

Editorial

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## Sleepless in America : School start times

In America, in the early 1990s, Mary Carskadon et al. (1993), showed that the circadian biology drives the delayed sleep-wake patterns of adolescents and "our current understanding of adolescent sleep patterns may need revision". Since then many American studies have examined the effects of sleep loss on young people and the effects of school start times.

Many school students in America start their lessons before 8 am. Some even begin at 7:00 am, leaving home around 6:30 am. A growing body of evidence has been used to challenge school start times suggesting that better student health, wellbeing and academic grades could be achieved with later start times.

In 2012, many campaigners continue to use the emerging research studies to support efforts to influence their local school boards and change the start of the school day.

For example, research compiled by Stacy Simera, (2011), is used to advocate for start times after 8:30 am for 6th through 12th grades students in Ohio.

Dennis Nolan's website (2012), contains an exhaustive compilation of research that is updated and used to influence later school start times in California as well as providing support for campaigners in other states.

Figures from the National Sleep Federation (2012), suggest that, "...individual schools or districts in 19 states have pushed back their start times, and more than 100 school districts in an additional 17 states are considering delaying their start times".

### Adolescents' sleep

Carskadon et al., (1980) showed that adolescents require at least as much sleep as they did as children, generally 8.5 to 9.25 hours each night. Research also showed that many adolescents undergo a sleep phase delay that results in them both falling asleep and waking up later. Thus the typical adolescent's natural time to fall asleep may be 11 pm or later; because of this change in their internal clocks, teens may feel wide awake at bedtime, even

when they are very tired (Wolfson & Carskadon, 1998). On a school day this leads to sleep deprivation due to waking up early for school, and not getting the 8.5 - 9.25 hours of sleep that they need. It also causes irregular sleep patterns affecting the quality of sleep, since the weekend sleep schedule often ends up being much different from the schoolday schedule as teenagers try to catch up on lost sleep (Dahl & Carskadon, 1995).

Carskadon et al., (1998), also found that more mature adolescents had later circadian rhythm timing, based on melatonin secretions in saliva samples. This showed that melatonin secretion occurred at a later time in adolescents as they mature; thus, it is difficult for them to go to sleep earlier at night. The melatonin secretion also turns off later in the morning, which makes it harder to wake up early.

### School start times

In 1997, following the medical research that found that teenagers have biologically different sleep and wake patterns, the seven comprehensive high schools in the Minneapolis Public School District shifted the school start time from 7:15 a.m. to 8:40 a.m. In 2002, Kyla Wahlstrom published the results of a 4-year study that affected more than 12,000 secondary students. Among the many findings were: "Numerous 'beneficiaries' of a later high school start time emerge from the evidence in the study. The students benefited the most. For example, attendance rates for all students in grades 9, 10, and 11 improved in the years from 1995 to 2000, with the greatest rate of improvement for grade 9 students. Perhaps the most surprising finding was the discovery that Minneapolis high school students continue to get an hour's more sleep each school night than is the case for students whose schools begin an hour earlier. This is contrary to the fears and expectations that a later start would result in students staying awake an hour later on school nights. Instead, students in Minneapolis high schools get 5 more hours of sleep per week than do their peers in schools that start earlier in the

day."

"Similar studies on students have recently been completed in Brazil, Italy, and Israel .... Those studies have revealed that the sleep-wake cycle for students in those countries is nearly identical to that found among students in the United States. In other words, the sleep phase shift occurring in adolescents' neurological systems is not culturally based; it is, instead, a phenomenon of human development." (Wahlstrom, 2002).

A study in Kentucky, in 1998, focused on improved safety as a successful outcome of later school start times. A school district in Fayette County moved its start time from 7:30 am to 8:30 am, and students averaged up to 50 minutes more sleep per night. Comparisons in the car collision rates of Fayette County teenagers revealed that the car crash rate for 16-18 year olds dropped following the change (Danner et al. 2008).

### Academic performance

Some of the studies that consider later school start times and academic performance include:

A study by Judith Owens et al. (2010), examined the impact of a 30-minute delay in school start time at a Rhode Island school on 210 adolescents' sleep, mood, and behavior. After the start time delay, mean school night sleep duration increased by 45 minutes, and average bedtime advanced by 18 minutes. The percentage of students getting less than 7 hours of sleep decreased by 79.4%, and those reporting at least 8 hours of sleep increased from 16.4% to 54.7%. Students reported significantly more satisfaction with sleep and experienced improved motivation. Daytime sleepiness, fatigue, and depressed mood were all reduced. Most health-related variables, including Health Center visits for fatigue-related complaints, and class attendance also improved. A modest delay in school start time was associated with significant improvements in measures of adolescent alertness, mood, and health. The results of this study support the potential benefits of adjusting school schedules to adolescents' sleep needs, circadian rhythm, and developmental stage.

Peter Hinrichs' research used data from 1993-2002 and looked at the impact of later school start times on academic performance using statewide standardized tests. The results did

not suggest an effect of school starting times on achievement. (Hinrichs, 2011).

Eric Eidea and Mark Showalter, (2012), explored the relationship between the amount of sleep adolescents receive and their performance on standardized tests and then estimate the "optimal" hours of sleep that maximize student test score performance. Results showed a statistically significant relationship between sleep and test scores using nationally representative data on students ages 10 through 19. Optimal sleep declines substantially by age: optimal sleep for 10-year-olds is about 9.0-9.5 hours, while for 18-year-olds it is slightly under 7 hours.

Finley Edwards used data from 1999-2006 to study the impact of start times on academic performance. Using variation in start times within and across schools he found that starting school one hour later leads to a three percentile point gain in both math and reading test scores. Using only variation in start times within schools over time, the effect is a two percentile point gain. Evidence was also shown for an association with later start times and decreased absences, less time spent watching television and a greater amount of time spent on homework. Edwards suggested that these factors may explain why later starting students have higher test scores. (Edwards, 2012).

