SINGAPORE SPORT & PERFORMANCE CONFERENCE 2022

From Youth to Elite Sport: Harnessing Potential and the Pursuit of Excellence

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From Youth to Elite Sport: Harnessing Potential and the Pursuit of Excellence

Effect of the timing of low-dose caffeine on 3-point shooting accuracy in college basketball players

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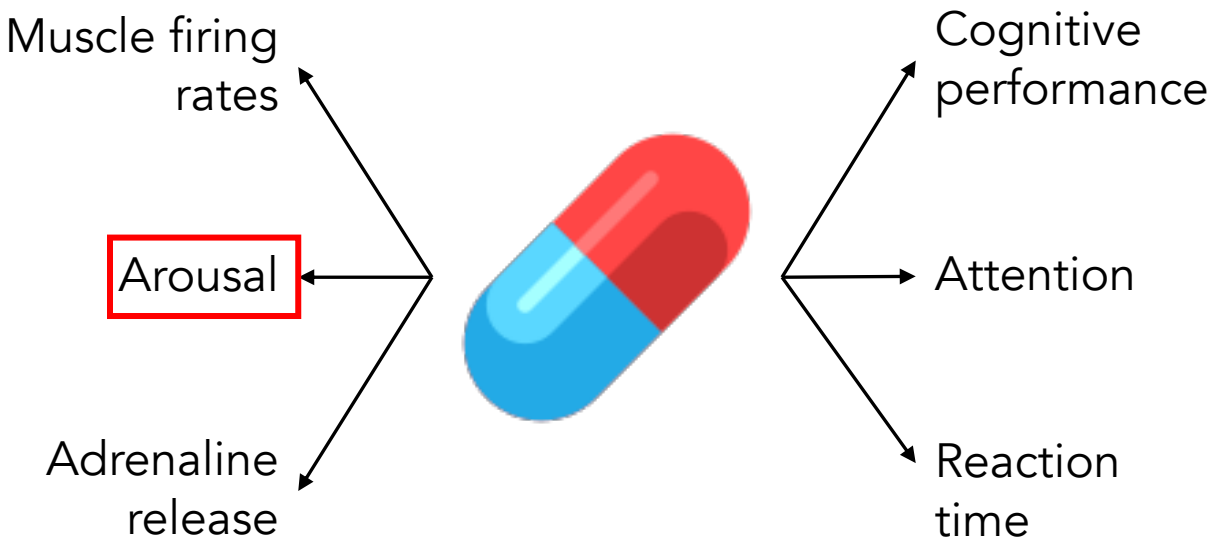
Introduction – Caffeine

- Caffeine is the most popular and widely used ergogenic aid.
- Approximately 75% of athletes ingest caffeine before or during competitions.



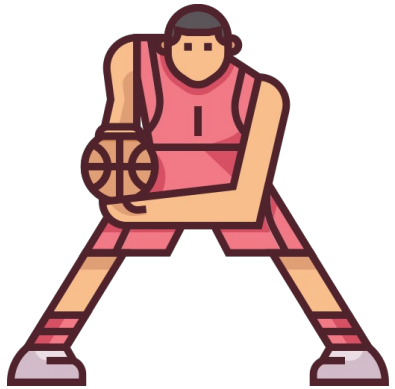
Introduction – Timing of Ingestion

Caffeine ingestion before exercise

Fresh?
OR
Fatigued
?

