Morningness-eveningness and sleep habits among adolescents: Age and gender differences

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Previous research has indicated the need to use large samples in different cultural contexts in order to clarify age and gender differences on morningness-eveningness and sleep habits. The goal of our research was to study the relationship between morningness-eveningness and sleep habits in a large sample of 2,649 adolescents between 12 and 16 years. The Morningness- Eveningness Scale for Children and an adaptation of the School Sleep Habits Survey measures were used. Results indicated a greater tendency toward eveningness with age and higher eveningness in 13- and 14-year-old girls. Older adolescents claimed later rising time on weekends, later bedtime and shorter sleep length, and greater social jetlag, weekend rise time delay, and weekend bedtime delay. Girls reported earlier rising time on weekdays, later rising time on weekends, longer sleep length on weekends, and greater social jetlag and weekend rising time delay. Lastly, evening oriented adolescents claimed later rising time and bedtime, shorter sleep length on weekdays but longer sleep duration on weekends, and greater social jetlag, weekend rising time delay, and weekend bedtime delay.

Matutinidad-vespertinidad y hábitos de sueño en adolescentes: diferencias de edad y sexo. La investigación previa ha indicado la necesidad de usar muestras amplias en distintos contextos culturales para clarificar las diferencias de edad y sexo en matutinidad-vespertinidad y hábitos de sueño. El objetivo de la investigación fue estudiar la relación entre la matutinidad-vespertinidad y los hábitos de sueño en una muestra amplia de 2.649 adolescentes entre 12 y 16 años. Se utilizó la escala Morningness-Eveningness Scale for Children y una adaptación del School Sleep Habits Survey. Los resultados indicaron una mayor tendencia hacia la vespertinidad con la edad y en las chicas de 13 y 14 años. Los adolescentes mayores tendían a levantarse más tarde el fin de semana, acostarse más tarde y dormir menos, así como a un mayor jetlag social y retraso en la hora de levantarse y de acostarse. Las chicas tendían a levantarse antes entre semana y después el fin de semana, dormían más el fin de semana y tenían un mayor jetlag social y retraso en la hora de levantarse. Finalmente, los vespertinos tendían a acostarse y levantarse más tarde, dormir menos entre semana y más el fin de semana, así como a un mayor jetlag social y retraso en la hora de levantarse y de acostarse.

Morningness-eveningness (M/E) can be considered as a continuum between two ends: morning ("larks") and evening types ("owls") (Natale & Cicogna, 2002). This separation into chronotypes makes reference to individual differences in the preference for a specific time of day to carry out activities during the morning or the afternoon/ evening hours (Kerkhof, 1985). These differences are reflected in timing of sleep (Natale & Danesi, 2002), the peak of cognitive abilities (Clarisse, Le Floc'h, Kindelberger, & Feunteun, 2010; Goldstein, Hahn, Hasher, Wiprzycka, & Zelazo, 2007), academic performance (Randler & Frech, 2009), personality (Cavallera & Giudici, 2008; Díaz-Morales, 2007), psychological and physical dysfunctions (Gau et al., 2007; Randler, 2011), and well-being (Randler, 2008a).

During adolescence appears a well-known progressive tendency to evening preference (Carskadon, Vieira, & Acebo, 1993; Díaz-Morales & Randler, 2008; Gau & Soong, 2003; Kim, Dueker, Hasher, & Goldstein, 2002), whereas the examination of gender differences on M/E, with adapted versions of Morningness/ Eveningness Questionnaire (Carskadon et al., 1993), has shown mixed results. Several studies have reported no gender differences on M/E (Carskadon et al., 1993; Gau & Soong, 2003; Giannotti, Cortesi, Sebastiani, & Ottaviano, 2002; Kim et al., 2002; Russo, Bruni, Lucidi, Ferri, & Violani, 2007), whereas others have found that girls tended to be more oriented to eveningness (Caci et al., 2005; Díaz Morales & Gutiérrez, 2008), or to morningness (Warner, Murray, & Meyer, 2008). Randler (2007) indicated several possible explanations related to specific characteristics of the sample (i.e. size, age range), cultural aspects, and the interaction between social and biological factors. One large age range (8-18 years) could produce smaller effect sizes and tends to obscure gender differences in the pubertal onset or in social roles and demands. The study of gender and age differences on M/E in different cultural contexts would

contribute to improve the knowledge about these discrepancies, given that it remains poorly understood how biological, cultural, and environmental zeitgebers act together to determine individual differences on M/E (Schmidt & Randler, 2010).

