SUPPLEMENTAL INFORMATION: METHODS

MEASURES

SLEEP AND MEDIA DIARIES

Every day, participants provided information about their sleep and their evening activities on SED and off-screen (either on paper version or via internet). For sleep, they reported their bedtime, time to fall asleep (sleep latency), wake-up time, out of bedtime, and the number of nocturnal awakenings. They also evaluated their sleep quality and morning mood using a 5-star rating system (from 1: very bad sleep to 5 stars: very good sleep, and from 1: very bad mood to 5 stars: very good mood). For evening activities, they reported the time spent (in minutes) on different screen-based activities and off-screen activities after 9 pm (from 9 pm until sleep onset). Screen-based activities were categorized as either social media (e.g., Facebook, WhatsApp, SMS, Snapchat), watching TV, watching videos (not on TV), playing games and computer activities (e.g., email, reading blogs, online homework). Off-screen activities comprised of time spent on homework (not using a computer), sports, and reading. We then calculated the average of each variable for pre-school nights versus weekend nights. "Pre-school nights" referred to the evenings and nights preceding school days (i.e., Sunday to Thursday). "Weekend nights" were the evenings and nights before weekend days (i.e., Friday and Saturday) where participants had no wake-up time constraint related to school.

ACTIGRAPHY

Participants wore an Actimeters GT3X+ (Actigraph, FL, USA) on their non-dominant wrist non-stop for the two successive periods of two weeks (Phases 1 and 2). This device contains a triaxial accelerometer with a dynamic range of ± 8 G, a sampling rate of 30 Hz and data are stored in a raw non-filtered format in G's directly into a non-volatile flash memory. Mean actigraphic data during 60 s epochs were scored as sleep or wake using an automatic detection algorithm (AARA; http://orbi.ulg.ac.be/handle/2268/173392). We, then, reviewed each night manually by comparing the sleep times indicated by the automatic detection with those reported by the participants in the diaries. In case of a mismatch greater than one hour for bedtime or out-of-bed time, the night was removed from further analysis. In case of a mismatch of less than one hour, bedtime hour was corrected starting at the first Sleep Bout detected after the subjective bedtime reported by the participant. Morning out-of-bed times were similarly considered, by either removing the night for mismatches greater than one hour, or by correcting it using the beginning of the first Wake bout after subjective out-of-bed time reported by the participant. From these data, we computed several sleep

variables: sleep onset time (SO; first sleep bout longer than 5 minutes), total sleep period (TSP; period between SO and wake-up time) and sleep efficiency (SE in %: (TSP minus wake time intra-sleep)/total time in bed*100).

QUESTIONNAIRES

All participants (*N*=569), whether they wore the actimeter, filled out the diaries, followed the restrictive rule or not, filled out two sets of questionnaires: one at the end of Phase 1 and one at the end of Phase 2. Besides questionnaires about their age, sex, height, weight, health status, consumption habits, evening activities habits, and academic performance, participants also answered the Chronic Sleep Reduction Questionnaire (CSRQ) (57), which contains questions about sleepiness, irritation, and loss of energy during the day. They also responded to the Kessler Psychological Distress Scale (K6) (58) that quantifies non-specific psychological distress including anxiety, depression, despair.

SUSTAINED ATTENTION TO RESPONSE TASK (SART)

Participants performed the SART on tablet computers at the end of each phase. Due to technical problems with tablet early in the study, we included data from 454 (out of 569) participants in the final analyses. The SART consists of a GO/NO GO task, which measures sustained attention and vigilance performance (59). Participants were shown digits from 0 to 9 presented one at a time, each for 250 ms, and they had to tap the screen as quickly as possible when a digit appeared (GO) except if it was the digit "3" (NO GO). A fixation cross was presented for 900 ms after each digit. A total of 250 single digits were presented in a pseudo-random order excluding the immediate succession of the same number, with every digit appearing 25 times. The duration of the task was 4.3 min. We analyzed the number of commission errors (GO when the "3" appeared), the number of omissions (not responding to a "GO" signal), and the sum of both types of errors (i.e., total number of errors) (60). We calculated mean reaction times (RTs) for corrects responses, but also the 75^{th} percentile (slowest) of the distribution of the RTs, which has been shown to best reflect deterioration of psychomotor vigilance and wake instability due to augmented sleep pressure (22, 61). Indeed, the slowest RTs have been shown to be more sensitive to sleep deprivation than faster RTs (62).

MELATONIN

Five saliva samples were collected twice in order to assess individual melatonin profiles before Phase 1 and after Phase 2 (**Fig. 1**). Collection was performed at home by the participants using the SalivaBio Oral Swab (SOS; Salimetrics; Suffolk, UK) method. They were asked to collect saliva every hour, starting 4 h before their usual bedtime and finishing with the last one collected 1 h after their usual bedtime.

