

Deep Learning to Identify Adolescent Development Patterns

Translational Science Benefits Model IMPACT PROFILE

We aim to use different kinds of long-term data to find groups of teens who follow different paths in behavior and thinking. Our hope is that this work will help improve treatments, design better programs, and guide future research studies.

The Challenge

Mental health problems are becoming more common around the world. When these problems begin in the teen years and are not treated early, the symptoms often continue into adulthood. In the U.S., visits to the emergency room for mental health reasons rose by 43% between 2015 and 2022. While many mental health issues start to show during the teen years, the root causes often begin earlier in childhood. As kids grow, their development includes many areas—not just physical or mental health alone. These conditions often overlap and happen together, which makes them hard to diagnose with current systems. Because of this, we are using a method that looks at patterns without relying on specific diagnoses or labels.

The Approach

We want to find groups of young people who follow different paths in their overall development. To do this, we will:

1. Use deep learning tools (VaDER, CRLI) to group teens based on mental and physical health data collected over time from the ABCD Study.
2. Look at each group to understand how they relate to early traits, possible risk factors, and outcomes that affect teen well-being.

The Impact

This work will support the creation of clear models that use basic patient information to predict which teens may face more serious health issues. These models can help doctors and patients make better choices together and encourage early action rather than waiting for problems to arise.

RESEARCH HIGHLIGHTS

This project will result in:

- A foundation on which to build robust models predictive of mental health outcomes in adolescents
- Multivariate risk profiles that can inform clinical decision-making and risk-informed care.
- Best practices for informatics researchers who plan to deploy these clustering methods in other longitudinal biomedical contexts.

Key Benefits



CLINICAL

This project can help doctors create full risk profiles to guide decisions - **Potential**



COMMUNITY

This project can help parents understand child development – **Potential**



ECONOMIC

This project can support new ways to screen or treat problems, saving money over time - **Potential**



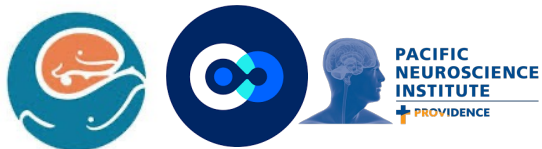
POLICY

This project has generated scientific research presentations and grant applications - **Demonstrated**



CLINICAL

This project can build a base for future data work with similar studies – **Potential**



The team:

Bhargav Vemuri, MPH (UW BIME); Laura Richardson, MD, MPH; Molly Adrian, PhD (Seattle Children's Research Institute); Jennifer Bramen, PhD (Pacific Neuroscience Institute); Christine Schaeffer, PhD, MBA, MPH (Providence Health & Services); Jennifer Hadlock, MD (Institute for Systems Biology)

Find out more:

<https://hadlock.isbscience.org>

Contact:

Bhargav Vemuri, MPH, UW BIME Department
vemuribv@uw.edu