

# **High School Start Time Study Committee**

## **Final Report December 2, 1999**

### **Introduction**

In February of 1999, Mrs. Darlene Mickey, writing for the Arlington County School Board, asked Mr. Peter Bruce, Chairman of the Advisory Council for Instruction, to undertake a study of secondary school start time. There had been some discussion and comments from citizens that the current high school start time was too early. The ACI formed a subcommittee to look at this issue, to review available research, to sample public opinion, to gather an initial impression from professional staff and to present findings to the School Board.

The Committee presented an Interim Report on June 17, 1999.  
The report along with all Appendices is submitted as Folder #1.

During the year of study, members of the committee attended workshops on sleep needs of adolescent humans, reviewed literature, contacted experts conducting research in both the academic and health views of the topic, probed Internet web sites and interviewed Arlington parents and high school students.

We have learned about the effects of sleep deprivation on the health, safety, biological and sociological function of adolescents and what we have learned has led us to believe that sleep deprivation most certainly does impact on academic achievement.

### **Review of Research**

Anecdotal evidence that teenagers tend to sleep later in the morning has been available for a long time. Only in the last decade or two has a more scientific approach been taken for investigating this phenomenon. The principal conclusions so far are:

- Daytime alertness declines in adolescence even when sleep is held constant, suggesting that adolescents need more sleep than do pre-adolescents. This we know from a long term Stanford University study in which 10-12 year olds were given fixed identical sleep schedules (10pm to 8am) and closely monitored. The more physically mature youngsters were then compared to the less physically mature on an alertness scale (the scale measures how long it takes a person to fall asleep at various points during the day). Throughout the day, the more physically mature youngsters were sleepier than the less mature youngsters.

- In addition to a greater overall need for sleep, children's biological clocks shift during adolescence to a later "bedtime" and later "wakeup" time. This we know from measurements of the secretion of melatonin, a hormone closely correlated with sleepiness and alertness. When adolescents were placed on identical light/dark cycles (to control for external influences on the clock mechanism), mature subjects had a later onset and termination of melatonin. One study found that adolescents do not get sleepy to release into night sleep before 10:30 to 11:00 P.M. and that they do not clear from that sleep before 8:00 A.M.
- When confronted with a shift to an earlier school start time, students do not compensate by going to bed earlier. This we know from close monitoring of the same group of youngsters at two points – at the end of middle school (8:25 start) and the beginning of high school (7:20 start). Despite the 65 minute shift, average bedtime did not change at all – averaging 10:40 pm in both cases. This is consistent with our knowledge (above) that, as adolescents get older, their biological clocks tell them to go to sleep later.
- The biological clock's strongest "sleep signal" occurs just before the clock's wakeup time. When people have adequate sleep, this may be offset by a different biological process that signals "I've had enough sleep," but this signal is absent when there is a sleep deficit (and this is the case with most teenagers in the studies).
- The biological clock is a circadian one, meaning that it tries to synchronize itself with the 24-hour day, using light-dark signals. If wakeup time is in the dark, no signals are sent to the biological clock to realign itself and both the "bedtime" and "wakeup" signals remains late.
- In a report published in 1997 by the NIH Working Group on Problem Sleepiness, Mary Carskadon reports that children between the ages of 10 years to 17 years require an average of 9.2 hours of sleep. Rarely is this ideal met.
- When sleep is restricted over a series of nights, a cumulative decline in waking alertness follows.

The conclusion from this research is that starting high school at 7:30 produces sleepy students in class. Their biological clocks are shifted to a later hour, yet they must wake up earlier. Their clocks prevent them from compensating by going to bed earlier. Their early morning hours are not just minimally impaired -- we are putting them in classrooms at the time of maximum sleepiness.

