

## Podcast of the Journal of Clinical Sleep Medicine

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WELCOME TO THE REGULAR PODCAST OF THE JOURNAL OF CLINICAL SLEEP MEDICINE. I AM DR. STUART QUAN, EDITOR OF THE JOURNAL. THESE PODCASTS are a regular feature of each issue of the Journal and can be downloaded at the Journal's website. Each Podcast features summaries of important articles published in the current issue of the Journal, as well as occasional interviews with authors of these papers.

The lead article in this issue of the Journal is entitled, "Adolescent Sleep, School Start Times and Teen Auto Accidents," by Drs. Fred Danner and Barbara Phillips from the University of Kentucky, Department of Educational and Counseling Psychology and the Division of Pulmonary, Critical Care & Sleep Medicine in the Department of Internal Medicine. For this Podcast, I am fortunate to have the opportunity to interview Dr. Phillips regarding this paper.

**SQ:** What were the major findings in your study?

**BP:** There were actually two different things that we measured in this study. One was the outcome of some responses of a large number of high school students to some questionnaires. But the other was actually state-collected measures of crash in the state of Kentucky of drivers who were 17 and 18 before and after high school start times changed. I really have to give credit to Fred Danner, who's an educational psychologist at the University of Kentucky and is very interested in young adults and sleep. This was really his brain child and he did the heavy lifting of this report. What we did, though, was to get a survey to nearly 1,000 kids in grades 9-12 before and then again after we had a county-wide change in high school start times. In the first year, which was 1998, we had about 67% of kids in grades 9-12 complete a questionnaire about sleep habits, sleepiness and so forth. At that point in time, the high schoolers were starting at 7:30 and the middle schoolers were starting at 8:00. After the change in high school and middle school start times by an hour later, so that now the kids were starting at 8:30 in high school and 9:00 for middle school, we repeated the questionnaire. What we found from the questionnaire data was that, at least by self report, kids in high school were getting poor sleep and it was a statistically significant increase in the amount of sleep that they got. The ninth graders were only increasing their self-reported sleep time by about 12 minutes but the seniors actually increased their sleep time by a half an hour. They also reported, in aggregate, that they were having less make-up sleep on the weekends. We did see improvements in their Epworth Sleepiness scores, although I don't think this is unusually important since the scores were normal at 8.9 to

begin with and went to 8.2 after the change. Perhaps what's more important is that the proportion of teenagers who had 10 or higher on the Epworth fell from 43% to about 37% after the change. Overall, by the questionnaire data, we found that the high schoolers reported that they were getting more sleep, a fewer number of them were excessively sleepy by the Epworth and we also saw that they were having to do less make-up sleep on weekends. However, I think the really important part of this study is the collected data on crash rates that Fred was able to get from the State. In Fayette County, which is where this happened, was the only school district that changed high school start times during this period. Fred was able to get crash rates for 1,000 licensed drivers who were 17 and 18 years old in our county to compare with statewide crash rate data before and after the change in start times. There was a very statistically significant fall in crash rates in kids in our county where school started an hour later than for the rest of the state. I think that's really the take-home message here in that later high school start times can reduce crash rates, which obviously has public health implications.

**SQ:** So the important public health implication of these findings would be that school districts should try to delay the school start times in high school students so that they can possibly decrease the motor vehicle crash rates for these students. Would that be your take on this?

**BP:** It would be. And of course that's been the position of the National Sleep Foundation for a long time. They have educational materials and workshops on how to work with your school district to get later high school start times. I have also just learned that the Centers for Disease Control is now setting up an approach for advocacy to help people who are interested in working with their school districts to have later high school start times. Car crash is an important public health problem. Of course it's a common cause of injury and death in teenagers so anything that we can do that would reduce this is important and this seems to be one easily... Well, not that easily, but certainly one accomplishable way to do that.

**SQ:** You mention that possibly this is an easy thing to accomplish. What then are the barriers to actual implementation of this strategy and why haven't more school districts actually done this?

**BP:** This is a really important question. It has to do with bus schedules, primarily. Somehow, bus transportation to school has become a mandate and part of what people expect from public education. There are so many buses and so many drivers so that

school bus schedules tend to influence, greatly, what time high schools and other schools can start. If somebody gets to go to school at 9:00 that means that somebody else is probably going to have to go to school at 6:30 or 7:00 in the morning. It is the elementary school parents who have opposed later high school start times because that means that their children have to get on the school bus or get to school in the dark. At least in our school district, that was the major source of opposition to the change. But there are other things that happen as well and one is sports and other after-school activities because band practice and football practice and play practice typically take place after school. If your school doesn't start until 9:00, it may not get out until 3:30 or 4:00. Many of the teachers in our school district and students adopted what is called "zero hour." Instead of having their play practice or band practice after school they would have it before school. This was undermining some of our efforts to have delayed high school start times. There are also, of course, problems with established work schedules and child care arrangements. If the parents have to be at work at 8:00, what do they do about supervision or getting their kids on the school bus at 9:00 and so forth? It really has to do with buses, child care, and extra-curricular activities.

