8. Sleep Patterns and Daytime Function in Adolescence: An Epidemiological Survey of an Italian High School Student Sample

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The developmental changes occurring during adolescence include psychological as well as organic factors and their nature and rapidity are striking. Modifications in sleeping patterns with chronologic age have been well documented and have been related to greater social pressures, as well as normal ontogenetic trends. Several studies have suggested that adolescents, despite an increasing physiological need for sleep, tend to sleep less with age (Simonds & Parrega, 1982; Carskadon, 1990a; Andrade, Benedito-Silva, Domenice, Amhold, & Menna-Barreto, 1993). The sleep-wake cycle tends to become delayed, and many adolescents may experience sleep phase delay syndrome with insufficient sleep (Carskadon, Vieira, & Acebo, 1993). The consequences of chronic insufficient sleep are numerous: daytime sleepiness, mood and behavioral problems, negative effects on daytime functions such as poor school achievement, greater risk of severe accidents, and increased vulnerability to psychoactive substance abuse. Furthermore, in adolescent years expanding social opportunities, including academic demands, changing parent-child relationship, and changing life habits, may also affect the development of adolescent sleep patterns.

Despite the fact that very few epidemiological studies comparing sleep habits in different countries have been conducted, it has been hypothesized that ethnic and sociocultural factors may influence sleep patterns and habits, too (Strauch & Meier, 1988). Although the importance of healthy sleeping habits in this age group has been pointed out in other countries, this topic has not received adequate interest in

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Italy. Few studies exist of teenagers' sleeping habits and difficulties in our country, and the entire adolescent age range has not previously been studied with the same survey instrument (Lugaresi, Cirignotta, Zucconi, Mondini, Lenzi, & Cuccagna, 1983; Manber, Bootzin, Acebo, & Carskadon, 1996). Therefore, we carried out a questionnaire survey of sleep habits and problems on a sample of adolescents ages 14 to 20 years representative of the Italian high school student population.

Methods

Research data were collected from a sample representative of public high school population in Italy in the academic year 1995–1996. The sample was drawn from 349 schools across the state, according to a two-stage sample procedure involving the selection of a stratified sample of high schools according to geographical regions, and a sample of students stratified to represent the different grades within a high school. Each grade was equally represented. The questionnaires were mailed to schools in March–May 1996. The response rate was 87%. All students suffering from chronic illness and reporting stressful experiences, such as accidents or death among the subject's family or friends, serious illnesses, and family changes in the last year were excluded. The final sample population consisted of 6,632 students (3,987 females and 2,645 males).

A widespread slight prevalence of females among students attending the secondary schools in Italy has already been reported. Data were collected through a modified version of the Sleep Questionnaire for Adolescents by Carskadon (Carskadon, Seifer, & Acebo, 1991). The questionnaire is a comprehensive instrument including items about sleep-wake behaviors during the previous two weeks and the following scales: sleepiness (SS), sleep disturbances (SD), anxiety (ANX), depression (DEP), morningness/eveningness (M/E), and substance use (SUBS). To evaluate the reliability of this questionnaire for an Italian student population, the Italian translation of the integral version of it was given to 1,000 high school students. After this pilot testing we decided to omit items involving unusual life habits for Italian students, such as part-time jobs, and to include some items regarding the use of substances to promote sleep, questions including background, and sociodemographic information such as household composition, living environment (large cities, urban area = cities and towns; rural area = village or countryside), geographical regions (northern, central, and southern Italy) and

parents' occupation. This latter information was used as an indicator of socioeconomic status. Students responded anonymously during a class period with a teacher overseeing them.

For the purpose of establishing a developmental picture, we analyzed the data by dividing the entire sample into five age groups as follows: 14–15; 15–16; 16–17; 17–18; > 18 years. Most of the results are based on cross-tabulations by sex and age group. Statistical significances were calculated by means of chi-square (Yates correction), t-test, and analysis of variance (ANOVA). To identify variables related to a perceived poor sleep quality, we examined the relationship among subjective evaluation of poor sleep quality, reported sleep habits, and disturbances. The "Do you consider yourself to be a good or a poor sleeper?" question was used to define sleep quality. Furthermore, to identify predictors of poor sleep quality self-perception and use of substances to promote sleep, multiple logistic regression analyses were performed. In view of significant sex differences, in both cases separate logistic regression analyses were conducted for boys and girls.

