Moderate to vigorous physical activity early in the day influences weight management, health outcomes

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Even though epidemiological evidence has been controversial regarding the optimal timing of physical activity for weight management, the hours

of 7 a.m. to 9 a.m. appear to be the most favorable time of day to enhance the association between daily moderate to vigorous physical activity and obesity, according to a new analysis titled "The Diurnal Pattern of Moderate-to-Vigorous Physical Activity and Obesity: A Cross-Sectional Analysis", published in the journal *Obesity*.

"Our study provided a novel tool to explore the diurnal pattern of physical activity and to investigate its impact on health outcomes," said Tongyu Ma, Ph.D., assistant professor, Health Sciences Department, Franklin Pierce University, Rindge, N.H., and the Department of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hong Kong, China. Ma is the corresponding author of the study.

Experts note that previous research has focused on the frequency, intensity and duration of physical activity. So far, few studies have investigated the diurnal pattern of accelerometer-measured physical activity to classify the time of day of human movement. It is unclear whether accumulating physical activity at different times of day is equally associated with obesity.

In additional, it is unclear whether meeting the physical activity guidelines (150 minutes/week of moderate to vigorous physical activity) with different patterns is equally beneficial for reducing obesity. In the current study, researchers explored whether the diurnal pattern of accelerometer-measured moderate to vigorous physical activity influences the association between such human movement and obesity.

Researchers used data from the 2003–2004 and 2005–2006 cycles of the National Health and Nutrition Examination Survey by the Centers for Disease Control and Prevention because accelerometry was implemented during that time.

A total of 5,285 participants were cross-sectionally analyzed. The diurnal

pattern of objectively measured moderate to vigorous physical activity was classified into three categories by K-means clustering analysis: morning, midday and evening. K-means is an established algorithm that is commonly used to identify hidden patterns in unlabeled data sets.

Results revealed a strong linear association between moderate to vigorous physical activity and obesity in the morning group, whereas a weaker curvilinear connection was found in the midday and evening groups. Participants who met the physical activity guidelines in the morning cluster had a lower body mass index and waist circumference than those in the other clusters.

Self-reported dietary recall indicated that participants in the morning cluster had a healthier diet and less daily energy intake per unit of body weight compared with other clusters. The authors also found that participants in the morning cluster spent a significantly higher amount of time on sedentary behavior than the participants in the other clusters. Despite the longer duration of sedentary time, the lower body mass index and waist circumference outcomes in the morning group persisted.

Overall, participants in the morning cluster were 10 to 13 years older than the two other groups. The morning cluster also had the highest percentage of female participants among the three groups. The majority of participants in the morning group were primarily non-Hispanic White, had a college or higher education, and had never used tobacco or alcohol.

"Our findings propose that the diurnal pattern of moderate to vigorous physical activity could be another important dimension to describe the complexity of human movement," Ma and his colleagues stated in the study.

Rebecca Krukowski, Ph.D., a clinical psychologist with expertise in behavioral weight management, commented, "This is exciting new

research that is consistent with a common tip for meeting exercise goals—that is, schedule exercise in the morning before emails, phone calls or meetings that might distract you."

However, Krukowski said, since this is a cross-sectional study, "It is not known whether people who exercise consistently in the morning may be systematically different from those who exercise at other times, in ways that were not measured in this study. For example, people who exercise regularly in the morning could have more predictable schedules, such as being less likely to be shift workers or less likely to have caregiving responsibilities that impede morning exercise.

"Predictable schedules could have other advantageous effects on weight that were not measured in this study, such as with sleep length/quality and stress levels. In addition, the 'morning larks' who consistently rise early enough for morning exercise may be biologically different from their 'night owl' counterparts."

Krukowski, professor, and co-director of the Community-Based Health Equity center, University of Virginia, School of Medicine, Department of Public Health Sciences, was not associated with the research.

The study's authors noted that prospective studies and randomized clinical trials are needed to confirm their findings.

More information: Tongyu Ma et al, The diurnal pattern of moderate-to-vigorous physical activity and obesity: a cross-sectional analysis, *Obesity* (2023). DOI: 10.1002/oby.23851

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