Introduction – Basketball

Repeated movements
- Jumping
- Sprinting/Running
- Shuffling

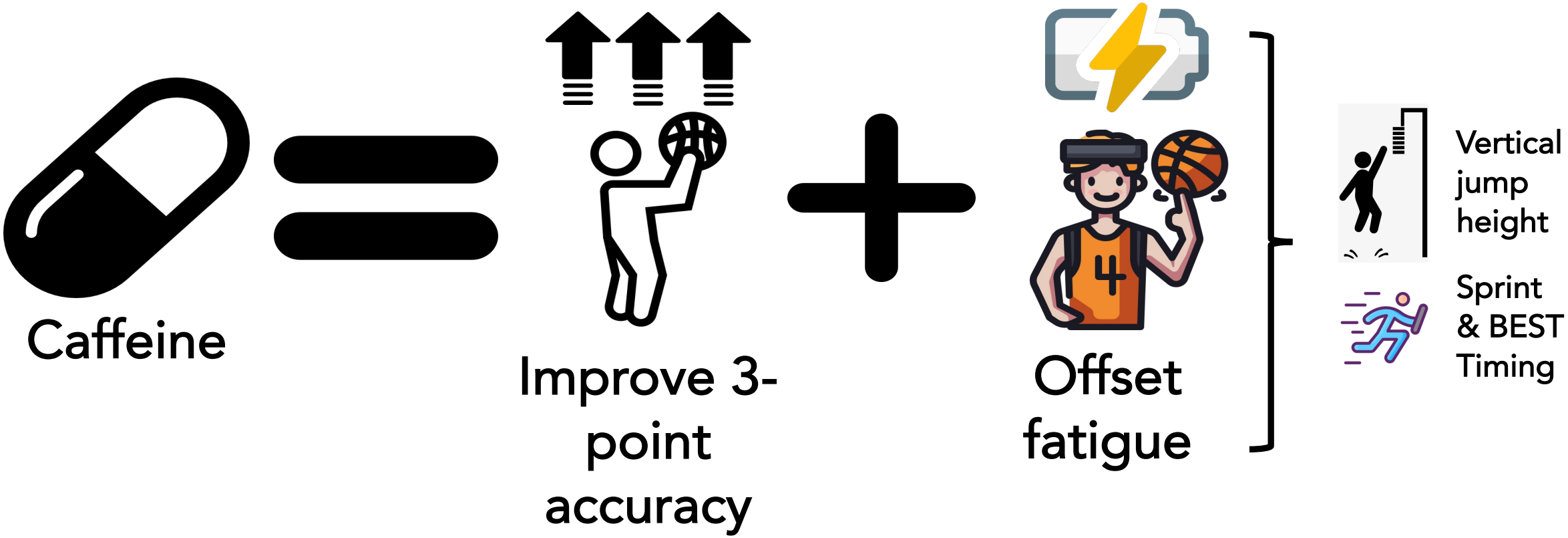


Basketball

Accuracy-based tasks
- Passing
- Shooting

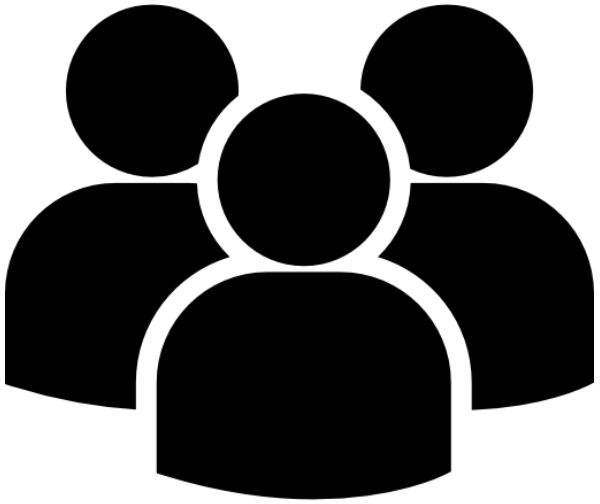
Duration – 4 quarters of 10 minutes

Introduction – Aim & Hypothesis



Methodology – Study Design

Laboratory visits



18 university basketball players

Time 1	Time 2
P	P
P	C
C	P

3 randomized conditions

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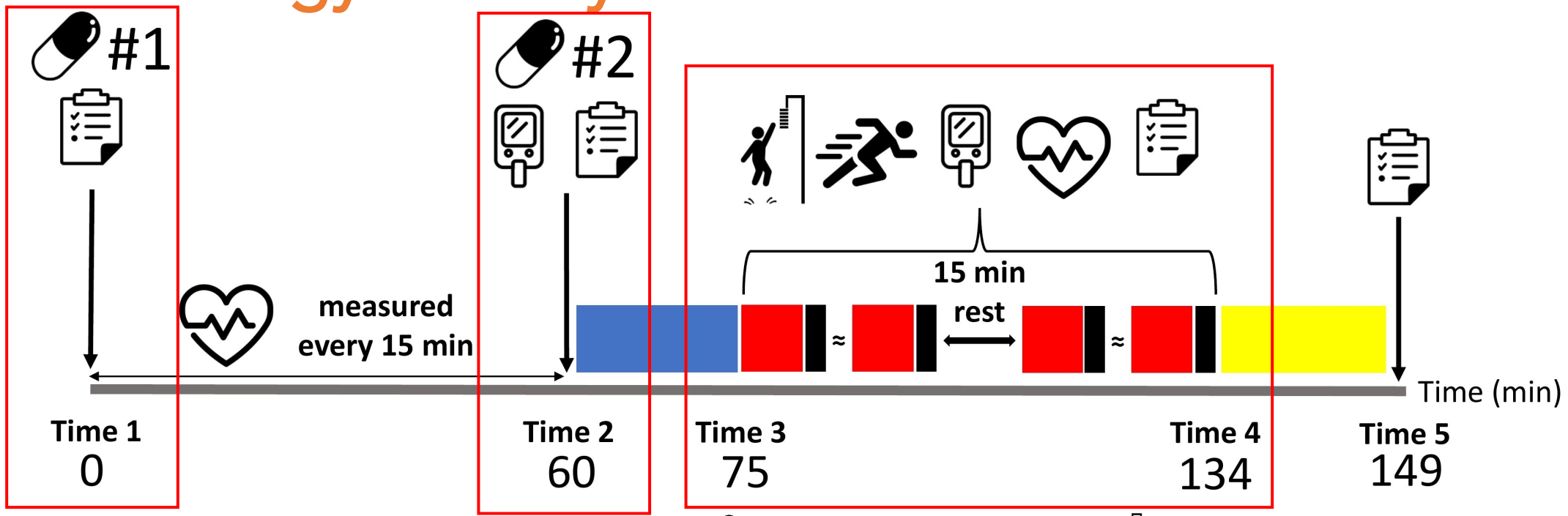
Methodology – Study Procedures



