

## **Does Start Time at High School Really Matter? Studying the Impact of High School Start Time on Achievement, Attendance, and Graduation Rates of High School Students**

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### **Abstract**

This study examined the impact of school start times on student achievement, attendance, and graduation rates for high school students. Data from a purposeful sample of 256 high schools across three regions centers (Region IV, Region V, and Region VI) in southeast Texas for the 2017-2018 school year were analyzed. These 256 high schools were sorted by size (small, medium, and large) based on student enrollment. Additionally, interviews from 15 superintendents provided a unique perspective on the process and implementation of altering high school start times. Findings of this research indicated that delaying school start times had a positive impact on achievement, attendance, and graduation rates. Specific insights are provided in terms of the logistical, practical, and political aspects behind the healthy alignment of school start times and the internal clocks of teenagers.

### **Key Words**

high school start time, achievement, attendance, graduation rates, internal clocks of teenagers, superintendent's perspectives

## Introduction

Excessive sleep loss among teenagers has prevailed in school settings for years (Jacob & Rockoff, 2011). Adolescents average less than eight hours of sleep a night; while their bodies require 9-10 hours per night (Martin, Gaudreault, Perron, & Laberge, 2016). According to the American Physiological Association (APA, 2014), the optimal amount of sleep for adolescents is approximately 9.25 hours per night, yet only 29% of 12-14-year-olds and 10% of 15-17-year-olds are reportedly getting enough sleep.

In the teenage years, sleep patterns drastically transformed with after school activities, homework, and social media feeds. Teenagers in grades 9 through 12 unwind after eleven o'clock on school nights (National Sleep Foundation, 2006). Adolescents' biological rhythms shift in high school; therefore, high school students do not experience a full sleep cycle until the weekend (Wheaton, Ferro, & Croft, 2015).

Traditionally, high school classes started as early as seven o'clock (Wahlstrom, 2002). High school students wake up even earlier than other students due to bus routes in most districts which leads to sleep deprivation (Boyland, Harvey, Riggs, & Campbell, 2015). Many school districts have not changed their transportation schedules in decades (Owens et al., 2014b). The routines of school systems collided with the biological needs of teenagers, contributing to sleep deprivation in teenagers (van der Vinne et al., 2015). Even the American Academy of Pediatrics requested that secondary schools modify their start times to begin no earlier than 8:30 a.m. in the morning (Wheaton et al., 2015). However, most school districts had traditional transportation tiers, with high schools starting school an hour prior to elementary schools (Wolfson & Carskadon, 2005).

With high schools starting earlier, teenagers report missing school or arriving late due to oversleeping at least once a week (Indiana Youth Institute, 2011; National Sleep Foundation, 2006). Schools with early start times deal with discipline issues related to unexcused tardiness, limited concentration, moodiness, and difficulty staying awake in class (Barnes & Drake, 2015). It is evident that school systems adhere to traditional schedules; although, researchers suggest aligning high school start times to accommodate the physiological needs of teenagers (American Academy of Pediatrics, 2014a; American Medical Association 2016; National Sleep Foundation, 2006).

With chronic absenteeism on the rise in secondary schools, start times may have the potential to improve attendance rates in secondary schools (Wolfson & Carskadon, 2005). In our nation, sleep deprivation among our teenagers is evident with daytime sleepiness, absenteeism, tardiness, and social jetlag present in the high school classrooms (Wahlstrom, 2002). Social jetlag describes the incongruity between work and free time, connected with their sleep patterns and social time (Wittmann, Dinch, Mellow, & Roenneberg, 2006). This continues to affect teenagers as they balance school schedules and biological sleep patterns.

Teenagers struggling to get the recommended amount of sleep per night, often experience emotional issues such as depression, anxiety, and moodiness (Wahlstrom, 2016); therefore, discipline issues could result in the lack of sleep among teenagers in high school. With the rise in teenage issues, research will need to address altering school start times (Owens et al., 2014b). The procedures in switching time frames could show a cost savings in transportation, depending on size and type of district (Owens et al., 2014a).

