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Improvement (CAREI)

College of Education and Human Development

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School Start Time Study

Final Report Summary

By The Center for Applied Research and Educational Improvement (CAREI)

Table of Contents

Introduction	2
Review of Literature	3
	Findings
Transportation	9
Athletics	9
Fine Arts	10
Community Education	11
Food Service	12
Contractual Agreements	13
Crime	14
Teacher Survey	15
Student Survey	16
Parent Survey	17
Case Study: Edina	18
Bibliography	25

Introduction

The initial purpose of this study was to discover and examine the array of factors inherent in a consideration of changing the starting time for high schools in the Minneapolis/St. Paul area. It has gathered information from multiple sources and perspectives, including students, teachers, parents, school administrators, community members, and medical researchers. The study has been conducted in a manner to avoid bias, with the results and implications provided to the reader in neutral language as findings of fact only. Thus, as intended, there are no specific recommendations as to "the best" starting time for any grade level. Rather, the report is a comprehensive view of the factors present within this issue, and it provides data for realistic and substantive discussion.

This study was initiated at the request of several school superintendents and was completed with the administrative and financial support of seventeen area school superintendents. The seventeen participating districts are:

- Bloomington
- Burnsville-Eagan-Savage
- Chaska
- Eden Prairie
- Edina
- Hopkins
- Lakeville
- Minnetonka
- Moundsview
- North St. Paul-Maplewood-Oakdale
- Orono
- Richfield
- Robbinsdale
- Rosemount-Apple Valley-Eagan
- St. Louis Park
- Shakopee
- Wayzata

It is important to note that most of the participating districts are in one of two athletic conferences located in the west metropolitan area. The reasoning for this apparent selectivity is that changing the starting time for the secondary schools has an impact on other school districts within the same activities conference, with respect to the start time for games and co-curricular activities that involve students from two or more school districts. Therefore, the superintendents sought to have common information so that the interrelational aspect of this discussion could occur as well.

Review of the Literature: An Overview

Because the information from the medical community was the impetus for initiating this study, the full literature review is provided to the reader in this executive summary. For those who prefer a brief and less comprehensive overview of the research, the following are the essential elements of their findings:

Sleep Research:

All living organisms appear to have rhythmic patterns at the cellular level known as circadian rhythms. Circadian rhythms are generated internally and develop without any social or environmental cues.

Natural circadian patterns are very resistant to change.

Sleep deprivation is associated with information processing and memory deficits; increased irritability, anxiety, and depression; hyper-sexuality; decreased creativity and ability to handle complex tasks.

Research information on adolescent sleep patterns and needs:

As teenagers move through teenage years, they need increasing amounts of sleep.

Nine hours per night is the necessary amount to avoid behaviors associated with sleep deprivation.

Risks with teenage sleep deprivation include mood and behavior problems, increased potential for drug and alcohol use, and vulnerability for accidents.

20% of all high school students fall asleep in school (Maas, 1995)

Over 50% of students report being most alert after 3:00 PM (Allen & Mirabile, 1989)

Forced awakening does not appear to reset the circadian rhythm, and school sleep lag is worse for earlier starting schools (Allen, 1991). Additional weekend sleep does not ameliorate this negative effect.

Students who evidence a sleep lag syndrome correspond to those having poorer grades. Causation is not implied here, but the relationship does statistically exist (Allen, 1992; Carskadon, 1993; Wolfson & Carskadon, 1995).

Review of the Literature: School Start Time and Adolescent Sleep

What do we know about adolescent sleep patterns? What time of day do adolescents appear to be most suited and able to learn? What are some of the effects of adolescents not getting enough sleep? How can we restructure school start times to enhance learning for adolescents? A review of literature from both the medical and educational fields was completed in search of answers to these questions. Findings show that preliminary issues surrounding these questions are beginning to be studied, but no strong conclusive decisions can be drawn, as the cognitive and physiological factors are numerous and complex.

Cognition and Sleep Loss

There is much empirical literature available that points to the connection between cognition and sleep loss. It has been shown that sleep deprivation is associated with memory deficits (Dinges & Kribbs, 1991; Nilsson, Backman & Karlsson, 1989), impaired performance and alertness (Carskadon & Roth, 1991; Dinges & Kribbs, 1991), as well as time-on task decrements and optimum response shifts (Dinges & Kribbs, 1991). The specific loss of REM sleep has also resulted in memory loss (Smith, 1995; Li, Wu, Shao & Liu, 1991). Dujardin, Guerrien & Leconte (1990) found that REM sleep affects information processing, while Maas (1995) listed the consequences of REM sleep loss as including: unintended sleep, increased irritability, anxiety and depression, decreased socialization and humor, hyper sexuality, mental fatigue with reduced memory concentration, and decreased ability to handle complex tasks and be creative.

Time of Day for Learning

Besides needing a proper amount of sleep in order for cognitive processes to function adequately, is there a best time of day to learn? Dunn (1995) does believe that time of day has an effect on learning. In fact, utilizing Dunn's Learning Styles Inventory assisted one school in changing the time of day that various instruction was held and, consequently, dramatically improving learning and reducing behavior problems (Stone, 1992). It is suggested by Kraft & Martin (1995) that performance typically peaks in the afternoon, though others believe this depends on the individual. For example, Anderson, Petros, Beckwith, Mitchell & Fritz (1991) found that individuals classified as "morning-types" performed better on measures of speed and response in the morning, while "afternoon-types" performed better in the afternoon. In another study on time of day, Barron, Henderson & Spurgeon (1994) found that afternoon reading instruction produced the greatest increase in reading scores as compared to morning instruction. Perhaps due to findings of this nature, it is suggested by Callan (1995) that administering the SAT only in the morning may discriminate against some students.