≈ Two min rest

Cool-down

Warm-up

8-min BEST

2-min shooting protocol

Pill (Caffeine or Placebo)

HR and RPE

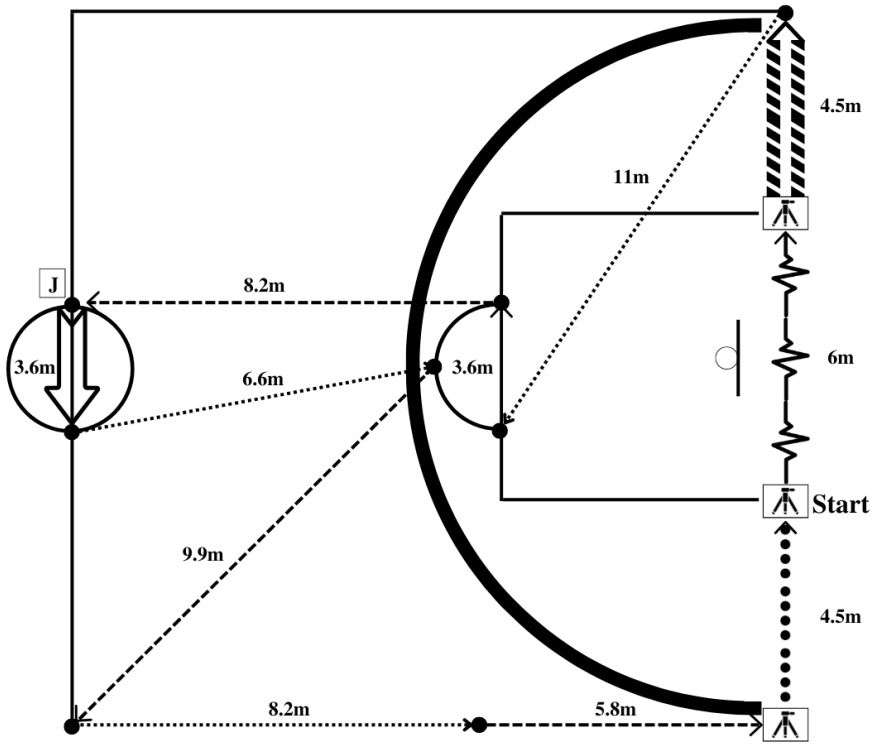
BGLu and BLa

Vertical jump height

Sprint performance