Along with transportation savings, a decrease in absenteeism could be a financial advantage to districts when considering altering start times (Wheaton et al., 2015). Texas school districts receive funding per student based on their daily attendance throughout the year (Henderson, 2015).

Considering the current research suggesting teenagers' sleep wake cycle is disrupted due to early start times, it seems necessary to address the issue of sleep deprivation among teenagers and the consequential impact on student achievement. This study looks to be a contribution to current studies looking for answers in terms of the potential effect that school start times may have on the general performance of teenagers.

## Methods

### Participants

The population of the study consisted of Texas high schools including public, charter, private, academies, and technical schools. The total number of high schools in Texas is 3,709 consisting of 3,263 public schools and 446 private schools (Texas High Schools, 2018). A purposeful sample of 256 high schools with various school start times from Region IV, V, and VI were selected for participation in this study (81 Large; 91 Medium; 79 Small).

High schools across Texas are classified based on University Interscholastic League (UIL) conference cutoffs; UIL football conference cutoff numbers based on student enrollment into categories (UIL, 2016). For this study, high schools will be categorized by student enrollment into three categories: (Small) 1A, 2A, and 3A, 18—479 students; (Medium) 4A and 5A, 480—2,149 students; and (Large) 6A, 2,150—4,835 students (UIL, 2016).

Student enrollment ranged from 26 to 4,835, with the average number of

economically disadvantaged students per region are as follows: Region IV (58.6%), Region V (59.3%), and Region VI (50.1%) (Texas Education Agency [TEA], 2018). The earliest start time was determined to be 6:30 a.m. with 8:30 a.m. being the latest start time. The average start time for small schools was 7:45 am, 7:31 am for medium schools, and 7:17 am for large schools.

High schools located in Major Suburban areas represented the biggest community type with 104 schools, while the Independent Town areas represented the lowest with 13 high schools. Additionally, a purposeful sample of 15 superintendents, based on experience in small, medium, and large districts, were solicited evenly from each of the regions. Seven of the 15 participants were female (46.7%), comprised of 28.6% Hispanic and 71.4% Caucasian, and ranging in age from 45 to 55, while the eight males (53.3%) consisted of 50.0% Caucasian, 12.0% Hispanic, and 37.5% African American, and ranging in age from 45 to 65. The experience level ranged from first year to 12 years in a superintendent's role.

### Instrumentation

In the state of Texas, high school campus performance is measured based on their student achievement on standardized testing. At the high school level, students are administered the STAAR (State of Texas Assessment of Academic Readiness) End of Course (EOC) exams in English I, English II, Algebra, Biology, and U.S. History. Following administration, campuses are measured based on average student performance on each test. The purpose of the EOC exams is to guarantee high school graduates master specific skills; thereby, meeting the state standards for graduation criteria (TEA, 2017b).

The EOC assessments are formulated based on the Texas Essential Knowledge and

Skills (TEKS) which is the state mandated curriculum in Texas (TEA, 2017b). Students in high school must pass the EOC exams to be eligible for graduation. If students pass one of these courses but do not pass the EOC exam, they must retake it until they pass it for graduation (TEA, 2019b). Due to a lower percentage of students passing the EOC exams, seniors have been allowed to produce alternative projects or assignments by adhering to the requirements approved by districts and the Individual Graduation Committee in order to graduate (TEA, 2019b).

As a campus, the accountability measures are dependent on the success rates of student EOC scores. There are no provisions to alternatively assess campus scores to improve campus accountability measures. Therefore, campuses are held accountable by their students' success rate on the EOC exams.

### **Data Collection and Analysis**

IRB approval was granted prior to any data being collected. Once approval was granted, data were collected from the Texas Student Data Systems (TSDS). This data included enrollment and demographic data as well as campus achievement scores from the 2017-2018 school year for multiple high schools. TSDS also provides names of principals, high schools, and email addresses to collect start time information. The quantitative data were collected, sorted, and uploaded into an SPSS database for subsequent analysis.

