



SWAMPSCOTT PUBLIC SCHOOLS Superintendent of Schools

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TO: Swampscott School Committee
FROM: Matthew H. Malone, Ph.D.
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RE: Superintendent's Report on Current Research

The enclosed research was compiled by Ms. Christine DiPilato, Assistant Principal, Swampscott High School.

Circadian Rhythms & Adolescent Learning

Christine M. DiPilato

For the last twenty years, serious efforts have gone into the study of circadian rhythms, or the sleep/wake pattern, of adolescents. Mary Carskadon, Director of the Chronobiology/Sleep Research Laboratory at Bradley Hospital in East Providence, R.I. and Professor of Psychiatry and Human Behavior at the Brown University School of Medicine, has discovered that adolescent sleep patterns are significantly impacted from the onset of puberty to the late teen years by the brain chemical melatonin (Carskadon et al., 1998). In adolescents, the brain secretes melatonin, the chemical responsible for feeling sleepy, from approximately 11pm until approximately 8am. This nine hour time span represents the amount of sleep necessary for healthy living and optimal performance (<http://www.stanford.edu/~dement/adolescent.html>). In other words, due to their biological make-up, typical teens are not able to fall asleep much before 11pm and their brains remain in "sleep mode" until about 8am regardless of the time that they go to bed (www.education.umn.edu, 2000). In prepubescent and adult brains, melatonin is released by the brain approximately two hours earlier (from 9pm to 6am) allowing younger children and adults to wake and function earlier in the morning.

The impact of this medical research on educational practice is clear. Early start times at high schools across the world require students to rise long before their bodies are ready. With start times ranging from 7:15-8am, students are required to wake up as early as 5:30am to prepare for the day and begin their commute to school. The National Institute of Mental Health agrees,

“imposing too early start times on children require unrealistic bedtimes to allow for adequate sleeping” (nimh.nih.gov). In order for a student at Swampscott High School to acquire 9 hours of sleep, she would need to go to bed between 9 and 9:30pm, two hours before her brain allows her to start shutting down; and yet, this early bed time would prove insufficient, as research shows that students need an additional hour at the end of sleep (during REM phase sleep) rather than the beginning.

The late bed times followed by early morning school hours result in sleep deprivation and sleep lag syndrome; common problems among U. S. teenagers (Wahlstrom, 2002). Professor Kyla Wahlstrom at the Center for Applied Research and Education Improvement (CAREI) in the College of Education and Human Development at the University of Minnesota conducted the first longitudinal study of later high school start times and found that sleep deprivation can have many negative consequences on cognition including:

memory deficits (Anderson, Petros, Beckwith, Mitchell, & Fritz, 1991; Dahl, 1996), impaired performance and alertness (Barron, Henderson, & Spurgeon, 1994; Carskadon, 1994; Pilcher & Huffcutt, 1996), as well as time-on-task decrements and optimum response shifts (Cooper, 1994; Wolfson & Carskadon, 1996). The specific loss of REM (rapid eye movement) phase sleep also results in memory loss (Poirel & Larouche, 1987). Callan (1995) found that REM sleep affects information processing, whereas Maas (1995) listed the consequences of REM sleep loss for adolescents to include unintended sleep; increased irritability, anxiety, and depression; decreased socialization and humor; hypersexuality; mental fatigue; and decreased ability to handle complex tasks and be creative. (Wahlstrom, 2002)

School districts around the country, cognizant of this research, have been engaging in discussions about the importance of sleep and school start times. Locally, Lynnfield and Hingham have altered their start time, and both Shrewsbury and Boston are gearing up to make changes in the year to come. Districts and states around the country are evaluating their start times to better match student learning rhythms with the school's instructional programs. The data that Wahlstrom collected in her longitudinal in Minneapolis (please see attached) “combined with current knowledge of physiology of adolescent maturation and brain development, give some clear markers to districts concerned with the overall well-being of their teenage students” (Wahlstrom, 2003).

At the forefront of school start time discussions is the health and welfare of our adolescent students. As a school, it is our job to provide the best learning environment for our students so that we may challenge them each day to give us their all, to struggle and grow, and to take risks knowing that we will support them along the way. Though our students can only give us their all when they have their all to give. As parents, teachers, and administrators, we owe it to our students to continue challenging the regularities of our school day in hopes of providing a school community that supports the physical, emotional, and intellectual growth of *all* of our students.

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“Later start times for high school students”

<http://www.education.umn.edu/Pubs/ResearchWorks/sleep.html> (2002)

“They Need More Sleep”

<http://www.stanford.edu/~dement/adolescent.html>

Mayo Clinic Website

<http://www.mayoclinic.com/health/teens-health/CC00019>

Theoretical Perspectives

The findings of adolescent sleep researchers have, within the past 12 years, provided compelling evidence that sleep deprivation and sleep lag syndrome are common problems among U.S. teenagers. Adolescents are substantially

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