Psychological measurements

Methodology – Exercise Protocol



Stand/walk

Jog

Run

Sprint

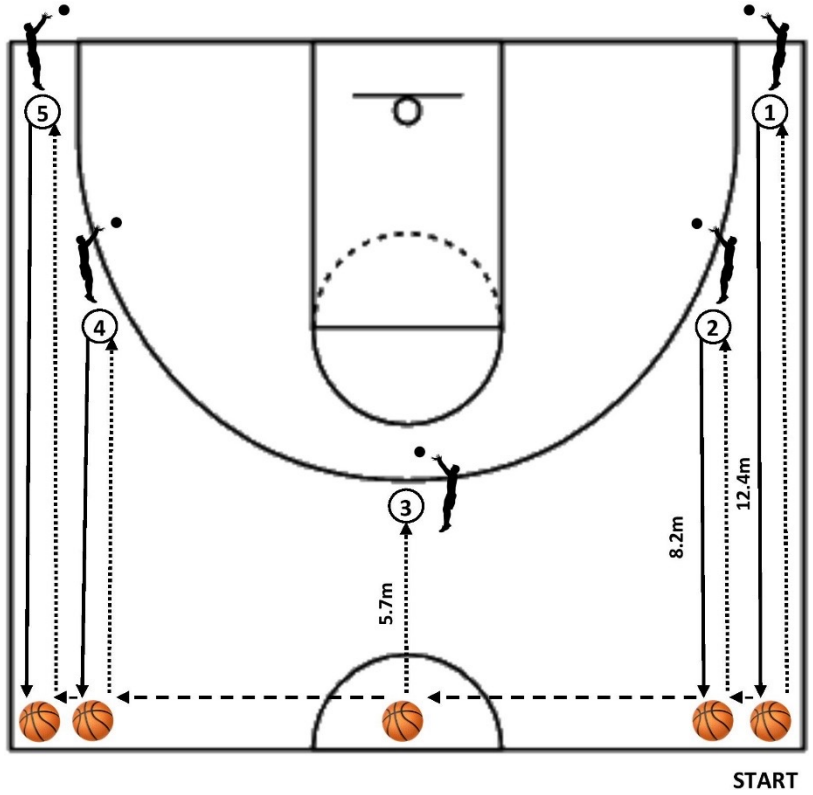
Deceleration

Low shuffle

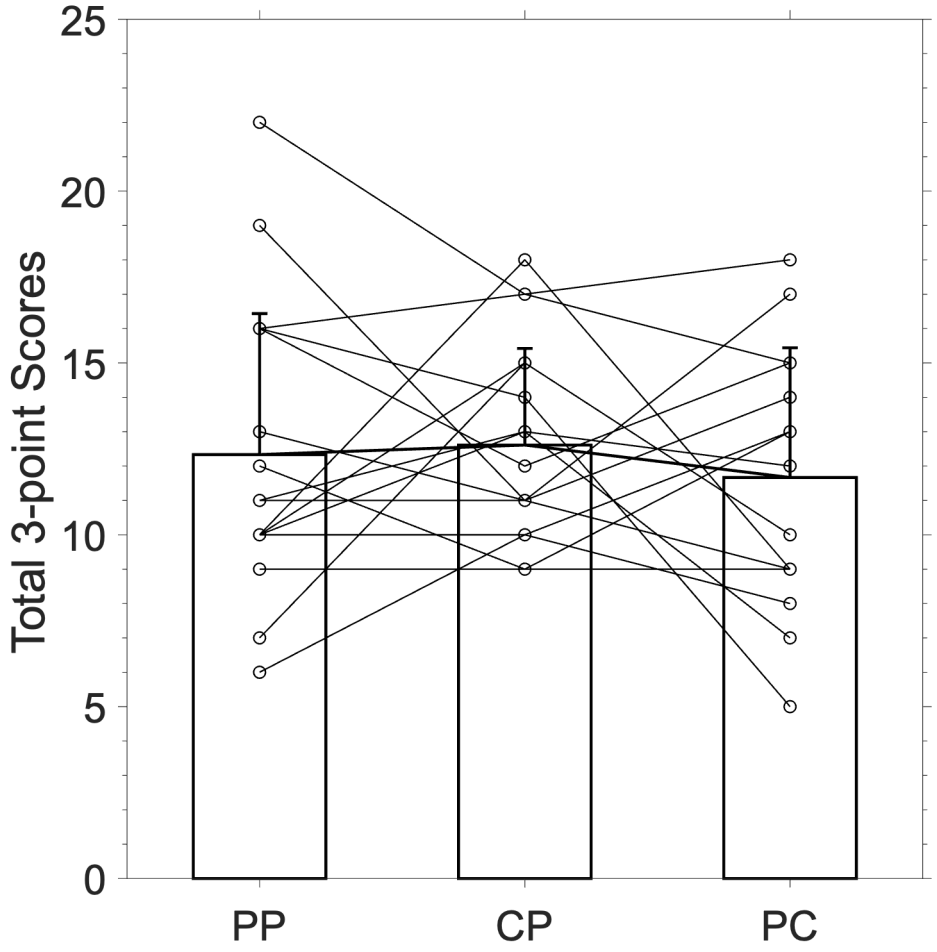
High shuffle