### ***Academic Performance and Readiness Effects of Sleep Deprivation***

- A study of 10<sup>th</sup> graders with a 7:20 am start time showed that, when tested at 8:30 am, alertness scores showed that most were in the "pathological" range (requiring only 5 minutes to fall asleep) and that 50% had a sleep pattern similar to that seen in narcolepsy (a sleep disorder in which wakefulness is interrupted with brief periods of deep sleep).
- Although the committee encountered no large-scale studies linking test scores and sleep deprivation, the biological evidence suggests that sleep deprivation impairs academic performance. In studies based on self report from students, poorer grades have been associated with short nocturnal sleep. (Allen, 1992 University of North Carolina). Inattentiveness, short attention span, reduced comprehension are all self reported in the sleep deprived. (Kelman.)
- Carskadon in a 1990 study for NIH reported that the sleepy teenager potentially may be at greater risk to abuse caffeine, nicotine, and alcohol.
- It also appears that insufficient sleep affects mood, attention and behavior in teenagers. Anxiety and depression have also been linked in several studies.

Note: Except where noted, the above summary of research results draws extensively from Mary Carskadon's review of her own and others' studies, published in the January, 1999, *Phi Delta Kappan* (see Resource Folder #2).

### ***Health and Safety Effects of Sleep Deprivation***

- The National Highway Safety Research Center at University of North Carolina reports that drivers with increased sleepiness from inadequate sleep or sleep deprivation or a sleep disorder have performances lapses, slowed reaction times and an accelerated loss of attentional vigilance. (Dinges 1992) Moreover sleepy subjects may briefly fall asleep in an unpredictable fashion (microsleeps) and be temporarily unaware of their surroundings.
- The frequency of crashes in which the driver was judged by state police to not be intoxicated but judged to have been asleep are highest for young people between the ages of 16 and 20. The highest incidence of time of occurrences for sleepy drivers are between 5 A.M. and 8 A.M. "Characteristics of Crashes Attributed to the Driver Having Fallen Asleep", Pack et al. Pulmonary & Critical Care Division, Department of Medicine, University of North Carolina. See entire Article in Resource Folder #2
- According to the NHSTSA expert panel on Driver Fatigue and Sleepiness "Young people, and males in particular, were the most likely to be involved in fall asleep crashes" (Pack et al, 1995) "Fall asleep crashes may kill more young Americans than alcohol related crashes."(Mark Mahowald, M.D. in the quarterly *Sleep Medicine Alert*, Summer 1999, published by the National Sleep Foundation.) (See Resource Folder #2.)

- Carskadon reports on the impact of employment and extracurricular activities on sleep patterns for teens. Her study shows teens to be at risk on the job when they are sleepy and at risk in the drive to and from work. Many reported falling asleep at the wheel as often as “once a week”. These microsleeps are often unreported as they are “drive off the road” episodes.
- Many students in the Carskadon study, worked or carried extracurricular activities for 20 to 30 hours a week. She writes that it is often the brightest, most engaged, most energetic teenager who must confront the greatest number of risks and vulnerabilities. “Adolescent Sleepiness: Increased Risk in a High Risk Population”, Mary Carskadon, Volume 5, Number 4/ Volume 6, Number 1, *Alcohol, Drugs and Driving*. The entire article may be found in the Resource Folder #2.
- The opportunity that early dismissal present for anti-social, criminal and high-risk behavior has also been cited as a concern. According to Arlington County Deputy Police chief John Haas, “We would love to see down time between high school dismissal time and the start time for extracurricular activities eliminated entirely, thus eliminating opportunities for mischief and criminal activity.”

## **Extra Curricular Activities**

High school students in Arlington are very similar to the students studied in other parts of the country. Bright, energetic, and hard working, they have a wide range of optional activities. (See the Curry Report Appendix, Folder #1.) Concern that a change in start time would adversely affect participation in beneficial activities, the committee took a look at start times for these activities.

We found that there is a “down time” between the dismissal from school and games or events. For games and performances, this lag time is usually over an hour and, in most cases, could accommodate a later high school start time.