Results

In general all girls were postmenarchal, and all boys showed evidence of marked pubertal changes. All of them were free of sleep complaints, but, with age, irregular sleeping habits, as well as sleep difficulties, emerged. Age, and in some cases sex, were important explanatory factors of sleeping habits and sleep difficulties. Therefore results are presented by age group and sex.

Sleeping Habits

As expected, our results confirmed significant changes in sleep patterns with chronological age (see Table 8.1). A reduction of sleep time either during school ($F(4,66) = 59.1$; $p < .0001$) or weekend nights ($F(4.66) = 138.53$; $p < .001$) was found. Between 14 and 19 years the mean sleep time on school nights passed from 8 hours and 30 minutes to 7 hours and 30 minutes. The mean sleep time on school days was about 8 hours for both sexes, whereas on weekends it was less for boys than for girls (sex effect $F(1,66) = 102.63$ $p < .0001$). A tendency to go to bed later ($F(4,66) = 110.7$; $p < .0001$) and less regularly with age was found ($F(4,66) = 179.2$; $p < .0001$) in boys more often than in girls ($F(1,66) = 31.72$; $p < .0001$). Moreover, girls had an earlier bedtime and rise time

Table 8.1. Sleep Patterns among Age Groups

		Girls			Boys		
	Age	**Bedtime**	**Rise Time**	**Sleep Time**	**Bedtime**	**Rise Time**	**Sleep Time**
School nights	14–15	10:15 P.M.	6:45 A.M.	8 h 15 min	10:30 P.M.	7:00 A.M.	8 h 30 min
	15–16	10:30 P.M.	6:45 A.M.	8 h 15 min	10:40 P.M.	7:00 A.M.	8 h 20 min
	16–17	10:45 P.M.	6:45 A.M.	8 h 00 min	11:05 P.M.	7:05 A.M.	8 h 00 min
	17–18	11:05 P.M.	6:50 A.M.	7 h 45 min	11:20 P.M.	7:10 A.M.	7 h 30 min
	>18	11:15 P.M.	6:50 A.M.	7 h 35 min	11:50 P.M.	7:10 A.M.	7 h 20 min
Weekend nights	14–15	11:50 P.M.	9:40 A.M.	9 h 30 min	11:50 P.M.	9:30 A.M.	9 h 40 min
	15–16	11:55 P.M.	9:45 A.M.	9 h 25 min	12:30 A.M.	9:30 A.M.	9 h 00 min
	16–17	12:30 A.M.	9:55 A.M.	9 h 15 min	12:45 A.M.	9:50 A.M.	8 h 55 min
	17–18	12:45 A.M.	10:00 A.M.	9 h 00 min	1:20 A.M.	10:10 A.M.	8 h 50 min
	>18	1:30 A.M.	10:10 A.M.	8 h 40 min	2:00 A.M.	10:20 A.M.	8 h 20 min

(about 20 minutes) on school days. With age, taking naps also became more prevalent during school days (27% at 14 years to 50% at 18 years on weekdays; Pearson chi-square = 259.57; df = 8; $p < .001$), and napping was more frequent among older adolescent boys (58% vs. 48%; $p < .001$). Across all age groups, a small percentage of boys and girls (about 8%) used to nap on weekends. The main reason students gave for going to bed on weeknights was being sleepy (about 50%) and on weekends the completion of socializing (about 60%). The latter tended to increase with age. The second reason was watching television, which involved about 30% of students, more on school nights than on weekend nights, and tending to decrease with age. The third reason they gave was doing homework, more reported by girls on weekdays (about 8%). Parental involvement, both at bedtime and rise time, decreased as adolescents got older (bedtime from 3% at 15 years to 0.9% at 18 years, $p < .001$; risetime from 43% at 15 years to 32% at 18 years, $p < .001$) on weeknights. On weekends, parental influence at bedtime tended to increase with age but only for girls. We found that most students who went to bed later on school nights than on weekends (about 3% of the whole sample) across all age groups (57% at 14 years to 37% at 18 years) stayed up later to do homework in the evening. This was more common in girls than in boys ($p < .01$).

