**Title:** Sleep, travel and recovery responses of national footballers during and following long-haul international air travel

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## ABSTRACT

***Purpose:*** The present study examined the sleep, travel and recovery responses of elite footballers during and following long-haul international air travel, with a further description of these responses over the ensuing competitive tour (including two matches). ***Methods:*** In an observational design, 15 elite male football players undertook 18 h of predominately westward international air travel from the United Kingdom to South America (-4 h time-zone shift) for a 10-day tour. Objective sleep parameters, external and internal training loads, subjective player match performance, technical match data and perceptual jet-lag and recovery measures were collected. ***Results:*** Significant differences were evident between outbound travel and recovery night 1 (night of arrival; $P<0.001$) for sleep duration. Sleep efficiency was also significantly reduced during outbound travel compared to recovery nights 1 ($P=0.001$) and 2 ($P=0.004$). Furthermore, both match nights (5 and 10), showed significantly less sleep than non-match nights 2-4 and 7-9 (all $P<0.001$). No significant differences were evident between baseline and any time point for all perceptual measures of jet-lag and recovery ($P>0.05$); although large effects were evident for jet-lag on Day 2 (two days after arrival). ***Conclusions:*** Sleep duration is truncated during long-haul international travel and following night matches in elite footballers. These results suggest although sleep quantity is lost during long-haul travel with a 4 h time-zone delay, there is a significant increase in these values on the night of arrival. However this poor sleep appeared to have a limited effect on perceptual recovery, which may be explained by a westbound flight and a relatively small change in time zones, in addition to the substantial sleep following the long-haul flight.

**KEYWORDS:** Soccer, fatigue, match performance, regeneration, team sport

## Introduction

Sleep has been recognised by players, coaches and practitioners as critical to both optimal physiological and psychological recovery.[1,2] Unfortunately, professional footballers currently face numerous situations throughout a season where disrupted sleeping patterns can exist.[2] Such scenarios could include compromised recovery during and following short- and long-haul domestic or international travel, late-night matches and congested competition scheduling.[2,3] Of these, long-haul international air travel (LHIT) is a necessity for some national and club football teams who are required to play away matches in different continents due to international competitions. When LHIT is endured across multiple time-zones, numerous physiological variables are disrupted including the sleep-wake cycle,[4] body temperature and hormonal circadian rhythms.[5] Sleep is perhaps the more critical given sleep loss can affect athletic performance[6] and has been shown to reduce physiological and cognitive recovery in rugby-league footballers.[7] In addition, travelling across time zones can cause disruption to circadian rhythms and give rise to jet lag, further disrupting sleep and increasing residual fatigue – particularly in eastward compared to westward directions.[4] However, to date, the interaction between these aforementioned situational disturbances and objective measurements of sleep in team sports is relatively unknown. Given the upcoming 2016 Olympic Games in Brazil, further knowledge of the objective sleep and perceptual responses to LHIT in elite team-sport athletes would be welcomed to assist the planning of travel and training schedules.

Previous research has described the sleeping patterns of elite junior football players following LHIT.[8-10] For instance, Lastella et al[10] reported reductions in sleep duration (6.6±1.3 h per night compared to baseline 7.5±1.3 h) and quality immediately following travel from Sydney to Denver with an 8-h eastward time-zone change. However, Lastella et al[10] focused on the effects of altitude at the destination on ensuing sleep. Additionally, insights provided by Roach et al[8] and Sargent et al[9] into the influence of international travel on sleep are further compounded by the lack of sleep measurement during the flight, most likely due to understandable logistical issues.[8,9] Thus, further research is required to confirm the assumption that LHIT disrupts sleep, let alone aspects of team-sport performance. To date there is only one previous study that has attempted to investigate the effects of LHIT on sleep with relation to the physical and psychological demands of team sports. Fowler et al[11] reported 24 h simulated LHIT significantly reduced sleep quality and quantity in trained participants.[11] However, this study only focussed on the acute, 24 h post-travel recovery timeline.[11] Thus, recovery responses following this initial 24 h arrival period remain unclear, which is of particular relevance as matches are routinely conducted after this initial 24 h arrival period. Since sleep reportedly assists in memory consolidation, motor learning, cognitive growth and physical regeneration,[12] poor sleep during or following LHIT may limit athletes' post-exercise recovery timeline, which could also be especially pertinent to subsequent training sessions performed close to arrival. Therefore, further research is required to assess the sleep and recovery responses to LHIT in field-based team-sport settings.

