Title: Evening electronic device use and sleep patterns in athletes

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Abstract:

The present study aimed to investigate pre-sleep behaviours (including evening electronic device use) and sleep quantity in well-trained athletes. Seventy well-trained athletes (44 females, 26 males) aged 21±4 y from a range of team and individual sports were asked to complete an online sleep diary for 7 days. The sleep diary included questions about pre-sleep behaviours (e.g. napping, caffeine intake), electronic device use in the 2 h prior to bedtime (e.g. type of device and duration of use) and sleep (e.g. time in bed, sleep onset latency). On average, athletes spent 8:20±1:21 h in bed each night. Associations between age, time in bed and sleepiness suggested that younger athletes spent more time in bed (B=-0.05, p=0.001) but felt sleepier (r=-0.32, p<0.01) than older athletes. On average, athletes mostly used electronic devices for 0-30 min prior to sleep. The use of multiple devices in the evening was associated with more perceived difficulty in falling asleep (B=0.22, p=0.03), but no associations existed with other sleep variables. In summary, younger athletes may require later start times or improved sleep quality to resolve excessive sleepiness.

Key words:

Performance; physiology; recovery; sleep

Introduction

Sleep is recognised as an important form of recovery, and is especially pertinent to athletes, as adequate recovery assists them to perform optimally, both physically and psychologically (Halson, 2014). Previous research has demonstrated that providing athletes with extended sleep opportunities enhances athletic outcomes such as sprint times, reaction times, basketball free throw accuracy and mood (Mah, Mah, Kezirian, & Dement, 2011). Furthermore, sleep loss has been related to performance decrements (Jarraya, Jarraya, Chtourou, & Souissi, 2013), and alterations in numerous other processes such as immunity, hunger and stress hormone levels (Halson, 2014).

To achieve adequate sleep, individuals are encouraged to maintain good sleep hygiene practices. Some of these recommendations suggest that individuals maintain a consistent sleep/wake routine each day, avoid caffeine in the 6 h prior to bedtime, and ensure the bedroom is dark and at a comfortable temperature (Nédélec et al., 2015). It is also recommended that electronic devices are avoided prior to bedtime and are kept out of the bedroom overnight, as previous studies have reported impaired sleep following device use (Hysing et al., 2015; King, Delfabbro, Zwaans, & Kaptsis, 2014). Two hours of exposure to the blue, short-wavelength light emitted from electronic device screens has been shown to suppress the nocturnal increase in melatonin (Wood, Rea, Plitnick, & Figueiro, 2013), which may in turn prolong sleep onset latency (SOL) and disrupt sleep continuity (Chang, Aeschbach, Duffy, & Czeisler, 2015; Green, Cohen-Zion, Haim, & Dagan, 2017). Furthermore, SOL may also be prolonged by increased arousal levels after engaging in stimulating activities on electronic devices (e.g. completing school work, watching an exciting movie, engaging with others on social media) (King et al., 2013). Alternatively, individuals may lose track of how long they have been using an electronic device for, thereby having them stay awake for longer than desired and reducing the opportunity for optimal sleep duration (King et al., 2014).

Previous studies investigating sleep patterns in athletic populations indicate that athletes may not obtain adequate sleep per evening (i.e. they obtain < 7 h per night) (Hirshkowitz et al., 2015) and approximately 50% may experience poor sleep (Knufinke, Nieuwenhuys, Geurts, Coenen, & Kompier, 2017; Lastella, Roach, Halson, & Sargent, 2015; Swinbourne, Gill, Vaile, & Smart, 2016), both of which may inhibit optimal recovery and, subsequently, influence athletic performance (Halson, 2014). Impaired sleep may eventuate from poor sleep hygiene practices, including irregular sleep schedules and engaging in activating activities prior to bedtime (Arora, Broglia, Thomas, & Taheri, 2014; Custers & Van den Bulck, 2012). These studies were conducted with non-athletic individuals but as sleep quantity and quality are not comparable between athletes and non-athletes (Leeder, Glaister, Pizzoferro, Dawson, & Pedlar, 2012), it is unknown whether these results would translate to an athletic population. Indeed, 70 ± 29% of athletes reportedly perform activities that involve short-wavelength light (e.g. electronic device use) prior to bedtime (Knufinke et al., 2017) but to date, there are limited studies investigating whether electronic device use influences sleep quality and quantity in athletes (Dunican et al., 2017; Jones et al., 2017). As such, the current study investigated the relationship between evening electronic device use and sleep patterns of well-trained athletes from a variety of sports, over a 7-day period.