As adolescents get older, they delay progressively their rise time and bedtime, sleep length decreases (see Gradisar, Gardner, & Dohnt, 2011), and sleep irregularity increases (Giannotti, Cortesi, Sebastiani, & Vagnoni, 2005; Laberge et al., 2001; Russo et al., 2007; Yang, Kim, Patel, & Lee, 2005). This last one has been measured using weekend rise time delay (WRD), weekend bedtime delay (WBD), and social jetlag as indicators. WRD and WBD make reference to the difference between rise time or bedtime (respectively) on weekends and weekdays (Crowley, Acebo, & Carskadon, 2007; Wolfson & Carskadon, 1998). The social jetlag makes reference to the misalignment between social and biological time on weekends and weekdays, measured by the difference between mid-sleep on weekends and weekdays (Wittmann, Dinich, Merrow, & Roenneberg, 2006).

The results about gender differences on sleep patterns with similar measures and age range are quite contradictory. Several studies have found no gender differences in bedtime (weekends/weekdays) and rise time on weekdays (Giannotti et al., 2002; Laberge et al., 2001; Randler, Bilger, & Díaz-Morales, 2009), while others have found that girls wake up earlier on weekdays but later on weekends (Díaz-Morales, Dávila, & Gutiérrez, 2007; Yang et al., 2005), and go to bed earlier (Giannotti et al., 2002; Randler et al., 2009; Russo et al., 2007). Furthermore, although some researchers have found that girls sleep longer (see Olds, Blunden, Petkov, & Forchino, 2010), others have found no gender differences on weekdays (Giannotti et al., 2002; Laberge et al., 2001; Russo et al., 2007; Yang et al., 2005). Finally, regarding irregular sleep patterns, some researchers have found no gender differences in WBD and greater WRD among girls (Laberge et al., 2001; Yang et al., 2005), whereas others have found higher WBD among boys (Giannotti et al., 2005).

The greater tendency toward eveningness during adolescence implies a significant misalignment with the strict morning schedules of the school environment. Eveningness has been linked with poor academic performance (Roberts, Roberts, & Duong, 2009), substances consumption (Adan, 2010), and affective dysfunctions (Randler, 2008b; Wittmann et al., 2006). Given that Spain has later times or lifestyle habits compared to other European countries, such differences could be reflected on M/E and sleep habits of adolescents (Smith et al., 2002; Díaz-Morales & Randler, 2008). On the other hand, it has been indicated that large samples are necessary in order to detect gender differences on M/E measured by questionnaires versus biological measures such as temperature, cortisol or melatonin (Kerkhof, 1985; Randler, 2007). In consequence, the first aim of this study was to examine age and gender differences on M/E in a large sample of adolescents from 12 to 16 years. The second aim was to examine age, gender, and chronotype differences on sleep habits such as rise time and bedtime, sleep length, and irregular sleep patterns (i.e. social jetlag, WRD, and WBD).

Method

Participants

The sample included 2,649 adolescents (1,303 girls) between 12-16 years old ($M = 14.09$, $SD = 1.33$) from 128 school classes of 10 public schools with similar socio-demographic characteristics and located in six cities near Madrid. Gender distribution was not different across age groups ($\chi^2 = 3.88$, $p = .42$).

Instruments

Sleep habits: Questions about rise time and bedtime on weekends and weekdays were adapted from the *School Sleep Habits Survey* (Carskadon, Seifer, & Acebo, 1991). Specific questions were: What time do you usually go to bed on weekdays? What time do you usually go to bed on weekends? What time do you usually wake up on weekdays? What time do you usually wake up on weekends? Several sleep parameters were calculated on the basis of rise time and bedtime. From these, we calculated sleep length (time in bed) on weekdays and weekends. Social jetlag was calculated according to the formula indicated by Wittmann et al. (2006) considering the absolute difference between mid-sleep on weekdays (MSW) and mid-sleep on weekends (MSF): $\Delta MS = | MSF - MSW |$. First, to calculate mid-sleep, we calculate the middle of sleep length on weekend and weekdays. Afterwards, we calculated mid-sleep on weekend and weekdays: bedtime + the middle of sleep length, for weekends and weekdays. We used mid-sleep of time in bed (midpoint between bedtime and rise time) which is a proxy for mid-sleep (midpoint between sleep onset and wake up) used by Wittmann et al. (2006), (see Roenneberg, Wirz-Justice, & Merrow, 2003). WRD was calculated as the difference between weekdays and weekend rise time and WBD was calculated as the difference between weekdays and weekend bedtime according to the procedure indicated by Wolfson and Carskadon (1998) and Crowley et al., (2007).

