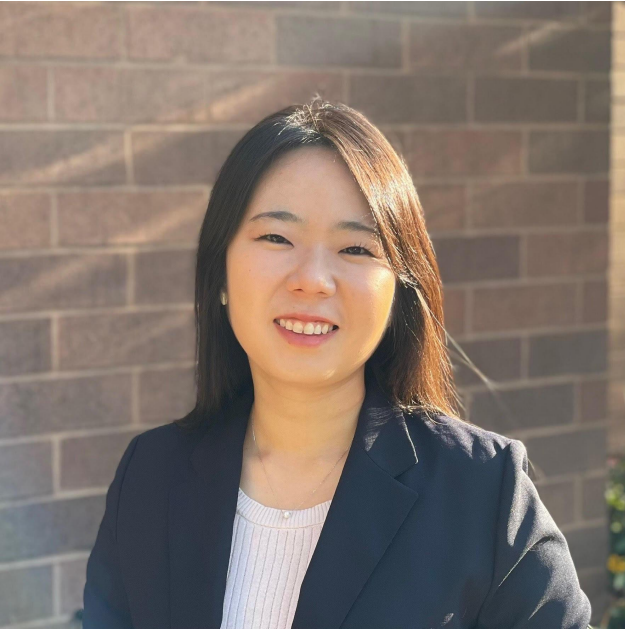


MEET YOUR SPEAKER



- Hayoung K. Donnelly, Ph.D
- Postdoctoral Research Fellow
- University of Pennsylvania, Department of Psychiatry
- Dr. Donnelly is a computational social scientist whose work focuses on the application of data science (i.e., Natural Language Processing and Machine Learning) and the ecological framework to understand the experiences of youth struggling with suicidal issues.



ABOUT TALK

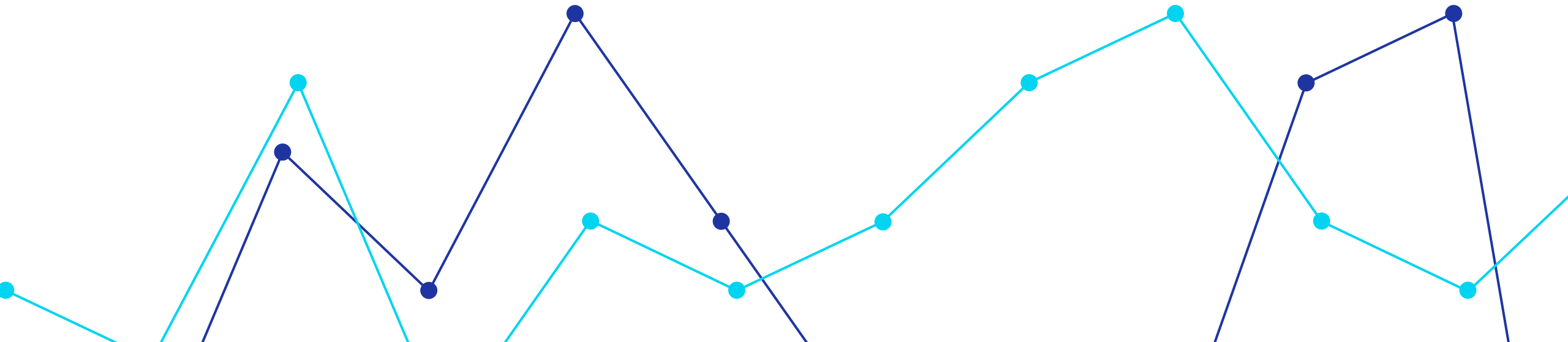
- Topic: Global youth suicide research with AI
- Summary: Suicide is a leading cause of death among youth globally, and the disparities across countries have become a rising public health concern. In terms of research approach and methodology in youth suicide research, there is a particular need for exploratory, natural behavior, data-inspired, and socio-ecological approach research. To deepen our understanding of global youth suicide and further discuss prevention for all, this presentation introduces the potential and strengths of artificial intelligence as a complementary tool in global youth suicide research. Two global research will be presented as an use case of AI in global youth suicide research. Remaining needs and directions to best optimize AI for future youth suicide research is discussed.