Circadian Rhythms

Another area to be considered is that of circadian rhythms. Although most findings up to this point are preliminary, there seems to be a growing body of literature that supports the profound effects of various rhythmic patterns in living organisms. According to Kraft & Martin (1995), virtually all body systems operate on some rhythmic cycle, even at the cellular level. Weinert, Sitka, Minors & Waterhouse (1994) contend that circadian rhythms develop in early childhood, though at different rates and times. There is evidence that circadian rhythms are generated endogenously (internally) and that these patterns persist in the absence of any periodic environmental or social cues (Kraft & Martin, 1995). Redfern, Minors & Waterhouse (1994) believe that the endogenous clock (maintained by the hypothalamus and, to a lesser extent, the pineal gland) and the exogenous system (affected by many factors including social situation, light/dark phases, and exercise) are not necessarily directly in relation with one another. Their study of jet lag subjects demonstrates that disturbing the rhythms has profound effects on mental performance and concentration. Other findings regarding circadian rhythms include their relation to physiology (Tolstoi, 1994), melatonin (Reppert & Weaver, 1995; Brage, 1995; Bjorksten, Basun & Wetterberg, 1995) and depression symptomatology (Brage, 1995). Finally, it is noted that natural circadian patterns are very resistant to change (Kraft & Martin, 1995).

In terms of how all of this pertains to adolescence, Dahl & Carskadon (1995) claim that adolescents experience a natural circadian phase delay and, therefore, tend to stay up later and sleep in later than in preadolescence. They point to circadian schedule disorders as one of the most common adolescent sleep disorders, though one that can be treated with schedule stabilization, gradual realignment, and ongoing maintenance.

Adolescent Sleep Needs

Contrary to popular belief, according to Mary Carskadon of Brown University's School of Medicine (1989-90), teenagers do not need less sleep than others. In fact, as they move through their teenage years, adolescents need increasing amounts of sleep (Carskadon, 1982). Maas (1995) reports that teenagers need nine hours of sleep nightly, compared to the eight hours needed by adults. Excessive sleepiness in teenagers and young adults is related to physiological changes during puberty. Carskadon (1993) concludes, "Daytime sleepiness increases at about the time of mid-puberty even without any change in a youngster's nighttime sleep length." However, there often is quite a change in the amount of time adolescents spend sleeping.

Adolescent Sleep Patterns

Sleep researchers concur that biology as well as social pressures are major factors in determining adolescent sleep. Factors identified as contributing to the development of adolescent sleep patterns include puberty itself, parental involvement in setting bedtime and awaking teens, curfews, school schedules, part-time employment, use of alcohol, caffeine, and other drugs, and development of circadian rhythms (Carskadon, 1990). For example, parents of even 12-13 year olds frequently stop setting bed times and enforcing wake-up times, and school schedules get earlier as students mature despite the fact that puberty demands more sleep (Carskadon, 1993).

Allen and Mirabile (1989) examined self-reported wake patterns for students during the school year from two different senior high schools. A total of 61 students were surveyed in two schools with different start times (8:00 AM and 7:30 AM) Both student groups reported "remarkably short" sleep time (seven hours) with bed times close to 11:00 PM on weekdays. On weekends sleep time averaged nine hours and bedtime was around 1:00 AM

Brown, Tzischinsky, Wolfson, Acebo, Wicks, Darley & Carskadon (1995) studied 14 9th graders during their transition to 10th grade, which included a one hour earlier school start time. Findings showed "marked changes in sleep patterns across this school transition, largely resulting from students waking earlier."

Consequently, it appears that despite their increasing need for such, adolescents are actually getting less and less sleep, which could have serious consequences.

Consequences of Unmet Sleep Needs

Risks for adolescents lacking sleep include daytime sleepiness, vulnerability to catastrophic accidents (echoed by Dr. Mark Mahowald, director of the Minnesota Regional Sleep Disorders Center at Hennepin County Medical Center in Minneapolis), mood and behavior problems, increased vulnerability to drugs and alcohol, and development of major sleep disorders (Carskadon, 1990).

In a study conducted by Wolfson, Tzischinsky, Brown, Darley, Acebo & Carskadon, (1995), it was found that conduct/aggressive behaviors were highly associated with shorter sleep and later sleep start time. These results signal important relationships between sleep quantity and behavioral difficulties in adolescents.

Alertness

According to Maas (1995), 20% of students fall asleep in school and are "habituated to a low level of 'alertness'." Carskadon & Dement (1987) share their belief that "the truly alert adolescent may be exceptional." The determination that maximum sleepiness occurs during the early part of the school day was made by Kowalski & Allen (1995).

Finally, in the aforementioned study by Allen & Mirabile (1989), students were consistent when reporting their level of alertness throughout the day. Students were on average least alert at about 10:00 AM, while 50% of the students reported being most alert after 3:00 PM "Thus, most students were in school during the period they reported being least alert and were released from school at the time they were reaching their peak alertness. This may reflect the boredom of school or the tendency toward a late sleep phase as also suggested by the weekend sleep habits."

Sleep Phase Delays

This tendency to sleep later on weekends is referred to as a sleep lag condition or delayed phase preference, "as youth sleep in to compensate for sleep lost during the weekdays when they rise earlier and retire later" (Carskadon, Vieira & Acebo).

Wolfson & Carskadon (1996) surveyed a total of 3,120 students ranging in age from 13 to 19. Results show sleep time decreased linearly by almost 40 minutes across the four age groups, as both weekday and weekend bed times became later with age. "On average, weekend bed times were two hours later and weekend rise times were 3-1/2 hours later than on school days."