A purposeful sample of 15 superintendents were solicited from a framework of participating school districts to participate in the qualitative portion of this study. The participants were asked to engage in a face to face semi-structured interviews. The superintendents were originally contacted via email with a formal request to participate in the interview. Once consent was given, the interviews were scheduled, and the participants

were formally apprised of the study details through a consent form. The form also included assurance that participation in the study was voluntary, that their identities would remain confidential, and that the participants would experience no undue harm while participating in the interview. Participants were also provided with the consent forms which included information on the interview process. The semi-structured interviews lasted on average between 20-45 minutes.

In the interviews, participants were asked to consider how high school start times affect student achievement. Specifically, superintendents were asked how the barriers of activities, transportation, parents, and community opinions impact high school start times. After each interview, the interviews were transcribed. The data collected including field notes, audio-tapes, and transcription were stored in three locations: on the researcher's external drive, a cloud server, and on a memory drive. The data were password-protected for security purposes.

IBM SPSS was utilized to analyze all of the data obtained from TSDS (attendance, achievement, and graduation rates) from Regions IV, V, and VI. This archival data were analyzed using Pearson's product moment correlations ( $r$ ) to determine if there was a relationship between high school start times and student achievement in English I, English II, Algebra, Biology, and U.S. History; between high school start times and attendance; and between high school start times and graduation rates.

Student attendance was measured using the high school attendance percentage calculated by an average of attendance for each campus (TEA, 2019a). Effect size was measured using the coefficient of determination ( $r^2$ ), which measured the proportion of variation that was shared by both variables. A

significance value of .05 was used for this study.

The qualitative part of the study included a generic approach to coding (Lichtman, 2013) to analyze the face-to-face transcribed interviews from the purposeful sample of 15 superintendents. The interview questions asked participants about their perceptions of the impact of school start times on high school students.

The qualitative data obtained from the interviews were analyzed using the three Cs of analysis: from coding to categorizing to concepts (Lichtman, 2013). Axial coding strategies and open coding were also employed “to make connections between category and its subcategories” (Strauss & Corbin, 1990, p. 97) to further explain and categorize the data for the emerging themes. Validity was strengthened by triangulating the results across the data, along with peer reviewing and member checking.

## Results

### Student achievement

When analyzing the relationship between start times of all of the high schools and achievement scores on STAAR EOC Exams in English I, English II, Algebra, Biology, and U.S. History, the relationship between school start times and achievement scores was not evident in the grouping of Region IV, V, and VI ( $p > .05$ ).

When examining the dynamics in terms of school size, a statistically significant positive relationship was found to exist between school start times and student achievement in biology in small sized schools,  $r(75) = .310$ ,  $p = .007$ ,  $r^2 = .096$ . The later the start time, the higher the biology scores for small schools. The proportion of variation in biology scores attributed to high school start time was 9.6%.

### School attendance

When analyzing the relationship between the start times of high schools and school attendance, results indicated a statistically significant positive relationship existed across all high schools in Region IV, V, and VI,  $r(248) = .166$ ,  $p = .009$ ,  $r^2 = .027$ : The later the start time, the higher the school attendance. The proportion of variation in school attendance attributed to high school start times was 2.7%.

When examining the dynamics in terms of school size, a statistically significant relationship was not found to exist between school start times and student attendance in medium or large sized schools ( $p > .05$ ). Findings, however, did indicate a statistically significant positive relationship between school start times and student attendance in small sized schools,  $r(76) = .380$ ,  $p = .001$ ,  $r^2 = .144$ : The later the start time, the higher the school attendance for small schools. The proportion of variation in school attendance attributed to high school start times was 14.4%.