Moreover, whilst there is evidence supporting the loss of sleep prior to competition in athletes,[13] research evaluating sleep following matches is lacking.[14] Considering that playing at night could promote arousal and prolong wakefulness,[2] playing at night might potentially cause sleep disturbances. Additionally, the physical demands of the actual game could inflict pain and increase perceived soreness and thus, combined with sleep disruption, may hinder physiological and/or psychological recovery.[7,12] Thus, there could be potential for players to sleep differently to those who do not play. Accordingly, the purpose of this study was to examine the sleep, travel and recovery responses of elite footballers during and following international air travel, with a further description of these responses on an ensuing competitive tour. Within this overall purpose, two secondary aims were investigated. Firstly, a comparison of sleep responses on outbound travel and recovery nights (nights following arrival), and secondly given this tour included two respective night matches we aimed to provide a comparison of sleep responses between players and non-players for both match nights and non-match nights.

## Methods

### *Subjects*

Fifteen elite male football players voluntarily agreed to participate in the investigation (mean±SD; age 25.5±4.9 y, body mass 74.3±7.3 kg and height 180.0±10.0 cm). The players were national representatives for their country with 5.1±4.8 y and 19.4±24.7 matches of playing experience. All players provided written informed consent prior to data collection. Participants were excluded if they experienced a prolonged injury or illness during the data collection period. One participant was excluded in accordance with these criteria. In addition, from an original pool of twenty-one players, all of whom partook in the study, a further five were excluded due to lack of complete data sets. Thus, data of fifteen participants were included for final analysis. This study was approved by the local Human Research Ethics Committee and conducted in accordance with the Declaration of Helsinki.

### *Design*

This study had a descriptive-observational design. Data was obtained from all players over a 10-day period during a pre-FIFA™ World Cup friendlies 2014 trip to South America, which included a trip from Europe to South America and a similar return trip (Fig. 1). All players were familiarised with the experimental procedures prior to the commencement of the investigation. Data was collected from the players prior to the tour (baseline), during each flight (outbound and return travel) as well as during the 10-day tour (day 1-10). During this tour, two matches were played against Uruguay (day 5; 20:00 local time) and Chile (day 10; 20:40 local time). The outbound flight from London, United Kingdom (GMT+1 h) to Montevideo, Uruguay (GMT–3 h; an overall time-zone shift of 4 h) consisted of late-afternoon departure from London to Paris, France (eastbound travel; 1 h; 341 km travelled), a 3-h stopover in Paris then an evening departure from Paris to Montevideo for a final arrival at 10:00am (westbound travel; 14 h; 10931km). The return trip was from Santiago, Chile to London, United Kingdom, consisting of a late-afternoon departure from Santiago to Paris (15 h; 11627 km travelled), a 2-h stopover in Paris then a midday departure from Paris to London. The afternoon trip from Montevideo to Santiago on day 6 required a 2-h journey with no time-zone change. Modes of travel were in premium economy class, meaning players were restricted from lying in a pure supine position for all flights. During both flights players were left to their own travel routines and were not monitored. No sleep or travel recommendations were given to the players. Training schedules were continuously monitored and conducted at the discretion of coaches (days 1-4 and 8).

## *Methodology*

### *Sleep measures*

The assessment of sleep duration (total amount of sleep obtained; min), sleep onset latency (time at which bed was entered to when the individual first fell asleep; min), sleep efficiency (sleep time expressed as a % of time in bed), wake episodes and wake episode duration (min) were collected using wrist-watch actigraphy (Readiband™, Fatigue Science, Vancouver, Canada). Data were analysed using the manufacturer's software (Fatigue Avoidance Scheduling Tool™ software). The use of these actimetry measures is based upon a previously validated fatigue model[15] and have also been validated in flight crew and attendants during both work and rest patterns, making them suitable for sleep measurements on commercial aircraft[16]. In addition, within-industry tests revealed Readibands showed good agreement (93%) with polysomnographic measurements[15]. These actigraphs were utilised during outbound and return travel, and every night on the tour (worn continuously except during training and matches).

