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AI SLEEP DATA COULD PROVIDE ONE-WEEK EARLY WARNING OF FLU AND COVID-19 ACTIVITY

Joint research highlights the potential of passively collected cough data as a valuable and leading signal for disease outbreak detection.

Sleep Cycle, the world's leading AI sleep technology company, today announced the results of its research collaboration with the UK Health Security Agency (UKHSA), the United Kingdom's national public health agency.

The joint study evaluated whether aggregated, privacy-preserved nightly cough data collected through the Sleep Cycle app could complement established respiratory disease surveillance systems. The findings demonstrate that passive digital health data can provide a robust and regionally consistent indicator of community respiratory illness while also showing epidemiologically plausible lead signals of approximately one week for influenza and COVID-19 activity, supporting the growing role of digital health data in public health surveillance.

The strongest and most consistent relationship was observed between Sleep Cycle's nightly cough data and NHS 111 Acute Respiratory Infection (ARI) triage calls across England. The study also found that population-normalised cough metrics showed short-term leading relationships of approximately one week for both influenza and COVID-19 surveillance indicators. The findings suggest that passive cough monitoring can provide an earlier and independent syndromic indicator of respiratory illness burden that enhances existing surveillance systems.

Unlike traditional surveillance, Sleep Cycle's cough signal is generated automatically during normal sleep using privacy-preserved, passively collected data and updated daily, providing a near real-time view of respiratory illness activity. The study found that increases in coughing were often observed around one week before increases in influenza and COVID-19 activity, highlighting the potential of passive digital health data to provide earlier situational awareness alongside established surveillance systems.

Importantly, the study evaluated statistical relationships between surveillance indicators rather than the operational availability of data. As discussed in the publication, passively collected cough data is refreshed every 24 hours globally and becomes available with minimal reporting delay, while established surveillance systems may be influenced by healthcare utilisation, laboratory processing and reporting workflows. Consequently, the observed statistical timing may represent a conservative estimate of the practical timeliness that continuously available digital health signals could provide in operational public health surveillance and warrants prospective evaluation. Combined with the approximately one-week leading relationships observed for influenza and COVID-19, this highlights the potential for prospective evaluation of passive cough monitoring as an early situational awareness tool.

“No single surveillance system provides a complete picture of respiratory disease activity,” said Professor Steven Riley, Chief Data Officer at UKHSA. “These findings suggest that combining established surveillance approaches with novel digital health signals could contribute to an earlier, richer and more resilient understanding of population respiratory health. Passive nocturnal cough monitoring can provide a timely population-level signal of respiratory symptom burden, with greatest utility as a broad syndromic indicator that complements surveillance sources without being affected by healthcare-seeking behaviour, laboratory turnaround times, backfilling, and reporting delays.”

“The study demonstrates that passively collected nightly cough data captures meaningful changes in community respiratory illness,” said Dr. Emil Carlsson, Research Scientist & Co-lead Author. “Equally important, it shows that consumer-generated health data can be transformed into epidemiologically meaningful surveillance signals using rigorous scientific methods while maintaining strong privacy protections.”

“This study validates a completely new category of health data,” said Dr. Mikael Kågebäck, Chief Technology Officer & Acting Chief Executive Officer. “For the first time, we’ve demonstrated that passively generated smartphone data can produce robust population-level health intelligence at national scale, while also providing earlier signals for influenza and COVID-19 activity. That creates opportunities to strengthen public health surveillance and enable researchers, healthcare organizations and industry partners to build new services for situational awareness and operational decision support.”

About The Study And Key Findings
The study compared three years of aggregated, anonymized nocturnal cough data collected through the Sleep Cycle app, including total coughs, coughs per user, and coughs per hour of sleep, with established UKHSA respiratory surveillance indicators in England between January 2023 and January 2026. Comparator data included NHS 111 Acute Respiratory Infection (ARI) triage calls, PCR test positivity for influenza and COVID-19, and hospital admission rates for influenza, COVID-19, and respiratory syncytial virus (RSV).

Among the key findings:

- Strong and regionally consistent relationships between Sleep Cycle’s cough signal and NHS 111 Acute Respiratory Infection (ARI) surveillance.
- Passive smartphone-based monitoring generated a continuously updated respiratory health signal without requiring symptom reporting or healthcare interaction.
- Population-normalized cough metrics also showed associations with influenza and COVID-19, including indications of an approximately one-week lead signal, warranting further prospective evaluation.
- The findings support passive digital health data as a complementary input to future respiratory disease surveillance.

The manuscript has been published as a medRxiv preprint and is currently undergoing peer review. The full preprint is available **here**.

Advancing Responsible Health Data Research
With more than four billion nights analysed across over 180 countries, Sleep Cycle has built one of the world's largest datasets related to sleep, recovery and respiratory behaviour.

The collaboration with UKHSA demonstrates how privacy-preserved passive digital health data can contribute to scientific research and public health while maintaining rigorous privacy standards. All analyses were conducted using aggregated and anonymized data, ensuring that no individual users could be identified.

The findings also demonstrate the broader potential of continuously generated passive digital health data to support research, public health and future healthcare innovation. Sleep Cycle continues to explore collaborations with public health agencies, healthcare organizations, academic institutions and industry partners seeking to advance population health through responsible use of large-scale passive digital health data.

About Cough Radar
Sleep Cycle's Cough Radar visualizes aggregated nocturnal cough activity across regions using anonymized, privacy-preserved data. The platform was developed to support research into respiratory health trends and population-level disease monitoring.

Learn more at **www.sleepcycle.com/coughradar**

About Sleep Cycle
Sleep Cycle is dedicated to making healthy sleep accessible to everyone. Our app helps users to build hero habits, identify potential sleep issues, and gain valuable insights into their sleep patterns. Leveraging patented sound technology and over 4 billion analyzed sleep sessions, Sleep Cycle provides great accuracy and personalized guidance. As part of its broader partnership program, Sleep Cycle offers company partnerships including in-app promotions, tailored SDK solutions, and an extensive data library, enabling businesses to expand their offerings with sleep solutions and insights. Sleep Cycle is listed on Nasdaq Stockholm under the ticker SLEEP, with its headquarters in Gothenburg, Sweden.

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