Allen (1991) examined the effects of this condition by using a sleep-wake questionnaire with 226 students in 11-12th grade at four high schools. The purpose was to discover if students at earlier starting schools report a sleep phase delay syndrome and have shorter sleep times. Results indicated that during the school week, students from early compared to late starting schools showed shorter sleep time and earlier times when most likely to doze off, and during the weekend, a tendency for longer sleep time. He concludes, "School sleep lag produces sleepy students in class and appears worse for earlier starting schools. Treatment data from patients with the sleep phase delay syndrome indicate that forced awakening alone does not reset the circadian rhythm; similarly the forced awakening for five out of seven days in the week does not appear to reset the adolescent's sleep phase delay."

Another study by Allen (1992) explored the relation between amount of sleep phase delay and major social factors including grades. The sleep-wake questionnaire was administered to 72 twelfth grade students in an early start school (7:40 AM). Purposes of the study included determining if early start students show a sleep phase delay syndrome and if the greater degree of sleep phase delay (as determined by weekend bed times) corresponded to poorer grades, among other things. These data certainly do not indicate causation, "but are consistent with the view that students with greater school-week sleep lag are at significant disadvantage for academic achievement, owing to their reported decreased alertness and increased sleepiness during the school day."

Kowalski and Allen (1995) likened high school students' sleep pattern to the experience of jet lag due to the "conflict between their established sleep pattern and the demands placed on them by the relatively early starting time of most high schools." This study consisted of 119 12th graders in a late start school (9:30 AM) and 97 11-12th graders in an early start school (7:20 AM), who completed the sleep-wake questionnaire which addressed sleep patterns, times of alertness/sleepiness, and significant social factors. Results indicated that total sleep time during the school week was significantly longer for the late start group (7.5 hours vs. 6.9 hours), though weekend bedtime did not significantly vary. In addition, poorer school grades were associated with increased school sleep lag and alertness later in the day. "Nonetheless even for this late starting school the problems associated with school sleep lag were still evident in all measures used. Starting at 9:30 AM helps some, but not as much as had been hoped. Correlations do not establish causation, but a conservative interpretation of these data support two views: 1) Starting high school later increases the students' sleep time during the week and 2) good weekend sleep habits are associated with better grades."

This latter conclusion has been duplicated by Wolfson & Carskadon (1995): "Students with (self-indicated) higher grades reported that they obtain more sleep and go to bed earlier on school nights than

student with lower grades." Our findings document that for the 1990's adolescents starting school at 7:30 a. m. or before is too early."

Recommendations

Experts advise the following to ensure students get enough sleep: establish a regular, relaxing routine to unwind from the day to signal the body it is time to prepare to sleep; do not read books or watch television programs that are violent, frightening, or controversial; avoid all caffeine in the afternoon and evening; get regular exercise; avoid horseplay with young children before bed time; and do not take naps.

Carskadon (1993) recommends ways to have teens get more sleep by altering their behavioral preferences. She advocates considering such actions as educating parents and children, changing school schedules, enforcing or altering child labor laws, and educating teens about the risks of combining sleepiness and alcohol use, as well as driving tired. Health and sleep education is essential. "The message must be repeated often that sleepiness is not a weakness one can overcome by willpower or by rolling down windows or turning up the radio or by learning better driving skills. These approaches are not enough."

Conclusions

Clearly, several issues have emerged. There is mounting medical evidence that amount of sleep, time of day, and circadian rhythms do play a part in how prepared an adolescent is to learn. It is also the case that despite their increased need for sleep, teenagers get less than they did as children. There are serious risks adolescents face when they are sleep-deprived, and simply getting more sleep on weekends does not appear to be the answer. This topic is in its early stages of exploration within the research community, where many new questions will be generated as the data unfolds. The medical community also fully acknowledges that there are no simple solutions to this complex issue.

Findings

Transportation (N = 17)

Costs

The overall finding was that the transportation directors emphasized the need to stagger the high school, middle school, and elementary school start times. They need their drivers to go in "tiers" so as to cut down on the number of drivers and buses and, thus, costs. School districts are limited in their transportation funding by the legislature. Of the 17 directors, 15 of them mentioned (and most stressed) the importance of staggering times. However, there were two directors that thought if they moved the high school to the same as the middle school the costs of the change could be minimal. Three directors also mentioned another possible implication of high school starting last: there might be extra transportation costs if the bus drivers would be then working overtime hours because of the later time runs of the activity (sports, etc.) buses.

Safety

When asked about safety concerns, most directors (12 of 17) did talk about the possible danger of having elementary students outside in the dark, either in the early morning or coming home late from school--depending on when the elementary start and dismissal times are. However, one director said that when he was the transportation director in another district, the parents did not complain about the early elementary school start time (8:00). "It was what they were used to." Another director stated that they pick up some elementary school band members very early and "we have not experienced any problems."

Athletics/Activities Report (N=51)

Three people were interviewed by phone in each of the 17 districts: the athletic director, a coach, and either the activities director or a Fine Arts teacher (or sometimes both if the activities director was also the athletic director). In the interviews the faculty responded to questions about the possible impact of a later high school or middle school start time on after school athletics and activities. Many issues and concerns were raised. The following is a summary of the 51 interviews. This report will start by looking at athletics, then high school activities (fine arts and clubs), followed by a short summary of findings specific to the middle schools.

