Sleep Health xxx (2018) xxx–xxx

Contents lists available at ScienceDirect

Sleep Health

Journal of the National Sleep Foundation

journal homepage: sleephealthjournal.org

The influence of sleep hygiene education on sleep in professional rugby league athletes

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ARTICLE INFO

Article history:
Received 2 November 2017
Received in revised form 23 February 2018
Accepted 4 May 2018
Available online xxxx

Keywords:
Team sport
Recovery
Actigraphy

ABSTRACT

Objective: To examine the usefulness of sleep hygiene education on the sleep of professional rugby league athletes during a 10-week period of the competitive season.
Design: Case study.
Participants: Twenty-four professional rugby league athletes.
Measurements: Initially, participants were monitored for a 2-week period using wrist activity monitors allowing baseline estimation of sleep. Following this, 12 athletes attended two 30-minute sleep hygiene education seminars delivered over successive weeks, whereas the remaining 12 athletes received no education. Sleep was monitored in all athletes across the 2-week education period and for a 2-week period 1 month following the end of education. Split-plot analysis of variance and paired *t* tests were used to examine differences in sleep across the duration of the investigation.
Results: An initial sleep hygiene education seminar resulted in an earlier bedtime (effect size [ES] = 0.53 ± 0.48), more time in bed (ES = 0.53 ± 0.49), and increased sleep duration (ES = 0.47 ± 0.44). A second sleep hygiene education seminar resulted in more time in bed (ES = 0.84 ± 0.50) but a reduction in sleep efficiency (ES = 1.15 ± 0.48). One month following sleep hygiene education, sleep behavior was comparable to that observed at baseline.
Conclusion: This study shows that sleep hygiene education can lead to positive changes in sleep behavior. However, changes in sleep from education may not be sustained following the initial intervention.

Introduction

Insufficient sleep duration, poor sleep quality, and sleep disturbances are common in athletes.[1–3] Indeed, athletes across a multitude of team and individual sports have been shown to obtain less than 7 hours of sleep,[2] whereas other work has classified up to 50% of athletes as poor sleepers.[1] These findings are concerning when considering the importance of sleep to recovery and performance, with unsatisfactory sleep having the ability to reduce the effectiveness of a training program and lead to decrements in physical and cognitive performance.[4]

Available methods to improve sleep in athletes are currently limited, although sleep hygiene (SH) strategies have been offered as a solution to promote optimal sleep.[5] Specifically, SH involves the practice of habits typifying optimal behavioral and environmental sleep manner to promote improved sleep quantity and quality.[6,7] Such conduct includes maintaining a regular sleep-wake cycle; reducing stress and arousal; avoiding caffeine in the hours prior to bed; and sleeping in a cool, dark, and quiet bedroom.[6,7] Typically delivered via education, SH strategies may offer a simple, accessible, and inexpensive mode for individuals desiring improvements in their sleep. Despite this, empirical support for SH strategies remain inconsistent,[7] whereas the usefulness of SH appears limited in clinical populations.[6,7] Nonetheless, SH strategies may have use in assisting sleep in nonclinical populations, including athletes.[8–12]

An acute SH intervention has been shown capable of increasing the quantity of sleep obtained by competitive athletes.[8,10] Indeed, a single 60-minute SH education seminar resulted in a 22.3 ± 39.9–minute increase in sleep duration, concurrent with reductions in wake variance and wake episode duration.[8] However, whether such changes in sleep are maintained over time remains unclear. Most recently, 25 professional Australian footballers took part in a 6-week

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https://doi.org/10.1016/j.sleh.2018.05.002
2352-7218/

sleep education program targeting improvements in sleep quantity and quality.[9] Encouragingly, sleep education resulted in significant improvements in self-reported sleep duration, sleep efficiency, fatigue, and vigor.[9] However, when considering sleep duration and sleep efficiency estimated via wrist actigraphy, sleep was no different at the conclusion of the 6-week intervention period in comparison to baseline measures.[9] As such, further work is warranted examining the efficacy of SH strategies in athletes over time. Such information could be valuable to practitioners working with athletes throughout prolonged pre- or competitive seasons where enduring improvements in sleep may be desired.

The usefulness of SH education for professional athletes is yet to be fully elucidated, whereas the efficacy of SH strategies in athletes beyond immediate influence is not yet understood. Therefore, the purpose of this study was to investigate the effect of SH education seminars on the sleep of professional rugby league athletes during a 10-week period of the competitive season.

Methods

Participants

Twenty-four professional rugby league athletes (25.4 ± 3.3 years, body mass 96.6 ± 11.4 kg, and height 1.86 ± 0.05 m) were recruited to partake in this study. Prior to the commencement of the investigation, ethical approval was sought from the local institutional review board. When granted, written and verbal information about the research and its procedures was provided to all participants before written informed consent was obtained from willing participants.