AI-based Research for Global Youth Suicide Prevention

The 2024 NYPI Global Youth Research Center Colloquium Series (July 17, 2024)

Hayoung K. Donnelly, Postdoctoral Research Fellow

Department of Psychiatry, University of Pennsylvania





Trigger warning

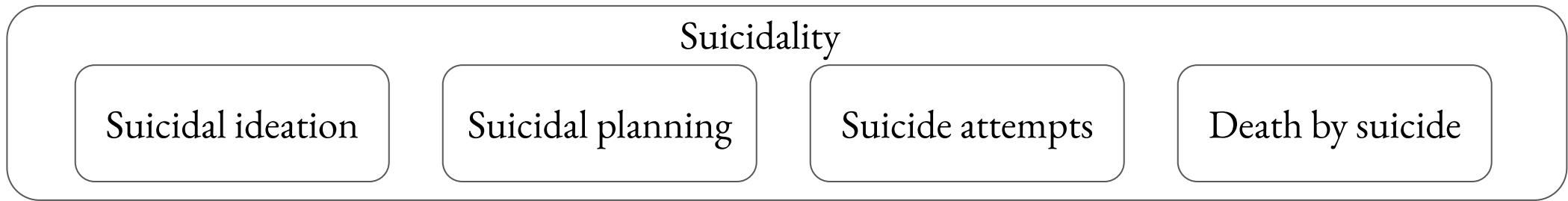
This presentation contains content about suicide

Contents

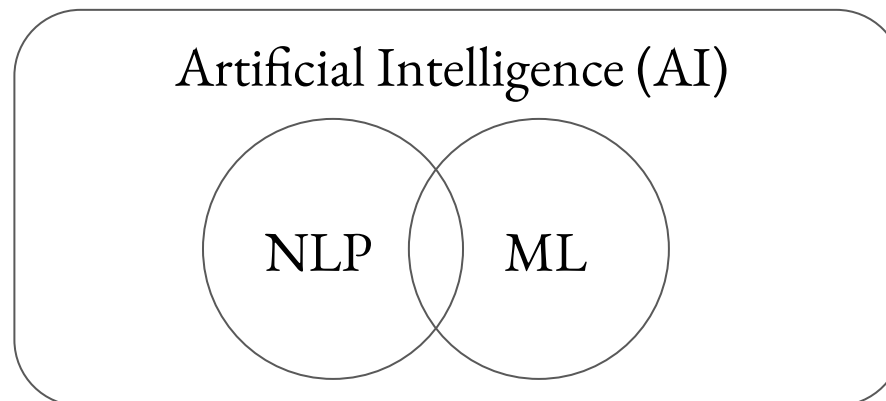
1. Global Youth Suicide
2. Strengths of AI in Youth Suicide Research
3. Examples of AI Applications in Youth Suicide Research
4. Next Steps for Harnessing AI in Youth Suicide Research