Athletics

Overall, the majority of athletic directors and coaches believed that a one hour later start time would cause difficulties, ranging from minor to major problems. About nine of them stated clearly that they prefer to keep the school day as it is. However, about one third of the athletic directors and coaches thought it would be "possible" or "manageable" to start one hour later. Others were undecided as to whether the change would be manageable or not. Four of them said they would prefer a later school start time, primarily for the students' academic sake. Also, five individuals mentioned that a half hour later school start time would work better than the present school time, but that more than a half hour change would start causing conflicts. A few others said there would be a big impact unless the other schools changed their school time also. Eleven of those interviewed mentioned that practice time could or would be cut back if school started later.

Community groups/Facilities availability

The concern most often mentioned regarding a later school day is the effect it would have on community education and youth programs. Twenty-four study participants brought up the concern that community

sports for adults and youth start right after the high schools' practices. Generally, the cities/suburbs have agreements with the school districts to have students use facilities (school and city facilities) after school and for games, and then the community takes over after school practices are finished. Many interviewees mentioned that there is a big demand on the limited sports' facilities in their city because of all the adult and youth programs. Gym space at the schools is in particularly high demand. In addition, ice arenas, softball fields, and the football/soccer fields are often shared between the schools and the larger community. Changing to later start times for the community activities "would increase the tensions," as one athletic director explained it, and allow less time for adults, younger children, and families to participate in community sports.

Daylight/darkness concern

Another major concern was the limited daylight to finish games/meets and practices. Twenty of the interviewees brought up this issue saying that certain sports would be affected by darkness in the late fall, the winter months, and early spring. The major concerns were how to fit events in before darkness, yet not have students miss school. Some interviewees pointed out that to get students to away games and have them warmed up before the event, they have to leave right after school the way it is now.

Eleven athletic directors/coaches mentioned that the big concern would be the impact on the lower level sport teams-the freshman, sophomore, and junior varsity teams. Presently, these games (they mentioned football and soccer games specifically) usually start at 4:00 PM and the fields they use are not lighted. With a later start the games might not end before dark.

Other comments

Many student athletes work after practices, so if the school day and practices began later this could impact the student/athlete's job in a number of ways: working less, working later, or not working during the week. Indeed, two athletic directors and two fine arts teachers thought that moving the school day back might cause less after school student participation. Students may choose work over an after school activity or participate in fewer school activities.

At the Edina schools the three people interviewed seemed to feel "the positives have outweighed the negatives" concerning the later high school starting time. One stated, "Most student-athletes, teachers, and coaches have viewed the change favorably, but we have to wait a year before we really know the results."

Activities/Fine Arts

Interviewed were seventeen activities directors and five teachers who instruct in one or two of these areas: music, debate, speech, and drama. The overall sentiment was that the fine arts and clubs would not be nearly as affected by a later high school start time as would the athletic programs. The interviewees were split evenly between believing the school time should stay as it is, and believing it would be manageable to move the time back.

Some of the same concerns were raised by the fine arts directors and teachers as were raised by the athletic directors and coaches. However, two major differences make the fine arts programs much less affected by a later start time than athletics: there are many fewer competitions in the fine arts programs, and the use of facilities is not a major issue as in athletics.

Two main concerns were raised in addition to the issue of students getting home later. First, seven fine arts directors/teachers mentioned that some students would miss school for competitions unless other schools also moved their school day and event times back. The second concern raised by five individuals was the belief that with all the other commitments that students have, they might not get involved in fine arts programs. They believe that, with a later school start time, there might be less student participation because of greater time constraints, with students being involved in other things like work and athletics.

Middle School

Five of the fifty-one interviewees commented specifically about middle school, or junior high, athletics and activities. In general, the middle schools would also be impacted by a later school day, but probably not nearly as much as the high schools. Middle schools have fewer athletic programs and after school fine arts programs than do high schools. Also, the middle school students are not employed as much as the high school students, and thus would still be involved in sports without a job getting in their way. However, the middle schools would have some of the same problems as the high schools in fitting in their practices and games before it gets dark and before the community wants to use the facilities.

Community Education Report (N=16)

The Community Education departments in the districts involved in the School Start Time Study all have similar programs which service preschool age children through adults; some of the districts also offer senior citizen programs. Sixteen out of the seventeen districts responded to telephone calls about their community education programs. In general, the directors spoke positively about their flexibility; they would change as necessary in order to provide services for all community members.

Facilities

The majority of community education directors reported that facilities would be impacted the most by a change in school start times. Currently, in most districts, the demand for gyms far exceeds supply; gyms are used every week day and Saturdays. A change in school start and end times would influence practice times and space for middle, junior and senior high schools athletic programs. Scheduling pools was also a problem in some districts, as was available ice time in others. This varied considerably from district to district.

School age childcare

All districts offered school age childcare, though some programs were contracted out to the local YMCA. Hours generally run from 6 AM to 6:30 PM, with some slight variation. Most directors said that a change in the school start and end times might affect the number of children enrolled in the before and after school programs. If elementary schools started earlier, the number of children enrolled before school may drop, while the numbers might increase in the afternoon. That would impact the staffing of those programs.

Adult enrichment

Community education directors reported that most of the adult enrichment programs don't begin until after 6 PM in the evenings and there wouldn't be an impact if the schools started and ended later.

Additional comments

A similar concern expressed by a number of community education directors was the importance of a common start and end time for all levels of schools, to make sure there is consistency, i.e., all elementary, all middle or junior high schools, all senior high schools should begin and end at the same time in the district/metro area. It may be a benefit if the middle school ended earlier, because it would mean more time for students to be involved.

