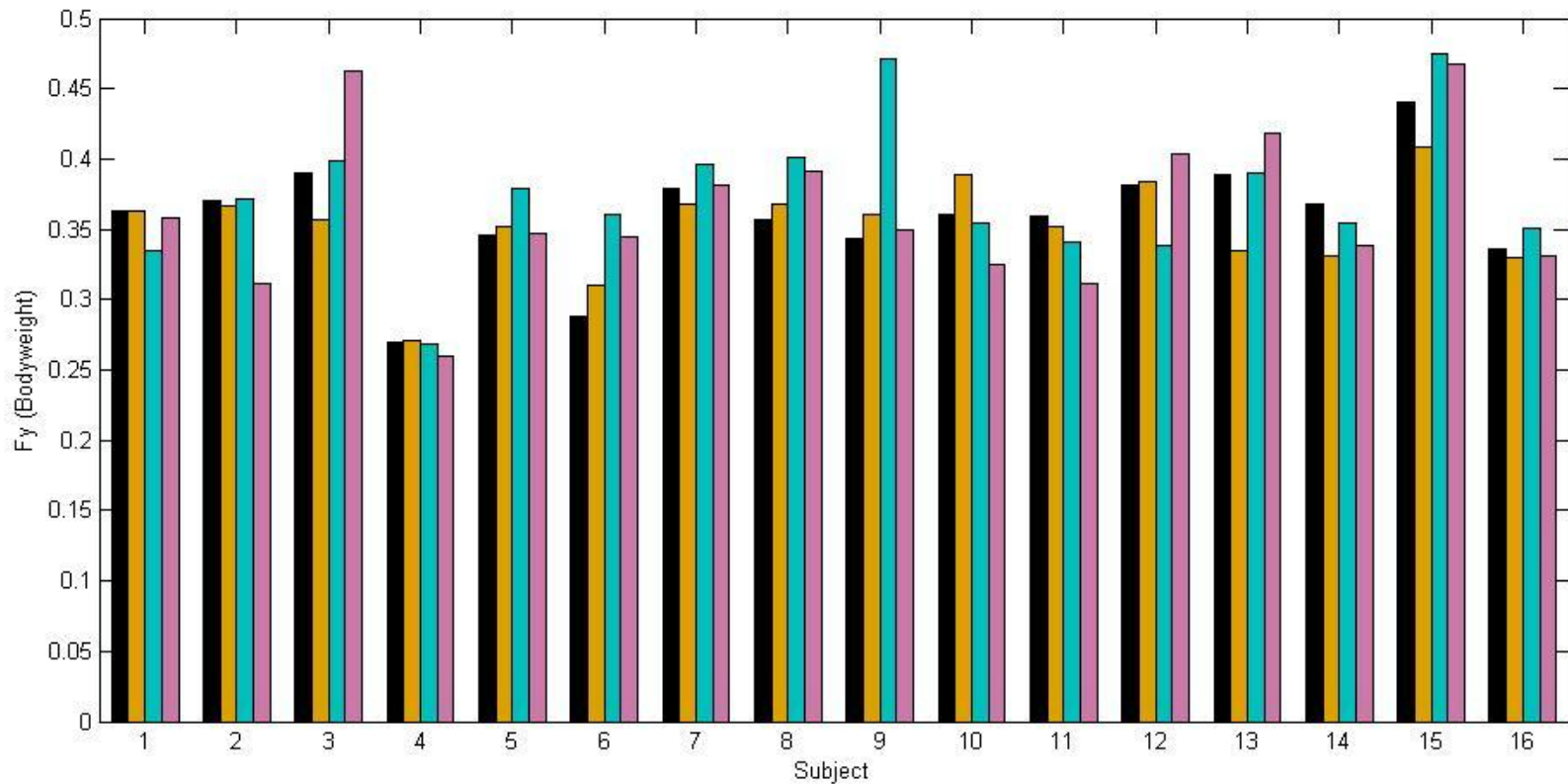
Soft/High

Soft/Low



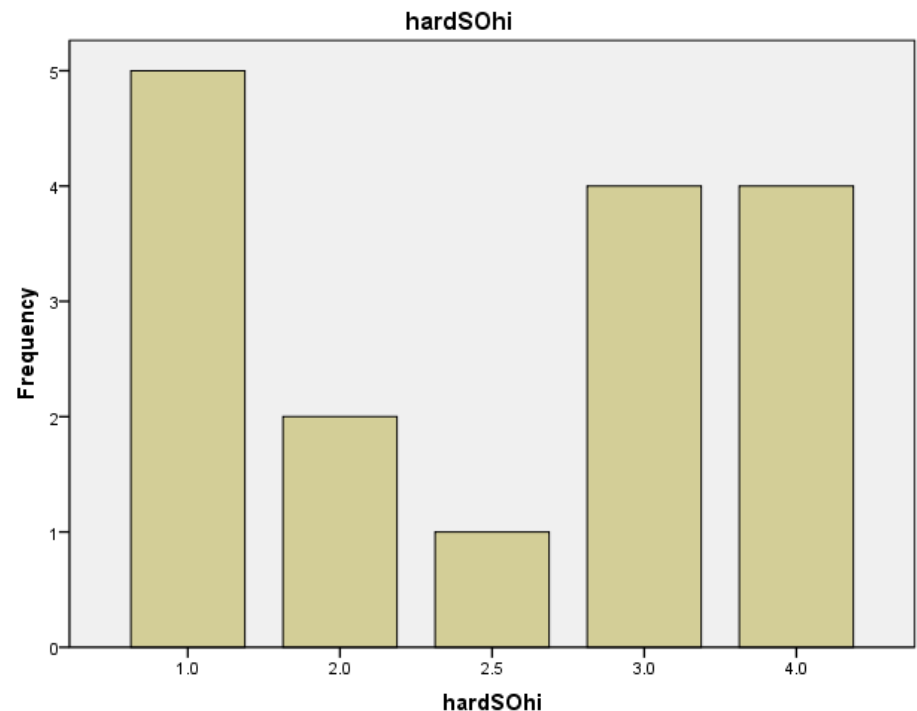
# Ground Reaction Forces (F<sub>y</sub>)

□ Push off peak    Hard/High    Hard/Low    Soft/High    Soft/Low



# Discussion

- No apparent difference of ground reaction forces on group level
- Some differences between surfaces on individual level
- Player perception?
- Movement strategy?





Questions?

Suggestions?

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