They were instructed to avoid eating one hour before the first extraction and between the five saliva samples. They were also asked to avoid drinking alcohol and energy drinks after 3 pm, and also to avoid too much sweet (e.g. chocolate, banana) or sour (e.g. lemon) food during the last meal. They were asked to place the tubes with the saliva samples in their fridge and to bring them at their school the next morning, where they were collected by one experimenter. Salivary samples were centrifuged briefly to collect supernatant at the bottom of the tube (only when there was at least four samples for one evening) and the pre-processed samples were then kept at minus 80 °C until assays were performed. The quantitative determination of melatonin in saliva was then obtained using enzyme-linked immunosorbent assay (ELISA) kits (Direct Saliva Melatonin ELISA; Bühlmann Laboratories, Allschwil, Switzerland). Hour of Dim Light Melatonin Onset (HDLMO) was calculated using the hockey-stick method (63). We were able to successfully analyze melatonin profile for 70 *Active* participants for Phase 1, while only 13 *Active* participants had melatonin profiles for both Phase 1 and 2.

GENOTYPING

Saliva samples were collected during Visit 2 and consisted in spitting at least 3 ml of saliva in a tube. Tubes were kept at minus 80 °C until analyses were performed. Total genomic DNA was extracted from saliva samples using the Gentra-Puregene kit (QIAGEN; Venlo, Netherlands). We genotyped the A/G SNP of COMT gene (ID of the National Center for Biotechnology Information dbSNP database: rs4680, location: chr 22: 19951271) using the TaqMan platform (https://ige3.genomics.unige.ch) for allelic discrimination (Applied Biosystems). PCR amplification was performed on 384-well plates using TaqMan Predesigned SNP Genotyping Assays (Applied Biosystems) and conditions recommended by the manufacturer. Reactions were analyzed by individuals blinded to subject using the Applied Biosystems TaqMan 7900HT system and the sequence detection system software v2.2.1. All samples were genotyped in triplicate, with 100% concordance. A total of 203 samples were successfully analyzed for COMT.

STATISTICAL ANALYSES

Statistical analyses were performed using IBM SPSS Statistics for Windows (Version 23.0. Armonk, NY: IBM Corp).Using multivariate linear regressions, we examined associations between time spent on screen-based activities or off-screen activities after 9pm and several sleep parameters. Repeated measures analyses of variance (ANOVA) with post-hoc pairwise t-tests were used to specify main and interaction effects due to the instruction. Thus, most ANOVAs included a repeated measure factor Phase (Phase 1, Phase 2) as within-subject factor. In order to test for any effect of age or *COMT* gene, some ANOVAs were computed with between-subjects factor Age Group (12-13, 14-15, 16-17, 18-19 years old) or *COMT* Gene (Val/Val, Val/Met, Met/Met polymorphisms). Degrees of freedom were

corrected according to Greenhouse-Geisser, when appropriate. The level of significance was set to a p-value < 0.05. To further examine the impact of the different types of screen-based activities performed after 9 pm on sleep duration during Phase 1, we used a Structural Equation Modeling (SEM) approach (multivariate path analysis in SPSS AMOS Version 23.0. Armonk, NY: IBM Corp).

SUPPLEMENTAL INFORMATION: RESULTS

Table S1: COMT genotypes repartition (*N*=121) and characteristics (gender, age, body mass index, Phase 1 parameters).

Participants (*N*=121) with genetic (*COMT*) profiling			
Allele	Val/Val	Val/Met	Met/Met
N	37	61	23
Girls / Boys	22 / 15	43 / 18	16 / 7
Age (mean ± SD)	16.13 ± 2	15.54 ± 2.1	15.69 ± 1.52
BMI (mean ± SD)	20.88 ± 2.85	19.83 ± 2.53	20.33 ± 3.11
Phase 1 parameters (mean ± sem)			
-SED use after 9 pm (min)	86 ± 8	70 ± 6	88 ± 12
-Offscreen activities after 9 pm (min)	53 ± 6	52 ± 5	59 ± 9
-Sleep duration (hours)	7h25 ± 0.13	7h34 ± 0.1	7h28 ± 0.13
-Sleep efficiency (%)	89.1 ± 0.7	89.1 ± 0.6	89.8 ± 0.9
-Daily mood (from 1 to 5 scale)	3.58 ± 0.09	3.49 ± 0.07	3.51 ± 0.11

There was no significant difference between the three groups during Phase 1.

Table S2: Repartition between *Active* and *Passive* participants and their characteristics (gender, age)

Participants included in PHASE 1					
Total Participants	Total	12-13 y.o	14-15 y.o	16-17 y.o	18-19 y.o
N	569	140	168	138	123
Girls | Boys	299 | 270	72 | 68	70 | 98	83 | 55	74 | 49
Age (mean ± SD)	15,35 ± 2,1				
Active Participants	Total	12-13 y.o	14-15 y.o	16-17 y.o	18-19 y.o
N	315	68	72	93	82
Girls | Boys	203 | 112	42 | 26	42 | 30	62 | 31	57 | 25
Age (mean ± SD)	15,69 ± 2,12				
Passive Participants	Total	12-13 y.o	14-15 y.o	16-17 y.o	18-19 y.o
N	254	72	96	45	41
Girls | Boys	96 | 158	30 | 42	28 | 68	21 | 24	17 | 24
Age (mean ± SD)	14,93 ± 2				

