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Strategic Daytime Napping Enhances Agility and Lowers Perceived Exertion but Does Not Improve Fatigue Resistance in Adolescent Soccer Players

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Strategic Daytime Napping Enhances Agility and Lowers Perceived Exertion but Does Not Improve Fatigue Resistance in Adolescent Soccer Players

DETAILED TRIAL PROTOCOL

1. Structured Abstract

Background and rationale: Strategic daytime napping (25 min, 45 min) may acutely influence anaerobic performance in team sports via sleepiness-recovery dynamics.

Objectives and hypotheses: Primary objective is to test whether nap conditions improve pro-agility performance. Hypothesis: N25 and/or N45 outperform N0 on pro-agility time. Secondary objectives examine effects on RSA, RPE, Hooper wellness, and VAS alertness/sleep quality. Exploratory objective assesses associations of PSQI and POMS with outcomes.

Design: Quasi-experimental, repeated-measures crossover with 3 conditions (N0, N25, N45), 48-h washout, afternoon sessions, testing 60 min post-awakening.

Participants and setting: Sixteen competitive male soccer players (U17–U19), isolated dark rooms at ≈22°C; standardized field/lab conditions.

Interventions: N0, 25-min, 45-min nap opportunities; sleep–wake verification by Visual Analogue Scale; prohibition of visual/stimulating activities; standardized warm-up monitored by Polar H10.

Primary/secondary outcomes: Primary: Pro Agility Test time. Secondary: RSA (6×30 m, 20-s recovery), RPE, Hooper Index, VAS. Exploratory: correlations with PSQI/POMS.

Sample size: G*Power 3.1.9.7 for RM-ANOVA (α=0.05, 1–β=0.80, f=0.30–0.40) indicated ≥12; n=16 recruited.

Randomization and blinding: Within-subject random order of conditions; automated timing to reduce measurement bias; assessor blinding not implemented.

Statistical analysis (summary): RM-ANOVA with Bonferroni adjustments; assumption checks (Levene, Mauchly, Greenhouse–Geisser); effect sizes (ηp^2, Cohen's dz, 95% CI); Pearson correlations.

2. Objectives and Testable Hypotheses

Primary objective: Determine whether agility, perceived exertion and fatigue resistence differs between N0, N25, and N45 conditions.

Primary hypothesis: N25 and/or N45 conditions gives better results than N0.

Secondary objectives: Assess condition effects on Pro Agility time, RSA metrics (best/mean time, fatigue index), RPE, Hooper Index, and VAS alertness/sleep quality.

Exploratory objectives: Examine associations between PSQI/POMS and performance/subjective outcomes.

3. Study Design

- **Design:** Quasi-experimental, repeated-measures crossover.
- **Conditions:** N0 (no nap), N25 (25 min), N45 (45 min).
- **Order:** Randomized within participant.
- **Washout:** 48 h between sessions [1].
- **Timing:** Nap starts at 14:00; testing begins 60 min post-awakening [2,3].
- **Testing flow:** Warm-up → Pro Agility → 3-min rest → RSA; RPE after each sprint.

4. Setting and Infrastructure

- **Sleep environment:** Isolated, ventilated, dark rooms with blackout curtains; ambient temperature ≈22°C [4].
- **Sleep monitoring:** Visual Analogue Scale for sleep–wake verification [5,6].
- **Physiological monitoring:** Polar H10 for heart rate during warm-up [7].

5. Participants

5.1 Inclusion Criteria

- Competitive male players from Yeni Malatyaspor U17 or U19 squads.
- Healthy, no recent illness or injury.
- No habitual daytime napping.

5.2 Exclusion Criteria

- Active infection.
- Diagnosed hyperactivity or sleep disorder.
- Experiencing sleep problems on protocol days.
- Non-adherence to instructions, inability to complete sessions, or cooperation issues.

5.3 Sampling and Screening

- End-of-season volunteer recruitment from U17–U19 squads.
- Pre-screening by trained staff; verification with training logs.

5.4 Informed Consent

- Written consent from all participants; for those under 18, parental/legal guardian consent obtained.
- Ethics approval: Inonu University Non-Interventional Clinical Research Ethics Committee (Approval No: 2024/5635; Date: 05/03/2024); study conducted in accordance with the Declaration of Helsinki.