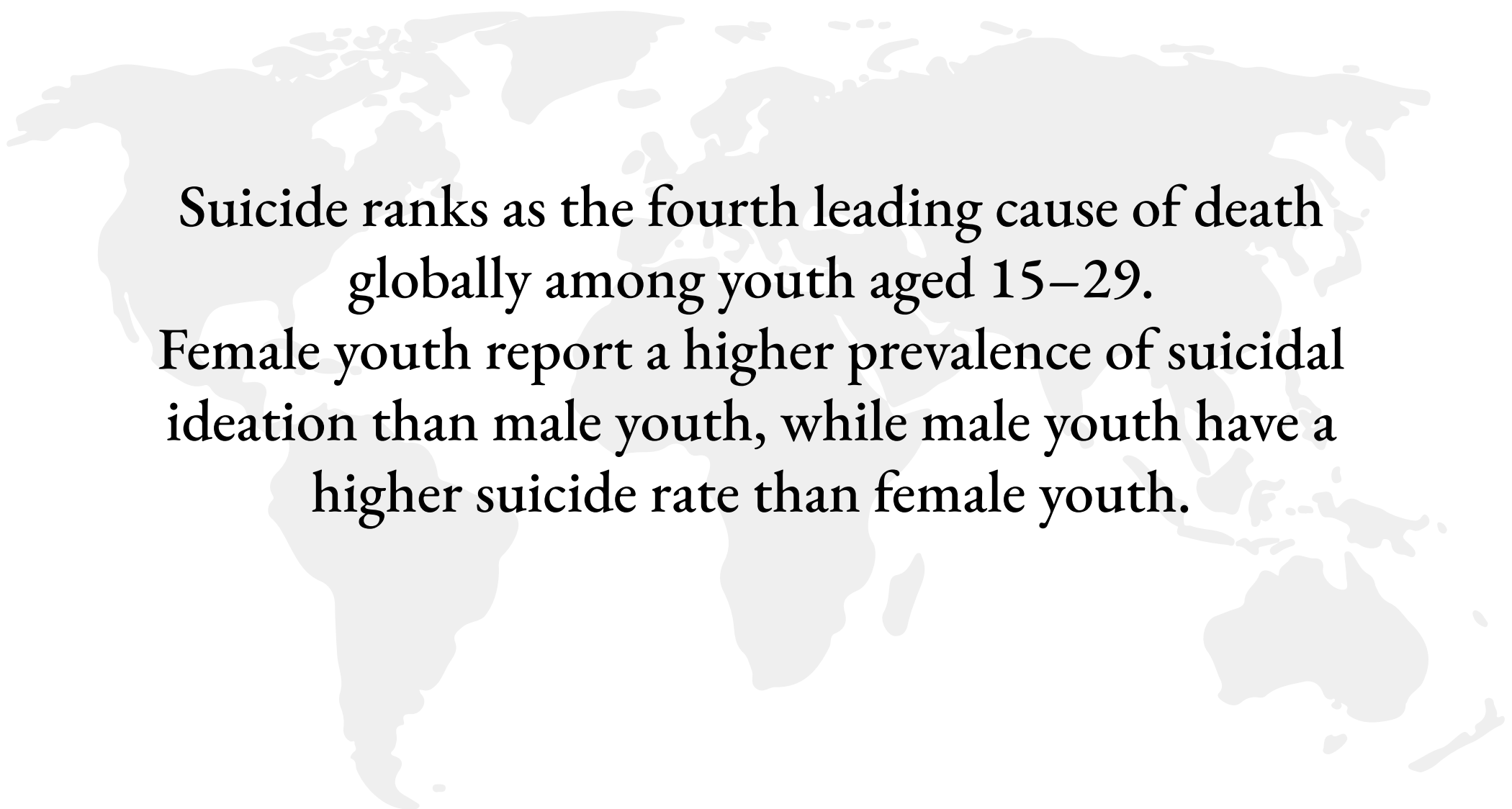
Terminology

- **Suicide Research:** Research covering ‘Suicidality’ or ‘Suicidal behaviors’ encompassing the spectrum of suicide-related experiences.



- **AI (Artificial Intelligence):** A wide range of technologies and techniques, including Natural Language Processing (NLP) and Machine Learning (ML).





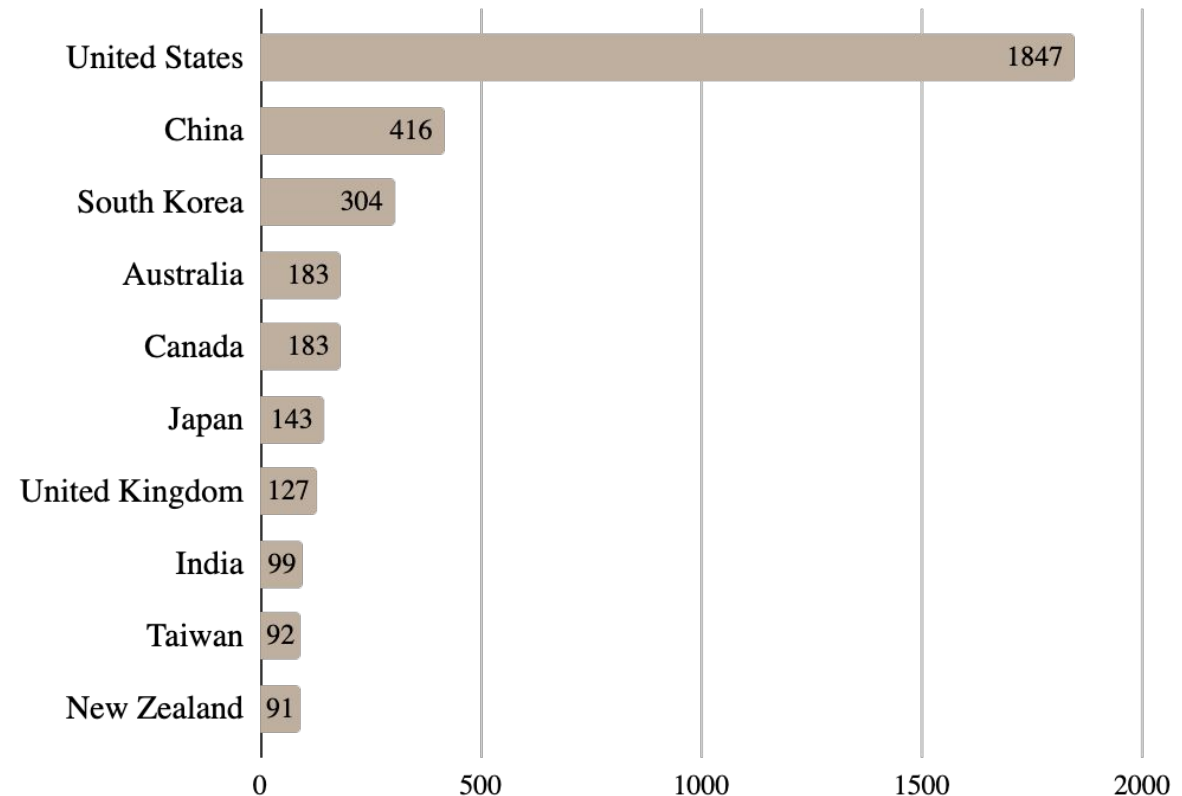
Suicide ranks as the fourth leading cause of death globally among youth aged 15–29.