### Complex problems

Some of the complexities of changing school start times can arise due to the need to involve many people, including - parents, teachers, students, principals, school boards, and healthcare professionals. In addition, problems associated with re-organising transportation and extracurricular activities can be enough to delay or put-off attempts to bring about change. However, as the debates continue across America, the movement to alter school start times appears to be gaining momentum.

*"Even without the pressure of biological changes, if we combine an early school starting time - say 7:30 am, which, with a modest commute, makes 6:15 am a viable rising time--with our knowledge that optimal sleep need is 9 1/4 hours, we are asking that 16-year olds go to bed at 9 pm. Rare is a teenager that will keep such a schedule. School work, sports practices, clubs, volunteer work, and paid employment take precedence. When biological changes are factored in, the ability even to have merely 'adequate' sleep is lost."* Mary Carskadon.

## References

- Carskadon, M.A., Harvey, K., Duke, P., Anders, T.F., Litt, I.F., and Dement, W.C. (1980). Pubertal changes in daytime sleepiness. *Sleep*. 2: 453-460.
- Carskadon, M.A., Vieira, C., and Acebo, C. (1993). Association between puberty and delayed phase preference. *Sleep*. 16(3):258-262.  
[http://www.sleepforscience.org/stuff/contentmgr/files/d2639df6ae30de274482fbac22473883/pdf/carskadon\\_etal\\_1993.pdf](http://www.sleepforscience.org/stuff/contentmgr/files/d2639df6ae30de274482fbac22473883/pdf/carskadon_etal_1993.pdf)
- Carskadon MA, Wolfson AR, Acebo C, Tzischinsky O, and Seifer R. (1998), Adolescent Sleep Patterns, Circadian Timing, and Sleepiness at a Transition to Early School Days. *Sleep*. 15;21(8):871-81.  
<http://sleepforscience.com/stuff/contentmgr/files/5598e427689cd7382cdb641d6b672c2a/pdf/carskadonschltrans1998.pdf>
- Dahl, R.E. and Carskadon, M.A. (1995). Sleep and its disorders in adolescence. In *Principles and Practice of Sleep Medicine in the Child*, R.Ferber and M.H. Kryger (Eds.), W.B. Saunders, Philadelphia, 1995, pp. 19-27.
- Danner, Fred. and Phillips, Barbara. (2008). Adolescent Sleep, School Start Times, and Teen Motor Vehicle Crashes. *Journal of Clinical Sleep Medicine*, Vol. 4, No. 6.  
<http://www.sleepeducation.com/resources/lessons/teensdrowsydriving/schoolstarttimes.pdf>
- Edwards, Finley. (2012). Early to Rise? The Effect of Daily Start Times on Academic Performance. *Economics of Education Review* Available online 20 July 2012.  
<http://www.sciencedirect.com/science/article/pii/S027277571200830?v=s5>  
... and ...  
<https://netfiles.uiuc.edu/fedward2/www/Edwards%20Start%20Times.pdf>
- Eidea, Eric, and Showalter, Mark. (2012). Sleep and Student Achievement. *Eastern Economic Journal* advance online publication 23 January 2012; doi: 10.1057/ej.2011.33.  
<http://www.palgrave-journals.com/ej/journal/vaop/ncurrent/full/ej201133a.html>
- Hinrichs', Peter. (2011). When the Bell Tolls: The Effects of School Starting Times on Academic Achievement. *Education, Finance and Policy*. Vol. 6, No. 4, Pages 486-507.  
[http://www.mitpressjournals.org/doi/abs/10.1162/EDFP\\_a\\_00045](http://www.mitpressjournals.org/doi/abs/10.1162/EDFP_a_00045)
- Owens, Judith, Belon, Katherine, and Moss, Patricia. (2010). Impact of Delaying School Start Time on Adolescent Sleep, Mood, and Behavior. *Arch Pediatr Adolesc Med*. 164(7):608-614.  
<http://archpedi.jamanetwork.com/article.aspx?articleid=383436>
- National Sleep Federation. (2012). School Start Time and Sleep <http://www.sleepfoundation.org/article/sleep-topics/school-start-time-and-sleep>
- Nolan, Dennis. (2012). The Impact of School Start Times on Adolescent Health and Academic Performance (website)  
<http://schoolstarttime.org>  
... and ...  
<http://www.scribd.com/doc/84533328/The-Impact-of-School-Start-Times-on-Adolescent-Health-and-Academic-Performance-Research-Paper-Alternate-Format>
- Simera, Stacey. (2011). Research that supports school start times after 8:30 am for 6th through 12th grades.  
<http://www.slideshare.net/ssimera/adolescent-sleep-research-for-linked-in-6584580>
- Wahlstrom, Kyla. (2002). Changing Times: Findings From the First Longitudinal Study of Later High School Start Times. *NASSP Bulletin* Vol. 86:633. <http://www.cehd.umn.edu/carei/publications/documents/Bulletin200212Wahlstrom.pdf>
- Wolfson, A.R. and Carskadon, M.A. (1998). Sleep schedules and daytime functioning in adolescents. *Child Development* 69(4):875-887, 1998. [http://sleepforscience.com/stuff/contentmgr/files/73fcbc8090d3aca81567db2c113cf0e8/pdf/wolfson\\_carskadon1998.pdf](http://sleepforscience.com/stuff/contentmgr/files/73fcbc8090d3aca81567db2c113cf0e8/pdf/wolfson_carskadon1998.pdf)

## Other useful websites

<http://sleepforscience.org/about/><http://www.sleepfoundation.org/article/sleep-topics/school-start-time-and-sleep>

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