Methods

Participants

The sample consisted of 70 Australian athletes (44 females, 26 males) aged 21 ± 4 y (range: 16-33 y). Inclusion criteria required athletes to have represented their sport at a state, national or international level. Athletes currently competing in a variety of sports participated in this study (Table 1), with an even distribution of individual (54%) and team sport athletes (46%) recruited. Athletes had been involved in their sport for 10 ± 4 y, and the majority were in the competition phase of their training year (pre-season 17%, competition 60%, off-season 23%). Ethical approval was obtained from both the University of Western Australia (RA/4/1/7163) and Australian Institute of Sport Human Ethics Committees (201502UWA) prior to data collection.

Design

Participants were required to complete an online questionnaire regarding their pre-sleep habits, electronic device use and sleep quantity/quality (on a recall basis the following day) from the previous evening for 7 consecutive nights. Participants were sent a link to their online personal sleep diary, where informed consent was gained. Upon initial login, athletes were asked to provide demographic data (age, gender, sport, stage of the training year) and information regarding general health (e.g.

insomnia, anxiety, migraines). Participants completed the Epworth Sleepiness Scale (ESS) as a measure of general sleepiness, where a score of >10 indicates excessive sleepiness (Johns, 1991). Subsequently, participants answered questions each day regarding daytime behaviours (i.e. caffeine consumption, physical activity, napping), perceived sleep quality (e.g. how easily they fell asleep) and quantity (e.g. bedtime, estimated SOL, wake time), and whether they used any electronic devices in the 2-h before attempting to sleep were asked (Supplement 1). Additionally, time in bed (TIB) was calculated as the duration from bedtime (i.e. the time the athlete went to bed) to wake time. If any electronic devices were used, details regarding the type of device, duration of use, how stimulating they found the task to be, and the time between using the device and attempting to sleep were requested.

Statistical analysis

Variable-level descriptive statistics and the decomposition of variance over time (level 1) and between individuals (level 2) via intra-class correlation coefficient (ICC) determination were first estimated. Multilevel modelling was used to examine the associations between technology use and sleep-related variables over the 7-day period to account for the non-independence in the data (i.e. time nested within individuals). This primary analysis was performed in M*plus* 8 (Muthén & Muthén, 1998-2015) using a robust maximum likelihood estimator with full-information likelihood estimation to handle missing data, which makes use of all raw data and therefore offers more accurate and efficient estimates when compared with other approaches (e.g. listwise deletion) (Enders & Bandalos, 2001). In Mplus, an ICC represents the degree of between-person variation, such the proportions above .05 or 5% suggest that the amount is greater than expected by chance and therefore the non-independence in the data requires attention via multilevel analyses (Dyer, Hanges, & Hall, 2005). Two categories of technology variables were created for the purposes of the primary analyses: (i) *any device use* in the 2 h prior to going to bed (0 = no, 1 = 0-30 min, 2 = 30-60 min, 3 = 60-90 min, 4 = 90-120 min) and the *total number of devices used* in the 2 h prior to bedtime (range of 0-3 devices). Given the repeated-measures of the technology variables and sleep-related outcomes over the 7-day period, these variables were separated into two components that captured the between-person (stable mean for each participant) and within-person (average daily deviation from the stable person mean) aspects of the data (Bolger & Laurenceau, 2013). Each of the predictor variables at level 1 (within-person) were person-centred such that each individuals' data deviated around his or her overall mean across the 7 days. At level 2 (between-person), the predictor variables were grand mean centred, meaning that each individuals' mean deviated around the mean of the total sample. The analysis encompassed random intercepts and controlled for age and gender and the linear effects of day of the week. Pearson correlation coefficients were calculated to investigate associations between demographic data and sleep diary variables of interest using IBM SPSS Statistics Package 22.0 (Armonk, NY, USA). Confidence intervals (CI) of 95% are reported for all analyses. Overall, there was 88% compliance from a potential 490 responses.