As with previous research,[17] logistical reasons prevented the allocation of wrist actigraphs until just prior to outbound travel. Accordingly, mean baseline sleep data was subjectively recorded over a three-day period prior to the outbound flight via the completion of an online sleep and sporting activity questionnaire (SosciSurvey©). The questionnaire was completed in the morning after awakening, and at night prior to sleeping. However, recent research suggests the majority of sleep parameters related to duration, latency and efficiency within this questionnaire correlate poorly with objective methods of actigraphy (ICC=0.22-0.70[18]). Consequently, sleep parameters during the tour were excluded from comparative analyses to baseline given such different methods of collection. Thus, baseline measures of sleep would be presented herewith purely to provide some descriptive context of pre-tour sleeping patterns.

### *Perceptual measures*

The Liverpool John Moore's Jet-lag Questionnaire (LJMJQ)[19] was completed both prior to boarding on the day of outbound travel (baseline) and before training (same time each day) on days 2, 4, 6 and 10. The questionnaire assessed participants' subjective ratings of jet-lag on a visual analogue scale (VAS) of 0 (no jet-lag) to 10 (very bad jet-lag), and sleep (latency, onset time, quality, wake time, inertia), function (fatigue, concentration, motivation, irritability), diet and bowel movement ratings on a VAS of -5 to +5, with 0 representing habitual ratings prior to travel. At the same time points, subjective mental, emotional, and physical well-being (total stress-recovery score) were assessed using the Recovery-Stress Questionnaire for Athletes (RESTQ-Sport)[20] and a Likert scale (1=very restful to 5=not at all restful) was used to assess sleep restfulness.

### *Training load and match performance*

For each training session mean total distance (m), high intensity running distance (>19.9 km/h), mean speed (m/min), mean heart rate (HR; beats per min) and time spent above 85% of $HR_{max}$ (min) were recorded using 10 Hz Global Positioning Satellite (GPS) devices (STATSports™ Viper, STATSports Technologies, Dundalk, Ireland) and Polar heart rate monitors. In addition, rating of perceived exertion (RPE) was collected approximately 30 min following each training session using Borg's CR-10 scale to calculate training load (session-RPE x min).[21] Additionally, subjective match performance for each player was assessed from the same member of coaching staff for both matches using a scale ranging from 0=very poor to 10=excellent. In addition, technical match data (possession percentage, passes attempted, passes completed, pass completion rates, and attacks in the final third) were collected and analysed using Prozone™ software for both matches (VideoPro, Amisco Sports Analysis Services).

### *Statistical Analysis*

Data are presented as means±SD. Recovery nights (those following outbound travel) were classified as nights 1-4. Non-match nights were classified as nights 2-4 and 7-9, whilst matches were played on nights 5 and 10. A one-way repeated measures ANOVA was used to compare differences between time points of the away trip including and following international travel (outbound travel, night 1-10, return travel) for all sleep parameters. A one-way repeated measures ANOVA was also used to compare differences in perceptual recovery and jet-lag parameters between baseline measures (pre-travel), and time points of the away trip including both directions of travel. Where significant effects were observed, a Scheffé post-hoc test was performed. $P<0.05$ was accepted as significance for statistical comparisons. Furthermore, standardised effect size (Cohen's $d$; ES) analyses were used to interpret the magnitude of the mean differences between pre- and post- outbound and return travel for sleep, jet-lag and recovery parameters with $d<0.20$ (trivial), $d=0.20$ (small), $d=0.50$ (medium), $d=0.80$ (large)[22]; NB: only large ES reported for sleep parameters). ES analyses were also used to assess pre- and post-match differences for objective sleep indices for both players (played more than 60 min in each game) and non-players.

## Results

### *Sleep measures*

A summary of variables related to sleep quantity and quality is presented in Table 1. In addition, individual subject cases for sleep duration are illustrated in Fig. 2.

*The effect of travel on sleep parameters*

Significant differences were evident between outbound travel and night 1 ($P<0.001$; $d=1.86$) for sleep duration, with large ES evident on nights 2-4 ($d=1.20$-$1.41$). Significant differences were evident for sleep efficiency between outbound travel and recovery nights 1 ($P=0.001$; $d=1.05$) and 2 ($P=0.004$; $d=1.00$). There were no significant differences between outbound travel and recovery nights (1-4 all $P>0.05$) for either sleep onset latency or wake episodes, nor were any large ES present. Large ES were present between outbound travel and recovery night 2 ($d=0.90$), and 3 ($d=0.80$) for wake episode duration. Significant differences were also evident between the return flight and the preceding nights 7 ($P<0.001$; $d=1.54$), 8 ($P=0.002$; $d=1.35$) and 9 ($P=0.01$; $d=1.30$) for sleep duration. In addition, significant differences were present between return travel and nights 7 (*P*=0.03; *d*=0.92) for sleep efficiency, with large ES also present on night 9 (*d*=0.86).