Related to the Community Education Study, four Park and Recreation directors were contacted to see if there would be any impacts on their programs if the high schools' start and dismissal times were later. The directors said there would not be an impact, with the exception of use of ice arenas after school (in the late afternoon). The high school hockey teams would have to practice in the morning and/or have their afternoon practices cut back, which both of the Edina High School's hockey teams have done because of their later school day.

Food Service Report (N=4)

Food service directors were contacted in four school districts. If wide differences had emerged among those four, additional food service directors would have been contacted. As it was, the information provided revealed great similarities from one district to another and it appeared to be representative of the broad issues associated with a potential change in the starting times of the local schools.

Overall impressions

Lunchtime would have to change if the schools started later or earlier in most districts. For several districts, changing the start time may create difficulties because some kitchens only have a serving site with no preparation facilities. One food service director, said a later start time might result in establishing a breakfast program.

Many district food programs also prepare meals for senior citizens, including Meals on Wheels and for district child care services. The coordination and timing of providing those meals would likely be affected by shifting the start times of certain schools.

Some districts' workers are unionized and some are not. Changing the employees' schedules may or may not be a problem. The food service workers in one district often are semi-retired and work as needed; changing the start time would not be a problem.

Contractual Agreements Report (N=6)

Part of the study was to find out if there would be any implications for school contractual, or employee contract agreements with changing the start time for schools. Interviewed were six human resource directors who are in charge of their district's employee contract agreements with the teachers, secretaries, custodians, food service workers, etc. The response given by all six interviewees was that the employee contracts refer to the employees of the school working a certain amount of hours each day, but the contracts do not mention specific start and end times.

Elementary Directors Report (N=13)

Thirteen curriculum directors, elementary directors, and elementary principals whose districts are participating in the School Start Time Study were contacted for this section of the report. Current elementary school start times range from 8:25 AM to 9:40 AM.

Overall impressions

Nearly all of the respondents volunteered the belief that morning is the best time of day to learn, and thus having a longer morning for teaching would be an advantage. One principal thought an earlier start time wouldn't change instruction. Another elementary principal said teachers prefer mornings for the most intensive study because children are more alert and ready to learn then. Several respondents noted that a longer morning would be better educationally, but kids might need a break of some sort.

One elementary principal particularly noted that a start time of later than 9:00 is too late: teachers perceive a loss of good learning time. Also, there is difficulty scheduling elementary field trips in the afternoon because buses are usually transporting secondary students and are therefore not available.

One principal said that the parental response to starting elementary schools earlier in the morning would be "situational." Some families have older siblings who would leave for school later and could make sure the younger children get off to school first. Or, a parent could get the child off to school in the morning before leaving for work. Several respondents believed that an earlier elementary start would likely mean that someone would at least be home in the early morning to supervise young children, as opposed to leaving them alone to get themselves off to school. An elementary director thought that parents would adjust, and overall it may be easier in terms of family schedules. After-school childcare is generally easier to arrange than early-morning care.

Several respondents referred to the fact that darkness is a concern at this time of year for little ones. While agreeing that is an issue, one director doesn't know to what extent. Currently elementary students are dropped off at 4:15 in the afternoon when it is nearly dark in the winter. This principal is not sure whether dark mornings are worse than dark late afternoons. An assistant superintendent noted that in a small geographic district darkness and safety were not problems because they have short bus runs.

Employers Report (N=15)

One aspect of the School Start Time Study was to determine if a later high school start and dismissal time would impact local employers of the students. Names of employers were furnished by the school districts. In addition to speaking to employers, interviewed were three Chamber of Commerce directors and a teacher who works with the 9th grade Work Experience Career Exploration Program (WECEP), which helps 9th grade students fulfill a work study during the second half of the school day. The 15 businesses contacted included: 6 fast food restaurants, 3 supermarkets, 3 department stores, 2 mall retail stores, and one manufacturing company.

The overall impression that the employers, managers and human resource workers gave was that there would be little or no impact from a later school dismissal time. Four employers stated there would be an impact in the after-school work shifts, but when asked if a one hour later start time would have an impact, three said that one hour would not make much of an impact, that they "could deal with it" or that they are "flexible." Most of the employers said that their high school employees either do not start right after school or that they could "adjust the day workers" shifts to accommodate a later arrival of the students.

Impact on 14 and 15-year-old students who work centered on the fact that, by law, they can only work three hours a day during the school week and not after 7:00 PM. However, one of the employers pointed out that it would not be a problem as long as the students could start by 4:00 PM.

The three Chamber of Commerce directors not only provided names of employers to contact, but also they talked about possible implications of a later school day. Basically, they thought there would be no or little impact. One director thought the employers might benefit from a later school time because their student workers would be better rested for work.

Crime Statistics Report

Juvenile crime in the state of Minnesota has been increasing at a high rate. According to the Minnesota Department of Safety's Bureau of Criminal Apprehension, the number of juvenile arrests rose by 52.5% between 1990 and 1995, placing the 1995 total at 68,212. This number represents 29.5% of all apprehensions made in the state during that year. In addition, 13 to 17 year olds were apprehended more often than any other age group of a similar five-year age span.

For the purposes of this study, it would be desirable to know when these crimes are occurring. Unfortunately, the Minnesota Bureau of Criminal Apprehension does not separate juveniles from adults when compiling crime data based on the time of day crimes were committed. There is national data available from the FBI, however, that suggest that on school days, juvenile crime peaks between 2 PM and 4 PM and decreases throughout the evening hours. In contrast, the number of crimes committed by adults increases during the day and evening hours, with the peak occurring around midnight. Finally, this data reveals that the frequency of juvenile crime is about four times greater in the hours after school than during curfew hours.

