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Sleep and Teenagers' Health: A Recommendation for Later High School Start Times

In August 2013 U.S. Secretary of Education Arne Duncan tweeted his support of a proposal under consideration by the school board in Fairfax County, Virginia: “Common sense to improve student achievement that too few have implemented: let teens sleep more, start school later.” Duncan’s tweet pointed readers to a *Washington Post* editorial titled “A Smarter Way to Start High Schoolers’ Days,” which posited that a deficit of sleep undermines not only the academic performance of teenagers but also their overall health and well-being. The editorial argued that delaying the start time of the county’s high schools (then 7:20 A.M.) would allow adolescents to get about an extra hour of much-needed sleep. Countering critics who suggest that teens simply need to go to sleep earlier, the authors pointed out that the biological processes known as circadian rhythms are partly responsible for adolescents’ lack of adequate sleep. Even without the demands of classwork, extracurricular activities, and electronic devices, teens are naturally “programmed” to fall asleep late in the evening and to sleep for about nine hours. In fact, a survey conducted by researchers at the University of Minnesota found that the average weeknight bedtime for high schoolers is 11:30 P.M., meaning that many teens do not naturally feel wakeful until 8:30 A.M. — later than the start time of many high schools (Wahlstrom). The editors at the *Washington Post* admitted that altering the high schools’ schedule would not be an easy task, considering the competing schedules of buses, parents, and after-school activities, as well as the potential cost. However, the editorial concluded by stating that scheduling concerns and monetary costs, while legitimate, “don’t outweigh the importance of the [school board’s] goal — ensuring the healthy development of young adults” (Editorial Board).

Recent pieces in *The New York Times* and on National Public Radio reveal that Fairfax County is not the only locality considering a later beginning to the high school day (Hoffman, Aubrey). These

pieces highlight a growing number of educators, parents, and teens who are leading movements to push back the early start to high schoolers' days. Moreover, hundreds of communities in 41 states already have instituted later high school start times, according to a national organization called Start School Later. Considering this ongoing national conversation, it is an opportune time to reexamine the 7:40 A.M. start time of Des Moines' public high schools. The following report will present evidence that starting high school before 8:00 A.M. interferes with teenagers' sleep requirements and patterns. It then will outline negative effects of sleep deprivation on teen's health and well-being. Finally, it will conclude by recommending that the Des Moines Public Schools move their high schools' start time to 8:30 A.M. or later.

TEENAGERS' SLEEP REQUIREMENTS AND PATTERNS

National studies reveal that teenagers, in general, are not getting enough sleep. Adolescents require between 8.5 and 9.5 hours of sleep per night, according to a 2012 article in *Contemporary Pediatrics* and a study published by the University of Minnesota in 2014 (D'Andrea, Wahlstrom). Yet those sources, as well as a 2007 study by the Centers for Disease Control and Prevention, report that the majority of adolescents sleep fewer than eight hours per night, on average (National Sleep Foundation). Only 9% of high school students reported sleeping for nine hours per night (D'Andrea). One survey showed that teens' average bedtime was 11:32 P.M. on school nights, with an average waking time of 7:20 A.M., resulting in an average of only 7 hours and 48 minutes of sleep per night (Wahlstrom).

One of the most common markers of this inadequate sleep among teens is their attempt to make up their sleep deficit on the weekends (D'Andrea, Wahlstrom). According to the survey cited above, teens went to bed an average of 1 hour and 24 minutes later on weekend nights (12:56 A.M.), but their average weekend waking time was 3 hours and 16 minutes later (10:36 A.M.) than during the week. Even with sleeping in, however, teens achieved about 9 hours and 40 minutes of sleep on weekend nights — not significantly more than their recommended 8.5 to 9.5 hours.

If teenagers are not getting the recommended amount of sleep, why are they going to bed so late? The reason is, at least in part, biological. The body's circadian rhythms help to determine the timing of sleep. According to *Contemporary Pediatrics*, adolescents experience a shift in their circadian rhythms that results in a predisposition to stay up late. At the same time, adolescents tend to experience a decrease in "sleep drive," which may be described as the feeling of needing to sleep (D'Andrea). This lower sleep drive makes it difficult for many teenagers to fall asleep before 11:00 P.M., even when they are required to get up between 6:00 and 7:00 A.M. on school days (Aubrey). Given the natural inclination of teens to fall asleep late in the evening, it is clear that starting high school before 8:00 A.M. reduces their ability to get more than eight hours of sleep per night. The University of Minnesota study confirms this finding; it shows that later school start times are correlated with a greater percentage of teenagers getting eight or more hours of sleep a night (Wahlstrom; see table below).

Table 4. Percent of High School Students Sleeping At Least 8 Hours Per School Night by School Start Time

School Start Time	7:30 AM	7:35 AM	8:00 AM	8:00 AM	8:05 AM	8:20 AM	8:35 AM	8:35 AM	8:35 AM	8:55 AM
School Year	2010-2011	2011-2012	2011-2012	2010-2011	2011-2012	2010-2011	2010-2011	2010-2011	2010-2011	2012-2013
District & State	Boulder Valley School District, CO	Teton County Schools, WY	Boulder Valley School District, CO	Mahtomedi School District, MN	Boulder Valley School District, CO	St. Louis Park High School, MN	South Washington Co., MN	South Washington Co., MN	South Washington Co., MN	Teton County Schools, WY
School	Fairview High School	Jackson Hole High School	Boulder High School	Mahtomedi High School	Fairview High School	St. Louis Park High School	Woodbury High School	East Ridge High School	Park High School	Jackson Hole High School
Sample Size	333	446	1379	884	1353	902	1249	960	1407	459
Sleep ≥ 8 hours/night	33.6%	44.2%	44.5%	49.7%	42.5%	49.8%	57.0%	58.9%	60.0%	66.2%

THE NEGATIVE EFFECTS OF INADEQUATE SLEEP

What are the effects of insufficient sleep among teenagers? The obvious ones — daytime sleepiness and fatigue — may make it difficult to concentrate in class and to complete homework in the evening. A lack

of sleep also is associated with attention problems, which also may hurt academic performance. More alarmingly, attention problems associated with sleep deprivation have been linked to an increased risk of teenage car accidents (Danner).