*The effect of match play on sleep parameters*

Match 1 (night 5) showed significantly less sleep than non-match nights 2-4 (all *P*<0.001; *d*=1.79-2.00) and 7-9 (all *P*<0.001; *d*=1.95-2.18). Match 2 (night 10) also showed significantly less sleep than non-match nights 2-4 (all *P*<0.001; *d*=1.46-1.60) and 7-9 (all *P*<0.001; *d*=1.56-1.72). No significant differences were evident for sleep onset latency (*P*=0.75), although large ES were present between Match 2 and non-match night 8 (*d*=1.20). Match 1 showed large ES with non-match nights 7 (*d*=0.93) and 9 (*d*=0.85) for sleep efficiency, although no significant differences or large ES were present between Match 2 and non-match nights 2-4 or 7-9. A significant difference was present for wake episodes between both match nights (5 and 10) and non-match night 3 (*P*=0.02; *d*=1.78 and *P*=0.007; *d*=2.08, respectively). Large ES were also present between Match 1 and non-match nights 2-4 (*d*=1.17-1.78) and non-match night 8 (*d*=0.86). No significant differences were evident for wake episode duration for all comparisons, although large ES were also evident between Match 2 and non-match night 3 and 4 (*d*=0.80 and *d*=1.02, respectively).

Participants mainly napped on three specific days: day of arrival (Day 1; number of nappers=6, mean start time: 14:27±1:29, mean end time: 15:32±1:19, mean duration: 65±15 min), day of match 1 (Day 5; n=7; 14:54±1:28; 16:34±1:06; 100±35 min) and day of match 2 (Day 10; n=11; 14:53±0:14; 16:30±0:32; 91±38 min). Outside of these days no more than two participants each day napped during the daylight hours.

*Players vs. non-players*

As presented in Table 2, small ES were found for the within-player change in sleep duration when comparing players to non-players for match 1 (*d*=0.25). This was determined as the relative change following a match compared to the individual mean of the previous three nights. For the second match, non-players presented overall poorer absolute means and within-player changes, including sleep duration and efficiency (Table 2). For the first match, five starters played the full game and a further four played at least 80 min (overall starting mean 87 min). In the second match five starters played the full game, with a further three playing at least 80 min (mean 85 min).

***Perceptual measures***

There were no significant differences between baseline and any day of the tour for any perceptual measure (*P*>0.05; Fig. 3). However, large ES were evident for jet-lag on day 2 (*d*=1.47; two days after outbound travel) and moderate (*d*=0.76 on day 6. Moderate ES were present for sleep restfulness on day 6 following match 1 (*d*=0.52).

### *Training load and match performance*

The physical performance data for the five training sessions are presented in Table 3. The results of both matches were similar (0-1 in match 1 and 0-2 in match 2), along with coaches' ratings of player performance (match 1=7.5±1.0, match 2=7.4±0.9). Match technical data included 46% and 32% possession, 451 and 175 passes attempted, 368 and 122 passes completed (pass completion rates of 82% and 70%), and 44 and 21 attacks in the final third of the pitch, per game in match 1 and 2 respectively.

## Discussion

This study describes the sleep, travel and recovery responses of professional footballers during and following LHIT from the United Kingdom to South America, including a comparison of sleep responses during travel and nights following arrival, and a comparison of sleep responses between players and non-players for both match nights and non-match nights. The main finding was the truncated sleep durations during outbound and return travel. That said, a 'rebound' effect (significant increase in sleep duration) was evident on the first night of arrival. Furthermore, both match nights (5 and 10) showed significantly less sleep than non-match nights 2-4 and 7-9. Interestingly, there were no significant differences in perceptual recovery between baseline and any day of the tour, nor were players any worse in sleep than non-players. Thus, it would appear further analysis of the relationship between the nuances of sleep loss and recovery in elite football players is required to confirm sleep loss impedes athletic recovery.