Procedures

The study took place during the competitive rugby league season with athletes undertaking their regular training commitments consisting of a combination of rugby league specific practice, conditioning, and strength training. Specifically, rugby league practice and conditioning were conducted between 0800 and 1100 hours, with strength training conducted between 1200 and 1500 hours. Additionally, during all monitoring periods, athletes competed in 1 professional rugby league match per week based in the home state of their team, with no travel required for competition.

Initially, all athletes had their sleep objectively monitored during a 2-week baseline period. Here, participants were required to wear a wrist activity monitor (Actiwatch 2; Philips Respironics, Bend, OR) at all times except for when they were training, competing, or showering. The monitor allowed for recording of body movement and light exposure to provide an estimation of the daily sleep-wake cycle.[13] To distinguish a sleep period, participants were instructed to press the event marker button on their activity monitor immediately prior to switching the lights off in anticipation of sleep and again immediately upon waking. Activity monitors collected data in 1-minute epochs, with wake threshold selection set at high.[14] Additionally, all athletes were provided and completed a self-report sleep diary in which they documented bedtime and get-up time of nightly sleep. Data derived from wrist activity monitors and self-report sleep diaries were used to measure the sleep obtained by an athlete, with an athlete considered awake unless the sleep diary indicated that they were attempting to sleep and the activity count from the actigraphy device were sufficiently low to indicate that they were immobile.[9]

Using a median split approach[15], the 12 athletes who obtained the shortest average sleep duration throughout the 2-week baseline monitoring period were assigned to a group receiving structured SH education. These athletes were assigned to SH because, from a practical perspective, it was believed that these athletes had the most to benefit from an SH intervention. The remaining 12 athletes received no SH education (non-SH). Directly following the baseline monitoring period, athletes composing the SH group attended 2 education seminars in successive weeks encouraging optimal SH delivered by a practitioner with expertise in sleep. Both sleep seminars lasted approximately 30 minutes and consisted of approximately 25 minutes of SH education, as well providing approximately 5 minutes for questions and group discussion. The education seminars outlined the importance of sleep for athletes and provided practical information and guidance on ideal SH. Specifically, the seminars focused on regularity of sleep patterns, prebed routine, electronic device use, the bedroom environment, and consumption of caffeine and alcohol prior to bed.[7] Non-SH athletes did not attend either of the seminars. Throughout the SH education period, all athletes wore activity monitors to objectively monitor sleep as described above. This allowed assessment of sleep 1-week following the initial SH education seminar, as well as 1-week following the delivery of the second seminar.

After the conclusion of the SH education period, no formal education was delivered to any athlete for a period of 1 month. Following this month-long period, all athletes had their sleep objectively monitored for a final 2-week period to assess the usefulness of SH education over time. It is important to note that throughout the entire duration of the study, all participants had daily access to the practitioner with expertise in sleep, allowing them sleep-related assistance where necessary, with no player refused sleep-related support.

Statistical analyses

The effects of SH education on sleep in professional rugby league athletes were examined using a 2 (group: SH or non-SH) by 4 (time: baseline, SH week 1, SH week 2, follow-up) split-plot analysis of variance. For each sleep variable, the main effects for group and time were evaluated, as well as the group × time interaction. Additionally, paired *t* tests were conducted to examine differences in sleep between time points for athletes assigned to the SH group, with statistical significance set to $P = .008$ via Bonferroni correction. Paired *t* tests were also used to compare demographic differences between SH and non-SH athletes. The magnitude of differences were assessed using effect sizes (ESs), categorized using the thresholds of <0.2 trivial, 0.21-0.60 small, 0.61-1.20 moderate, 1.21-2.0 large, and >2.0 very large.[16] Descriptive statistics are presented as mean ± SD, whereas all other data are reported as mean and 90% confidence limit. Statistical analyses were conducted using SPSS (version 23; SPSS Inc, Chicago, IL) and R statistical software (R.3.3.2, R Foundation for Statistical Computing).

Results

Foreseeably, moderate to large differences existed between SH and non-SH athletes across the 2-week baseline monitoring period when considering bedtime (ES = 1.35 ± 0.60), time in bed (ES = 1.09 ± 0.50), and sleep duration (ES = 0.87 ± 0.51) (Fig. 1). Athletes assigned to SH education were no different to non-SH athletes when considering age, height, mass, or years of professional rugby league experience (Table 1).

A significant group × time interaction was observed for sleep efficiency ($F = 3.17$, $P = .03$). No statistically significant interaction effects were present when considering bedtime, wake time, time in bed, sleep duration, or sleep efficiency (Table 2). A significant main effect of time was observed for wake time ($F = 6.77$, $P = <0.0001$) but no other sleep variable. No significant effect of group was found across any measure of sleep.

Following the initial SH education seminar, SH athletes went to bed 23 minutes earlier when compared to baseline (ES = 0.53 ± 0.48), leading to 25 minutes of additional time in bed (ES =

Please cite this article as: Caia J, et al, The influence of sleep hygiene education on sleep in professional rugby league athletes, Sleep Health (2018), https://doi.org/10.1016/j.sleh.2018.05.002