Results

The ESS indicated that, on average, athletes experienced normal levels of sleepiness (8 ± 4), although 29% (n = 20) athletes scored >10 and were categorised as "excessively sleepy" (Figure 1). Sleepiness was negatively correlated with age, such that younger athletes reported feeling sleepier than older athletes (r = -0.32, p<0.01, -0.52, -0.09).

Means and standard deviations of bedtime, wake time, time in bed, how many electronic devices were used before bedtime, and how long each was used for (phone/tablet, laptop, television, and combined) are detailed in Table 2. On average, athletes used at least one device per night (usually a smartphone or tablet) in the 2 h prior to bedtime for a total of 0-30 min. For all days, athletes fell asleep "fairly easily" (2 ± 1) and woke up feeling "fairly refreshed" (2 ± 1). On average, 21 ± 4% of athletes reported napping for 73 ± 48 min during the day. Regarding pre-sleep behaviours, 27 ± 6% of athletes reported consuming caffeine in the 6 h prior to bedtime, and 40 ± 15% reported exercising in the 5 h prior to bedtime, with the exercise intensity being 4 ± 1 out of a maximal intensity of 5. Most athletes did not report any distractions while trying to fall asleep or during the night (53 ± 5%). In those who did report distractions, the three most common sources of disturbance were uncomfortable temperature (13 ± 6%), discomfort (13 ± 3%) and outside noise (11 ± 3%). Electronic devices were not frequently reported as distracting (3 ± 1%). On all nights, athletes reported using 1 ± 1 (range 0-4) devices (smartphone, tablet, laptop and/or television).

The ICC was first examined to understand the degree of dependence of observations by comparing within- and between-person variability in the study variables in a null or intercept-only model. An inspection of the ICCs for individual devices (phone/tablet use = 0.24, laptop use = 0.26, television use = 0.28), the composite technology variables (device use = 0.21, number of devices used = 0.27), and sleep-related outcomes (bedtime = 0.26, time in bed = 0.10, ease of sleep onset = 0.25) indicated that a multilevel approach to data analysis was appropriate. The results of the multilevel regression analysis are detailed in Table 3. In terms of the covariates, there was a significant within-person effect of the night of measurement on the time at which participants went to bed ($p = 0.01$), such that athletes went to bed later towards the end of the week (which, in the context of this study, included the weekend). There was a between-person inverse association between age and the amount of time spent in bed ($p = 0.001$), such that older participants reported, on average, fewer hours in bed. All other effects of the covariates were small and statistically non-significant. There was a significant within-person inverse correlation between bedtime and time in bed within-person residuals ($p < 0.001$); this association indicates that on days when athletes' bedtime was later than their average, the time they spent in bed was shorter than their weekly average. There was also a significant within-person inverse correlation between bedtime and ease of sleep onset ($p = 0.04$), meaning that when bedtime was later, athletes found it easier to fall asleep.

Of the direct effects of technology engagement on sleep-related variables, the only salient effect was that of the number of devices on sleep onset scores at the between-person level ($p = 0.03$). This finding indicates that athletes who, on average, reported using more devices in the 2 h preceding bedtime experienced greater difficulty falling asleep. All other direct effects of the technology engagement variables on sleep-related outcomes were small and non-significant at both the within- and between-person levels of analysis.

Discussion

The aim of this study was to investigate the pre-sleep behaviours (including electronic device use) and sleep outcomes in well-trained Australian athletes. These data indicate that, on average, athletes generally obtain adequate time in bed each night (8:20 ± 1:21 h), but younger athletes still feel 'quite sleepy' and may not spend as much time in bed as older athletes. Furthermore, despite there being no relationship between electronic device use and bedtime or time in bed, there was a relationship between the number of devices used prior to bedtime and how easily athletes perceived they fell asleep.