J Vertical jump

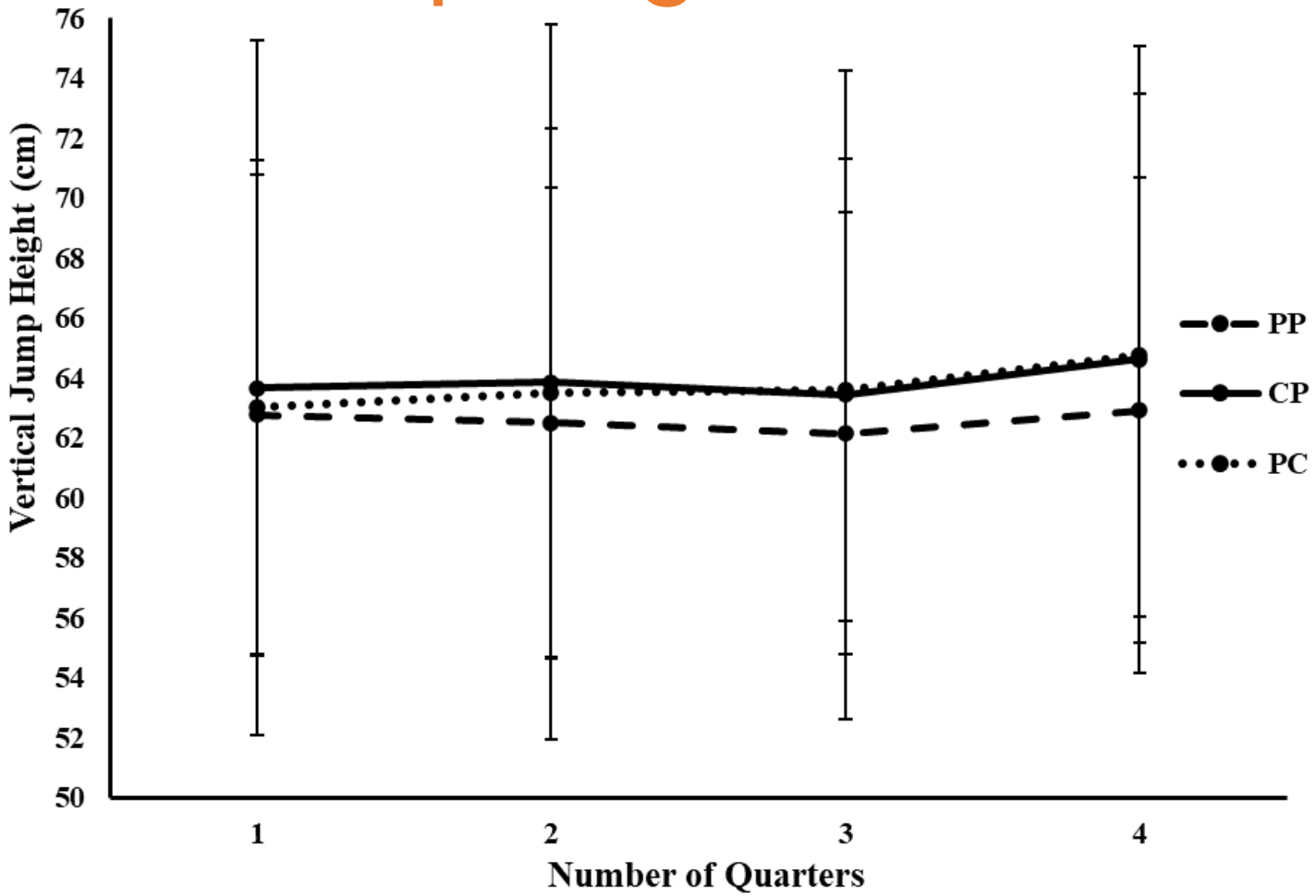
Timing gate



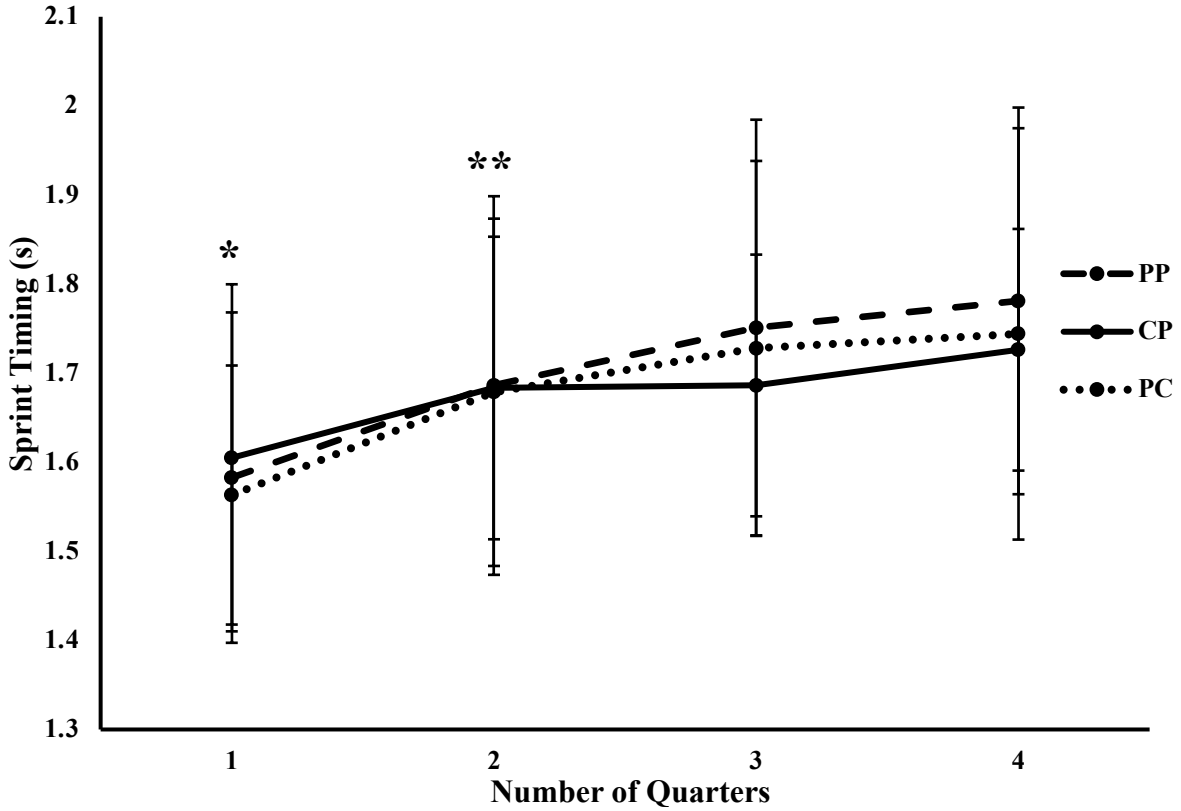
Results – 3-point Shooting Accuracy



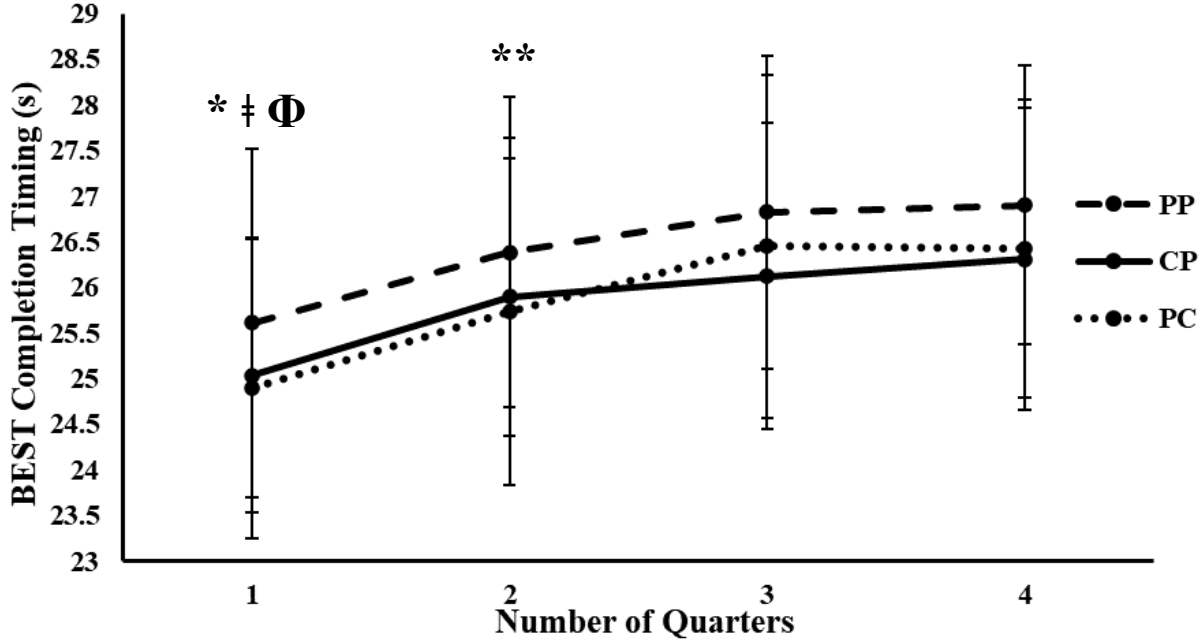
Results – Vertical Jump Height



Results – Sprint & BEST Completion Timing



***** denotes statistical significance ($p < 0.01$) of Q1 with Q2, 3 and 4. ****** denotes statistical significance ($p < 0.01$) of Q2 with Q3 and 4.



