



Introduction

Sleep is considered important for optimal athletic preparation and post-exercise recovery. However, recent evidence suggests that athletes experience poor sleep quantity and quality, particularly in individual and junior athletes on the night preceding important tournaments (T-1). High-level junior tennis players are exposed to condensed training schedules and tournament fixtures which pose risks to sleep behaviour.

Design

Each player completed three weeks of testing, with one considered a baseline measure during a regular training week, and the other two taking place during ITF Junior tournaments. During one tournament week (Control), players went about their regular routine and were not provided any advice. In the second tournament week (Intervention), players attended a sleep education workshop prior to the week commencing and were prescribed a nightly sleep hygiene protocol (below).

The sleep education workshop highlighted the prevalence of poor sleep among athletes (in particular junior athletes), the proposed consequences of insufficient sleep and thus the importance of sleep for young athletes. Examples of high-level players (e.g. Roger Federer and LeBron James) who valued their sleep were also examined. Finally, players were provided practical tips on how to achieve quality sleep in the form of a nightly sleep hygiene protocol.

To monitor sleep, actigraphy wristwatches were used to detect movement, from which results were calculated. To assist with this process, each player completed a sleep diary including their bedtime, time they attempted to fall asleep, waketime and a subjective rating of their sleep. In addition to sleep, players wellbeing was monitored using TA's AMS wellbeing questionnaire each day, along with the Competitive State Anxiety questionnaire to determine states of cognitive and somatic anxiety and self-confidence. The Athlete Sleep Screening Questionnaire was also completed at the start of each week to characterise the difficulty each athlete had in achieving sleep.

Methodology

During each week of testing, each athlete wore an actigraphy wristwatch each night from 30min prior to going to bed until waking the following morning. Each morning the subjective sleep diary was completed and the AMS wellbeing questionnaire was entered. During the Baseline and Control weeks no instruction was given regarding night-time routines.

During the Intervention week, athletes were to complete the following sleep hygiene protocol each night; no consumption of caffeine and/or other stimulants after 15:00; at 20:00 a reminder was sent to all athletes to prepare their room to be cool (18-21°C), quiet and dark; at 20:30 athletes were to commence a 'power down' hour including reducing exposure to light, limiting the use of technology and minimising physical activity; by 21:30 athletes were to be in bed with their actigraphy wristwatch on and to begin listening to a mindfulness recording (12 min – focusing on breathing and body awareness) and to put their eye mask on; finally, if they hadn't fallen asleep during the recording, athletes were to attempt to fall asleep by 21:45.

Results

Analysis was performed on the weekly means and on the night prior to the first match of the tournament. The tables below outline the key results from the study. Of particular interest, was the bedtime being significantly (32 min) earlier, time in bed being up to 39 min longer and total sleep time increasing by up to 35 min across the week. Even greater improvements in these same measures were observed on the night preceding the first match of the tournament (T-1). In addition to these improvements in sleep parameters, cognitive anxiety was lower, and self-confidence was higher when using the intervention. Moreover, on the morning before the first match, athletes seemed to be less worried, have lower states of cognitive anxiety and higher levels of self-confidence.

Group Weekly Average

Outcome	Baseline/Training	Control Tournament	Intervention Tournament
Bedtime	22:21pm	22:18pm	21:46pm
Time in Bed	534 min / 8.9 h	524 min / 8.7 h	563 min / 9.4 h
Total Sleep Time	433 min / 7.2 h	425 min / 7.1 h	460 min / 7.6 h
Worry	8.61/10	7.92/10	7.92/10
Mood	7.95/10	7.79/10	8.07/10
Cognitive Anxiety (0=best)	5/27	8/27	5/27
Somatic Anxiety (0=best)	4/27	6/27	5/27
Confidence (36=best)	28/36	24/36	25/36

Group's Night Before Tournament (T-1) Average

Outcome	Control Tournament	Intervention Tournament
Bedtime	22:18pm	21:35pm
Time in Bed	510 min / 8.5 h	571 min / 9.5 h
Total Sleep Time	423 min / 7 h	465 min / 7.8 h
Worry	7.53/10	8.41/10
Mood	8.07/10	7.47/10
Cognitive Anxiety (0=best)	7/27	6/27
Somatic Anxiety (0=best)	6/27	5/27
Confidence (36=best)	24/36	26/36

Importance of Findings for Tennis

- Combatting (often) early morning wake times for training/competition
- Achieving adequate rest between days of the tournament
- Optimising mood regulation
- Potentially alleviating feelings of anxiety and worry
- Sleep is proposed to have a strong link with cognitive performance such as reaction time, decision making and other executive functions