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Effects of caffeine capsules and Tour Tempo music on golf-specific skill performance under mental fatigue

Submission date 27/04/2026	**Recruitment status** No longer recruiting	[X] Prospectively registered [X] Protocol [_] Statistical analysis plan [_] Results [_] Individual participant data [X] Record updated in last year
Registration date 06/05/2026	**Overall study status** Completed	
Last Edited 30/04/2026	**Condition category** Signs and Symptoms	

Plain English summary of protocol
Not provided at time of registration

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Study information

Scientific Title
Acute effects of caffeine capsules with and without Tour Tempo music on golf-specific skill performance under mental fatigue: a randomized, placebo-controlled crossover trial

Study objectives
Experimentally induced mental fatigue in healthy adult male golfers through STROOP task, with a focus on its effects on golf-specific skill performance and the acute influence of caffeine capsule supplementation.

Ethics approval required
Ethics approval required

Ethics approval(s)
Approved 15/04/2026, Ethics Committee of Hainan Normal University (No.99 South Longkun Road, Haikou, Hainan, 570000, China; +86 85368564748; 920538@hainnu.edu.cn), ref: 20260005

Primary study design
Interventional

Allocation
Randomized controlled trial

Masking
Blinded (masking used)

Control
Placebo

Assignment
Crossover

Purpose
Health services research, Treatment

Study type(s)

Health condition(s) or problem(s) studied
Experimentally induced mental fatigue in healthy adult male golfers

Interventions
This registration concerns the caffeine-capsule experiment only. Each participant will complete four experimental conditions in a randomised crossover order: caffeine capsule plus Tour Tempo music, caffeine capsule plus no music, placebo capsule plus Tour Tempo music, and placebo capsule plus no music. Consecutive experimental visits will be separated by a washout period of at least 7 days.

Randomisation will be performed at the level of treatment sequence. A balanced Latin-square /Williams-type sequence will be used to counterbalance the order of the four conditions and reduce period and carryover effects. An independent researcher who is not involved in outcome assessment will generate the sequence allocation using random.org or an equivalent computer-generated randomisation procedure. Participants will be assigned to the sequences in approximately equal numbers. The allocation list will be kept in a password-protected file by the independent researcher. If paper allocation is used, sequentially numbered opaque sealed envelopes will be prepared.

Caffeine will be administered as a 3 mg/kg body-mass dose in capsules approximately 60 minutes before the golf performance tests. Placebo capsules will contain Nutricost maltodextrin, with each capsule containing 200 mg of maltodextrin and no caffeine. The placebo capsules will be matched to the caffeine capsules in appearance, capsule size, colour and administration procedure as closely as possible. Capsule preparation, coding and dispensing will be completed by an independent researcher, and participants and testing staff will be blinded to capsule condition.

Tour Tempo music will be delivered through Bluetooth headphones for 15 minutes using a fixed participant-selected track. In the no-music condition, participants will wear the same headphones for the same duration without music. A 30-minute Stroop task will be used to induce mental fatigue before the audio/warm-up period and golf performance tests. All sessions will follow the same testing order and timing structure.

Putting performance will be assessed on a standardized artificial putting surface using 20 putts per session while wearing the ZZT putting training device. Performance will be quantified using mean radial error (MRE) to reflect overall putting accuracy, with lower values indicating better performance. Additional putting consistency may be evaluated using bivariate error (BVE). Golf swing performance will be assessed in an indoor golf simulator using five shots with a 7-iron and five shots with a driver in each session. Outcome measures will include shot distance, clubhead speed, and ball speed.

Intervention Type
Supplement

Primary outcome(s)
1. Putting performance measured using ZZT putting training device during each experimental session at after the 30-minute Stroop task, the 15-minute audio intervention, and the standardized warm-up, before the end of the testing session.

Key secondary outcome(s)
1. Golf swing performance, including shot distance, clubhead speed, and ball speed, measured using an indoor golf simulator using five shots with a 7-iron and five shots with a driver in each session, during each experimental session at after the putting test, following the 30-minute Stroop task, the 15-minute audio intervention, and the standardized warm-up, before the end of the testing session.

Completion date
10/07/2026

Eligibility

Key inclusion criteria
1. Healthy adult male golfers with regular golf practice experience
2. Aged 18 years or older
3. Self-reported 18-hole scores between 90 and 100
4. Normal vision and no colour blindness
5. Low habitual caffeine intake (<50 mg/day)
6. Free from cardiovascular or neurological disease
7. Free from any acute injury that could affect golf swing or putting performance

Healthy volunteers allowed
Yes

Age group
Adult

Lower age limit

18 Years

Upper age limit
30 Years

Sex
Male

Total final enrolment
22

Key exclusion criteria
1. Known caffeine allergy or marked caffeine intolerance
2. Arrhythmia, uncontrolled hypertension, or other conditions making caffeine intake unsuitable
3. Recent musculoskeletal injury affecting golf swing or putting performance (e.g., shoulder, elbow, wrist, low back)
4. Current use of medications affecting the central nervous system or heart rate
5. Hearing impairment that would interfere with standardized audio delivery

Date of first enrolment
10/05/2026

Date of final enrolment
30/05/2026

Locations

Countries of recruitment
China

Sponsor information

Organisation
Hainan Normal University

ROR
https://ror.org/031dhcv14

Funder(s)

Funder type

Funder Name
Hainan Normal University

Alternative Name(s)
HNU

Funding Body Type
Government organisation

Funding Body Subtype
Local government

Location
China

Results and Publications

Individual participant data (IPD) sharing plan

IPD sharing plan summary
Not expected to be made available

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Protocol file	version 1.1		28/04/2026	No	No