

서울 거주 중 · 고등학교 학생의 학년별 수면 양상

Sleep Patterns of Middle and High School Students in Seoul

송형석¹ · 박영민¹ · 남 민² · 김 린¹

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■ ABSTRACT

Objectives: It is been reported that sleep patterns change significantly during the adolescent years. In Korea, the sleep patterns of adolescents have not been investigated systematically. The authors performed preliminary study about sleep patterns of middle and high school students in Seoul before nationwide study.

Methods: The authors selected one of middle and high schools located in typical middle class area in Seoul. The study was performed during the periods when examination or vacation did not affect the sleep cycle. Fifty to one hundred male and female students were selected from one school year each. One of investigators explained the purposes and methods of this study to the students and gave additional explanation to the teachers in charge. We designed a questionnaire for subjects to describe the nap time, bedtime, sleep latency, total sleep time, rise time and sleep efficiency, and the students recorded sleep logs for seven days including weekend. Eight hundred three students answered the questionnaires. Among them, we selected the subjects who recorded sleep logs at least three days and filled up the questionnaires completely. Finally, seven hundred seventy one subjects were included in this study. Weekend was defined as the time from Saturday morning to Sunday morning, and Sunday sleep patterns were treated separately.

Results: Across the six school years, school - night bedtimes were delayed one hundred twenty four minutes and school - ight rise times were advanced by thirty five minutes. School - night total sleep times were decreased by one hundred fifty eight minutes, and weekend bedtimes were delayed by one hundred twenty five minutes. The students tended to oversleep on weekends, and the mean of weekend oversleep was ninety six minutes. But, bedtime in weekends was not delayed. Daytime sleep, sleep latency and sleep efficiency were not changed greatly across six school years. Total sleep time of female students was decreased significantly between third middle school year and first high school year, but time of male students was decreased between first and second high school year.

Conclusion: It is supposed that sleep deficiency of middle and high school students in Seoul was due to delayed bedtimes and advanced rise times across the school years. *Sleep Medicine and Psychophysiology 2000 ; 7(1) : 51-59*

Key words: Sleep patterns · Adolescents · School year.

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연구대상 및 방법

1. 연구대상

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3. 통계방법

SPSS - PC for windows 7.0

Table 1. Sleep variables of school night and weekend by grades

	M 1 N = 83(SD)	M 2 N = 106(SD)	M 3 N = 102(SD)	H 1 N = 155(SD)	H 2 N = 166(SD)	H 3 N = 159(SD)	F	Bonferroni
School night BT	2327(0.93)	0005(0.87)	0016(1.10)	0026(0.91)	0023(0.87)	0131(0.87)	67.24***	1 < 2,3,4,5 < 6
Weekend BT	2324(1.19)	0004(1.25)	0017(1.53)	0035(1.11)	0037(1.45)	0129(1.75)	27.70***	1,2,3,4,5 < 6
School night RT	0714(0.59)	0716(0.51)	0723(0.52)	0707(0.53)	0632(0.55)	0639(0.47)	60.32***	1,2,3 > 4 > 5,6
Weekend RT	0750(1.52)	0821(1.48)	0818(1.57)	0811(1.61)	0831(2.15)	0816(1.97)	NS	
School night TST	7.73(1.09)	7.15(0.86)	6.98(1.18)	6.62(0.81)	6.09(0.90)	5.10(0.94)	118.45***	1 > 2,3,4 > 5 > 6
Weekend TST	8.41(1.87)	8.25(1.68)	7.89(2.14)	7.56(1.80)	7.83(2.00)	6.71(2.23)	12.05***	1,2,3,4,5 > 6
School night WTS	0.05(0.14)	0.02(0.09)	0.09(0.31)	0.07(0.18)	0.05(0.12)	0.01(0.05)	4.67***	
Weekend WTS	0.02(0.10)	0.02(0.14)	0.13(0.43)	0.04(0.19)	0.07(0.33)	0.02(0.11)	NS	

*** : p<0.001, ** : p<0.01

M1 - M3 : Grades of middle school

BT : Bedtime

TST : Total sleep time(hours)

H1 - H3 : Grades of high school

RT : Rise time

WTS : Waking time during sleep(hours)

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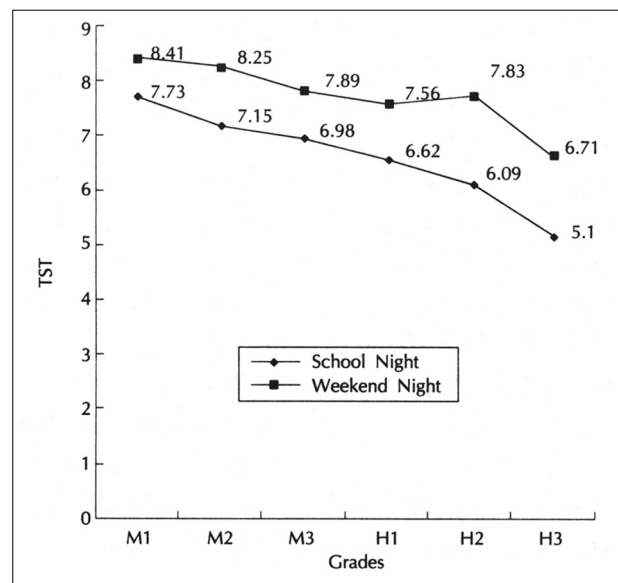


