Title
Youth orienteering training and wellbeing study: camp participants versus matched club peers, measuring resting heart-rate variability, morning salivary cortisol, and mood over 28 days.

Background and rationale
Intensive training camps compress physical and cognitive load. In adolescent orienteers aged 15–18, we will characterise psychophysiological adaptation during a four-week national preparation camp and compare trajectories with peers who continue usual club training. Domains include autonomic recovery, endocrine stress, perceived stress, affect, sleep, and emotional skills.

Objectives
The primary objective is to determine whether camp participation is associated with a greater improvement in resting RMSSD from Day 1 to Day 28 than club training as usual. Secondary objectives cover SDNN and LF/HF, morning salivary cortisol, perceived stress (PSS-10), affect (PANAS-C), sleep (PSQI), trait emotional intelligence (EISA-24), and weekly perceived training load (CR-10). We will also assess feasibility and safety of the measurement schedule.

Design
Prospective, longitudinal, non-randomised, open-label, parallel-group interventional study. Groups are defined by natural allocation: four-week national camp versus usual club training. Assessments occur on Day 1, Day 14, and Day 28.

Setting
National Youth Orienteering Preparation Camp, Jiangsu Province, China, with academic oversight from the School of Physical Education, Shanxi University, Taiyuan, China.

Participants
Inclusion: age 15–18 years; at least two years of official orienteering competition; medical clearance for training; ability and willingness to provide morning saliva and complete HRV and questionnaires at the three timepoints; written informed consent (parent/guardian consent and participant assent if under 18). Exclusion: acute illness or injury precluding training or assessments; medications or conditions that materially affect autonomic or endocrine measures (e.g., beta-blockers, systemic corticosteroids, untreated thyroid disease); febrile illness within seven days of an assessment; inability or unwillingness to follow saliva/HRV procedures; pregnancy; lack of consent/assent.

Intervention/exposure
Camp group follows the standard four-week orienteering curriculum (navigation drills, terrain running, interval sessions, routine morning assessments). Club group continues usual training. No masking. Usual training is not altered by the study.

Outcomes, instruments and timepoints
Primary: resting HRV (RMSSD, ms) measured using a five-minute seated morning HRV recording under fasted, rested conditions with Polar H10 chest-strap sensor (Polar Electro Oy, Finland), analysed in Kubios HRV v3.x (Kubios Oy, Finland) at Day 1, Day 14 and Day 28; primary endpoint is change Day 1→Day 28. Secondary: SDNN (ms) from the same HRV protocol and analysis at Day 1, Day 14 and Day 28; LF/HF ratio from the same HRV session and analysis at Day 1, Day 14 and Day 28; morning salivary cortisol (nmol/L) by ELISA using Salimetrics® Salivary Cortisol Kit (Salimetrics LLC, USA; e.g., cat. 1-3002) read at 450 nm on a BioTek Epoch 2 microplate reader (Agilent BioTek, USA) from first-waking saliva at Day 1, Day 14 and Day 28; perceived stress measured by Perceived Stress Scale-10 (PSS-10) total score at Day 1, Day 14 and Day 28; affect measured by Positive and Negative Affect Schedule for Children (PANAS-C) positive and negative subscales at Day 1, Day 14 and Day 28; sleep quality measured by Pittsburgh Sleep

Quality Index (PSQI) total score at Day 1 and Day 28; trait emotional intelligence measured by Emotional Intelligence Scale for Adolescents (EISA-24) total score at Day 1 and Day 28; perceived training load measured using session rating of perceived exertion (Borg CR-10) from weekly training logs over Weeks 1–4, with weekly means as endpoints.

Procedures

Assessments occur in the early morning. HRV is recorded seated for five minutes at ≥1000 Hz; artefact correction and time/frequency-domain metrics are computed in Kubios with standard filters. Saliva is collected on waking before food or drink, stored cold, and ELISA-assayed in batch. Questionnaires are completed on paper or secure electronic forms. Procedure-related adverse events are logged.

Sample size

Planned N=100, (50 camp, 50 club), giving ≥80% power to detect a moderate standardised difference (~0.5 SD) in RMSSD change between groups at two-sided $\alpha=0.05$, allowing for attrition and covariate adjustment.

Ethics and consent

Approved by Shanxi University Ethics Research Committee (IRB reference AD2024-197; approval date 15/06/2024). Written consent required; for minors, guardian consent and participant assent. Minimal-risk assessments; usual training is unchanged.

Data management and confidentiality

Identifiers are stored separately from study data. Electronic data are kept in password-protected institutional systems; paper forms in locked cabinets. Access is limited to authorised staff. De-identified data may be shared post-publication under a data-use agreement in line with consent and ethics approvals.

Dissemination and timeline

Results will be submitted to a peer-reviewed journal with a plain-English summary added to the registry; protocol, code and de-identified summary tables will be shared in a public repository. Set-up 01/05/2024; recruitment 01/07/2024–31/07/2024; follow-up through 28/08/2024; analysis thereafter. Principal Investigator: Haiyan Li (aepigenetic@gmail.com).