Overall, the athletes studied here appeared to spend an adequate amount of time in bed each night, considering the recommended amount of sleep per night is 7-9 h (Hirshkowitz et al., 2015). Previously, team sport athletes have considered sleep to be a more important recovery strategy than other methods such as fluid replacement and cold water immersion (Venter, 2014); therefore, sleep seems to be prioritised by athletes. The results indicated that younger athletes (where the range was 16-33 y) spent longer in bed but generally felt sleepier than their older athlete counterparts. It is possible that the younger athletes felt sleepier despite the longer time in bed due to increased SOL and, subsequently, reduced sleep duration. Evidence suggests that adolescents exhibit a delayed sleep phase, such that the evening peak in melatonin (and, subsequently, bedtime) is delayed (Eckerberg, Lowden, Nagai, & Akerstedt, 2012). As such, the younger athletes may have been going to bed before their evening peak in melatonin, which may have delayed sleep onset, reduced sleep duration and increased perceived sleepiness (Eckerberg et al., 2012). Younger athletes may require longer sleep durations than older adults, as is the case in general populations, with teenagers generally requiring more sleep time than adults (8-10 h vs. 7-9 h) (Hirshkowitz et al., 2015). Furthermore, athletes (regardless of age) went to bed later on the weekend than during the week and they spent less time in bed when bedtime was delayed (i.e. on the weekend), which suggests that wake time remained similar throughout the week. Non-athletic adolescents similarly report delayed bedtimes on the weekend, but sleep for longer by delaying wake time (Gamble et al., 2014). If sleep loss continues, a ‘sleep debt’ accumulates over time and ultimately impairs cognitive and physical performance (Van Dongen, Maislin, Mullington, & Dinges, 2003). Training early in the morning may truncate the opportunity for sleep, thereby reducing sleep duration in athletes (Sargent, Lastella, Halson, & Roach, 2014). In contrast, a study on elite swimmers showed that the athletes went to bed later and woke up later on rest days than training days (Sargent, Halson, & Roach, 2014), where the extended sleep opportunities on the rest days provided the athletes with the ability to recover (at least partially) from the weeks’ accumulated sleep debt (Merdad, Merdad, Nassif, El-Derwi, & Wali, 2014). Furthermore, only one in five athletes in the current study napped to extend their sleep opportunity and recover from accumulated sleep debt. Altering sleep/wake times on non-training days is considered a poor sleep hygiene behaviour as it may prevent a regular sleep/wake routine from being established (Thorpy, 2012), but napping for up to 30 min after lunch should be encouraged to improve alertness and mood (Waterhouse, Atkinson, Edwards, & Reilly, 2007). Where sleep extension is not possible (e.g. due to school/work commitments), educating excessively sleepy athletes on appropriate sleep hygiene strategies (e.g. maintaining a regular sleep/wake cycle and avoiding stimulating activities before bedtime) may be beneficial in reducing SOL, improving sleep quality and increasing sleep duration (Fullagar, Skorski, Duffield, & Meyer, 2016).