For practices and rehearsals, the lag could be anywhere from 20 to 35 minutes or more. Would this preclude a later start time? Not necessarily. While creative scheduling would be required, commitments with other school systems and transportation requirements are much less of an issue for these events than for scheduled games and performances.

A detailed analysis of timing of extra-curricular high school activities can be found in the Curry Report Appendix, Folder #1

## **Community Surveys**

### ***Survey of Parents of High School Students***

The Committee worked through several meetings to develop and refine a telephone questionnaire for high school parents and guardians. The questionnaire used in this survey is attached. It seeks opinions on the best and worst start times for high school. It also attempts to learn whether concerns raised by research studies were shared by parents, and whether a change in high school start time would adversely affect family life, disrupt students' work schedules, interfere with extra-curricular activities. Information was also sought on how students got to school.

This questionnaire, and others for elementary school parents, middle school parents and high school students, were reviewed by Dr. Jan Siegel, Coordinator, Pupil Services, and Dr. Kathy Wills, Director, Planning and Assessment, and approved by Superintendent Smith. Dr. Siegel arranged for the surveys to be translated into Spanish, and a Spanish-speaking volunteer contacted Spanish-speaking parents and guardians who did not speak English.

225 high school students (together with information about their parent or guardians) were selected by the Division of Planning and Assessment at random from the population of Arlington high school students as of June 1999. They were divided into sets of 25 students and distributed to volunteers together with instructions on how to conduct a telephone survey of a parent or guardian associated with each student.

7 of the 9 sets were distributed to volunteers and returned with results; of the 175 names represented therein, responses were obtained from 88, for a response rate of just over 50%. The most common reason for nonresponse was failure to reach the person.

#### **Key Points:**

1. 60% of the respondents were concerned about their teenager being too sleepy to learn effectively at 7:30 in the morning.
2. About 75% of the respondents favored a later start time. The most popular start times were 8:30 (34%) and 8:00 (26%). About 20% favored the current start time.
3. For the "least popular" start time, 52% chose "later than 9:00" and 31% chose 7:30. Nobody chose 8:00 or 8:30 as the worst time.

4. About 15% - 20% of the respondents said they shared concerns that a later start time would have an impact on family schedules (including sibling supervision and student work schedules).

### Concerns About Early Start (and Starting Later)

<u>Do you share these concerns about early start?</u>	<u>Yes</u>		<u>No</u>		<u>Uncertain</u>
Child too sleepy to learn early	50	60%	29	35%	4
Child must make up sleep on weekend	45	54%	37	44%	2
Child can't get to bed early	39	47%	43	52%	1
I have concern about unsupervised kids in PM	26	35%	49	65%	0

<u>Do you share these concerns about starting later?</u>	<u>Yes</u>		<u>No</u>		<u>Uncertain</u>
Impact on after school activities	31	38%	42	52%	8
Impact on family AM sched.	16	20%	63	78%	2
Impact on family PM sched.	13	16%	64	79%	4
Problems with sibling supervision	12	15%	62	79%	4
Impact on student work schedule	16	21%	52	68%	9

### Best and Worst Times

What's the best time?

	<u># Choosing</u>	<u>%</u>	<u>(Error Margin)</u>
		<u>Choosing</u>	
7:30	18	20%	(14%-27%)
8:00	23	26%	(18%-34%)
8:30	30	34%	(26%-43%)
9:00	10	11%	(6%-17%)
later	4	5%	(1%-9%)
unsure	3	3%	(1%-7%)
Total	88		

What's the worst time?