### Graduation rates

When analyzing the relationship between the high school start times and graduation rates, results indicated a statistically significant positive relationship existed across all high schools in Region IV, V, and VI,  $r(232) = .147$ ,  $p < .001$ ,  $r^2 = .021$ : The later the start time, the higher the graduation rate. The proportion of variation in graduation rates attributed to high school start times was 2.1%.

When examining the dynamics in terms of school size, a statistically significant relationship was not found to exist between school start times and graduation rates in medium or large sized schools ( $p > .05$ ). Findings, however, did indicate a statistically significant positive relationship between school start times and graduation rates in small sized

schools,  $r(70) = .293, p = .014, r^2 = .085$ : The later the start time, the higher the graduation rate for small schools. The proportion of variation in graduation rates attributed to high school start times was 8.5%.

### Superintendents' perceptions

Among the superintendent participants, 40% expressed start time decisions should relate to research; however, "competing forces in education sometimes delay common sense improvements" according to one of the participants. They face competing interest groups when considering changing school start times especially in high schools. These competing forces were evident in the findings of the study with robust discussions of research along with the logistics of running a district.

A few superintendents were compelled to follow research and shared the results of their success. Other superintendents desired the alignment with research; yet the financial and political issues were a controlling factor in their decisions. A common thread among the superintendent participants was intensive knowledge and experience in sleep deprivation among teenagers.

The semi-structured interviews opened with personal experience to explore sleep deprivation in teenagers with ease. When probing questions shifted to more of a campus perspective, the participants seemed comfortable sharing their expertise.

Although the superintendents were often very political in their responses, they conveyed a sense of realism in their roles as superintendents. In their roles, they juggle research-based decisions with logistics to ensure proposals to change have been vetted before implementation.

One superintendent of a small district stated:

*I believe secondary students' sleep patterns vary based on their level of engagement outside of school. Students who are actively engaged in their school or participate in community-based events tend to go to bed earlier than non-active students. Students who have more time to engage in video games and social media tend to stay up later navigating those avenues.*

The responses from participants were conclusive that the decision-making role of superintendents typically involved research and data to support their opinions or decisions when serving as superintendents.

A few of the school district superintendents with later start times were confident that the alignment with research resulted in the growth in attendance and achievement. On the contrary, several school district superintendents were adamant that high school start times do not matter when it relates to attendance and achievement. Although all parties acknowledged the sleep deprivation research, a few superintendents voiced that the parental role is essential in teenagers getting the proper amount of sleep at night regardless of the high school start time.

A superintendent with small and large sized school district experience stated:

*Start times do not matter. It is about those students, concerned about their education, who will be engaged regardless of the start time. On the other hand, students, who don't care, will not be concerned when classes start.*

The superintendents, with experience with later start times, have shared that later start times do matter; however, parenting was

mentioned 100% by all participants as the key factor in improving attendance. Among all interviews, 20% of the superintendents, from medium and large sized school districts, stressed the importance of parenting in the home to enforce attendance.

The large sized school districts were knowledgeable of research in relation to late start times and attendance; however, 53% wanted to see more data to support this relationship. All superintendents were knowledgeable about research regarding late start times; hence, the superintendents with direct experience anticipated an increase in attendance with later start times.

A superintendent from a large school district shared:

*In a large district, high school students were not making it to school on time due to dropping off little brother or sister. Parents were quite reliant on the older siblings to take care of the younger ones. Then students without siblings were just not making it to school on time because they had trouble waking up for an earlier start time. In the larger school district, we saw improvements by moving from an earlier to a later start time because the kids were sleeping later. Parents were quite reliant on the older siblings to take care of the younger ones.*

## Discussion

Throughout the investigation, the findings analyzed whether high school start times influenced achievement scores in high schools. The participating high schools were categorized into small, medium, and large sized high schools as well as analyzing the all high school category. These results found a positive relationship in English I, English II, Biology, and U.S. History with an average start time of

7:51 a.m. in the small sized high schools. These results were consistent in the findings from Carrell, Maghakian, and West (2011) and Perkinson-Gloor, Lemola, and Grob, (2013) who reported late start times showed a positive effect on student achievement for small schools. Previous related studies tend to analyze on-line surveys, time of day protocol, self-reported surveys, and a few studies disseminated testing data. However, these studies lacked generalizability due to the participants consisting of homogenous populations in private, boarding, and military school settings (Edwards, 2012; Thatcher & Onyper, 2016; Valdez, Ramirez, & Garcia, 2014).

