**JOINT NEWS RELEASE**

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# NTU Singapore and IMH scientists develop AI framework to detect early psychosis risk in youths from casual speech

*The new hybrid approach analyses subtle emotional patterns in natural conversation without relying on direct self-disclosure of mental health symptoms.*

**Nanyang Technological University, Singapore (NTU Singapore)** and the **Institute of Mental Health (IMH)** have developed a novel artificial intelligence (AI) framework capable of identifying youths at high risk of psychosis - a severe mental health condition that typically emerges in adolescence to early adulthood where a person may experience hallucinations, delusions, and disordered thinking - from short samples of casual, spontaneous speech.

This is the first reported study in Singapore to focus specifically on early psychosis risk among youths using large language models (LLMs), a form of artificial intelligence trained to analyse and generate human language. The team of researchers believes the technology could eventually support primary care providers and community workers in identifying vulnerable youths before clinical symptoms escalate.

Early identification of individuals at ultra-high risk (UHR) of psychosis is challenging because youths in everyday life rarely articulate mental health struggles directly. Ultra-high risk of psychosis refers to a clinical state in which an individual shows early warning signs or risk factors that significantly increase the likelihood of developing psychosis.

For example, a depressed person may not explicitly state that they feel depressed. This is known as “non-disclosing speech,” meaning language that does not contain any explicit mention of the mental health condition experienced by the speaker. Therefore, evaluating whether AI can detect potential risk purely from casual, spontaneous conversation addresses a key hurdle in early intervention.

## Transforming casual conversation into clinical insight

Published in the scientific journal *npj Mental Health Research*, the joint NTU-IMH study evaluated transcribed text samples from 429 participants aged 14 to 29 enrolled in Singapore’s Longitudinal Youth-at-Risk Study (LYRIKS), a landmark Singapore study

initiated in 2008 to comprehensively assess the social, clinical, and biological risk factors associated with youths at ultra-high risk of developing psychosis.

Each participant provided a 45-second non-self-disclosing speech sample in response to a neutral prompt, such as making a case for why they should win an award for being the 'most interesting person'.

The researchers found that standard LLMs struggled when prompted directly to predict clinical risk from raw transcripts, achieving performance no better than a random guess and missing most at-risk individuals.

The researchers believe standard models struggled due to a lack of suitable training datasets, as well as the nature of spontaneous everyday speech, which rarely contains structured clinical information or explicit symptom descriptions.

To overcome this limitation, the team developed **LEMon-AID (Latent Emotion Proxy for Mental Health Detection with AI-integrated Decision-making)**, which leverages LLMs to extract subtle emotional profiles such as joy, trust, fear, and sadness from the text, then combines these emotional signals with traditional machine learning predictions.

The study demonstrated that LEMon-AID performs significantly better than conventional approaches. It boosted overall predictive accuracy from 55 per cent under conventional direct LLM prompting to 67 per cent, while dramatically increasing detection sensitivity such that up to 93 per cent of at-risk youths can be identified.

**Human-AI collaboration and transparent reasoning**

**Co-lead investigator of the study, Wilson Goh, Assistant Professor of Biomedical Informatics from LKCMedicine and the NTU Centre of AI in Medicine**, said: “Standard AI models struggle to pick up early mental health risks from everyday conversation because people rarely talk about their symptoms openly. Instead of asking AI to give a direct diagnosis, LEMon-AID uses language models to read underlying emotional cues. This system connects emotional patterns with mental health risks while keeping patient data private and providing clear, understandable explanations.”

Unlike traditional machine learning models, which may operate as 'black boxes', LEMon-AID generates natural-language explanations alongside its risk assessments. This allows clinicians to understand the clear reasoning behind each prediction, making AI a safer and more transparent tool for doctors to use when evaluating patients.

**Dr Jimmy Lee, Group Chief Research and Innovation Officer, NHG Health and Senior Consultant, IMH, and an Associate Professor at NTU’s LKCMedicine**, who

led the LYRIKS study said, “Early detection is one of our most powerful tools in preventing long-term disability and restoring the health and futures of young people with mental illness. This research brings us a meaningful step closer to that goal, a future where frontline community workers and healthcare providers are better equipped to identify at-risk youths early, supported by AI tools that help surface those who might otherwise be missed. The aim is to reach young people sooner and encourage them to seek the care they need before their condition worsens."

**First author of the study, Matheus Calvin Lokadjaja, Research Assistant, LKCMedicine**, said: “When we directly asked standard AI models to identify at-risk individuals from casual conversation transcripts, they missed almost everyone. By shifting the AI's focus to mapping emotional signals such as joy, sadness, or trust across a conversation, we found a way to uncover meaningful patterns that were previously hidden in everyday speech.”

**Next steps towards clinical validation**

The newly developed LEMon-AID framework is currently being explored for various clinical deployments in future work. The researchers will tap into multimodal approaches, incorporating different data types and modalities - such as acoustic cues, vocal pitch, speech rhythm and facial expressions - to improve system reliability while also helping us understand how discovered patterns across speech, behaviours and acoustics inform on mental health progression.

Further extensive research and real-world validation will be needed before practical implementation can occur.

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**Note to editor:**

Paper titled: *“Emotion-informed associative learning in large language models for mental health detection from speech”*, published in *npj Mental Health Research*, 20 August 2026.
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***About Nanyang Technological University, Singapore***

Nanyang Technological University, Singapore (NTU Singapore) is a premier technological university that develops leaders and creates societal impact through education, research, and service.

Ranked amongst the world's top universities, NTU has 40,000 undergraduate and postgraduate students in the Business, Computing & Data Science, Engineering, Humanities, Arts, & Social Sciences, Medicine, Science, and Graduate colleges.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education and S Rajaratnam School of International Studies – and various leading research centres such as the Earth Observatory of Singapore, Nanyang Environment & Water Research Institute, Energy Research Institute at NTU, and Singapore Centre for Environmental Life Sciences Engineering.

The University aspires to shape an AI-enabled future. By bringing together global talent across disciplines and combining technology with human creativity, NTU nurtures AI-ready graduates, drives breakthrough discoveries, and forges partnerships that tackle the challenges of our time.

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***About the Institute of Mental Health (IMH)***

The Institute of Mental Health (IMH), a member of NHG Health, is the only tertiary psychiatric care institution in Singapore. Located on the sprawling 23-hectare campus of Buangkok Green Medical Park in the north-eastern part of Singapore, IMH offers a multidisciplinary and comprehensive range of psychiatric, rehabilitative and therapy services in hospital-based and community-based settings. The 2,000-bedded hospital aims to meet the needs of three groups of patients – children and adolescents (aged below 19 years), adults and the elderly. Besides providing clinical services, IMH dedicates resources to carry out mental health promotion and raise mental health literacy. IMH also leads in mental health research and training the next generation of mental health professionals in Singapore. For more information, please visit www.imh.com.sg

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