	<u># Choosing</u>	<u>%</u>	<u>(Error Margin)</u>
		<u>Choosing</u>	
7:30	25	31%	(22%-40%)
8:00	0	0%	(0%-4%)
8:30	0	0%	(0%-4%)

9:00	6	7%	(2%-12%)
later	42	52%	(43%-62%)
unsure	8	10%	(5%-15%)
Total	81		

## Transportation

	<u>Yes</u>	<u>No</u>
Does your child ride the morning bus?	31 39%	48 61%
Does your child ride the afternoon bus?	40 50%	40 50%
Does your child ride in a carpool?	19 26%	54 74%

31 of the respondents had more than 1 child in high school, 35 had only one. 15% of these children were in 9<sup>th</sup> grade, 28% in 10<sup>th</sup> grade, 36% in 11<sup>th</sup> grade, and 21% in 12<sup>th</sup> grade. 27% attend Yorktown, 33% attend W-L, 33% attend Wakefield, 6% HB, and 2% other.

## Spanish-Speaking Respondents

17 of the respondents were interviewed in Spanish. Results for them did not differ greatly from the overall pattern. They were concerned about their child being too sleepy to learn effectively (13 Yes, 4 No), and they discounted concerns about a later start time's impact on after-school activities (10/6), family morning schedule (13/4), family evening schedule (12/5), sibling supervision (13/4), and the student's work schedule (12/3).

## ***Surveys of Other Groups***

Random samples were also drawn of high school students, middle school parents, and elementary school parents. One set of each was surveyed, yielding 37 respondents total. These groups concurred in the HS parent conclusion that teenagers are too sleepy to learn at 7:30 in the morning (17 Yes, 6 No, not asked of elementary parents). They were asked what they thought was the best time for starting high school, and, like the HS parents, their preference was for a somewhat later start time (17 for 8:00, 12 for 8:30, 7 for other times).

Other questions specific to these groups' circumstances were also asked, but the sample sizes for each group are too small to permit useful analysis. Although adequate sample sizes were initially drawn, the Start Time Committee decided to concentrate its volunteer time on the priority tasks of reviewing research, assessing the schedules for after-school activities, and surveying the parents of high school students. As a result, there were insufficient volunteer man hours to do further surveys of these other groups.

## ***PLANNING FOR CHANGE***

Transportation issues, will need to be revisited with a fresh viewpoint. Bold innovations and adjustments may be necessary. Because of numerous options for education available to high school students in our community, planning for accommodation of all the variants will be substantial.

The ACI, TCI, County Council of PTA's and the Arlington Education Association, and student governments in each of the high schools need to assist in planning and execution of change.

In the course of this study, it came to light that historically, Arlington County High schools have had a later start time than the present school day.

## ***RECOMMENDATION***

We have reviewed the current research and talked to members of our community. We have reflected on our own lives as adolescents and as parents of teen age children.

We strongly believe that continuation of the early start time for high school students is detrimental to student achievement, health and safety. We believe that the evidence in favor of adjusting the school day to the biological needs of young people is overwhelming.

The Arlington County School Board should direct staff to make the necessary adjustments to accommodate a later school start time for high school by the opening of the fall term 2000.

Carpe Diem.

### Curry Appendix - Extra Curricular Activities

Sport	Washington-Lee		Wakefield		Yorktown	
	Practice	Games	Practice	Games	Practice	Games
Baseball				2 or 3 /week		
Varsity	2:30	6:00 or 7:00	2:30	6:00 - 10:00	2:45	5:00 (6 or 7 on Fri)
Jr. V.	2:30	5:30 1/	2:30	6:00- 9:00 1/	2:45	4:30
Basketball						
Varsity	2:30	7:30	6:45	7:30 – 9:00	2:45	7:30
Jr. V.	2:30	5:45	6:45	5:45 (Fri.)	2:45	5:45
Freshman	2:30	4:00	6:45	4:00 (Tues.)	2:45	4:00
Crew	2:30 & 3:30	Sat. morn. Regatta	2:30	Sat. morn. Regatta	2:45	Sat. morn. Regatta
Cross Country	2:30	4:00	2:30	4 to 6(Weds. & Sat.)	2:45	3:00 Saturday invitationals
Field Hockey						
Varsity	2:30	4:00	2:30	4:00	2:45	4:00
Jr. V.	2:30	5:00	2:30	5:00	2:45	5:30
Football						
Varsity	2:45	7:30 (Fri)	2:30	7:30-9:30	2:45	7:30
Jr. V.	2:45	5:45	2:30	5:45	2:45	5:45
Freshman	2:45	5:45	2:30	5:45	2:45	5:45
Soccer 5/						
Varsity	2:30	7:00	2:30	7:00	2:45	7:00
Jr. V.	2:30	5:30	2:30	5:30	2:45	5:30
Freshman	2:30	5:30	2:30	---	2:45	---
Softball JV & V	2:30	4:00	2:30	4:00 1/	2:45	3:30 1/
Swim/Dive	2:30	6:00	2:30	6 – 10 Fri & Sat.	2:45	5 or 6 (sometimes twice a week)
Tennis	2:30	3:30 Male 4:00 Female	2:30	3:30 – 7:30	2:45	3:30
Track	2:30	3:30	2:30	4:00 - 11:30 on Fridays	2:45	3:30 1/ Wednesdays
Wrestling	2:30	6:00 & 7:30	2:30	JV 6 to 7 Varsity 7:30	2:45	5:00 (Weds.) 1:00 (Saturdays)