Fig. 1. School night and weekend nocturnal total sleep time by school years. M1-M3 : grades of middle school, H1-H3 : grades of high school, TST : total sleep time(hours).

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Table 2. Sleep latency and sleep efficiency by grades

	M 1 N = 83(SD)	M 2 N = 106(SD)	M 3 N = 102(SD)	H 1 N = 155(SD)	H 2 N = 166(SD)	H 3 N = 159(SD)	F	Bonferroni
School night SL	15.09(10.08)	15.13(13.23)	18.25(14.51)	13.53(11.64)	15.35(17.75)	14.56(11.71)	NS	
Weekend SL	18.51(19.22)	13.70(24.61)	21.54(20.20)	14.81(18.34)	12.91(15.35)	13.15(14.94)	3.98**	
School night SE	91(0.08)	94(0.06)	89(0.10)	91(0.08)	92(0.07)	91(0.08)	4.38**	
Weekend SE	92(0.07)	95(0.06)	89(0.11)	92(0.09)	93(0.07)	93(0.08)	4.87***	M3

*** : p<0.001, ** : p<0.01

M1-M3 : Grades of middle school

H1-H3 : Grades of high school

SL : Sleep Latency(minutes)

SE : Sleep Efficiency(%)

: Significantly decreased

Table 3. Weekend oversleep and delayed sleeping by grades

	M 1 N = 50(SD)	M 2 N = 78(SD)	M 3 N = 72(SD)	H 1 N = 84(SD)	H 2 N = 76(SD)	H 3 N = 107(SD)	F	Bonferroni
Weekend oversleep [†]	0.70(1.72)	1.13(1.55)	1.19(2.47)	1.20(1.97)	2.51(2.44)	2.08(2.32)	12.95***	1,2,3,4<5,6
Weekend delay [†]	-0.06(1.00)	-0.01(1.05)	-0.01(1.36)	0.15(0.97)	0.23(1.34)	-0.04(1.47)	NS	

*** : p<0.001, ** : p<0.01

M1 - M3 : grades of middle school

H1 - H3 : grades of high school

Weekend oversleep is the difference of total sleep time between school night and weekend night

Weekend delay is the difference of bedtime between school night and weekend night

Numbers denote hours

Table 4. School day and weekend nap

	M 1 N = 50(SD)	M 2 N = 78(SD)	M 3 N = 72(SD)	H 1 N = 84(SD)	H 2 N = 76(SD)	H 3 N = 107(SD)	F	Bonferroni
School day nap	0.11(0.31)	0.07(0.26)	0.17(0.40)	0.21(0.39)	0.70(0.79)	0.43(0.62)	28.49***	H2
Weekend nap	0.04(0.26)	0.07(0.40)	0.26(0.83)	0.24(0.78)	0.82(1.31)	0.46(0.87)	14.50***	H2
Sunday nap	0.08(0.37)	0.04(0.27)	0.17(0.52)	0.21(0.61)	0.64(1.14)	0.43(0.89)	12.38***	H2

M1 - M3 : Grades of middle school
Numbers denote hours
H1 - H3 : Grades of high school
: Significantly increased

Table 5. Sleep patterns on sunday by grades

	M 1 N = 83(SD)	M 2 N = 106(SD)	M 3 N = 102(SD)	H 1 N = 155(SD)	H 2 N = 166(SD)	H 3 N = 159(SD)	F	Bonferroni
SD-night TST	7.59(1.24)	7.39(1.24)	7.30(1.56)	6.70(1.12)	6.23(1.43)	5.16(1.19)	64.89***	1,2,3>4,5>6
SD-night BT	2332(1.04)	2354(1.20)	0004(1.41)	0015(1.04)	0011(1.44)	0128(1.12)	38.38***	1,2,3,4,5<6
SD-night WTS	0.05(0.19)	0.03(0.24)	0.09(0.35)	0.04(0.22)	0.04(0.14)	0.01(0.05)	NS	
MD-morning RT	0710(0.65)	0720(0.52)	0727(0.64)	0700(0.56)	0628(0.49)	0638(0.53)	64.74***	1,2,3>4>5,6
SD-night SE	91(0.09)	95(0.06)	88(0.12)	92(0.10)	93(0.09)	92(0.08)	5.79***	M3