Morningness-Eveningness Scale for Children (*MESC*)*:* The scale has 10 items about the preferred timing of certain activities such as recess, tests, sleep timing, and so forth (Carskadon et al., 1993). This scale is an adaptation of the *Composite Scale of Morningness* (Díaz-Morales & Sánchez-López, 2005; Smith, Reilly, & Midkiff, 1989) for the adolescent population. The Spanish version of the scale was used (Díaz-Morales & Gutiérrez, 2008). Previous psychometric and cross-cultural studies have reported good internal consistence for *MESC* (Caci et al., 2005; Díaz-Morales et al., 2007; Gau & Soong, 2003; Kim et al., 2002). Score range from 10 (*eveningness*) to 43 (*morningness*). In the present sample, Cronbach's alpha was .70.

Procedure

Participants were recruited from schools through letters sent to schools, visits to schools, and regular announcements. Inclusion criteria included (a) being currently enrolled in 1th to 4th Education Secondary Obligatory (ESO) grades, (b) having parental consent to participate, (c) agreeing to study participation and random assignment. Parental informed consent and adolescent informed assent were obtained from study participants prior to data collection.

All participants were tested collectively in their classroom in similar school schedule (8:30-14:30/15:20). The assessment sessions were realized by trained measurement staff. Teachers were present in the assessment sessions. The evaluation was carried out from November to February.

Data analysis

The *chi-squared* and *Student t-test* were used to analyze age and gender differences on M/E. To evaluate bedtime, rise time, and sleep

length (considering weekends/weekdays), social jetlag, WRD, and WBD, an *ANOVA* was carried out using age (12, 13, 14, 15, and 16 years), gender (boys and girls), and chronotype (morning, neither, and evening-types) as independent factors. *Post-hoc comparisons* were performed using *Bonferroni test*. The hours and minutes were indicated in the 24:00 format. As a statistical measure of effect size we used η_p^2 corrected (Huberty, 2002). SPSS-X program was used (version 15).

Results

The mean of *MESC* was 25.10 (*SD*= 4.49). We established cut-off points in 25-75th percentiles (22/28 *MESC*'s scores) to separate evening- (E-type), neither- (N-type), and morning-types (M-type).

The percentage of M-types was smaller among girls than boys (27.2 and 31.1%, respectively), whereas percentage of E-types was greater among girls than boys (29.9 and 26.1%, respectively), χ^2 (2, N= 2649)= 6.94, *p*<.05; *C*= .05, *p*<.05. Pearson's correlation indicated that morningness decreases with age (*r*= - .16, *p*<.01). Subsequent *t-test* comparing boys and girls within each age group showed higher morningness among boys at 13 and 14 years, *t* (502)= -3.36, *p*<.01 and *t* (607)= -2.23, *p*<.05, respectively.

Below, we described the results of bedtime, rise time, sleep length, social jetlag, WRD, and WBD organized by age, gender, chronotype, and interaction effects. The descriptive statistics (*M* and *SD*) for these indicators are reported in tables 1, 2, and 3, respectively. The sample size changes in sleep indicators because some items have not been answered by all participants. All *F*

Table 1
Sleep habits by age (Mean (*SD*) and *N*)

