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# AI Tool Detects Early Psychosis Risk in Youth with 93% Accuracy from Short Speech Samples

Researchers at Nanyang Technological University and the Institute of Mental Health developed LEMon-AID, an emotion-focused AI that identifies early signs of psychosis in youths from 45-second speech samples. The AI tool achieves 93% detection sensitivity by analyzing emotional cues in speech, addressing a critical gap in early intervention for mental health.

**Breakthrough AI Framework Identifies Early Psychosis Risk from Casual Conversation**

Nanyang Technological University and the Institute of Mental Health have developed LEMon-AID (Latent Emotion Proxy for Mental Health Detection with AI-integrated Decision-making), an AI tool that detects early psychosis risk in youth from brief, spontaneous speech samples

This marks Singapore's first study using large language models specifically to assess early psychosis risk among adolescents, addressing a critical challenge in mental health

Psychosis typically emerges between adolescence and early adulthood, manifesting through hallucinations, delusions, and disordered thinking. Early identification of individuals at ultra-high risk (UHR) remains challenging because at-risk youths rarely articulate mental health struggles directly in everyday conversation—a phenomenon researchers call "non-disclosing speech"

For instance, a depressed person may not explicitly state they feel depressed, making detection through casual conversation particularly difficult.

**Analyzing Spontaneous Speech Samples Reveals Hidden Patterns**

Published in npj Mental Health Research, the study evaluated transcribed text from 429 participants aged 14 to 29 enrolled in Singapore's Longitudinal Youth-at-Risk Study (LYRIKS), initiated in 2008

Each participant provided a 45-second speech sample responding to neutral prompts, such as arguing why they should win an award for being the "most interesting person."

Standard large language models struggled when prompted directly to predict clinical risk from raw transcripts, achieving performance no better than random guessing and missing most at-risk individuals. Researchers attribute this failure to insufficient training datasets and

the nature of spontaneous everyday speech, which rarely contains structured clinical information or explicit symptom descriptions.

**Emotion-Focused AI Achieves Dramatic Performance Improvements**

LEMon-AID overcomes these limitations through an innovative approach that leverages large language models to extract subtle emotional cues in speech—including joy, trust, fear, and sadness—then combines these emotional signals with traditional machine learning predictions. The results demonstrate significant improvements: predictive accuracy jumped from 55% under conventional direct prompting to 67%, while detection sensitivity soared to 93%, meaning the system can identify nearly all at-risk youths.

Wilson Goh, Assistant Professor of Biomedical Informatics at LKCMedicine and the NTU Centre of AI in Medicine, explains: "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".

**Transparent AI Supports Clinical Decision-Making**

Unlike traditional machine learning models that operate as "black boxes," LEMon-AID generates natural-language explanations alongside its risk assessments. This transparency allows clinicians to understand the reasoning behind each prediction, making the AI tool safer and more trustworthy for evaluating patients. The system maintains patient data privacy while providing clear, understandable explanations that support human-AI collaboration in clinical settings.

Dr. Jimmy Lee, Group Chief Research and Innovation Officer at NHG Health and Senior Consultant at the Institute of Mental Health, emphasizes the potential impact: "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".

**Implications for Early Intervention and Mental Health Care**

The emotion-focused AI represents a shift in how technology can support early intervention for mental health conditions. By detecting early signs of psychosis in youths before clinical symptoms escalate, LEMon-AID could eventually support primary care providers and community workers in reaching vulnerable individuals who might otherwise go unnoticed.

The technology addresses a fundamental challenge: identifying at-risk youths when they're not actively seeking help or disclosing struggles.

This breakthrough in analyzing emotional cues in speech through AI opens possibilities for broader mental health screening in community settings, schools, and primary care environments. The 93% detection sensitivity suggests the tool could serve as an effective

screening mechanism, helping direct resources toward those who need them most while maintaining the transparency necessary for responsible clinical implementation.