Female youth report a higher prevalence of suicidal ideation than male youth, while male youth have a higher suicide rate than female youth.

Global Youth Suicide Research

- 70% of suicides across all age groups and 90% of youth suicides occur in low- and middle-income countries (LMIC). However, most suicide research focuses on high-income countries (HIC).

**The top 10 countries
based on the number of
suicide ideation articles**



Global Youth Suicide Research

Traditionally, suicidologists have focused on

- confirmatory, experimental, theory-driven, and neurocognitive psychology research
- targeting high-risk groups, individual factors, and clinical treatments.

However, there remains a significant research gap in

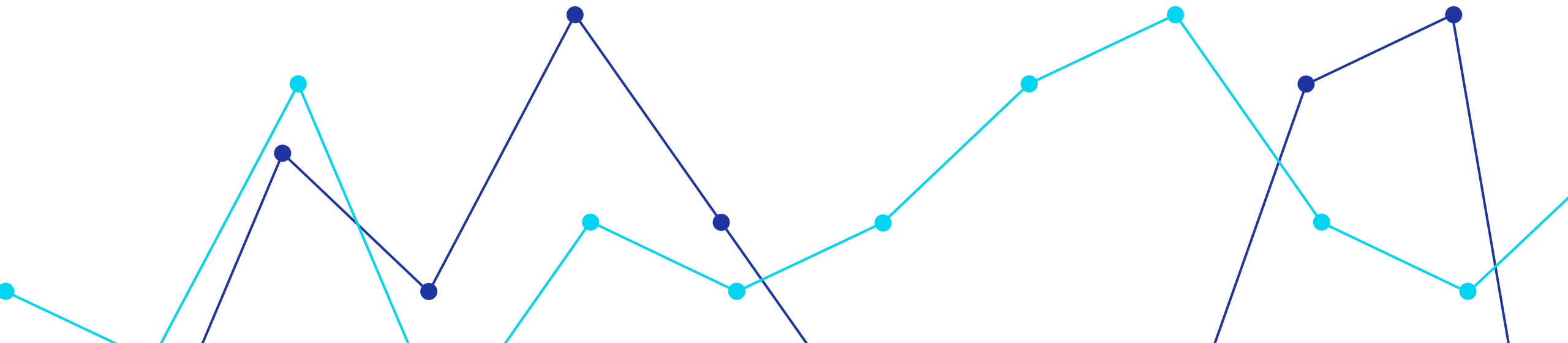
- exploratory, natural behavior, data-inspired/informed, and social and community psychology research
- focusing on low and moderate-risk groups, social determinants of health, and social and systemic support.

Strengths of AI on Youth Suicide Research

Utilizing AI in youth suicide research can be particularly beneficial for

- Exploratory Research: AI can mine large datasets to uncover unheard or less commonly known information beyond existing theories and previous studies.
- Naturalistic Behavior Observation: AI enables the collection of individuals' behaviors in real-life and time-sensitive manners with minimal researcher engagement.
- Multiple Factors: AI excels at predicting suicide risk by simultaneously examining numerous factors, helping to identify the most significant among them.
- Evidence from Different Data Sources: AI enables the leverage of various data forms (e.g., online posts and comments, teacher and counselor notes, pictures, videos) beyond traditional suicide research data (e.g., surveys and administrative data).