As a measure of sleep schedule regularity, we computed the difference between weekend and school-night bedtime and rise time. An irregular sleep schedule (bedtime and rise time higher than 3 hours) was found in 19% of students, in boys more often than in girls (21% vs. 17%; $p < .01$). With age, irregular sleeping habits increased and, by the age of 16, this gender difference became more evident. Students with irregular sleeping schedules took naps more frequently, got less sleep both on weekdays and weekend nights, complained of daytime sleepiness with a tendency to fall asleep during lessons, and reported more accidents. Furthermore, they used sleeping pills more frequently (see Table 8.2). With regard to circadian patterns, the M/E scale confirmed that in both sexes tendency toward a phase delay preference increased with age (group effect $F(4,66) = 18.87$; $p < .001$).

Sleep Difficulties

Current difficulties in falling asleep, defined as sleep latency higher than 30 minutes, were reported in about 21% of students, with a slight but not significant prevalence in girls. Girls suffered from multiple

Table 8.2. Characteristics of Irregular Sleepers School and Weekend Nights Bedtime and Rise Time Difference Greater Than 3 Hours

	Irregular	Regular	p
Week-night sleep duration	7 h 30 min	7 h 55 min	<.01
Weekend sleep	8 h 10 min	9 h 15 min	<.01
Nap	57.0%	37.0%	<.001
Poor school performance	9.7%	6.0%	<.001
Tendency to fall asleep at school	13.4%	6.3%	<.001
Sleeping pills	5.9%	3.6%	<.01
Daytime sleepiness scale	16.5%	13.0%	<.01

nighttime wakings (2–3 times per night) more frequently than boys, and 2.2% of them reported to wake up more than 3 times per night. Long night wakings, lasting more than 30 minutes, were found in about 6% of students with a marked sex difference. Early morning awakenings were found in 23% of students and, also in this case, they were significantly more frequent in girls (see Table 8.3). Long night wakings tended to increase with age for both sexes, whereas difficulties in falling asleep and multiple night wakings remained stable across in all age groups.

Of the whole sample 19.6% considered themselves as poor sleepers. Significantly more girls than boys (21% vs. 17%, p. < 01) reported poor sleep quality. Self-perception of poor sleep tended to increase significantly with age in both sexes (age groups: 14–15 years = 15%; 15–16 years = 18%; 16–17 years = 19%; 17–18 years = 20%; > 18 years = 22.3%; Pearson chi-square = 25.55; df = 4; p < .001). Logistic regression analysis showed that several independent variables – sleep length, sleep onset insomnia, night wakings (either brief, multiple, or prolonged), early morning awakenings, depression, anxiety and evening phase preference – were associated with self-perception of poor sleep. There were no sex differences. Partial arousal disorders and erratic sleep schedules,

Table 8.3. Sleep Difficulties

	% Boys	% Girls	p
Sleep onset insomnia	20.2	22.2	ns
Multiple night wakings	8.1	11.5	<.01
Long night wakings	4.3	6.9	<.01
Early awakening	21.0	25.0	<.01

Table 8.4. Poor Sleep Quality Self-Perception: Logistic Regression Results

	Girls		Boys	
	Odds Ratio (CI 95%)	p	Odds Ratio (CI 95%)	p
Sleep length	.61 (.55–69)	<.0001	.74 (.64–.86)	<.0001
Sleep onset insomnia	1.66 (1.44–1.9)	<.0001	1.24 (1.06–1.36)	<.0001
Night wakings (2–3 per night)	2.51 (1.97–3.2)	<.0001	2.26 (1.59–3.21)	<.001
Night wakings (> 3 per night)	5 (3–8.32)	<.0001	3.42 (1.37–8.51)	<.01
Prolonged night wakings	1.5 (1.1–2)	<.01	1.9 (1.23–2.9)	<.01
Mid-night wakings	1.6 (1.3–2)	<.0001	1.17 (.88–1.56)	ns
Late-night awakenings	1.2 (.93–1.5)	ns	1.54 (1.15–2.07)	<.01
Anxiety scale	1.07 (1.05–1.1)	<.0001	1.02 (1–1.09)	<.001
Depression scale	1.1 (1.09–1.14)	<.0001	1.14 (1.1–1.17)	<.0001
M/E scale	.96 (.94–.98)	<.01	.93 (.91–.96)	<.001
Early awakening	1.50 (1.24–1.81)	<.0001	1.52 (1.18–1.94)	<.0001

although more frequent in poor sleepers, were not statistically significant in relation to self-reported poor sleep quality (see Table 8.4).

