Early morning university classes correlate with poor sleep and academic performance

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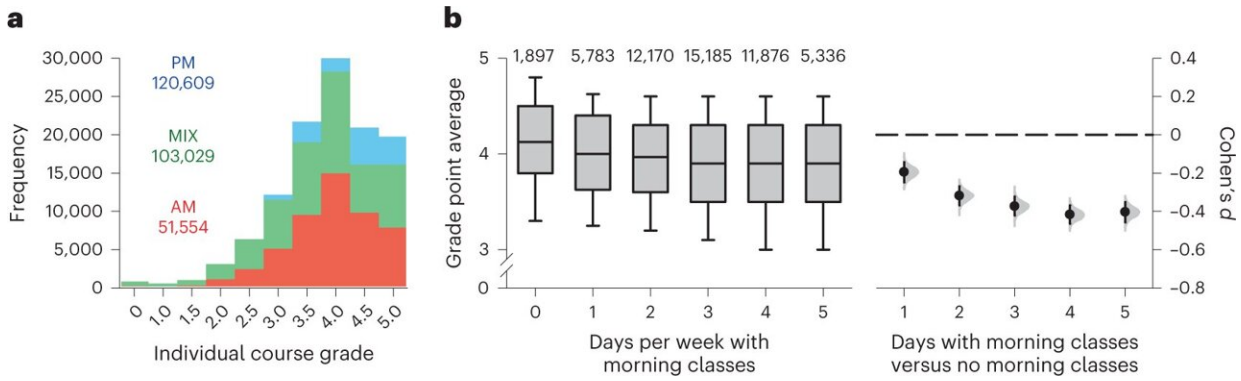

Students with morning classes on more days of the week had a lower grade point average. a, The distributions of grades are shown for courses with class sessions that took place exclusively in the morning (starting before 12:00), exclusively in the afternoon (starting at 12:00 or later) or in both the morning and afternoon. The number of morning-only (AM), afternoon-only (PM) and morning/afternoon (MIX) course grades is indicated on the plot. b, Box plots show the distribution of grade point average by the number of days per week that students had morning classes. Boxes show the median and interquartile range. Whiskers show the 10th and 90th percentiles. Sample sizes are displayed at the top of each bar. Effect sizes (Cohen's d) with 95% CIs and the bootstrap sampling distributions are plotted for days with morning classes (1 to 5 days) versus having no morning classes. Data were compiled from 33,818 unique students over six semesters. Credit: *Nature Human Behaviour* (2023). DOI: 10.1038/s41562-023-01531-x

Digital data from university students in Singapore suggest they could be

getting better grades if their classes started later. The findings, from tens of thousands of students, were published by Duke-NUS Medical School researchers and colleagues in the journal *Nature Human Behaviour*.

Research in recent years has shown that postponing the start time of high schools improves the amount of sleep that students get and reduces their sleepiness during school hours. But findings are mixed about whether this has a positive impact on grades.

To determine the impact specifically on university students, Associate Professor Joshua Gooley, from Duke-NUS' Neuroscience & Behavioral Disorders Program and colleagues used student Wi-Fi connection data, log-ins to university digital learning platforms, and activity data from special sensing watches to conduct large-scale monitoring of class attendance and sleep behavior of tens of thousands of university students.

"We implemented new methods that allow large-scale monitoring of class attendance and sleep behavior by analyzing students' classroom Wi-Fi connection data and their interactions with digital learning platforms," said Dr. Yeo Sing Chen, first author of the study and a Duke-NUS Ph.D. graduate.

From the data, the researchers found that early class start times were associated with lower attendance, with many students regularly sleeping past the start of such classes. When students did attend an early class, they lost about an hour of sleep. Morning classes on more days of the week were also associated with a lower grade point average.

"If the goal of formal education is to position our students to succeed in the classroom and workforce, why are we forcing many university students into the bad decision of either skipping morning class to sleep more or attending class while sleep-deprived?" asked Assoc. Prof.

Gooley. "The take-home message from our study is that universities should reconsider mandatory early morning classes."

The researchers drew insights using the Wi-Fi connection logs of 23,391 students to find out if early morning classes were associated with lower attendance. They then compared the data with six weeks of watch-derived activity data from a subset of 181 students to determine if the students were sleeping instead of attending early morning classes.

They also analyzed activity data with the day and night patterns of digital learning platform logins of 39,458 students to determine if early morning classes were associated with waking up earlier and getting less sleep. Finally, they studied the grades of 33,818 students and the number of morning classes these students were taking to determine if it impacted their grade point average.

The team is now investigating differences between class attendance, sleep, well-being and academic performance between early birds and night owls. "We expect to find that evening-type students will be at a learning disadvantage in early morning classes and have lower class attendance, shorter sleep, poorer mental health and lower grades compared with their peers," said Assoc. Prof. Gooley.

More information: Sing Chen Yeo et al, Early morning university classes are associated with impaired sleep and academic performance, *Nature Human Behaviour* (2023). DOI: 10.1038/s41562-023-01531-x

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