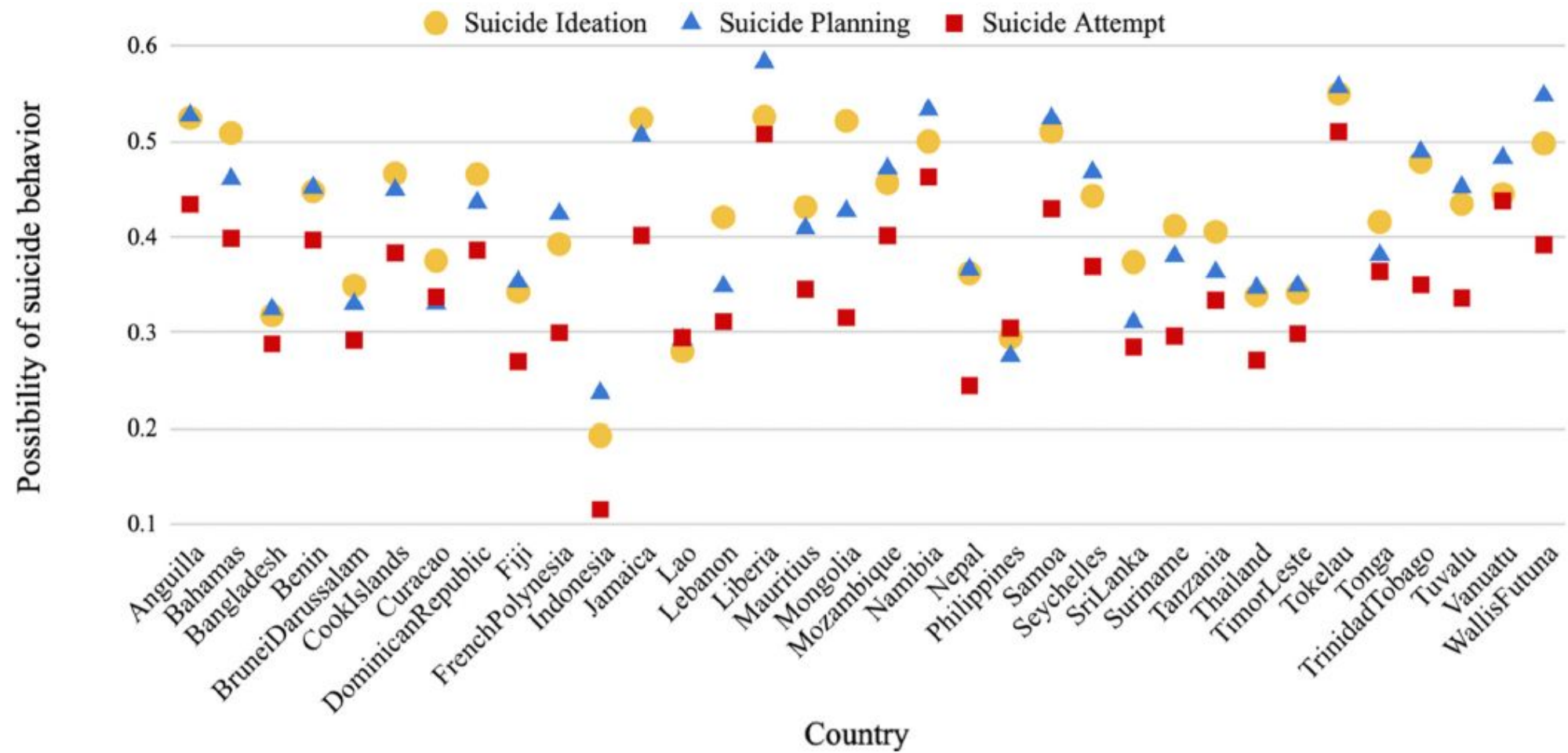
Research Example 1



Identifying important predictors of adolescent suicide ideation, planning, and attempt in low-and middle-income countries

- **Research Goals:** Identifying common and unique dominant predictors of suicide ideation, planning, and attempts among adolescents in LMIC
- **Data:** 82,494 adolescents aged 12–17 years (56.1% female) from 34 LMIC, collected by Global School-based Student Health Survey of World Health Organization (WHO), between 2013 and 2017
- **Methods:** Machine learning prediction model development, with Random Forest algorithm.
- **Variables**
 - Target variable (3): suicidal ideation, planning, attempts.
 - Predictors (22): Demographics (age, gender), psychological (loneliness, worry-induced sleep disturbance), physical (physically attacked, physical fight), behavioral (cigarette/alcohol/drug use, absence), relational (parent academic/emotional support, monitoring by parent, privacy from parent, number of friends), environmental (country, hunger, school atmosphere, indirect smoking) determinants.