Researchers have catalogued a list of other harmful effects. In 2007 the Centers for Disease Control found that inadequate sleep among teens was associated with ten behaviors that pose risks to teenagers' health: drinking sugary soft drinks, insufficient physical exercise, three or more hours of computer use per day, physical fighting, cigarette smoking, marijuana use, alcohol use, sexual activity, feelings of sadness or hopelessness, and suicidal thoughts (National Sleep Foundation). Other research has linked teen sleep deprivation with negative attitudes, low self-esteem, and difficulty regulating emotions (Wahlstrom). Insufficient sleep also may be correlated with heavy caffeine use and obesity among teenagers (D'Andrea, National Sleep Foundation). Adolescent sleep expert Mary Carskadon, a professor at the Brown University School of Medicine, notes that teens who get adequate sleep are less likely to be tardy or absent from school, more likely to earn good grades, less likely to drive while drowsy, less likely to have nutritional deficits, and less likely to be depressed. In sum, adequate sleep is a crucial component of teenagers' health and well-being.

RESULTS OF STARTING SCHOOL LATER

In the early 21st century, dozens of school districts across the country have instituted later high school start times. They have taken various approaches. Some have simply switched the start times of their elementary and high schools; others have made more complex adjustments. Whatever the approach, these districts have reported many positive results.

The University of Minnesota study found that later start times were correlated with improved attendance, better mental health, fewer teenage car accidents, and, in some schools, higher grades and standardized test scores (Wahlstrom, Hoffman). Although that study might have been stronger had it compared high schools that had changed their start time with schools that had not, Elizabeth Miller, chief

of adolescent medicine at Children’s Hospital of Pittsburgh, found that “its methods were pragmatic and its findings promising.” Miller concluded, “Even schools with limited resources can make this one policy change with what appears to be benefits for their students” (Hoffman).

An earlier study published in the *Journal of Clinical Sleep Medicine* examined data collected from a large, county-wide school district before and after the district delayed its high schools’ start time by one hour. The researchers found that the teens in the district increased their average amount of sleep per night. They also reduced their amount of “catch-up sleep” on the weekends. A more dramatic benefit of the later start time was a reduction in teen car accidents in the county. In the two years after the start time was changed, teenage drivers’ average crash rates dropped 16.5%. Rates in the rest of the state increased 7.8% over the same time period (Danner).

In a 2011 paper published by the Brookings Institution, authors Brian A. Jacob, a professor of education policy and economics, and Jonah E. Rockoff, a professor of business, calculate that the benefits of starting high school overwhelmingly outweigh any associated costs: “We conservatively estimate that the ratio of benefits to costs is 9 to 1 for later school start times.” The authors concede that many districts’ transportation systems would need to be overhauled — a costly and complex adjustment. Yet, they argue, “Even in school systems where buses would have to be added, costs are not expected to exceed \$150 per student per year. Later start times would lead to higher student achievement . . . equivalent to an additional two months of schooling.”

CONCLUSION

In April 2014 — less than a year after Arne Duncan tweeted his support of a later start time for high schools in Fairfax County, Virginia — the Fairfax County school board approved a group of proposals to push back its high schools’ start time from 7:20 A.M. The board planned to discuss several possible start times, ranging from 7:50 to 9:15, with the community before making a final decision. The board had commissioned researchers from Children’s National Medical Center to research and create the proposals.

Judith Owens, the center's director of sleep medicine, said that a later start time was essential for the health of the district's teens, some of whom board buses as early as 5:45 A.M. As the school board prepared to present the proposals to the community, Superintendent Karen Garza voiced her support for a later start to high school in her district: "There is a growing amount of research and literature about this issue [teenage sleep deprivation]. I know the easiest thing in the world is to do nothing. I know not everyone will be happy with a change. But I do think it's very important that we do it right."

The Des Moines Public Schools could benefit from seriously considering research that correlates early high school start times with the many negative effects of inadequate sleep among teenagers. Of three neighboring districts (Urbandale, West Des Moines, and Ankeny) and a local private school (Dowling), Des Moines' high schools begin the earliest, at 7:40 A.M. Urbandale and Dowling start at 8:00. West Des Moines begins at 8:20 or 9:20. Ankeny's two high schools have optional "early bird" classes at 7:15, but first period begins at 8:25. Moreover, on Wednesdays, high schools in Ankeny have a late start of 9:25.

In Des Moines, by contrast, most students arrive at school at 7:30 or earlier, suggesting that teens are likely to get up at 6:30 or before. To get their recommended 8.5 to 9.5 hours of sleep, Des Moines high schoolers would need to be asleep between 9:00 and 10:00 P.M. Those are unrealistic bedtimes, considering that teens' circadian rhythms generally cause teens to fall asleep closer to 11:00. Starting school between 8:30 and 9:00 would increase the likelihood that Des Moines teens would get their recommended amount of sleep each night.

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