*** : p<0.001, ** : p<0.01

M1 - M3 : Grades of middle school

SD : Sunday

TST : Total sleep time(hours)

RT : Rise time

SE : Sleep efficiency(%)

H1 - H3 : Grades of high school

MD : Monday

BT : Bedtime

WTS : Waking time during sleep(hours)

: Significantly decreased

Table 6. Sleep variables of school night by sex & grades

	M 1 N = 50(SD)	M 2 N = 78(SD)	M 3 N = 72(SD)	H 1 N = 84(SD)	H 2 N = 76(SD)	H 3 N = 107(SD)	F	Bonferroni
School night BT	M 2326(0.92)	0010(0.90)	0028(1.12)	0031(1.00)	0035(0.95)	0134(0.92)	39.44***	1<2,3,4,5<6
	F 2328(0.95)	2354(0.78)	2349(0.90)	0021(0.78)	0014(0.77)	0126(0.77)	30.93***	1,2,3,4,5<6
School night RT	M 0712(0.71)	0716(0.50)	0723(0.54)	0714(0.54)	0634(0.49)	0636(0.47)	39.28***	1,2,3,4>5,6
	F 0717(0.35)	0714(0.53)	0722(0.46)	0658(0.48)	0630(0.61)	0646(0.46)	23.06***	1,2,3>4>5,6
School night TST	M 7.73(1.15)	7.09(0.79)	6.78(1.19)	6.66(0.90)	5.93(1.01)	5.00(0.98)	73.91***	1>2,3,4>5>6
	F 7.72(1.01)	7.32(1.02)	7.48(0.99)	6.57(0.68)	6.22(0.77)	5.31(0.84)	50.43***	1,2,3>4,5>6

*** : p<0.001, ** : p<0.01

M1 - M3 : Grades of middle school

BT : Bedtime

TST : Total sleep time(hours)

M : Male

H1 - H3 : Grades of high school

RT : Rise time

WTS : Waking time during sleep(hours)

F : Female

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요 약

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REFERENCES

1. Carskadon MA. Sleeping and waking disorders: Indications and techniques. Second Decade, In C. Guilleminault (Ed.), Menlo Park, Addison-Wesley; 1982

2. Carskadon MA. Patterns of sleep and sleepiness in adolescents. *Pediatrician* 1990a;17:5-12
3. Carskadon MA, Vieira C, Acebo C. Association between puberty and delayed phase preference. *Sleep* 1993;16:258-262
4. Carskadon MA, Mancuso J. Sleep habits in high school adolescents: Boarding versus day students. *Sleep Research* 1988;17:74
5. Bearpark HM, Michie PT. Prevalence of sleep/wake disturbances in Sydney adolescents. *Sleep Research* 1987;16:304
6. Strauch I, Meier B. Sleep need in adolescents: A longitudinal approach. *Sleep* 1988;11:378-386
7. Carskadon MA, Harvey K, Duke P, Anders TF, Dement WC. Pubertal changes in daytime sleepiness. *Sleep* 1980;2:453-460
8. Carskadon MA, Orav EJ, Dement WC. Evolution of sleep and daytime sleepiness in adolescents. *Sleep/Wake Disorders: Natural history, epidemiology, and long term evolution*, In C. Guilleminault and E. Lugaresi (Eds.), New York, Raven Press;201-216
9. Allen R. Social factors associated with the amount of school week sleep lag for seniors in an early starting suburban high school. *Sleep Research* 1992;18:132
10. Williams R, Karacan I, Hirsch C. *EEG of Human Sleep*, New York, Wiley & Sons;1974
11. Wolfson AR, Carskadon MA. Sleep schedule and daytime functioning in adolescents. *Child Dev* Aug 1998;4(69):875-887
12. Gau SF, Soong WT. Sleep problems of junior high school students in Taipei. *Sleep* 1995;8(18):667-673
13. Manni R, et al. Poor sleep in adolescent, A study of 869 17-year-old Italian secondary school students. *J Sleep Res* 1997;6:44-49
14. Kathryn AL, Geoffrey MG, Delois W. Gender differences in sleep patterns for early adolescents. *J Adolesc Health* Jan 1999;1(24):16-20
15. Price VA, Coates TJ, Thoresen CE. Prevalence and correlates of poor sleep among adolescents. *Am J Dis Child* 1978;132:583-586
16. White L, Hahn PM. Sleep questionnaire in adolescents. Abstract presented at the 20th annual meeting of the Association for the Psychophysiological Study of Sleep, Mexico City;1980
17. Carskadon MA. Determinants of daytime sleepiness: Adolescent development, extended and restricted nocturnal sleep. Dissertation submitted to Stanford University in partial fulfillment of requirement for the degree of doctor of philosophy;1979
18. 대한민국 통계청 자료. 1999년 생활시간조사 결과;2000