Age	12		13		14		15		16		Total	
	M(SD)	N	M(SD)	N	M(SD)	N	M(SD)	N	M(SD)	N	M(SD)	N
Rise time												
Weekends	10:00 (01:20)	402	10:30 (01:19)	487	10:43 (01:24)	591	10:47 (01:27)	581	11:02 (01:44)	473	10:38 (01:29)	2534
Weekdays	07:19 (00:21)	401	07:20 (00:23)	488	07:21 (00:24)	588	07:22 (00:23)	586	07:24 (00:24)	478	07:21 (00:23)	2541
Bedtime												
Weekends	23:57 (01:03)	395	00:22 (01:17)	487	00:34 (01:11)	576	00:49 (01:20)	578	01:25 (01:32)	460	00:39 (01:22)	2496
Weekdays	22:36 (00:41)	401	22:51 (00:49)	484	23:09 (00:49)	589	23:20 (00:48)	593	23:37 (00:53)	476	23:08 (00:52)	2543
Sleep length												
Weekends	10:01 (1:27)	394	10:09 (1:20)	478	10:10 (1:23)	575	9:56 (1:29)	569	9:35 (1:53)	457	9:59 (1:31)	2473
Weekdays	8:43 (0:45)	398	8:28 (0:52)	481	8:11 (0:53)	582	8:02 (0:50)	583	7:46 (0:55)	473	8:13 (0:54)	2517
Social jetlag	2:00 (0:53)	388	2:21 (1:01)	466	2:23 (0:58)	566	2:25 (1:02)	560	2:43 (1:13)	450	2:23 (1:03)	2430
WRD	2:41 (1:19)	399	3:10 (1:21)	479	3:23 (1:30)	585	3:23 (1:26)	572	3:39 (1:49)	470	3:17 (1:32)	2505
WBD	1:21 (0:56)	392	1:31 (1:11)	477	1:24 (1:03)	572	1:29 (1:07)	575	1:48 (1:24)	456	1:31 (1:09)	2472

Note: all values are hours and minutes (hh:mm). WRD: weekend rise time delay, WBD: weekend bedtime delay

Table 2
Sleep habits (Mean (*SD*) and *N*), *F* values, and *partial eta squared* by gender

	Girls		Boys		Total		F	η_p^2
	M (SD)	N	M (SD)	N	M (SD)	N		
Rise time								
Weekends	10:52 (01:22)	1257	10:25 (01:34)	1277	10:38 (01:29)	2534	54.39***	.02
Weekdays	07:18 (00:23)	1264	07:25 (00:23)	1277	07:21 (00:23)	2541	56.81***	.02
Bedtime								
Weekends	00:38 (01:20)	1241	00:39 (01:24)	1255	00:39 (01:22)	2496	NS	
Weekdays	23:08 (00:50)	1265	23:09 (00:55)	1278	23:08 (00:52)	2543	NS	
Sleep length								
Weekends	10:13 (1:23)	1231	9:45 (1:37)	1242	9:59 (1:31)	2473	55.96***	.03
Weekdays	8:10 (0:53)	1258	8:15 (0:56)	1259	8:13 (0:54)	2517	NS	
Social jetlag	2:32 (1:01)	1219	2:14 (1:04)	1211	2:23 (1:03)	2430	46.58***	.02
WRD	3:34 (1:27)	1249	2:59 (1:33)	1256	3:17 (1:32)	2505	87.44***	.03
WBD	1:31 (1:10)	1234	1:30 (1:09)	1238	1:31 (1:09)	2472	NS	

Note: all values are hours and minutes (hh:mm). WRD: weekend rise time delay, WBD: weekend bedtime delay.
*** *p*<.001; *NS*, no significant

Table 3
Sleep habits by chronotype (Mean (*SD*)) and *N*)

	Evening-type		Neither-type		Morning-type		Total	
	M (SD)	**N**	**M (SD)**	**N**	**M (SD)**	**N**	**M (SD)**	**N**
Rise time								
Weekends	11:20 (01:27)	709	10:40 (01:23)	1090	09:56 (01:20)	735	10:38 (01:29)	2534
Weekdays	07:26 (00:22)	708	07:22 (00:23)	1094	07:15 (00:23)	739	07:21 (00:23)	2541
Bedtime								
Weekends	01:14 (01:25)	687	00:39 (01:13)	1075	00:05 (01:17)	734	00:39 (01:22)	2496
Weekdays	23:31 (00:52)	705	23:10 (00:47)	1094	22:44 (00:50)	744	23:08 (00:52)	2543
Sleep length								
Weekends	10:05 (1:36)	683	10:01 (1:29)	1063	9:50 (1:30)	727	9:59 (1:31)	2473
Weekdays	7:55 (0:54)	697	8:12 (0:52)	1085	8:31 (0:53)	735	8:13 (0:54)	2517
Social jetlag	2:48 (1:03)	668	2:23 (0:59)	1047	2:01 (1:00)	715	2:23 (1:03)	2430
WRD	3:53 (1:30)	701	3:18 (1:27)	1078	2:41 (1:25)	726	3:17 (1:32)	2505
WBD	1:42 (1:12)	678	1:29 (1:05)	1066	1:22 (1:11)	728	1:31 (1:09)	2472