School Start Times in Greater Minnesota

Eight smaller and larger towns and cities outside of the seven-county metropolitan area were contacted to get an idea of when their schools begin. Seven of the school districts contacted have a high school start time between 8:05 and 8:30. Generally, the junior high and elementary schools start at approximately the same time as the high schools. In smaller districts all grade levels ride together on one bus run. The buses begin picking up the students living farthest away from one hour to one and a half hours before school starts.

In the eighth district contacted, Rochester's high schools start at 7:25, middle schools at 7:45, and elementary schools between 8:30 and 9:00. Rochester will be opening a third public high school next year. The school district has created a "Sleep Deprivation Committee" to research the possibilities of the high schools and middle schools starting later. One person at the school district office thought that the district may implement a new start time around 8:00 AM for middle and high schools, and 9:00 AM for elementary.

Teacher Survey (N=3,460)

All secondary teachers and a random sample of elementary teachers from all districts participating in the study were surveyed. The survey questions centered around times of the day for school start and end in terms of optimal student learning and optimal instruction times. Elementary teachers were also asked about perceived issues for student safety if youngsters are coming to school while it is still dark outside. Open-ended comments were solicited after each question in order to amplify the response. The table containing the teacher responses to the question of best starting time to enable optimal learning is as follows:

Optimal Start Time of First Class for Majority of Students

	Secondary Teacher Survey		Elementary Teacher Survey	
	n	%	n	%
6:00	5	0.2	1	0.1
6:30	3	0.1		
7:00	20	0.7		
7:15	32	1.1	1	0.1
7:30	318	10.7	14	2.0
7:45	157	5.3	14	2.0
8:00	1037	35.0	159	23.0
8:15	291	9.8	97	14.0
8:30	696	23.5	287	41.5
8:45	77	2.6	57	8.2
9:00	250	8.4	52	7.5
9:30	19	0.6	7	1.0
9:45	1	0.0		
10:00	12	0.4	2	0.3
Other	9	.03	1	0.1
No opinion	37	1.2		
TOTAL	2964	100.0	692	100.0

Student Survey (N=7,168)

A stratified random sample of students in the secondary schools of the participating districts were asked to complete the "Sleep Habits Survey", a 62-item questionnaire developed and normed by Bradley Hospital at Brown University in Providence, Rhode Island. A total of 280 classrooms were sampled, with a return rate of 98.57%. Overall, approximately 10.8% of the total population of 66,394 students were sampled.

Summary of Findings

All six-grade levels (7-12) show the same general increase in reported academic grades associated with later start times, however for all six grade levels the pattern is different. The increase in academic grades associated later start times is greater at the early start time for students in grades 7 and 8, with the most rapid increase between 7:30 and 8:00. Grades 11 and 12 are very similar and contrast with the grade seven and eight pattern. For 11th and 12th graders, they have a gradual increase in academic grades, which accelerates rapidly from the 8:00 to 8:30 start time and beyond.

It is important to note that these findings do not indicate causality (i.e., that later start times will necessarily cause academic grades to improve), **but there is clearly a statistical relationship between these two variables** that may be explained by other variables (e.g., less depression, less struggle to stay awake in class) that change when the start time of school is changed.

Other findings from the student survey are consistent with the findings noted in the literature review in the beginning of this report. The "picture" of our students is very similar to that of the students studied in other locations in the United States. Finally, there is not a gender effect for the students and the starting time for schools. The relationship between start time and reported academic grades is basically the same for boys and girls, with the girls consistently reporting a higher level of academic grades.

Parent Survey (N=765)

A random sample of parents were contacted by telephone in each of the 17 school districts. Roughly 15 parents in each of the three age levels (elementary, middle/junior high, and high school; n=45 parent respondents per district) were asked questions about the time their child leaves home in the morning, as well as what time they thought would be the preferred leaving time, given the age of their child. A follow-up question was then asked about why that time was preferred. Parents of elementary age children were also asked to name the earliest leaving time from home that would be safe for the child.

What would be the best leaving time for you child?

	Elementary (%)	Middle/Junior High (%)	Senior High (%)
Before 7:15	0	3	9
7:15	1	11	11
7:30	4	16	15
7:45	2	13	7
8:00	23	28	31
8:15	10	5	7
8:30	28	13	9
8:45	9	1	0
9:00	14	4	2
9:15	1	0	0
9:30	1	0	0
9:45	1	1	0
No Preference	4	5	5
Unsure	1	1	1

Why did you select that time?

	Elementary (%)	Middle/Junior High (%)	Senior High (%)
Allows sleep	24	39	45
Able to get ready	33	25	18
Current time works	16	9	7
Better schedule	11	7	6
Light outside	3	8	10
Time to go to work	9	5	6
Will learn more	1	1	5
Leave with siblings	1	3	1
Avoid traffic	0	0	1
Unsure	3	2	1

EDINA CASE STUDY

Edina Teachers Focus Group Summary

Eight teachers were selected by Edina High School's principal to participate in a discussion after school about differences they may be noticing during this first term under the later start time. The group met in mid-October to discuss their impressions and observations regarding the impact on students and learning, changes in teaching behavior, and other pertinent issues.

There seemed to be a general agreement among all eight who said that, during first hour, they doesn't have "people with their heads down on the desk, they seem to be more engaged in what they're doing; they seem to be more focused." Flexibility for both students and staff was mentioned by a number of teachers. There's flexibility for students to come in early and take tests, get academic help, study, and so on. The teachers did wonder if students would continue to come in early in a couple years when the later start time is the "norm."