The viewpoint of most superintendents that participated in this study did not believe there would be a correlation with achievement. However, superintendents with late start time involvement expressed that the results would show a relationship based on their experience. One superintendent of a large sized school district reported evidence of improvement with a late start time; while another superintendent of a large sized school district was confident the results would not show a correlation. Thus, the intense data analysis of achievement scores and interview transcripts fell on both sides of the issue.

The results of the interview analysis mirrored the results of the study which portrayed variances between opinions on the relationship between school start times and achievement. The results of the data analysis and superintendent interviews depicted a wide range of outcomes without full consensus on matters.

The simple statement that late start times impacted attendance has been highly controversial since the release of recommendations from the American Academy of Pediatrics (2014b), American Academy of

Sleep Medicine (2018), and American Medical Association (2016) to start high schools at 8:30 a.m. or later. In this study, the analysis of high school start times and attendance found significance in specific areas aligned to previous research.

In the semi-structured interviews, a few superintendents anticipated positive results while many were cautious to confirm a relationship between attendance and school start times. Superintendents stressed the importance of parenting as well as the students' responsibility to attend school in a timely manner, which would impact the attendance rates more than school start times.

In this study, a significant relationship was found with attendance and school start times among all high schools in Region IV, V, and VI, as well as a higher significance with small sized schools as compared to medium or large sized schools. The average start time for all participating small sized high schools was 7:45 a.m. with an attendance average of 94.7%. These results were reflective of a small sized high school, with only four miles surrounding the school, that experienced a 30% increase in attendance after the implementation of a late start time (Wechsler, 2018).

Thus, this study found that the later the start time the higher the attendance average which supported research from Kelley et al. (2017), Edwards (2012), McKeever and Clark (2017), Owens et al. (2010), Wahlstrom (2002), and Wechsler (2018). These findings were consistent with previous research, where small, medium, or large sized schools had an average start time of 7:31 a.m. with 94.4% attendance averages. These data described the typical start times in high schools among Region IV, V, and VI, which aligns with previous research from Kelley et al. (2017), Owens et al. (2010), and Wechsler (2018).

When this study analyzed the relationship of graduation averages and high school start times, 80% of the superintendents stated that high school start times would not have an impact on the graduation averages. While 20% of the superintendents felt that later start times impacted graduation rates due to increased attendance averages.

In this study, significance was found in all high schools from Region IV, V, and VI with a graduation average of 92.8%. These findings supported previous researchers' findings (McKeever & Clark, 2017; Sabit et al., 2016; Wechsler, 2018) portraying increases in graduation with later start times.

Although previous research indicated later start times of 8:30 a.m. or later, the latest start time average that showed significance for this study was 7:52 a.m. in small sized high schools. In a previous study, it was reported that graduation improved from 70% to 88% with a delayed start time (McKeever & Clark, 2017).

The results of this data analysis reflected superintendent comments on the importance of intrinsic motivation among seniors, to reach their educational attainment of graduation, in order to see a relationship between start times and graduation rates. This study was conducted 2-years after the start time was implemented to assess the impact on attendance and graduation rates. The findings correlated with the superintendents' often shared perceptions of graduation rates, which were that seniors will figure out a way to graduate regardless of the start time of the high school.