**SQ:** It seems to be ubiquitous around the various school districts. I know that in Tucson, when this was raised, there was a major objection by the football coach about delaying practice in the afternoon.

**BP:** Exactly. I can't back this up with data but I do believe that I have read that the average time of teenage unplanned pregnancy occurs at 3:00 in the afternoon, when the parents are not yet home from work but the kids can be home from school. To me, this seems like a pretty compelling argument to keep kids in school in the afternoon to at least as close as you can when the parents can get home.

**SQ:** Do you think there are any other research issues that need to be addressed in this area?

**BP:** Heck yes. This was just an observational study. Fred Danner just took advantage of an opportunity that he saw but there are many other factors that can be associated with short sleep in teens and in everybody else. We now have some cross-sectional and prospective data that suggests that short sleep is associated with obesity. That data is actually stronger for young people than it is for older people. A very important study would be to see if the prevalence of obesity fell if teens are allowed to get more sleep, delaying their high school start times. We also believe that mood disturbance and impulsive behaviors, perhaps even things like attention deficit hyperactivity disorder are associated with reduced sleep times. Those are things that could be investigated as high schools change their start times. There is a lot of work to get that kind of data together. Getting it from school systems, we learned, is very hard but I think it is important because the more compelling data that we can garner about improvements that occur in the physical and emotional health of teens as they are allowed to sleep more the stronger the argument will be to delay high school start times.

**SQ:** Thank you very much, Barb. This has been a very enlightening interview. Your paper in the Journal, I hope, will be widely read and I think it's a very important first start in this area.

**BP:** Thanks, Stuart.

The next paper featured in this Podcast is entitled, "CPAP Therapy of Obstructive Sleep Apnea In Type 2 Diabetics Im-

proves Glycemic Control During Sleep," by Arthur Dawson, Susan Apple, Richard T. Loving, George Dailey, Farhad Shadan, John Cronin, Daniel Kripke and Lawrence Kline from the Scripps Clinic Sleep Disorders Center, Division of Chest & Critical Care Medicine, Scripps Clinic, La Jolla, CA. In this study, the authors measured interstitial glucose every five minutes during polysomnography in 20 patients with Type 2 diabetes and newly diagnosed obstructive sleep apnea. Measurements were made before and, on average, 41 days after institution of CPAP therapy. The authors found that mean, sleeping glucose decreased pre-therapy from a mean of  $122 \pm 61.7$  mg/deciliter to  $102.9 \pm 39.4$  mg/deciliter after CPAP therapy. However, there was no change in the hemoglobin A<sub>1c</sub> levels. As expected, the Epworth Sleepiness Scale decreased from 11.2 to 6.1 and the apnea-hypopnea index was reduced from a mean of 63 events/hour of total sleep time to 7.9 events/hour of total sleep time. Patients also gained a slight amount of weight, increasing from 117.9 kilos to 118.9 kilos. Recently, there have been epidemiologic studies, as well as small clinical studies, indicating that obstructive sleep apnea is a risk factor for poor glycemic control and that CPAP therapy may favorably intervene in improving this control. This study provides additional evidence that CPAP therapy may be useful in improving the glycemic control of patients with diabetes. However, this was a non-randomized study, using a before and after study design. Therefore, additional studies, using a placebo control group, are indicated.

The last study to be highlighted in this Podcast is entitled, "Relationships Between the Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale and Clinical Polysomnographic Measures In a Community Sample," by Daniel J. Buysse, Martica Hall, Patrick J. Strollo, Thomas Kamarck, Jane Owens, Laisze Lee, Steven Reis and Karen Matthews from the Sleep Medicine Institute & Neuroscience Clinical & Translational Research Center at the University of Pittsburgh. This study utilized the first 187 participants from the HeartSCORE study, which was an epidemiologic study concentrating on risk factor evaluation for cardiovascular disease. The study described in the Journal was an ancillary study to the HeartSCORE protocol. Various self-report measures, the Pittsburgh sleep diary, wrist actigraphy and home polysomnography were collected in these participants. The self-report measures included the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale. The authors found that the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale were only weakly correlated with each other, with a correlation coefficient of 0.16. Furthermore, the authors found that the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale measure orthogonal symptom domains and neither were related to objective sleep measures on polysomnography. The authors also found that the Pittsburgh Sleep Quality Index is more closely related to psychological symptom ratings and sleep diary measures than the Epworth Sleepiness Scale. The authors concluded that neither of these instruments were useful as screening measures for polysomnographic sleep abnormalities.

This concludes the regular Podcast of the Journal of Clinical Sleep Medicine. The listener is encouraged to read the contents of the Journal for additional information regarding each of the papers summarized in the Podcast, as well as other papers published in this issue of the Journal.