Staff can have morning meetings rather than after school. Guest speakers are more likely to come to a first hour class with the later start time. Many teachers commented that there's now time in the mornings to conduct meetings with parents, which wasn't the case in previous years. Parents also appreciate being able to attend a 7:30 AM meeting rather than taking time off from their jobs in the afternoon to meet with their child's teacher.

In general, teachers come at the same time in the morning as they did in previous years, but this year they have time to process and prepare new and timely information to incorporate in teaching. "I teach a lot of business courses and I use daily news, so I have time to go over some newspapers, jump on the Internet, and find out what some of the top topics are for the day." One teacher commented, "I think our day has gotten longer." This notion was reiterated by a number of faculty who said most of them come to school at the same time, but stay longer in the afternoon. A few of them mentioned that they miss the late afternoon break between school and dinner to wind down, exercise, or run errands.

Generally, parents seem to be in favor of the later start time. One teacher called the parents of all 160 students in her classes and asked if they saw a difference in the behavior of their children. She reported "it was just an overwhelming "yes", there was a difference within what was happening at home and in the family, particularly the behaviors and attitudes."

A drawback to the later start time was noted by one teacher. "What we're losing at the moment is some of the students involved in these athletics and sports that leave early from their 6th hour to get to the activities." Another stated "I don't think [students missing part of their 6th hour for activities] is anything that can't be worked out once people are aware of the facts."

In support of the later start time, a teacher commented, "I've heard a steady stream of positives from parents, and especially from kids. I polled the senior class and it was like 8 to 1 in favor of the change. The overwhelming response is positive; the only issue that ever comes up that's kind of negative is the impact that it does make on sports and school activities, because of the time pressure. But I think a number of those concerns might be addressed by taking a look at how long we run practices...how much time do we really need for practices and how can we be more effective with our use of time for extracurricular activities."

When asked if the students have changed their going-to-bed times, one teacher commented that she asked her classes this question and said there has not been a big change. She went on to say, "[The students] say they may stay up a little bit later to do their homework, because they have a little bit more time knowing they can sleep in, which is the positive side to this. But they're not just staying up for the sake of staying up."

One teacher added that she went to the school's health service "to inquire if there was a difference this year in terms of students not feeling well." She was told that there has been a "tremendous difference" this year over last year. Last year 39 students had been sent home for illness compared to 25 this year during the same time period. They added that there could be any number of factors for this change, but part of it could be the later start time and that kids are eating breakfast more often now.

Edina Student Focus Group Summary

Eight students from Edina High School were interviewed regarding the later school start time. The students were asked to speak not only from their own perspectives, but also to share what they have heard from their classmates about the later school start time.

The students were first asked what the biggest difference or change was as a result of the later school start time. A couple of the students immediately answered, "I get more sleep." One student replied, "I feel more awake in the first hour-I'm less likely to fall asleep." They have observed that fewer students are sleeping during school. One student said that after school activities are now shorter so they have less time to practice these various activities.

Most students said that they go to bed around the same time as they did last year and get up later, getting extra sleep. One student commented that he naturally is not sleepy until later at night. Last year he tried to go to sleep at 9:30, but it did not work and he "couldn't fall asleep until 11:30." Now he goes to bed at 11:30, and the later school start time allows him to get a good night's sleep. Another student said that his body doesn't "shut down" until midnight, so that is when he goes to bed. Not all students are getting more sleep, however. A few said they go to bed later this year, so they end up getting about the same amount of sleep as last year. One student commented that she would like to go to bed at the same time as she did last year, but has to stay up an hour later because she has more homework.

The students talked about some of the drawbacks to the later start time as well. For instance, one student said that the only thing that her classmates do not like about the change is that "they get home late after sports." Another student agreed. Still another added that some of his friends who work have complained about the change. He said, "Last year they could work 3-5. Now they are forced to work at a later time." One student mentioned that she knew somebody that had to quit her job because, with the new school schedule, she doesn't have enough time to work. However, she added that if a student really wants to work, he or she could if they manage their time well.

Originally there was some concern that, with the later school time, students would begin to fade by the end of the school day. Although one student commented that "kids are more excited to leave school by the end of the day than a year before," other students agreed that the last hour of the day, 6th hour, has not been negatively impacted.

A few students said they are doing better academically because they are more awake. One student shared, "I have only fallen asleep once in school this whole year, and last year I fell asleep about three times a week." Another student added that she's "more alert and doesn't 'zone out' as much." On a similar note, a student said, "I feel I pay better attention because my sleep schedule is closer to my normal sleep pattern." Two students added that it feels a lot better now that they leave for school when it is light out, whereas last year during the winter it was dark when they left for school.

Another positive aspect of the later school start is that there is time before school for students to make up tests, attend review sessions for important tests, and join activities that meet before school. Also, the students mentioned that they have eaten breakfast more often this year compared to last.

Edina Counselors Focus Group Summary

Edina high school counselors participated in a focus group meeting to discuss the impact of their district's later school day. They were asked what was most striking or interesting to them regarding the school start time moving back an hour.

One counselor said she had asked 50-60 students about how they are doing with the later start time. She said she "can't think of one student who did not like the change and most students are really appreciative" of the later start. She added that the students are booked solid all day with extra-curricular activities and work, and that they like having the extra hour in the morning. Sometimes they use that time to meet before school for their extra-curricular activities.

One respondent mentioned she has spoken with a few students who are morning-oriented and would prefer an earlier start, but "the overwhelming response is favorable to starting at 8:30." She added, "I think the kids are more alert...and they are 'with you' at 8:30." Last year was not always like that. She thinks the students are now getting more sleep.