Note: all values are hours and minutes (hh:mm). WRD: weekend rise time delay, WBD: weekend bedtime delay

Table 4
F values, *Bonferroni post-hoc test* and *partial eta squared* of age and chronotype effects on sleep habits

	Age			Chronotype		
	F	**Post-hoc**	**η_p^2**	**F**	**Post-hoc**	**η_p^2**
Risetime						
Weekends	18.29***	12 < 13-16; 13 < 15, 16; 14 < 16	.02	140.09***	E > N > M	.10
Weekdays	NS			37.04***	E > N > M	.03
Bedtime						
Weekends	60.73***	12 < 13, 14 < 15, 16	.09	101.68***	E > N > M	.07
Weekdays	84.80***	12 < 13 < 14 < 15 < 16	.12	122.38***	E > N > M	.09
Sleep length						
Weekends	12.38***	12-15 > 16	.02	5.67**	E > N > M	.01
Weekdays	64.33***	12 > 13 > 14 > 15 > 16	.09	55.90***	E < N < M	.04
Social Jetlag	16.47***	12 < 13-15 < 16	.02	76.55***	E > N > M	.06
WRD	15.46***	12 < 13-15 < 16	.02	89.38***	E > N > M	.06
WBD	9.54***	12-15 < 16	.01	12.64***	E > N, M	.01

Note: WRD: weekend rise time delay, WBD: weekend bedtime delay; E, evening-type, N, neither-type, and M, morning-type. ** $p<.01$; *** $p<.001$; *NS*, no significant

values, *partial eta squared*, and *post-hoc* comparisons are indicated by gender in table 2 and by age and chronotype in table 4.

Regarding age effect, adolescents woke up progressively later from 12 to 16 years on weekends (10:00 to 11:02), but not on weekdays (7:19 to 7:24), and went to bed progressively later (weekends: 23:57 to 1:25; weekdays: 22:36 to 23:37). Sleep length decreased (weekends: 10:01 to 9:35; weekdays: 8:43 to 7:46), and social jetlag (2:00 vs. 2:43), WRD (2:41 vs. 3:39), and WBD (1:21 vs. 1:48) were shorter in 12 than 16 year age groups.

Concerning gender, girls woke up later than boys on weekends (10:52 vs. 10:25) and earlier on weekdays (7:18 vs. 7:25). No gender differences were shown on bedtime. Girls reported higher sleep length on weekends (10:13 vs. 9:45), but not on weekdays. Social jetlag (2:32 vs 2:14) and WRD (3:34 vs 2:59) were larger on girls and no gender differences were found on WBD.

According to chronotype, E-types woke up later compared to N- and M-types (weekends: 11:20 vs. 10:40 vs. 9:56; weekdays: 7:26 vs. 7:22 vs. 7:15), went to bed later (weekends: 1:14 vs. 00:39 vs. 00:05; weekdays: 23:31 vs. 23:10 vs. 22:44), and claimed higher sleep length on weekends (10:05 vs. 10:01 vs. 9:50), and shorter sleep length on weekdays (7:55 vs. 8:12 vs. 8:31). E-types obtained greater social jetlag (2:48 vs. 2:23 vs. 2:41), WRD (3:53 vs. 3:18 vs. 2:41), and WBD (1:42 vs. 1:29 vs. 1:22).

Finally, the age*chronotype interaction effect was only significant on rise time showing that E-types of 12 years woke up later than M-types of 16 years (weekends: 10:42 vs. 10:12; weekdays: 7:24 vs. 7:15). All other interactions between age, gender, and chronotype were not significant.

Discussion

This study represents a systematic analysis of age and gender effects on chronotype and sleep habits in a large sample of adolescents among 12-16 years old. As it would be expected, a progressive tendency toward eveningness with age was found (Carskadon et al., 1993; Díaz-Morales & Randler, 2008; Giannotti et al., 2002; Kim et al., 2002).