**Note:** 1/ Moved to 5:30 or 6:00 due to transport problems (bus) in Fairfax County.

In general these three high schools have approximately 400 to 500 students involved in Sports at any given time in the school year. Although I can get totals in each Sport, it is more difficult to get the exact number of students without double and in some instances triple counting. Each school has a late bus @ 4:00 and 6:00. Washington-Lee has only 1 gym as does Yorktown, whereas Wakefield has 2 gyms.

The following observations were provided primarily by the Wakefield Director of Student Services, but might apply to the other schools as well:

- a) Some coaches allow 45 mins. or so of study hall at Wakefield so that practice begins at 3:00 or a little thereafter;
- b) Cheerleaders for Wakefield practice after school ; usually at 4:00 in the winter in the Cafeteria. They cheer at football games (away and at home) and on Tues. and Fri. Basketball games and any makeup games;
- c) Practice goes until 6:00 in the Spring – the constraint being the late bus; otherwise the practices might last until 7:00 for outdoor sports;
- d) Basketball practice at Wakefield starts at 6:45 and students find their own way home whenever it ends. Basketball double hitters that last well into the night for women and men Varsity teams are on some Tuesdays and Fridays and for JV and Freshman teams on some Mondays and Thursdays.
- e) Game time also depends on what time officials arrive and travel time involved;
- f) Makeup games are scheduled on Saturdays, especially for soccer; and,
- g) With only one gym, practices must be split e.g., 2:45 – 4:45 and 4:45 – 6:45. Use of other facilities such as fields and swimming pools are limited by amount of space, coordination with other schools, and time allotted to public use.

**Band/Choral/Drama Information– Not Club Related**

Band	Washington – Lee 1/	
	No. of Students	Concerts/ Practices
Marching Band (Sept. through Nov.)	100 2/	2:10 –4:00 (M,T,Thurs.) 6 – 8 Weds.
Jazz Band (Nov. to end of school) 3/	Lab: 22 Band: 21	2:15 - 3:30 Mon., Tues.
Symphonic Band (Concert) all year	60	6:00 – 8:00 Weds.
Percussion all year	15	2:15 – 4:00 Thurs.
Orchestra (String) all year	20	3:00 – 4:00 Tues. Thurs.
Jazz vocal starts Jan.	25	2:15-4 Thurs

Notes: 1/ 75% to 80% of music students also in Sports; 2/ Play at Friday night Varsity games 6:00 to 10:00 (7 games including 2 away); 3/ Most players from marching band.

\*Drama at Yorktown involves 50 to 60 students 2:30 to 6:00, three times/week in Oct./Nov. and March/April and 8 consecutive nights 5:00 – 10:00 for the final productions. Also smaller productions twice a year involve meeting 2 to 3 times/week for 4 or 5 weeks.

Joan N. Curry (4-21-99)