Use of Substances to Promote Sleep

We also investigated the use of sleeping pills in Italian adolescents to determine the prevalence and to identify associated factors. Results showed that 4% of students used medication to help themselves to sleep at least once during the past 6 months, but only 1.3% had regularly taken sleeping pills. Female adolescents were more prevalent users of sleeping pills than males (5.3% females vs. 2% males, $p < .001$). Consumption tended to increase with age (Pearson chi-square df = 4; $p < 001$). In general, the increase was considerably larger for girls than boys, and sex differences were found in all age groups. Although these differences were minor at age 14–15 (2.8% girls vs. 1% boys; $p < .01$), female overuse was clear by age 18 (6.7% vs. 2.4%; $p < .001$) (see Table 8.5).

Anxiolytic benzodiazepines were taken by 44.2% of students, 10% had used aspirin or nonsteroidal antiinflammatory drugs (NSAIDs),

Table 8.5. Percentage of Boys and Girls Who Report Using Substances to Promote Sleep

Age	Boys	Girls	p
14	1.1	2.8	<.01
15	1.6	4.0	<.001
16	1.9	5.8	<.001
17	2.3	6.1	<.001
18	2.4	6.7	<.001

33% had taken herbal teas, and homeopathic remedies were used by 2.6% of students to improve sleep; 6.5% did not specify the type of substance. Some sex differences emerged: girls were prevalent users of anxiolitic benzodiazepines (47.4% vs. 26%; $p < .001$), whereas in boys the use of over-the-counter remedies (39% vs. 30%; $p < .01$) and NSAIDs (14.8% vs. 8.3%; $p < .01$) were more common. Professional help for sleeping problems had been sought by 2.5% of all the sample. Half of the subjects who reported having taken sleeping pills had them prescribed by a general practitioner (51%), whereas in 25% the use was suggested by parents, and 10.3% of these students reported a self-prescription. Anxiolytic benzodiazepines were prescribed by general practitioners in 58.6% of cases, while NSAIDs were suggested by parents in 17% or self-prescribed in 25% of students.

To analyze the data further and determine which independent variables were significantly associated with the condition of using substances to promote sleep, separate logistic regression analyses for boys and girls were performed. Marked sex differences in predicting substance use were found. In females five independent variables (living in urban areas, multiple midnight awakenings, irregular sleep patterns, depressive mood, anxiety and consumption of psychoactive substances) were significantly associated with the use of sleeping pills. By contrast, in boys only depressive mood was associated with the use of sleeping pills. Sleep onset insomnia, sleep length, as well as partial arousal disorders, were not significantly related to the use of sleeping pills (see Table 8.6).

Sociodemographic Factors

Although the socioeconomic level of parents was not correlated with sleep problems, we found that adolescents from single-family homes

Table 8.6. Predictors of Sleeping Pill Use

	Odds Ratio	CI 95%	p
Girls			
Irregular sleep	1.39	0.99–1.19	<.001
Mid-night multiple night wakings	1.9	0.98–3.94	<.05
Depression	1.1	1.0–1.13	<.001
Anxiety	1.06	1.02–1.11	<.0001
Substance use	1.09	1.05–1.14	<.01
Urban area	1.5	1.1–2	<.01
Boys			
Depression	1.13	1.06–1.21	<.001

(8.6%) had more sleep irregularity (11% vs. 8%; $p < .001$). Moreover, small differences in some sleep habits were found among geographical regions. Students living in southern Italy went to bed significantly later (on average 20 minutes), but their sleep schedules were more regular compared with those living in northern and central Italy. Students living in urban areas tended to sleep less both on weekdays and on weekend nights (on average 30 minutes; p. < 001).

Impact of Sleep on Daytime Function

Sleep problems scale was positively correlated with daytime sleepiness ($r = .27$; $p < .001$); increased use of psychoactive substances ($r = .32$; $p < .001$); depressive mood ($r = .26$; $p < .01$); and anxiety ($r = .31$; $p < .001$) while showing a negative correlation with M/E scale ($r = .-30$; $p < .001$). Daytime sleepiness increased with age (group effect $F(4,66) = 4.99$; $p < .001$) and was more common in older adolescents girls (sex effect $F(1,66) = 31.73$; $p < .001$). By contrast, falling asleep during lessons, which also increased with age (Pearson chi-square = 34.79; df = 4; $p < .001$), was more frequent in boys (14% of boys vs. 7.8% of girls; $p < .001$).