6. Interventions

- **Conditions:** N0, N25, N45.
- **Nap procedure:** 10-min room adaptation at 13:50 [8]; nap opportunity at 14:00; preferred lying position allowed.
- **Verification:** Sleep onset, duration, and awakening verified via Visual Analogue Scale; wakefulness confirmed in N0 [5,6].
- **Pre-session standards:** Avoid strenuous training for 24 h; avoid alcohol for 24 h and caffeine for 6 h; verbal compliance check at arrival [9–11].
- **Prohibited activities:** No phone use, video games, or visually stimulating tasks during all conditions [12,13].
- **Warm-up standardization:** Light jogging plus a 3-min mobility sequence; heart rate monitored with Polar H10 [7].
- **Testing order:** Pro Agility → 3-min rest → RSA; RPE recorded after each sprint.

7. Outcomes and Assessment Schedule

7.1 Primary Outcome

- **Pro Agility Test time (20-yard shuttle, total 18.28 m):** Privided agility outcomes [14].

7.2 Secondary Outcomes

- **RSA (6×30 m, 20-s recovery):** Best/mean time and fatigue index [15–17].
- **RPE (Borg 6–20):** Recorded after each sprint; session mean used for analysis [18].
- **Hooper Index:** Fatigue, stress, muscle soreness (1–7), sleep quality (1–7) [19].
- **VAS (sleep quality and alertness):** 0–10 cm and 0–100 mm scales [8].

7.3 Exploratory Outcomes

- **Correlations** of PSQI and POMS with performance and subjective measures (Pearson r) [20–23].

7.4 Schedule of Assessments (Timeline)

Time point	Screening	T0 (Baseline)	Intervention	T1 (60 min post-awakening)
Eligibility and consent	X			
MEQ/PSQI/POMS		X		
Nap (N0/N25/N45)			X	
Pro Agility				X
RSA + RPE				X

Time point	Screening	T0 (Baseline)	Intervention	T1 (60 min post-awakening)
Hooper				X
VAS				X

8. Sample Size and Justification

- **Software and model:** G*Power 3.1.9.7; repeated-measures ANOVA (within-subjects, 3 conditions) [24].
- **Parameters:** α=0.05, 1–β=0.80; expected effect size f=0.30–0.40 based on prior literature [9,25,26].
- **Result:** Minimum ≥12; **n=16** recruited to accommodate variability and potential attrition.
- **Note:** Crossover design increases power by using each participant as own control [10].

9. Randomization, Allocation Concealment, and Blinding

- **Randomization:** Within-subject random assignment of condition order.
- **Allocation concealment:** Condition order not disclosed to participants until session day; administered by study staff.
- **Blinding:** Participant blinding is infeasible; automated timing reduces measurement bias; assessor blinding not implemented.
- **Unblinding:** Not applicable.

10. Study Workflow and Procedures

1. **Screening and baseline:** Eligibility, informed consent, demographics and anthropometry (SECA stadiometer; Toledo 2096 PP scale; BMI=kg/m² [27]). MEQ, PSQI, POMS administered once at baseline [20–22,28].
2. **Pre-session standards:** 24 h no heavy training; 24 h no alcohol; 6 h no caffeine; verbal verification at arrival [9,11,29].
3. **Nap session:** 13:50 adaptation; 14:00 N0/N25/N45; dark quiet room ≈22°C; subjective verification [5,6]; prohibition of visual/stimulating activities [12,13].
4. **Warm-up:** Light jog plus 3-min mobility; heart rate monitored with Polar H10 for standardization [7].
5. **Performance tests:** 60 min post-awakening [2,3], Pro Agility → 3-min rest → RSA (6×30 m, 20-s intervals [15–17]); RPE after each sprint [18].
6. **Post-session:** Hooper and VAS forms [8,19].

11. Data Collection Instruments and Quality Assurance

- **Devices:** SECA® stadiometer; Toledo 2096 PP scale; 16x Polar H10.
- **Validity/reliability:** MEQ, PSQI, POMS are validated instruments [20–22,28]; SmarTracks offers high temporal resolution; literature supports actigraphy-based sleep–wake verification with Fitbit [5,6].
- **Staff training:** Test administrators trained before data collection; measurement repeatability monitored.

