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The sleep of professional cyclists during a 5-day UCI Europe Tour road cycling race

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Background: A review of sleep and athletic performance (Fullagar *et al.*, 2015) reported that lack of sleep could have a negative impact on cognitive and physical performance. Numerous factors (i.e. jet-lag , hotels, pre-competition anxiety, early start times) can potentially disturb the sleep routine of athletes during competition (Lastella, Lovell and Sargent, 2014). Similar research has been done during a 3-day cycling race (Lastella *et al.*, 2014) and during a simulated cycling grand tour (Lastella *et al.*, 2015).

Purpose: The aim of the study was to investigate whether cyclists sleep parameters would worsen during a 5-day cycling competition. We hypothesised that total sleep time and sleep efficiency would decrease over the course of the race.

Methods: 5 professional male cyclists from Androni Giocattoli – Sidermec Professional Cycling Team participated in this study during Vuelta a Andalucía 2019. (Mean ± SD; age: 32 ± 4 years; stature: 179.8 ± 4.2 cm; body mass 67.8 ± 1.9 kg). In order to monitor quantity and quality of sleep, actigraph watches (Actiwatch Spectrum PRO, Philips Respironics, Murrysville, PA, USA) and sleep diaries were used following a method applied several times in the literature (Halson *et al.*, 2014; Lastella *et al.*, 2014, 2015; Sargent, Halson and Roach, 2014). Data were collected for 5 days (from the night before the start of the race until the morning of the last day of competition). Since the number of cyclists per team is limited by race regulations, the Bayesian Statistical Analysis framework offers an advantage over null-hypothesis significance testing as not depending on large samples (van de Schoot and Depaoli, 2014).

Results: Details of the Tour stages are shown in Table 1. A summary of the data collected are presented in Table 2. Results of Bayesian analysis can be found in Table 3. Get up time decreased over the stages (Figure 1). Cyclists woke up earlier on the first day of competition than the day before the start. Get up time was earlier the last day of competition than the first day of the race. Total sleep time decreased during the race (Figure 2) compared to the night before the start, cyclists slept less the first and the last night of the Tour, and sleep efficiency decreased during the event (Figure 3). Sleep efficiency was lower during the last night of competition compared to the night before the start of the Tour. The rest of the parameters were not affected by time.

Discussion: The findings of this study demonstrate that some sleep parameters decreased over time during a multi-day cycling Tour. Sleep time decreased over the course of the Tour,

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with cyclists sleeping more the night before the start of the event than after the first stage. Sleep efficiency decreased during the Tour, particularly, the night prior to the final stage.

Conclusions: The results of this study demonstrate that the sleep of professional cyclists is affected during a 5-day cycling Tour. These data emphasise the importance for athletes and coaches of sleep hygiene routines to optimise the quality and quantity of sleep, such as setup a consistent bedtime, control room temperature, avoid caffeine consumption 4-5h before going to bed, and reduce the use of electronic equipment prior to bedtime.

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Distance (km)	170.5	216.5	16.3	119.9	163.9
Stage type	Mountain	Flat	Individual Time Trial	Mountain	Mountain
Start time (hh:mm)	12:05	10:40	13:30	13:20	11:40
Cyclists at finish line	129	128	128	117	114

Table 1. Race characteristics.

	Night before	Night Stage 1	Night Stage 2	Night Stage 3	Night Stage 4
Bed time (hh:mm)	22:59: ± 0:14	23:11 ± 0:22	23:12 ± 0:16	23:25 ± 1:04	23:23 ± 1:11
Get up time (hh:mm) #	8:13 ± 0:20 [A]	7:25 ± 0:13 [A, B]	7:36 ± 0:25	8:08 ± 0:41	7:52 ± 0:11 [B]
Time in bed (h)	9.5 ± 0.3	8.4 ± 0.4	8.6 ± 0.7	8.9 ± 1.2	8.7 ± 1.2
Total sleep time (h) #	8.2 ± 0.4 [C, D]	6.8 ± 0.4 [C]	7.3 ± 0.9	7.6 ± 0.9	6.5 ± 0.7 [D]
Onset latency (min)	12.9 ± 14.4	49.9 ± 30.9	32.1 ± 18.1	30.3 ± 29.6	66.7 ± 62.2
Snooze time (min)	11.0 ± 19.4	14.3 ± 6.1	7.4 ± 8.1	12.7 ± 7.1	24.7 ± 26.4
Sleep efficiency (%) #	87.0 ± 2.5 [E]	80.7 ± 5.7	84.7 ± 3.6	85.0 ± 4.4	75.0 ± 8.9 [E]
Subjective sleep quality (AU)	2.6 ± 1.1	3.2 ± 1.5	2.8 ± 0.8	2.6 ± 1.5	3.0 ± 1.6
Mean activity score (AU)	5.3 ± 1.6	5.2 ± 1.3	5.2 ± 0.9	4.2 ± 1.0	4.6 ± 0.7

Table 2. Sleep variables. (Mean ± SD). # Evidence of time effect. Same superscript denotes evidence of differences between values (BF_{10}>3).