Regarding academic performance, ANOVA results showed an association between poor self-reported school achievement and increased complaints of daytime sleepiness ($F(4,66 = 21.54$; $p < .001$), greater use of caffeine, alcohol, and tobacco ($F(4,66) = 54.00$; $p < .001$), sleep problems ($F(4,66) = 54.11$; $p < .001$), evening phase delay preference ($F(4,66) = 30.55$; $p < .001$), anxiety ($F(4,66) = 20.17$; $p < .001$), and depressive mood ($F(4,66) = 17.21$; $p < .01$). Furthermore, students who reported attention problems at school (26% of boys, 21% of girls) slept slightly less both on

school nights (7 hours 40 minutes vs. 8 hours; $p < .001$) and on weekend nights (8 hours and 40 minutes vs. 9 hours and 5 minutes; $p < .001$), had more irregular bedtime (140 vs. 109 minutes; $p < .001$), and significantly higher scores on all scales, except the M/E scale where they obtained lower scores.

To investigate other factors that can affect the amount and timing of adolescents' sleep, we examined the influence of school starting time, and compared students' sleep patterns attending schools with earlier start times with those enrolled in schools that started later. Despite the small difference in school start time in Italy, ranging from 7:45 A.M. to 8:45 A.M. across all age groups, we found that, in general, students who attended the schools with the earliest start time (before 8:00 A.M.) had more irregular sleep schedules ($p < .001$), complained of daytime sleepiness ($p < .01$), tended to fall asleep at school ($p < .01$), and reported more frequently poor academic performance ($p < .05$) than those with late school start times (after 8:30 A.M.). Analyzing the differences among age groups, however, we found that students ages 14–15 who started school earlier did not show any problems but reported an earlier bedtime (by almost 30 minutes); by the age of sixteen, school and weekend bedtimes shifted to later times, school-night sleep time progressively decreased, and daytime sleepiness increased with age.

Of the whole sample, 88% reported having had some accidents (at home, at school, driving) There were no age or gender differences. The increased vulnerability to accidents was positively correlated with sleep problems ($r = .28$; $p < .001$), daytime sleepiness ($r = .20$; $p < .001$), and increased use of stimulants and tobacco ($r = .19$; $p < .001$), and less marked but significantly correlated with anxiety ($r = .16$; $p < .01$) and depressive mood ($r = .11$; $p < .01$).

Discussion

Our data confirm a developmental trend of sleep patterns in adolescence. Similar to other studies (Price, Coates, Thoreson, & Grinstead, 1978; Simonds, 1982; Strauch & Meier, 1988; Carskadon, 1990a; Andrade et al., 1993; Tynjala, Kannas, & Välimaa, 1993; Ledoux, Choquet, & Manfredi, 1994; Gau & Soong, 1995) there is a tendency for sleep duration to get shorter, on either weekdays or weekend nights, as age increased (Table 8.1). Moreover, in all age groups the night sleep duration was longer during weekends than during weekdays, and this difference increased with age. Sleeping habits varied considerably between

weekdays and weekends. During weekends bedtimes and rise times were later. Furthermore, a sleep schedule irregularity becomes more evident with age, especially in boys. Of our sample, about 19% of students reported bedtime and rise time differences between school and weekend nights greater than 3 hours. The average shift in bedtime was considerably greater in the older group, supporting the hypothesis that bedtime may get progressively later on weekends due to social pressures as adolescents get older. Moreover, the longer sleep duration during weekends may be a response to insufficient sleep during weekdays. In recent years we have witnessed a controversy over whether the population at large is chronically sleep-deprived. The change in sleep time over the past century has been most dramatic for adolescents. Social pressure, television, and late-night movies compete with sleep, resulting in a rather drastic change in sleep habits and sleep time in adolescents, who now tend to get insufficient sleep. In fact, laboratory data suggested that the need for sleep does not decrease during adolescence (Carskadon, 1990a). Adolescents expand their social lives and tend to spend leisure time with friends more often and later in the evening than before. Parental control at bedtimes decreased with age and among older adolescents, peer group influences over bedtime and sleeping habits, in general, assume greater importance than before. In our sample, parental involvement, both at bedtime and rise time, decreased as adolescents got older. This is different from the report by Carskadon (1990a) concerning the U.S. teens, where parental influence diminishes at bedtime but becomes more important on waking in the morning, but is similar to that reported by Gau for Taipei adolescents (Gau & Soong, 1995). In our study slight gender differences were found regarding parental influence at bedtime, being more common for girls on weekends. This, in our opinion, may be due to the differences in sociocultural contexts, which involves a trend for parents to control girls more than boys. A recent epidemiological study carried out in some European countries on students ages 11–16 years (Strauch & Meier, 1988) found great differences between countries in duration of sleep time with Israeli and Finnish students sleeping the shortest (about 8 hours and 30 minutes) and Swiss children sleeping the longest (over 9 hours). Sleep time among Italian students of the same age group was similar to Israeli adolescents. On the other hand the comparison with the U.S. population (Carskadon, 1990a) showed that American adolescents sleep about 15–20 minutes less than Italians on weekdays, while sleep length on weekends was quite similar. In younger groups