The data captured here suggested that the use of multiple devices, as opposed to the use of one particular device, influenced the athlete's perception of the ease with which they fell asleep (no other measured sleep variables were related to device use). Previous studies that have shown delayed bedtimes, prolonged SOL and reduced sleep duration following evening electronic device use (Chang et al., 2015; Chinoy, Duffy, & Czeisler, 2018; Green et al., 2017; King et al., 2014; Orzech, Grandner, Roane, & Carskadon, 2016), while others have not observed altered sleep in the general population (Heath et al., 2014; Rångtell et al., 2016) or athletes (Dunican et al., 2017; Jones et al., 2017; Romyn, Robey, Dimmock, Halson, & Peeling, 2016). In fact, Knufinke et al. (2017) found that athletes engaging in behaviours involving blue-light exposure prior to bedtime had shorter SOL. These authors speculated that if athletes had been performing unstimulating tasks on the devices, this may have outweighed any arousing effects from the light emitted by the device. Indeed, Jones et al. (2017) did not observe any differences in sleep variables when stimulating and unstimulating activities were performed on a tablet, supporting the notion that task stimulation might override any stimulating light-based effects of electronic devices. Furthermore, their results indicated that different types of tablet-based activities performed prior to bedtime had no differing effects on sleep. Pre-sleep electronic device use has been shown to be beneficial for sleep, with earlier bedtimes and longer sleep durations noted when participants performed more diverse activities on electronic devices in the 2 h prior to bedtime (Orzech et al., 2016). This effect was attributed to the high cognitive load experienced during the tasks leading to a subsequent increase in mental fatigue and sleepiness (Goel, Abe, Braun, & Dinges, 2014). As such, it is unclear whether electronic devices, and the types of tasks performed on them, have a negative effect on sleep and, if so, what the mechanisms are. Future research investigating the relationship between insomnia symptoms and evening electronic device use may also assist with this.

It is uncertain from the data in the current study whether athletes who reported using multiple devices in the evening did so simultaneously (i.e. multi-tasking) or consecutively (i.e. one at a time). It has been shown previously that individuals who frequently used multiple electronic devices were slower at responding to a primary stimulus when distracting stimuli were also present (i.e. they were more distracted by external stimuli) than individuals who didn't frequently multi-task (Ophir, Nass, & Wagner, 2009). As such, athletes here who used more devices in the evening may have felt more distracted by external stimuli when attempting to sleep, which could explain why they felt that it was harder to fall asleep afterwards. Alternatively, athletes who used multiple devices, one after another, may have subsequently spent longer using the devices. Previously, it has been shown that 2 h of exposure to an electronic tablet suppressed melatonin levels by 23% (which would be expected to subsequently delay sleep onset) (Wyatt, Ritz-de Cecco, Czeisler, & Dijk, 1999), but melatonin levels were not significantly suppressed after only 1 h (Wood et al., 2013). In the present study, the average use of any device fell within the 0-30 min category, which may not have been a long enough exposure to device screen light for melatonin to be suppressed. Furthermore, some athletes in the present study may have had access to light-filtering programs (e.g. Apple's Nightshift), which may not have had a significant effect due to the shorter duration of device use (Wood et al., 2013).

It should be considered that self-reported data are not as accurate as more objective measures of sleep, such as laboratory-based polysomnography, or actigraphy, particularly with regards to measures of SOL and wake after sleep onset (Baker, Maloney, & Driver, 1999; Caia et al., 2018; Dunican et al., 2017). Caia et al. (2018) compared sleep duration measured with actigraphy and sleep diaries in rugby players and, although highly correlated (r = 0.85), self-reported sleep duration was overestimated by approximately 20 min. Further work has also shown that athletes overestimated sleep duration by 58 ± 85 min and underestimated time of sleep onset by 37 ± 72 min (Dunican et al., 2017). Since calculating sleep duration from sleep diaries would not necessarily be accurate, the data presented in the current study reflect time in bed. Accuracy in reporting bedtime in this study could have been improved with more clarity in the questionnaire; for example, athletes may have gone to bed at a certain time (as per the questionnaire) but may not have attempted to fall asleep immediately. Additionally, individuals are not always accurate at reporting their use of electronic devices (Lee, Ahn, Nguyen, Choi, & Kim, 2017) and the time of day that they complete the questionnaire may reduce the reliability of the recalled data or be affected by the duration since waking. Future research should further investigate the relationship between sleep onset and the use of multiple electronic devices using objective measures of sleep and device usage.

Conclusion

Overall, well-trained athletes spent adequate time in bed each night to meet the recommended sleep requirements for adolescents and healthy adults. However, younger athletes tended to spend more time in bed than older athletes but still felt sleepier. This may indicate sub-optimal sleep quality or inadequate sleep durations in younger athletes, highlighting the need for sleep hygiene education and identifying sleep issues in athletes. On average, athletes used electronic devices for up to 30 min prior to sleep; specifically, it was the use of multiple devices in the evening that was associated with increased perceived difficulty in falling asleep, but not with any other sleep variables. Future research should continue investigating the importance of sleep in athlete populations and how evening electronic device use may influence sleep variables.