When asked about any changes in student behavior, one counselor noted that stress referrals for students who feel a lot of academic pressure are "significantly down." She thinks students feel they have more personal time with the later start time. However, another counselor added that the later start time is hard on the teachers who coach extra-curricular activities after school, because they don't get home from school until the early evening.

One issue brought up and echoed by all respondents was that the new schedule makes conferences between counselors and parents easier to schedule. Parents appreciate the convenience of later meetings, and they feel more free to ask the counselor for a 4:00 PM or even later meeting.

The counselors stated that the school climate is better this year. It appears to be more "calm" and "positive." The attitude and behavior of the students appears to be significantly better than past years. However, again, the counselors were not sure if this change is related to the new start time or not.

Edina Administration Focus Group Summary

Several Edina High School administrators participated in a focus group regarding the later high school start time. They were asked about any differences they see this year at Edina High School because of the schedule change.

One administrator started by stating, "there is an alertness in the students coming into school that I haven't seen in many, many years. I have also heard fewer complaints from the students about not getting enough sleep." Another administrator added, "The school as a whole seems more calm-there are less students who loiter in the halls at the start of first hour."

The school attendance rate for first period is better. Also, parents of children who have had trouble in previous years getting to school on time are supportive of the change, and these parents are more likely to be supportive of school policies when their children are late now.

One administrator had asked some of the student athletes and coaches about their impressions about the later school day. He said, "The change has been well received, by and large. If I had to put a percentage on the positives verse the negatives, I would have to say 85% have been in favor of the later start." However, he added, "We need to run through the whole year to get a fair assessment of the impact on athletics. There will be more of an impact in the winter and spring with student athletes getting out of their last period class early for away competitions." This fall some students have been dismissed about 20 minutes early for away games.

The administrators have also noticed that the teachers are less rushed in the morning. "In past years some teachers were here at 6:30 in the morning running off copies and trying to get last minute details ready for that starting class they had," stated one administrator. He added that the teachers are still getting to school early (7:15 to 7:30 AM) so that they have at least an hour to get prepared for their classes.

Another benefit of the later start time is that students who can't get academic help after school because of extracurricular activities can now come in before school and get help. This extra time has "provided a much more available cushion" for students to meet with teachers. One administrator added that it is also easier for group activities, such as marching band, to practice in the morning.

Concerning discipline issues, one administrator commented that he was not sure he has seen much change. However, he reiterated the point that was made earlier, that attendance for the first hour is presently not a problem. In past years the lack of attendance first hour "had been a big deal."

The administrators noted that the halls seem to be calmer. Also, one administrator said that the students are better behaved in the lunchroom. The administrators were not sure what to attribute these things to, but they seemed to believe the later start time has had a positive impact on the overall climate of the school.

Parent Survey Report from Edina School District

Parents who attended Parent/Teacher Conferences November 25th/26th, 1996 at Edina High School were asked to complete a written survey about their impressions about the change in the starting time of the high school. The total number of surveys returned represented 18.8% of the families with children at the school. Related to the total enrollment at the school, 11.8% of parents of seniors responded, 20% of parents of juniors responded, and 22.7% of parents of sophomores responded.

When asked:

Are you pleased with the later start time for high school students?

Parents of:	"Yes"	No"	"Not Sure"
Sophomores	96	6	4
Juniors	84	4	1
Seniors	48	2	0
Totals	228	12	5

15 Surveys included families with multiple students at the high school. This data is included within the individual class figures.

Written Comments: (sampled-not complete)

Senior Student Families:

Advantages: "Take time to eat breakfast," "more rested, healthier, awaken more easily. Has not overslept this year." "more rested and less hurried," "long overdue-would be nice for Middle School too," "student is a back up at home as a responsible person to get grade schooler off," "more alone time with each child," "he is better rested and more alert all day!" "time to meet teacher or make up test in the a.m.," "better grades, better focus," "I have had students at Edina High School for the past six years, this is THE best change."

Disadvantages: "She starts doing her homework later," "we don't see our son in the morning," "Phone calls later into the p.m.," "needs to leave 6th hour for sports too often."

Junior Student Families:

Advantages: "Both of us get more sleep. Now can you change Middle School?" "She is able to adjust and use her time better, especially with all the early evening activities this age group has-it allows her more time for homework." "stick with it, it's much better overall," "I get to talk with her at breakfast," "He is rested and is doing much better academically this year," "Parents are raving about the late start for EHS. Should have done this years before, BRAVO!" "psychological benefits even if she doesn't get any more sleep," "has time to review in a.m. on day of test," "everyone is not so rushed," "traffic patterns have eased up."

Disadvantages: "dinner hour later," "jobs start at 3:30 p.m.," "prefer to get a jump start on the day; conflicts with after school sports practices and early dismissals for meets."

Sophomore Student Families:

Advantages: "I am so relieved that Edina had the wisdom to follow the advice of the Minnesota Medical Association....Definitely keep it," "less stressful mornings," "breakfast is never missed," "fix the Middle Schools too!" "not as much time to kill in the afternoons-very pleased," "The later start time is very beneficial both relative to grades and energy level," "We have family time before school," "Keep it...would like to see Middle School start later. Buy more buses if needed," "my child can meet with teachers before school for help if necessary."

Disadvantages: "Only problem is regarding sports-athletes need to miss classes in order to get to meets," "Our child does not come home from extra curricular activities until 6:30 p.m. and is up early

for weights. We don't get the benefit of a late start." "They stay up later and the amount of sleep is the same," "Calls from friends late at night; won't go to bed," "Eating dinner later because of school sports. No time for a job."

Note: surveys on file in Principal Ron Tesch's office. (612-947-1905)

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