Sleep duration is reported to be reduced during simulated LHIT,[11] and following actual transmeridian travel.[10] Although we were unable to provide direct comparisons of sleep parameters to baseline in the present study, the mean of 5.5 and 5.7 h during outbound and return travel respectively is both far below the recommended 7-9 h for healthy adults[23] and the mean 8.5 h players subjectively reported prior to travel. Moreover, mean sleep efficiency during outbound travel was approximately 20% worse than average values for young adults who sleep for 8 h a night (~90% with polsomnography)[24], indicating poor sleep quality. Previous research suggests this poor duration and quality of sleep during travel could be due to hydration or cabin air pressure.[4] Additionally, the non-supine position experienced in economy class may have hindered melatonin secretion thus perhaps preventing the inducement of sleep[25]. Within the present study, noise within the cabin, comfort and the extensive travel schedule and timing of meals may also have played a role. Notwithstanding, there was a significant increase in players' sleep durations on the first night of arrival. This acute increase in sleep duration on night 1, followed by some stability on nights 2-4, suggests alterations to the sleep-wake cycle due to travel. The 4 h time zone shift is likely to have had only minor effects compared to more extensive time-zone shifts (i.e. 8-10 h).[4] In addition, it is suggested that body clocks are better adept at extending the day, and thus westbound flights such as the one experienced in this study are more likely to elicit reduced severity of jet lag symptoms (such as reduced sleep) than eastward travel.[4] Alternatively, the significantly greater sleep duration observed on the night following travel may be explained by an increased homeostatic pressure (drive) for sleep caused by the poor sleep incurred during outbound travel.[26]

Although perceptual jet-lag was present during the early stages of the trip, all other parameters relating to the LJMJQ, perceived recovery and sleep restfulness were relatively unchanged. These results may be explained by a westbound flight and a relatively small change in time zones, in addition to the substantial increase in sleep following the long-haul flight.[4] The finding of no effect on perceptual recovery could also possibly be explained by the elite playing experience of the current players, who are accustomed to constant travel and competition. Alternatively, athletes may have intentionally not reported concerns through fears of not being chosen to play.[27] Nonetheless, these results were somewhat surprising given reductions in subjective sleep quality and perceptual responses have been previously reported in athletes immediately following LHIT.[5] The presence of perceived jet lag on day 2 was anticipated, with the players' adjusting to the new light-dark cycle following travel. However, the dissipation of this effect by day 4 suggests that the timing of arrival five days prior to the first match was sufficient to alleviate symptoms of jet-lag fatigue. This sufficient re-adjustment may have been important given the effect circadian readjustment can have on athletic performance.[17]

In addition, sleep duration was significantly less on both match nights than non-match nights 2-4 and 7-9. These reductions were likely due to excess arousal, post-match commitments (i.e. press-conferences) and socialising.[2] These observations of altered sleep in our investigation are supported by evidence of post-competitive sleep disturbance in professional Australian soccer players[14] and elite individual and team-sport athletes.[13] It should be acknowledged that in our study the nights of matches were not controlled, thus a range of social-related factors were not controlled which may have contributed to the poor sleep. Notwithstanding, a 'rebound' effect was again evident in the majority of nights following match one (7-9) during which sleep duration was significantly greater. Thus, from a volume perspective, there appeared to be no *ongoing* concerns for the players in terms of sleep quantity for match preparation (for either match 1 or 2). However, sleep efficiency, and thus perhaps quality, saw limited improvement. Of further concern, a significant reduction in sleep duration occurred following match 2 and during return travel compared to the preceding nights 7 to 9. Given the congested scheduling of club fixtures following international matches,[3] this return journey represents perhaps the most demanding context for sleep loss in elite football players.

Interestingly, sleep parameters did not differ extensively between players and non-players following either match. It is perhaps indicative that it is not so much the act of playing that retards sleep duration and impairs quality, as has been previously hypothesised based on increased arousal at onset of sleep.[29] Indeed, the effect of exercising at night versus not is presently unclear. Some report no significant sleep changes following evening exercise,[30] whilst others have shown that judo competitors performing maximal aerobic exercise in the evening experienced greater elevated sleep-onset latency and awakenings.[31] Since non-players reported poorer aspects of sleep for the second match it is likely poor sleep induced from later bedtimes (due to the timing of the match and post-match functions) can be further attenuated from other sources (e.g. socialising, psychological reasons).