### **Implications**

As this study has found, even the slightest increase in start times portrayed a relationship with attendance, achievement, and graduation

percentages in small sized high schools. Often small sized high schools were found in rural settings which could require additional time for transportation. Superintendents with small sized school districts experienced issues with limited transportation, which included single routes and same start times for the entire district.

Thus, school district superintendents should check the pulse of the district to see if shifting all start times by fifteen minutes would possess positive outcomes in achievement, attendance, and graduation especially in small sized high schools. In small sized schools, the increase in attendance alone would benefit any school district due to attendance being a direct source of funding (Jones et al., 2008). With a crisis in school funding in Texas, attendance rates have been critical to school districts; whereas small sized high schools should shift to later start times to seize the opportunity of increased funding.

After all, this study referenced an average start time of 7:51 a.m. versus the claims from the American Academy of Pediatrics (2014a) and American Medical Association (2016) that recommended starting an 8:30 a.m. or later. With 256 high schools, the average start time was found at 7:31 a.m., perhaps a slight shift in scheduling would improve achievement and attendance averages. However, the challenge in changing start times must be weighed carefully due to the disruption of the family, community, and transportation routines.

Information from superintendents indicated the risk of changing start times in a district would not be worth the trouble due to the drastic differing opinions superintendents faced when changing traditional routines in a district. However, the superintendents who have addressed this issue by changing to a later start time have been successful when they

implemented change through strategic planning with key stakeholders. A recommended pathway would be to follow the components of Michael Fullan's change theory when working through the exploration stages of educational reform when considering changing start times in a district (Fullan, 2006; Johnson, 2012).

This study had few data points with significance; thus, superintendents should move cautiously when approached to change high school start times. The high schools that showed significance had a start time average of 7:51 a.m. which is not close to the recommended start time of 8:30 in the morning. The in-depth interviews with superintendents were indicative of the struggles they face when considering shifting or flipping start times. Policy makers should consider start times as a reportable indicator to aid in further research; however, start times should be a local decision due to the financial aspect tied to changing start times.

Although school districts of all sizes may face similar issues, large sized school districts, according to superintendent interviews, were faced with funding issues linked to transportation costs such as buses, fuel, and drivers after switching to later start times. It would be beneficial if large sized school districts shifted all routes at least fifteen to twenty minutes later to avoid students waiting sometimes as early as 5:30 a.m., along dark streets, for their ride to school.

A delayed start of 15-20 minutes would attribute to higher attendance rates; thereby, the districts would receive more funding from the state for the higher attendance rates. Students that gained a 90% attendance rate for the year would count towards additional Average Daily Attendance (ADA) funds which could be between \$3,500 to \$6,000 per student from the state (CERPS, 2018; TEA, 2019a).

The larger sized school districts which typically averaged a 7:17 a.m. start time should consider the impact of shifting start times to 7:45 a.m. or 7:50 a.m. without changing the order of elementary, middle, or high school routes. Based on the results from this study, for the most part large sized school districts have flipped start times with the elementary and high school schedules, they received negative feedback from parents due to lack of after school care for the younger siblings. Thus, a shift of all school start times would eliminate this occurrence.

Also, changes in start times may potentially impact securing jobs and participating in athletics. This would require a consortium of superintendents united to take a stance against early start times to propose plans for the after-school activities such as fine arts and athletics as a group. This coordination would be necessary for the logistics of handling daily high school functions among multiple school district competitions. The financial gain of later start times would be a primary advantage to larger sized school districts not to mention the healthy alignment of the circadian rhythms among teenagers.

Those superintendents experiencing success in changing start times tend to apply research and theoretical concepts to adjust the mindset of their district and community. This means alignment in terms school schedules with the unique health needs of teenagers. The medium and small sized school districts with later start times focused on the teenagers first in relation to the logistics of the district.

These superintendents described the battles with parents regardless of an earlier or later start time; however, the data found that small sized high schools with an average 7:51 a.m. start time experienced success in achievement, attendance, and graduation. These small sized school districts function with

fewer funds; hence, students matter in relationship to attendance averages. The funding aspect alone pushes superintendents to figure out what works to improve school attendance.