Participants included in both PHASES 1 & 2					
Total Participants	Total	12-13 y.o	14-15 y.o	16-17 y.o	18-19 y.o
N	467	120	151	111	85
Girls | Boys	243 | 224	61 | 59	64 | 87	67 | 44	51 | 34
Age (mean ± SD)	15,02 ± 1,9				
Active Participants	Total	12-13 y.o	14-15 y.o	16-17 y.o	18-19 y.o
N	183	36	43	58	46
Girls | Boys	120 | 63	17 | 19	28 | 15	43 | 15	32 | 14
Age (mean ± SD)	15,73 ± 2				
Passive Participants	Total	12-13 y.o	14-15 y.o	16-17 y.o	18-19 y.o
N	284	84	108	53	39
Girls | Boys	123 | 161	44 | 40	36 | 72	24 | 29	19 | 20
Age (mean ± SD)	14,84 ± 1,95				

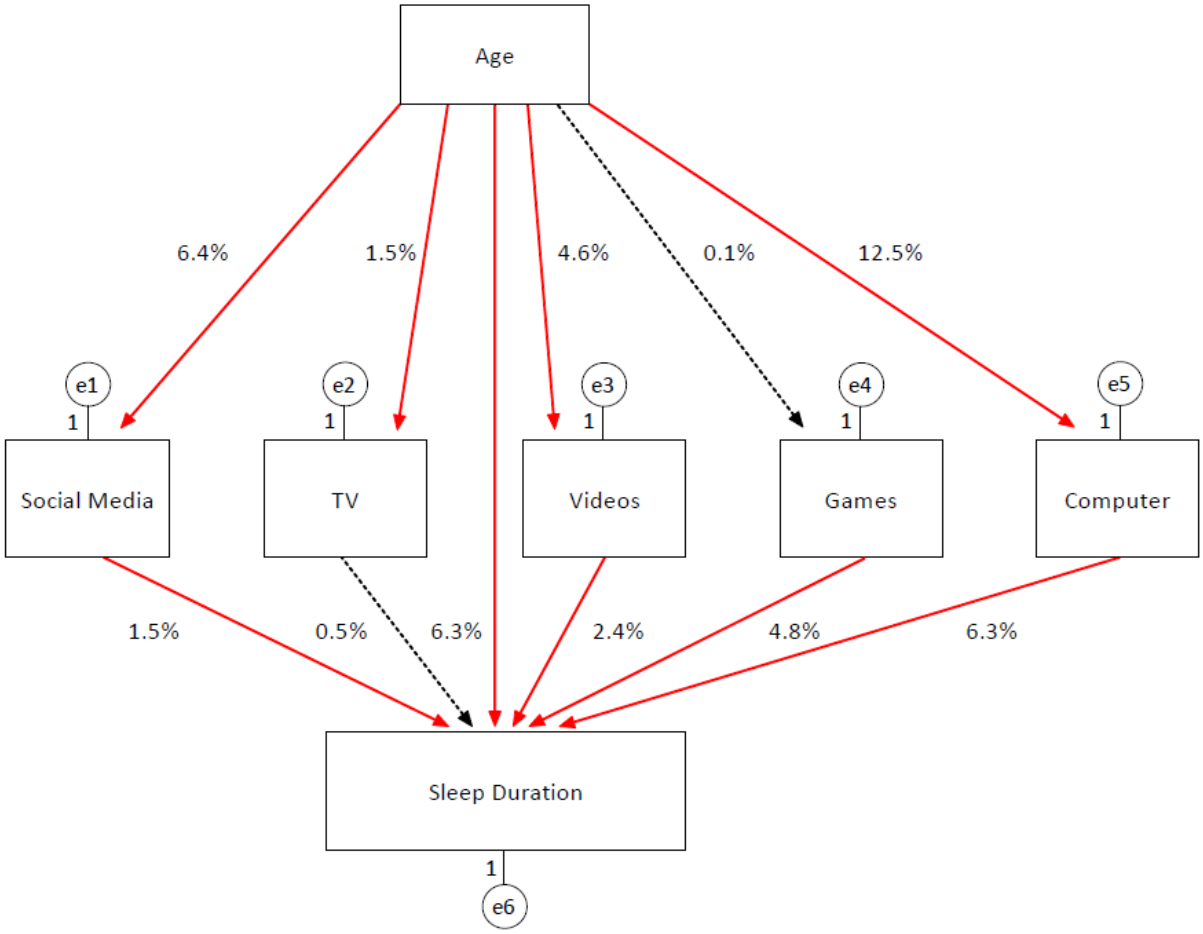

Fig. S1: Contribution of age and type of SED activities after 9 pm to sleep duration during pre-school nights using Structural Equation Modeling

Age and time spent on each SED activity after 9 pm collectively explained 37.8% of the variance of the variable sleep duration. While age and time spent on computer, games, videos and social media after 9 pm had significant unique contributions to sleep duration (red arrows), time spent watching TV after 9 pm did not significantly affect sleep duration (dotted black arrow).