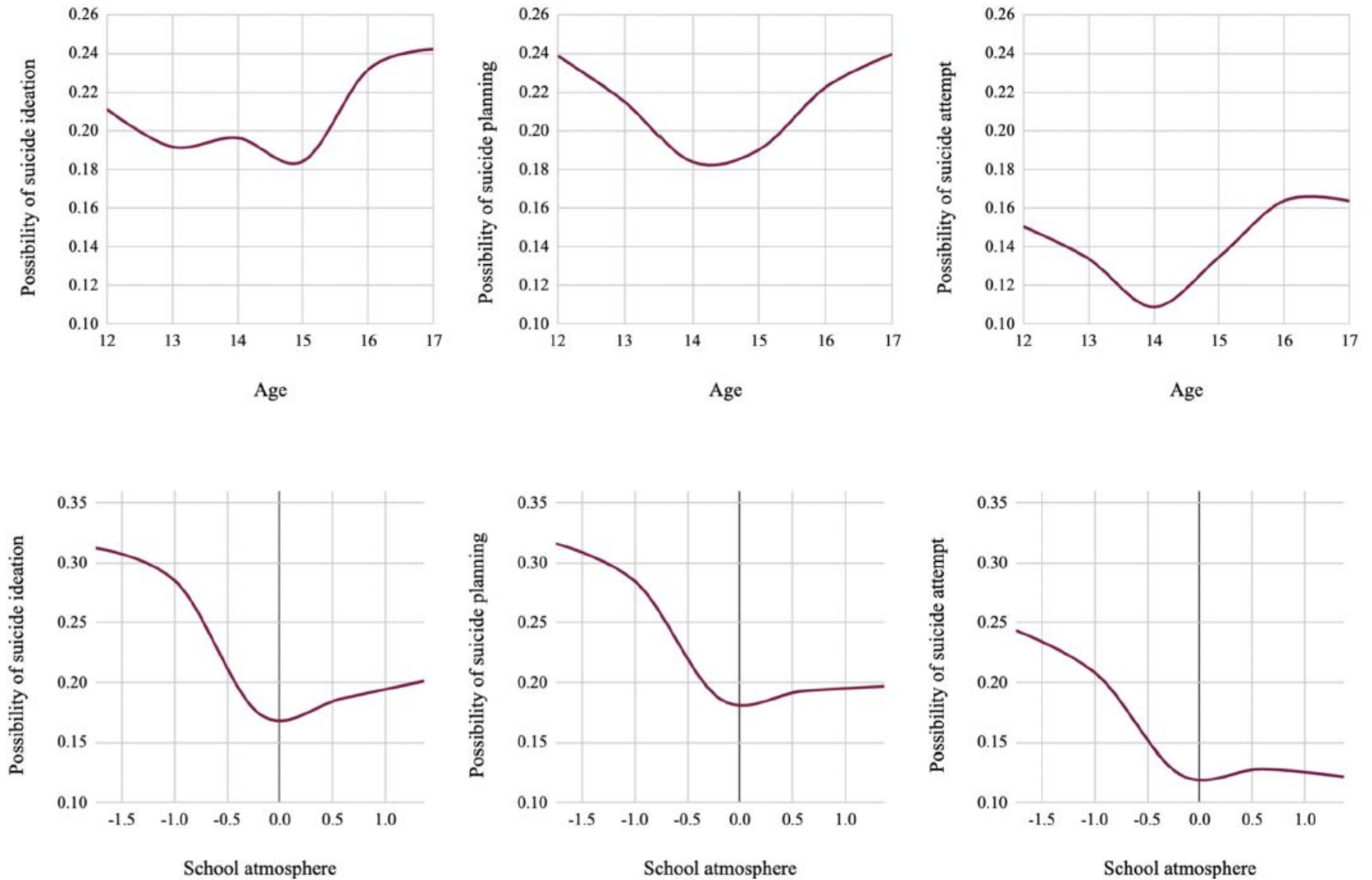
Suicidal risk prediction by country



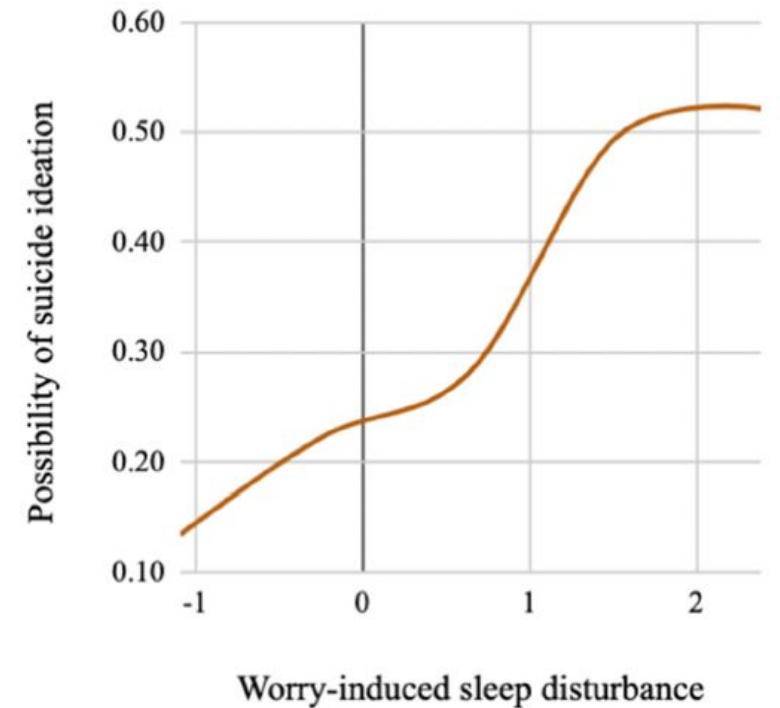
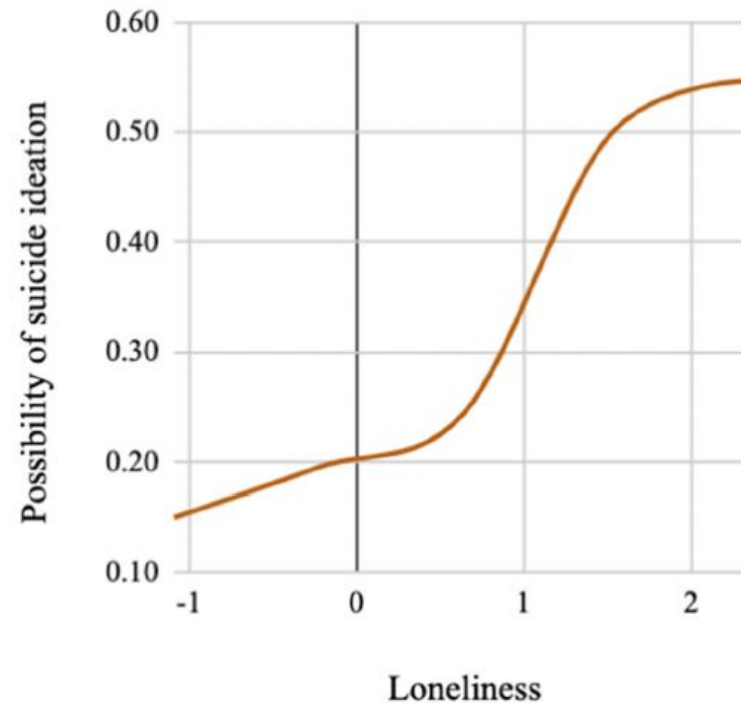
Most dominant predictors of suicidality

	Age	School Atmosphere	Loneliness	Sleep issue	Parent academic support	Monitoring by Parents
Suicidal ideation	✓	✓	✓	✓		
Suicidal planning	✓	✓			✓	✓
Suicide attempts	✓	✓			✓	✓