	Hypothesis	BF_{10}	Error %	Evidence for H_1	Effect size (δ)	95% credible interval
Bed time (*BF_{10} = 0.229) error % = 0.533*)						
Get up time (*BF_{10} = 13.155) error % = 0.544*)						
Pre – Race 1	Decrease	27.94	<0.0001	Strong	2.1	[1.1, 4.0]
Race 1 – Race 4	Either direction	51.59	<0.0001	Very strong	-3.7	[-5.9, -2.8]
Bed time (*BF_{10} = 0.860) error % = 0.320*)						
Total Sleep time (*BF_{10} = 33.297) error % = 1.604*)						
Pre – Race 1	Decrease	90.43	<0.0001	Very strong	3.9	[2.8, 5.6]
Pre – Race 4	Decrease	12.67	<0.0001	Strong	1.5	[0.3, 3.3]
Onset latency (*BF_{10} = 0.959) error % = 0.456*)						

Snooze time (*BF_{10} = 0.393) error % = 0.544*						
Sleep Efficiency (*BF_{10} = 7.054) error % = 0.416*						
Pre – Race 4	Decrease	5.943	0.002	Moderate	1.1	[0.2, 2.4]
Subjective sleep quality (*BF_{10} = 0.210) error % = 0.821*						
Mean activity score (*BF_{10} = 0.542) error % = 0.439*						

Table 3. Results of Bayesian Statistical Analyses. Evidence: BF_{10} >1 (weak), BF_{10} >3 (moderated), BF_{10} >10 (strong), BF_{10} >30 (very strong), BF_{10} >100 (extreme). BF_{10} <1 indicates more support for the null hypothesis (van Doorn *et al.*, 2019).

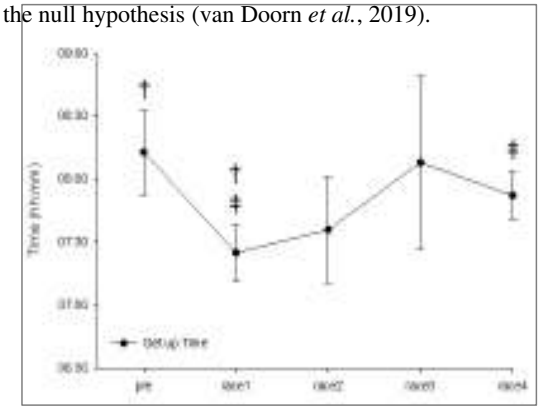

Figure 1. Get up time. Same symbol denotes evidence of differences between values.

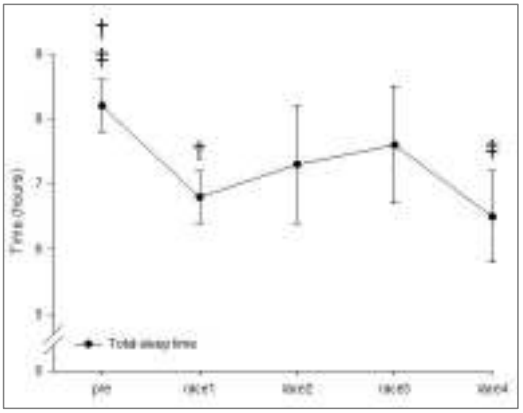

Figure 2. Total sleep time. Same symbol denotes evidence of differences between values.

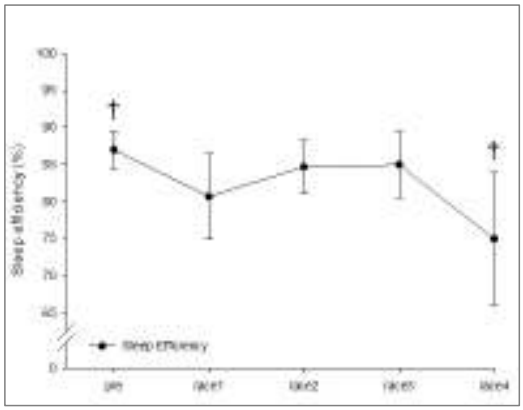

Figure 3. Sleep efficiency. Symbol denotes evidence of differences between values.

References

van Doorn, J. *et al.* (2019) 'The JASP Guidelines for Conducting and Reporting a Bayesian Analysis', *PsyArxiv Preprint*, (February), pp. 0–31.

Fullagar, H. K. *et al.* (2015) 'Sleep and Athletic Performance: The Effects of Sleep Loss on Exercise Performance, and Physiological and Cognitive Responses to Exercise', *Sports Medicine*, 45(2), pp. 161–186.

Halson, S. L. *et al.* (2014) 'Does hydrotherapy help or hinder adaptation to training in competitive cyclists?', *Medicine and Science in Sports and Exercise*, 46(8), pp. 1631–1639.

Lastella, M. *et al.* (2014) 'Sleep/wake behaviour of endurance cyclists before and during competition.', *Journal of sports sciences*. Routledge, 33(August), pp. 1–7.

Lastella, M. *et al.* (2015) 'The impact of a simulated grand tour on sleep, mood, and well-being of competitive cyclists.', *The Journal of sports medicine and physical fitness*, 55(12), pp. 1555–64.

Lastella, M., Lovell, G. P. and Sargent, C. (2014) 'Athletes' precompetitive sleep behaviour and its relationship with subsequent precompetitive mood and performance', *European Journal of Sport Science*. Taylor & Francis, 14(SUPPL.1), pp. 123–130.

Sargent, C., Halson, S. and Roach, G. D. (2014) 'Sleep or swim? Early-morning training severely restricts the amount of sleep obtained by elite swimmers', *European Journal of Sport Science*. Taylor & Francis, 14(SUPPL.1), pp. S310–S315.

van de Schoot, R. and Depaoli, S. (2014) 'Bayesian analyses: Where to start and what to report.', *The European Health Psychologist*, 16(2), pp. 75–84.