***** denotes statistical significance ($p < 0.01$) of PC Q1 with Q2 to 4 of PP and PC as well as Q3 and Q4 of CP.
****** denotes statistical significance ($p < 0.01$) of PC Q2 with PC Q3 and PP Q3 and Q4.
ǂ denotes statistical significance ($p < 0.01$) of CP Q1 with Q2 to 4 of PP and CP as well as Q3 and Q4 of PC.
Φ denotes statistical significance ($p < 0,01$) of Q1 with Q2 to 4 for PP.

Results – Individual Analyses (SWC)

SWC Comparison	3-point Shooting Accuracy	Vertical Jump Height	Sprint Time	BEST Completion Time
PP/CP	7↑	**9↑**	7↑	**9↑**
	7↓	4↓	4↓	4↓
	4↔	5↔	7↔	5↔
PP/PC	6↑	7↑	7↑	**12↑**
	10↓	3↓	3↓	4↓
	2↔	8↔	8↔	2↔
CP/PC	7↑	5↑	6↑	5↑
	10↓	8↓	8↓	7↓
	1↔	5↔	4↔	6↔

Smallest Worthwhile Change (SWC) = 0.2 x between-condition deviation

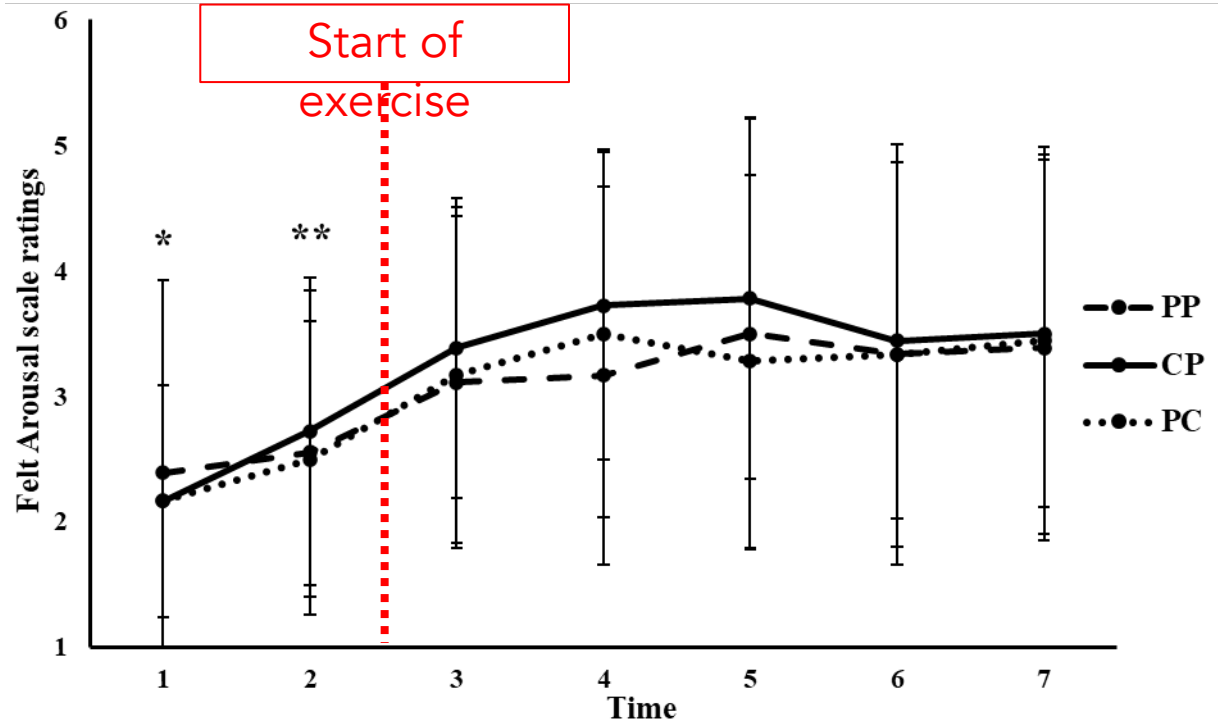
Results – Physiological Measurements

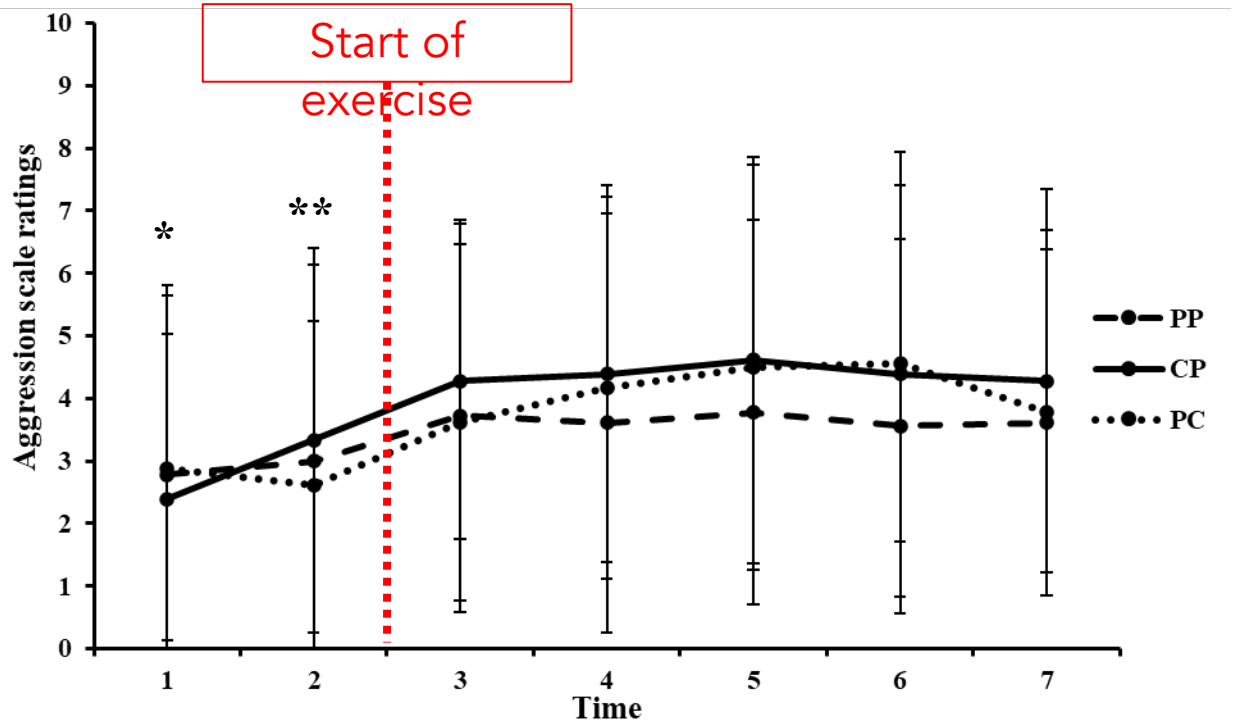
	Heart Rate (HR)	Rate of Perceived Exertion (RPE)	Blood Glucose (BGlu)	Blood Lactate (BLa)
Interaction	↔	↔	↔	↔
Condition	↔	↔	*	*
Quarters	*	*	↔	*

* denotes statistical significance ($p < 0.05$).

Bonferroni post-hoc analyses	
HR	↑ Q4 & Q2 vs. Q1
RPE	All quarters except between Q2 and Q3
BGlu	↑ CP vs. PP
BLa	↑ CP vs. PP and ↑ Q1 vs. Q3

Results – Psychological Scale Ratings





* denotes statistical significance ($p < 0.01$) of T1 with T2 to T7.