12. Data Management

- **Coding and de-identification:** Participant IDs (e.g., P001–P016); personal data stored separately and encrypted.
- **Entry and verification:** Electronic CRFs; double checks and random source data verification.
- **Missing data:** Multiple imputation may be applied when appropriate; sensitivity analyses reported.
- **Access and retention:** Restricted to authorized researchers; retention per regulations.

13. Statistical Analysis Plan

- **Software:** SPSS v29.
- **Descriptives:** Mean±SD, min–max.
- **Assumption checks:** Normality (skewness/kurtosis within ±1.5), homogeneity (Levene), sphericity (Mauchly; Greenhouse–Geisser corrections if violated).
- **Primary analysis:** RM-ANOVA across N0–N25–N45; Bonferroni where appropriate.
- **Effect sizes:** ηp^2 (small <0.06; medium 0.06–<0.14; large ≥0.14) and Cohen's dz for pairwise comparisons; 95% CIs [10,30].
- **Secondary analyses:** RM-ANOVA for RSA metrics, RPE, Hooper, and VAS with appropriate corrections.
- **Exploratory analyses:** Pearson correlations between PSQI/POMS and outcome variables [23].
- **Missing data and sensitivity:** Pre-specified sensitivity checks reported.
- **Pre-specified subgroups:** None; all participants classified as intermediate chronotype (MEQ) [20,28].

14. Safety Monitoring and Adverse Event Management

- **Risk profile:** Low-risk procedures involving brief naps and field-based anaerobic tests.
- **Adverse events:** Monitor for syncope, dizziness, musculoskeletal issues; medical evaluation as needed.

- **Reporting:** Serious adverse events reported within 24 h to the ethics committee per institutional policies.

15. Ethical Considerations

- **Ethics approval:** Inonu University Non-Interventional Clinical Research Ethics Committee; Approval No: 2024/5635; Date: 05/03/2024.
- **Participant rights:** Voluntary participation, right to withdraw at any time, confidentiality and data protection per applicable law.
- **Conflicts of interest and funding:** The authors declare no conflicts of interest.

16. Dissemination and Data Sharing Policy

- **Reporting:** Results will be reported in a peer-reviewed journal with a CONSORT flow diagram will be provided in the final report.
- **Data/code sharing:** De-identified data and analysis code to be shared per journal policies and institutional regulations.

17. Timeline and Gantt Plan

- **Preparation (Months 0–1):** Ethics approval, device calibration, staff training, pilot tests.
- **Data collection (Months 2–3):** Three sessions per participant, 48-h washout.
- **Analysis (Months 3–4):** Data cleaning, statistical analyses, sensitivity checks.
- **Reporting (Months 4–5):** Manuscript and supplementary materials.

18. Budget and Resources (optional)

- **Equipment:** SECA stadiometer, Toledo scale, Polar H10.
- **Consumables and personnel:** Forms, printing, staff time.

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T.C.
İNÖNÜ ÜNİVERSİTESİ
BİLİMSEL ARAŞTIRMA VE YAYIN ETİĞİ KURULU
(Sağlık Bilimleri Girişimsel Olmayan Klinik Araştırmalar Etik Kurulu)

Oturum Tarihi	Oturum Sayısı	Karar Sayısı
05.03.2024	05	2024/5635
Çalışma Adı	Futbolcularda Stratejik Şekerlemenin Bazı Anaerobik Performanslara Etkisi: Kronotip Açısından Değerlendirme	
Araştırmacılar	Doç. Dr. Özgür EKEN (Yürütücü) Yükseklisans Öğrencisi Mertkan ÖNCÜ (Yardımcı Araştırmacı)	

Başvurunuz; üniversitemiz Bilimsel Araştırma ve Yayın Etiği Yönergesi açısından uygun olup-olmadığı hususundaki başvurusuna ilişkin raportör raporu görüşüldü. Çalışma Bilimsel Araştırma ve Yayın Etiği Yönergesi açısından değerlendirildiğinde ***çalışmanın etik açıdan uygun olduğuna;*** **oy birliği ile karar verilmiştir.**

26.05.2025
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