Who's going to win? The answer could change by the hour

January 29 2015

Emily Defroand (left) and Holly Payne (right), two 'larks', students at the University of Birmingham, Great Britain hockey players, and participants of the study by Roland Brandstaetter and Elise Facer-Childs. Credit: Andy Smith

The outcome of that big sporting event you just can't wait to watch may depend on how the timing of the match aligns (or doesn't) with the internal biological clocks of the athletes on the teams, according to a study reported in the Cell Press journal *Current Biology* on January 29.

Athletes and coaches would do well to make note and adjust their schedules accordingly, the researchers say.

The study found that the performance of competition-level athletes varies over the course of the day by as much as 26%. People who would naturally prefer to sleep in will give their best performances hours later in the day than early birds will.

"If a one percent difference in performance can make the difference between 1st place and 4th place in a 100 meter race and actually win you the gold medal at the Olympics, then imagine what a 26 percent difference in your performance could give you," says Roland Brandstaetter from the University of Birmingham in the United Kingdom. "Our research takes us away from the idea of 'time of day of the race' and directs us more to internal biological time."

In other words, he says, what time is it for your body clock?

Earlier reports had suggested that athletes' personal best performances are always in the evening. But those studies had not actually taken into account whether those athletes were night 'owls' or morning 'larks.' While an individual's circadian phenotype often does shift from childhood into adolescence and adulthood, there are real physiological differences between people based on their natural sleep/wake patterns.

Brandstaetter and his co-author Elise Facer-Childs used a novel test to characterize the circadian phenotypes of more than 120 athletes. They then selected 20 athletes representing early, intermediate, and late types and tested their cardiovascular endurance in a standard fitness test at six times of day.

We can take "time" into our own hands if we listen to, understand, and follow our body clock. Credit: Roland Brandstaetter

Those fitness tests revealed considerable variation in individual performance over the course of the day. The best predictor of how well those groups performed at a given hour was the time elapsed since their entrained awakening—that is, the time since they would have gotten up in the morning if left to their own devices, alarm clocks switched off. While an early riser may be at his or her best in the early afternoon, someone who sleeps late hits his or her peak much later at night.

The findings "leave no doubt that the correct determination of an

athlete's personal best performance requires consideration of circadian phenotype, performance evaluation at different times of day, and analysis of performance as a function of time since entrained awakening," the researchers conclude. And the findings could come in handy for the rest of us, too.

"Obtaining a personal best performance is on everyone's agenda, but how to do it, now that is a different question," Facer-Childs says. One thing now seems sure: we'd be well advised to shift our attention from the clock on the wall to the one that's ticking inside each of us.

More information: *Current Biology*, Facer-Childs et al.: "The impact of circadian phenotype and time since awakening on diurnal performance in athletes" www.cell.com/current-biology/a … 0960-9822(14)01639-X

Provided by Cell Press