** denotes statistical significance ($p < 0.01$) of T2 with T4 to T6.

* denotes statistical significance ($p < 0.01$) of T1 with T2 to T7.

** denotes statistical significance ($p < 0.01$) of T2 with T3 to T6.

There were no statistical differences in performance, self-confidence, motivation and feeling.

Results – Effectiveness of Blinding

- 18 participants x 3 conditions.
- Less than half of all trials were accurately predicted (mean = 41.66%).
- PC condition = 48.14%.
- PP condition = 42.59%.
- CP condition = 34.26%.

Discussion

- 3mg/kg BM of caffeine may be insufficient to improve 3-point shooting accuracy.
- Genetic variations (CYP1A2) may be vital to successful manipulation of caffeine ingestion time.
- Caffeine ingestion may have increased amount of work done during BEST.
  - ➢Improved BEST completion timings.
  - ➢Increased blood glucose and lactate in CP.

Conclusion

- Low dose caffeine did not improve 3-point shooting accuracy or measures of basketball performance except BEST completion timing.
  - Higher amount of work done following 3mg/kg BM (~2-3 espresso shots).
- BEST is a valid tool to induce game-like fatigue.
  - Could be used as a training tool for athletes.
- Use of caffeine strategies should be designed specifically for individuals.
- **Considerations for future studies**
  - Using moderate dose of caffeine (~6mg/kg BM).

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