Although we found a greater percentage of girls among E-types, gender differences on M/E appear in the early adolescence (13-14 years-old). Several explanations could be indicated. Girls could have an earlier onset of their pubertal development (Steinberg & Morris, 2001), which has been related to eveningness (Carskadon et al., 1993). For example, changes in the gonadotropin secretion might affect biological timing of sleep and circadian preference (Randler et al., 2009). Besides biological effects, social zeitgebers could significantly influence on M/E (Roenneberg et al., 2003). Family and school environments could explain, in part, gender differences on M/E. It has been shown that parental control

modulated eveningness tendency of adolescents (Randler et al., 2009; Takeuchi et al., 2001). Also, boys could make more outdoor activities (i.e. sports) increasing their light exposition, that it has been related to greater morningness (Gaina et al., 2006; Harada, Morisane, & Takeuchi, 2002). The interaction between biological and social variables should be studied in depth to clarify the relative weight of the factors that promote these differences.

On the other hand, the large sample size used in this study has probably permitted to detect gender differences on M/E measured by questionnaires (Kerkhof, 1985; Randler, 2007). A previous study by Díaz-Morales and Gutiérrez (2008) found a greater tendency (non-significant) toward eveningness in girls among 600 adolescents. Finally, in general, Spanish adolescents and adults were more evening oriented compared to other countries (Díaz-Morales & Randler, 2008; Randler, 2008c; Randler & Díaz-Morales, 2007; Smith et al., 2002), and maybe these cultural differences could be influencing gender differences on M/E.

Age differences in sleep habits were according to sleep phase delay, increment of evening tendency (Carskadon et al., 1993; Kim et al., 2002), and, probably, decrease of parental monitoring (Randler et al., 2009; Takeuchi et al., 2001). As adolescents get older, they delay their rise time (in weekends) and bedtime, sleep length decreases and irregular sleep patterns increase. WRD among the oldest adolescents was higher than 3:30 hours, similar to results indicated by Roenneberg et al. (2003). While rise time on weekdays and bedtimes were similar to recent worldwide meta-analysis of sleep patterns (Gradisar et al., 2011), rise time on weekends was the latest, which indicates a clear evening preference among adolescents when they have a free schedule.

Girls showed greater sleep length on weekends, social jetlag, and WRD. Although girls were more evening oriented they showed earlier rise time on weekdays. However, on weekends, with a free schedule, showed later rise time according to their circadian preference. Several researchers (Fredriksen, Rhodes, Reddy, & Way, 2004; Giannotti et al., 2002; Yang et al., 2005) have indicated possible gender differences in the reasons to get up, suggesting that grooming routines, household chores, or both, could force girls to wake up earlier than boys on weekdays. Carskadon et al. (1993) found a correlation between later rise time on weekdays and eveningness among boys, but not among girls. Given that on weekdays girls wake up earlier and have the same sleep length than boys, girls accumulate higher sleep debt recovering on weekends (Tonetti, Fabbri, & Natale, 2008). Besides biological factors, age range, and sample size, gender differences in daily behavioral time structure might reflect differences in social roles for both sexes (Motohashi, Higuchi, & Maeda, 1998). The so-called "gender jetlag" makes reference to consequences of the misalignment between gender roles and biological times (Díaz-Morales & Sánchez-López, 2008) and it could begin to emerge during adolescence.

Finally, similar to previous studies (Carskadon et al., 1993; Díaz-Morales et al., 2007; Gaina et al., 2006; Gau & Soong, 2003; Giannotti et al., 2002; Randler et al., 2009; Russo et al., 2007), E-types showed later rise time and bedtime, longer sleep length on weekends and shorter sleep duration on weekdays and higher social jetlag, WRD, and WBD. The absence of interaction effects indicated that this tendency was robust. For that, it seems necessary to develop educational programs to improve these indicators of sleep among E-types (Díaz-Morales, Delgado, Escribano, Collado, & Randler, in press).

Although this study has limitations, it improved the knowledge of age, gender, and chronotype effects on sleep indicators among adolescents. Sleep onset was not considered, for that, sleep length was slightly larger than the total sleep time and social jetlag was slightly different from social jetlag analyzed by Wittmann et al. (2006). Sleep onset is approximately 17 minutes later than bedtime among adolescents (Gradisar et al., 2011). Puberal development has not been considered, futures studies could include a measure of pubertal status in order to analyze its relation with evening preference among early adolescent girls (Carskadon et al., 1993). Finally, other important aspects in relation to lifestyle habits, such as electronic media use, substance use, naps, parental monitoring, weekend timetables, social/gender demands, family schedules, academic performance, or psychological and physical dysfunctions have not been considered. All of them may be areas of interest for future studies.

Acknowledgements

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