Superintendents mentioned conversations with multiple parents stressing out over the struggle to wake their teenagers. These struggles turn into battles in the classrooms as teachers rattle teenagers out of deep slumber to engage in the learning process. Even moving the start time by 15-20 minutes would impact attendance averages according to this study.

Superintendents from small sized school districts should adhere to later start times to not only accommodate the sleep and wake cycles of teenagers but increase funding from improved attendance averages.

Superintendents from small, medium, and large sized school districts commented that parental controls in the home environment were necessary to implement later start times. This supports research that healthy sleep concepts must be addressed to provide a successful implementation of late start times (Wechsler, 2018). Superintendents discussed teenagers go to bed but not to sleep with endless hours spent in a digital world which supported previous researcher studies (Boergers, Gable, & Owens, 2014; Dimitriou et al., 2015).

Legislatures should propose a health credit as a requirement across the state to address issues such as healthy sleep routines among teenagers. A health class along with parental training on the importance of teenage sleep habits would be essential with late start time proposals. The moodiness teenagers experience with sleep deprivation due to the misalignment of their internal clock verses school start times could drastically affect their daily routines with depression, anxiety, daytime

sleepiness, and excessive caffeine use (Boergers et al., 2014; Valdez et al., 2014; Wahlstrom, 2016).

Perhaps the combination of health classes, parent training, and implementation of late start times would eliminate the constant stream of students facing emotional turmoil in their lives due to unhealthy sleep patterns.

## Conclusions

Research has abounded over the years calling for a healthy alignment of the internal clocks in teenagers and school start times. Parents have been quick to resist later start times based on personal preferences, whether they need teenagers to assist with siblings or difficulty in waking their teenagers. School districts have traditionally had earlier start times especially in high schools among the large sized school districts.

School start times were established based on logistical and financial needs. When the American Medical Association (2016), American Academy of Pediatrics (2014a), American Academy of Sleep Medicine (2019), and the National Sleep Foundation (2006) stressed the importance of 8:30 a.m. or later in middle and high school start times, this was a critical turning point for advocates of late start times.

School districts were functioning with a traditional bus route system with high school students on the earliest start time which was often 7:40 a.m. or earlier (Wolfson & Carskadon, 2005).

After reviewing the literature on high school start times, sleep deprivation was prevalent among teenagers especially in high schools with earlier start times (Lin and Yi, 2015; Martin et al., 2016; Urrila et al., 2017). The timing issue became evident when most research indicates only 29% of 12-14-year-olds

and 10% of 15-17-year-olds are reportedly getting enough sleep (APA, 2014).

Clearly, the synchronization of teenage sleep patterns and school start times led to sleep deprivation over time which impacted attendance issues on campus (Barnes et al., 2016). Hence, the practitioner and researcher found that the average start time, for all high schools in Region IV, V, and VI, was 7:31 a.m. which carried a lower attendance rate than the small sized high schools with a start time of 7:45 a.m. on average.

Based on the extensive research involved in this study, educational practices do not align with proven medical and psychological research when making healthy decisions for teenagers (Pradhan and Sinha, 2017; Valdez et al., 2014; Wahlstrom, 2002).

In regard to future research, it would be helpful to conduct student, teacher, and administrative focus groups in order to complement the findings on this topic. Involving these stakeholders may contribute to the school start time discussion beyond school superintendents' opinions.

Future research can also focus on specifics within demographic similarities or differences among schools and how these may impact students in general. In parallel, future research can emphasize specific differences in start times in terms of school sizes in comparison with average sizes.

Finally, future research can look to analyze additional variables impacting the findings as related to student achievement. Researchers, parents, and practitioners should collaborate, communicate, and commit to obtain a healthy alignment between high school start times and teenage sleep patterns to improve achievement, attendance, and graduation.

## Author Biographies

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