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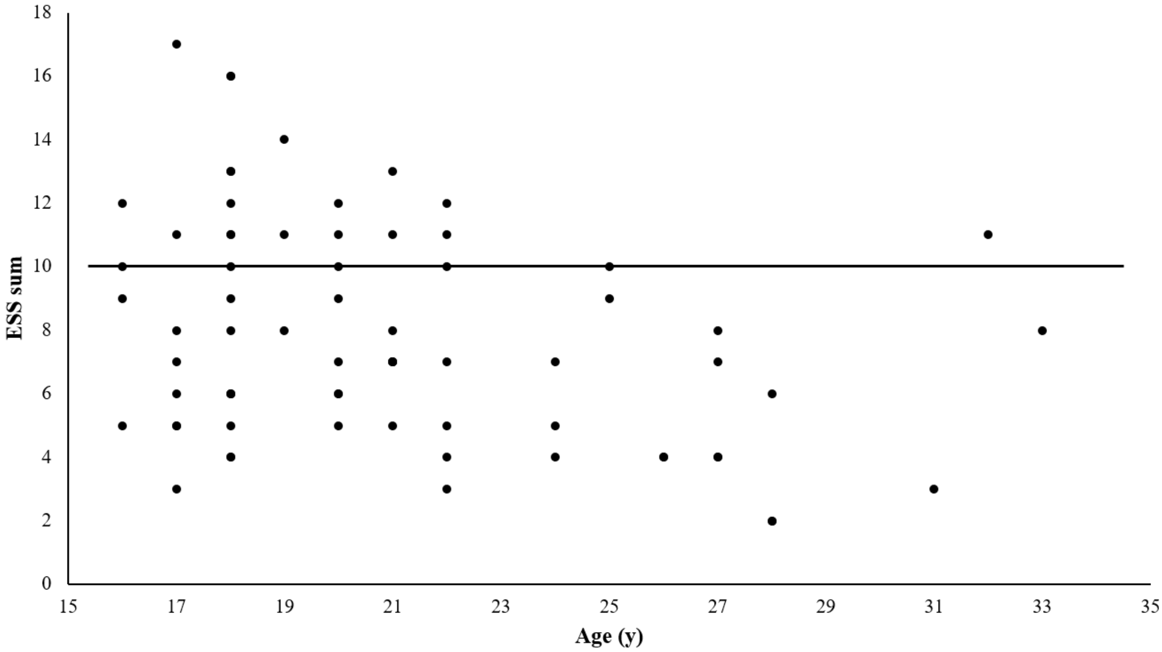
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Supplement 1: Sleep diary questionnaire

Q1 Did you have any naps **at any time during the day?** [Yes / No]

Q2 What time did you nap at? *Please answer in **24-hour time**. If you had multiple naps, please answer with regards to the last nap you had for the day.* [Start time / Finish time]

Q3 Did you smoke any cigarettes **at any time during the day?** [Yes / No]

Q4 Did you consume any caffeine (coffee, tea, energy drinks, soft drinks, chocolate, other) in the **6-hours prior to going to bed?** [Yes & amount consumed / No]

Q5 Did you do any physical activity in the **5-hours prior to going to bed?** [Yes / No]

Q6 What would you rate the intensity of the physical activity performed?

1. Very light
2. Light
3. Moderate
4. Hard
5. Very hard
6. Maximal

Q7 Did you consume any alcohol in the **4-hours prior to going to bed?** [Yes & how many/ No]

Q8 Did you take any medication to get to or stay asleep? [Yes & details about medication / No]

Q9 Did you change time zones yesterday? [Yes & magnitude of time zone change / No]

The following questions relate to your sleep <u>last night</u>.

Q10 What time did you go to bed?

Q11 How easily did you fall asleep?