bedtime and rise time were quite similar in different countries, whereas a great difference was found in late adolescence both in bedtime and in rise time with U.S. teenagers going to bed more than an hour later than Italians. This difference, in our opinion, may be due to different educational systems; in fact, in Italy 18-year-olds are still attending high school and living with their families, while in the United States they may already be attending college. This implies more parental control for the Italian population in late adolescence, resulting, probably, in more regular sleep habits.

Compatible with the results of Carskadon (1990a) and Gau and Soong (1995), we observed in this study that girls went to sleep and woke up earlier (about 20 minutes) on weekdays. The earlier rise time in girls may be due, as already pointed out, to the habit of spending more time in preparing for school (Price et al., 1978; Carskadon, 1990b; Carskadon, Seifer, Davis, & Acebo, 1991). Similar to other studies, daytime sleepiness increased with age, and there was a tendency for increased napping among older adolescent boys, who reported also more sleep schedule irregularity. Rather than maintaining healthy sleep habits, many Italian adolescents resort to stimulants, brief naps, or sleeping late on weekends to improve their level of daytime alertness. In fact, the teens in this study reported a shorter sleep duration, associated with irregular sleep schedules, resulting in teens' getting insufficient sleep. Likewise, decreased sleep and irregular sleep schedules were negatively related to daytime functions such as mood, tendency of increased use of psychoactive substances and sleeping pills, poor school performance, and increased vulnerability to accidents. In particular, as already documented by Carskadon, Wolfson, Tzischinsky, and Acebo (1995), we found a strong association between self-reported school difficulties, attention problems, daytime sleepiness complaints, shorter sleep time duration, and more irregular sleep schedules.

Regarding the effect of school start time on sleep, we found that by age 16 adolescents starting school earlier reported shorter sleep length, sleepiness complaints, falling asleep at school, and attention problems more frequently than their peers enrolled in schools with later start times. Again, results regarding older adolescents are similar to those reported by Carskadon et al. (1995) and Tynjala (1993); however, young adolescents with early school starting times in our sample did not show any of these problems except a tendency to have later bedtimes. Therefore, the sleep loss in older adolescents may be due to increasingly later

bedtimes. We hypothesize that these age group differences in our sample of Italian adolescents may be due to reduced parental control at bedtime, and increasing social pressure at around the age of 16.

Living environment and geographical regions, although less important than other factors such as age and sex, seemed to influence sleeping habits of Italian teenagers. Adolescents living in southern Italy, although reporting a later bedtime, seemed to have a more regular sleep schedule than their peers living in the northern and central regions. Moreover students living in the urban areas tended to sleep less at night than those living in rural areas. These slight differences seem, in our opinion, related to different sociocultural contexts, which determine different styles of living. In fact, it seems that social pressures and facility to expand social lives, such as socializing with friends more often and later in the evening, is easier for adolescents living in big towns and in central and northern regions. Although the socioeconomic level of parents was not related to sleep problems, adolescents from single-family homes showed more sleep irregularity, probably due to different life-styles such as reduced parental control over bedtime.