### *Limitations*

Given the ecological nature of data collection, certain limitations should be acknowledged. Unfortunately, due to players being located in different countries it was not logistically possible to obtain objective sleep and/or performance data prior to departure. Hence, a subjective online survey of sleep was used to collect baseline measures of sleep. This method makes it difficult to estimate sleep quantity and quality due to mood, memory bias and personality characteristics.[32] Although it has also been shown that respondents are capable of accurately estimating total sleep duration,[33] the overall poor agreement between objective and subjective measures[18] forced an exclusion of sleep parameters from baseline comparisons. Thus, this weakens inferences about the explicit effect of travel. In addition, the lack of a sleep diary filled out during the trip (especially during both directions of air travel, where subjects were sitting down for extended periods), limits the comprehensiveness, and perhaps accuracy, of sleep measurements. The lack of standardisation of numerous variables, perhaps most notably the lack of control for activities conducted post-match (i.e. socialising), weakens the internal validity of the effect of various influences on sleep. However, since those factors are usually not controlled for in real matches, external validity of our results is high. The low frequency of jet-lag data collection could also possibly have hindered perceptions of jet-lag.[34] In addition, having a stand-alone question(s) related to perceived soreness or muscle pain, outside that of the RESTQ-Sport, may have allowed for a greater derivation of factors associated with poor sleep after a match. Finally, no physiological measures of circadian rhythms were able to be collected to confirm whether or not circadian rhythms were disrupted. Indeed, it is difficult to differentiate between the effects from a time-zone shift and that of long-haul travelling in its own right.

## Practical Applications

- Sleep duration is poor during LHIT and following match play in elite footballers. Practitioners should be aware this may have repercussions for subsequent training sessions if performed closely after arrival or following matches.
- Despite this hindrance to sleep, international travel of more than 12 h (mostly westbound) together with a time-zone shift of 4 h, appears to have a limited effect on the perceptual recovery of elite footballers.

## Conclusion

LHIT results in worsened sleep durations in elite footballers than the recommended values for healthy adults. However this poor sleep appeared to have a limited effect on perceptual recovery, leaving the relationship between sleep loss and recovery ambiguous. These results suggest although sleep is initially poor during long-haul travel with a 4-h time-zone delay, a strong ‘rebound’ effect (significantly increased sleep duration) occurs upon arrival for the following night(s). Furthermore, sleep duration was significantly less on both match nights than non-match nights in elite footballers. Interestingly, there were no longitudinal perceptual recovery concerns for either playing or non-playing representatives outside that of early effects on jet-lag, and moderate effects on sleep restfulness following match 1. However, the hindrance to sleep during travel and following match play would suggest the future analysis of interventions which could potentially improve sleep parameters in these scenarios (e.g. the use of sleep hygiene protocols) is required, if not at least from a health perspective. In addition, further research into the relationship between sleep loss and recovery (i.e. physiological) of footballers is required to confirm the popular belief that sleep loss impedes athletic recovery.

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## FIGURE CAPTIONS

**Figure 1:** Schematic representation of the study design. * represents when perceptual measures (Liverpool John Moores Jetlag Questionnaire, REST-Q-19 for Sport and sleep restfulness) were collected prior to training. During training, external (Global positioning systems) and internal load (ratings of perceived exertion, heart rate) monitoring were collected. OTN: Outbound travel night; RTN: Return travel night.

**Figure 2:** All fifteen subjects' sleep durations (minutes) for baseline, outbound travel (O-travel), each night on the trip (Night 1-10) and return travel (R-travel). The thick black boxes signify nights of long-haul travel (both directions) and night matches (Night 5 and 10).

**Figure 3:** Mean ± standard deviation of Liverpool John Moores questionnaire (Jet-lag (A), Sleep (B), Function (C), Diet (D), Bowel mvt (movement (E)), RESTQ-Sport (RESTQ total stress recovery score (REST-Q-TSRS); F) and a Likert scale (1-5) for sleep restfulness (G). ° represents a small effect size (*d* = 0.20-0.49) compared to baseline, ^ represents a moderate effect size (*d* = 0.50-0.79), # represents a large effect size (*d* >0.80). B: Baseline; D2: day 2, and so forth.