1. Very easily
2. Fairly easily
3. With some difficulty
4. With great difficulty

Q12 Did you notice any mental or physical factors that disturbed your sleep (i.e. trouble falling asleep or staying asleep during the night)? *You may select more than one option.*

- Distracting lights
- Bad dreams
- Noise from outside the room
- Uncomfortable temperature
- Discomfort
- Stress
- Notifications from an electronic device (e.g. phone)
- Noise from inside the room
- Partner in bed
- Other
- Nothing disturbed my sleep

Q13 Did you wake up during the night? [Yes & how many times/ No, or not that I recall]

Q14 Did you snore during the night? [Yes / No / Not sure]

Q15 What time did you wake up this morning?

Q16 How did you feel when you woke up this morning?

1. Very refreshed
2. Fairly refreshed
3. Fairly fatigued
4. Very fatigued

Electronic Device Use

Q17 Did you use any of these electronic devices in the 2-hours before going to bed last night?

- Television (TV programs/movies/video games)
- Computer/laptop
- Tablet
- Mobile smartphone
- MP3 player (e.g. iPod)
- Other
- I did not use any electronic devices

Television Use

Q19 In total, approximately how long did you watch television for?

- Less than 15 min
- 15-30 min
- 30-60 min
- 1-1.5 h
- 1.5-2 h

Q20 Approximately how long after you finished watching television did you attempt to sleep?

- 0-15 min
- 15-30 min
- 30-45 min
- 45-60 min
- 1-1.5 h
- 1.5-2 h

Q21 How stimulating would you say that watching television was?

- Extremely unstimulating
- Fairly unstimulating
- Fairly stimulating
- Extremely stimulating

Tablet Use

Q22 In total, approximately how long did you use the tablet for?

- Less than 15 min
- 15-30 min
- 30-60 min
- 1-1.5 h
- 1.5-2 h

Q23 Approximately how long after you finished using the tablet did you attempt to sleep?

- 0-15 min
- 15-30 min
- 30-45 min
- 45-60 min
- 1-1.5 h
- 1.5-2 h

Q24 What activities did you perform on the tablet, and how stimulating did you find them (1= extremely unstimulating, 2= fairly unstimulating, 3= fairly stimulating, 4= extremely stimulating)?

- Playing games
- Surfing the internet
- Typing up work/homework
- Social media (e.g. Facebook, Twitter, Instagram)
- Watching movies/TV shows
- Watching videos (e.g. YouTube)
- Listening to music
- Reading
- Other

Computer/laptop use

Q25 In total, approximately how long did you use the computer/laptop for?

- Less than 15 min
- 15-30 min
- 30-60 min
- 1-1.5 h
- 1.5-2 h

Q26 Approximately how long after you finished using the computer/laptop did you attempt to sleep?

- 0-15 min
- 15-30 min
- 30-45 min
- 45-60 min
- 1-1.5 h
- 1.5-2 h

Q27 What activities did you perform on the computer/laptop, and how stimulating did you find them (1= extremely unstimulating, 2= fairly unstimulating, 3= fairly stimulating, 4= extremely stimulating)?

- Playing games
- Surfing the internet
- Typing up work/homework
- Social media (e.g. Facebook, Twitter, Instagram)
- Watching movies/TV shows
- Watching videos (e.g. YouTube)
- Listening to music
- Reading
- Other

Mobile smartphone use

Q28 In total, approximately how long did you use the smartphone for?

- Less than 15 min
- 15-30 min
- 30-60 min
- 1-1.5 h
- 1.5-2 h

Q29 Approximately how long after you finished using the smartphone did you attempt to sleep?

- 0-15 min
- 15-30 min
- 30-45 min
- 45-60 min
- 1-1.5 h
- 1.5-2 h

Q30 What activities did you perform on the smartphone, and how stimulating did you find them (1= extremely unstimulating, 2= fairly unstimulating, 3= fairly stimulating, 4= extremely stimulating)?

- Playing games
- Surfing the internet
- Typing up work/homework
- Social media (e.g. Facebook, Twitter, Instagram)
- Watching movies/TV shows
- Watching videos (e.g. YouTube)
- Listening to music
- Reading
- Texting