The rates of students reporting inability to fall asleep (21%) are quite similar to those reported by other studies (United States 24%, Taiwan 27.2%, Australia 22.85%) (Bearpark & Michie, 1987; Carskadon, 1990a; Gau & Soong, 1995) but less than that reported to Choquet and colleagues (1988) for the French population (40%). In contrast to other studies (Price et al., 1978; Bearpark & Michie, 1987; Gau & Soong, 1995), we found only a slight, but not significant, increased prevalence in girls. In one epidemiological study carried out in some European countries (Strauch & Meier, 1988), the rates of inability to fall asleep varied from 10% for Austrian adolescents to about 30% for Finnish students, with a trend to decrease with age. In contrast, Bearpark reported an increased prevalence of difficulty falling asleep with age in the Australian population, significant in girls but not in boys (Bearpark & Michie, 1987). By contrast, in our sample we did not find significant differences among age groups. As already reported, girls had multiple night wakings more frequently than boys. The rates for wakenings found in our sample (12%) are similar to those reported for the Australian population (11.4% girls, 10.8% boys), but lower than that reported by Choquet and colleagues (1988) for the French population (16% boys, 25% girls), and by Price et al. (1978) for the U.S. adolescents (20%). We found also a high incidence (23%) of early morning awakenings without gender differences; this figure is similar to that reported by Choquet et al. (1988) for French

adolescents (24%). In contrast to other studies (Bearpark & Michie, 1987; Choquet et al., 1988) that reported an increase of night wakings with age particularly for girls, we found that in girls the prevalence of night wakings is stable across all age groups, and in boys the rates decreased with age. Moreover, poor sleep self-perception occurred with sufficient frequency in healthy Italian adolescents (19%), with marked significant prevalence in girls (21%). Our results, similar to other studies (Simonds & Parraga, 1982; Patois, Valatx, & Alperovitch, 1993), suggest that adolescents who describe themselves as poor sleepers showed significant differences in daytime feelings and mood, feeling more depressed, anxious, and less alert and reporting more evening phase preference. In our sample, difficulties in falling asleep as well as multiple and prolonged night wakings, early morning awakenings, and shorter sleep length played an important role in predicting poor sleep quality self-perception. On the contrary, sleep schedule irregularity was not related to poor sleep quality.

Despite the relative incidence of sleep problems, professional help was sought by only 2% of the whole sample. A small percentage of Italian adolescents (4%) had occasionally used substances to help themselves to sleep, and only 1.3% had regularly taken sleeping pills. Although sex differences were found in all age groups, the increase in the use among girls between the age of 14 and 18 years led to a very marked difference by late adolescence, which may persist, as shown by other studies, throughout adulthood. Our results are similar to those reported for other adolescent populations (Kirmil-Gray, Eagleston, Gibson, & Thoresen, 1984; Manni et al., 1996). About half of the adolescents who reported using medication took benzodiazepines; the others took over-the-counter medications, including aspirin or homeopathic remedies. About one-third of students have taken medications suggested by relatives or parents or that were self-prescribed. One explanation is that cultural differences in family networks and parenting might lead some students to be more predisposed to use substances to promote sleep as a way of coping with sleep problems. Contrary to the report of Patois et al. (1993), who found difficulties with falling asleep related to the use of sleep medication in both sexes, we found striking sex differences. In our study, the girls' multiple nightwakings and sleep schedule irregularity were strongly associated with the use of sleeping pills as well as depressive mood, anxiety, living in an urban area, and an increased use of psychoactive substances. In contrast, in males only depressive mood played an important role in predicting the use of sleeping pills.

Although the use of medications to enhance sleep was not very common in Italian adolescents, the trend, which increases with age, to use a chemical solution may persist in adult life and become a risk factor for habitual use. As a general conclusion, sleep patterns of Italian adolescents seem to be similar to those of previous studies carried out in other countries. The slight differences found may be due to different sociocultural contexts, as well as data collection methods, or age groupings, or differences in formulation of questions related to sleeping habits and sleep difficulties. Our results also point out that Italian adolescents experience more unhealthy sleeping habits and difficulties in late adolescence. Age and, in some cases, sex are important explanatory factors.

In this sample of Italian teenagers, we observed a marked prevalence of sleep irregularity and unhealthy sleep habits, shorter sleep duration, daytime sleepiness, more attention problems, poor school performance, and a tendency to use stimulant substances in males; however, sleep problems were more common among the girls. This difference became stronger as age increased; in the older age group there was a marked prevalence of sleep problems in girls.

This study confirms that the roots of sleep problems may lie in the adolescent period and that a complexity of contributing factors (cultural, biological, and developmental) may influence sleeping habits and problems. Therefore multiple points of intervention for prevention and change should start as early in the life course as possible to alert adolescents, parents, educators, and health officials to the dangers of unhealthy and irregular sleeping habits in adolescence.

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