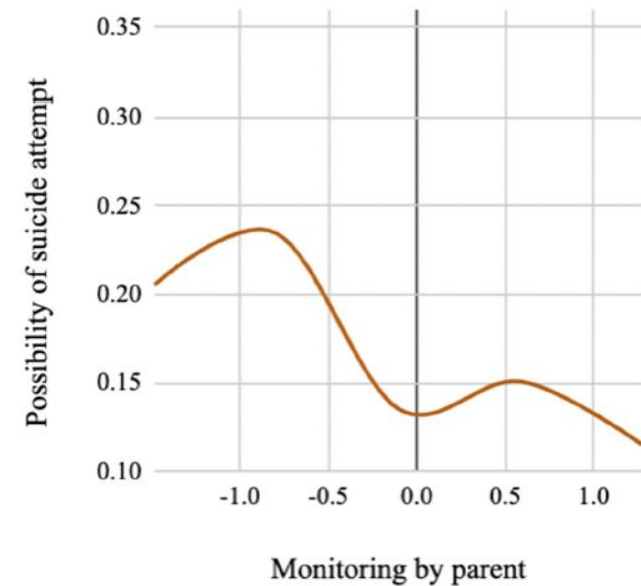
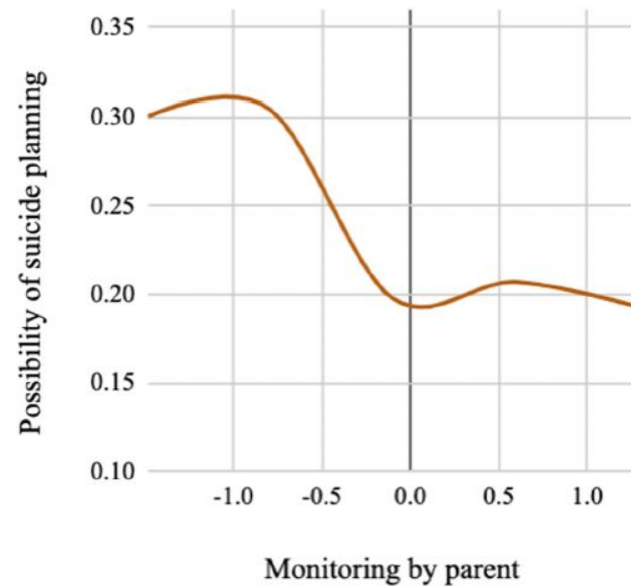
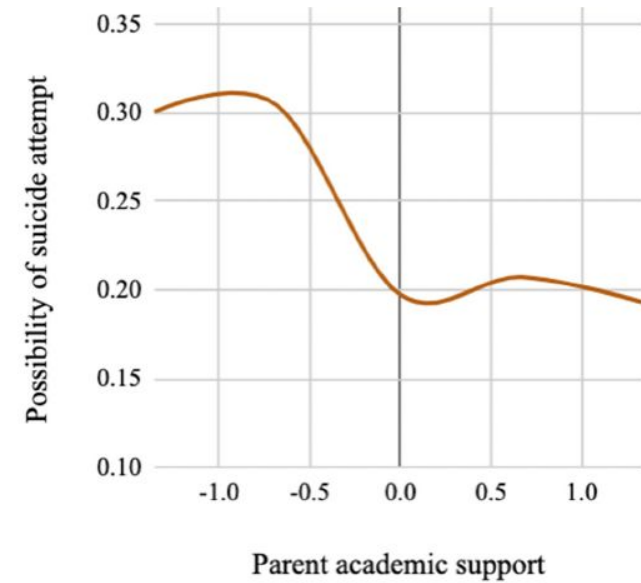
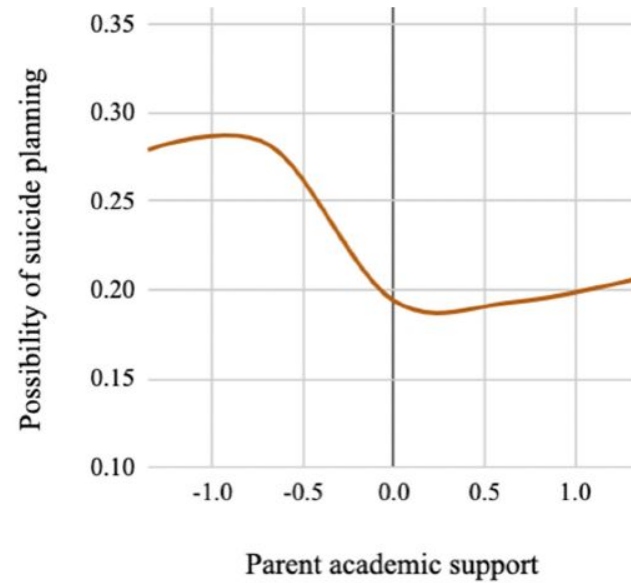
Common Predictors of Suicide Ideation, Planning, and Attempts: Age and School Atmosphere



Unique Predictors of Suicide Ideation: Loneliness and Sleep Disturbance



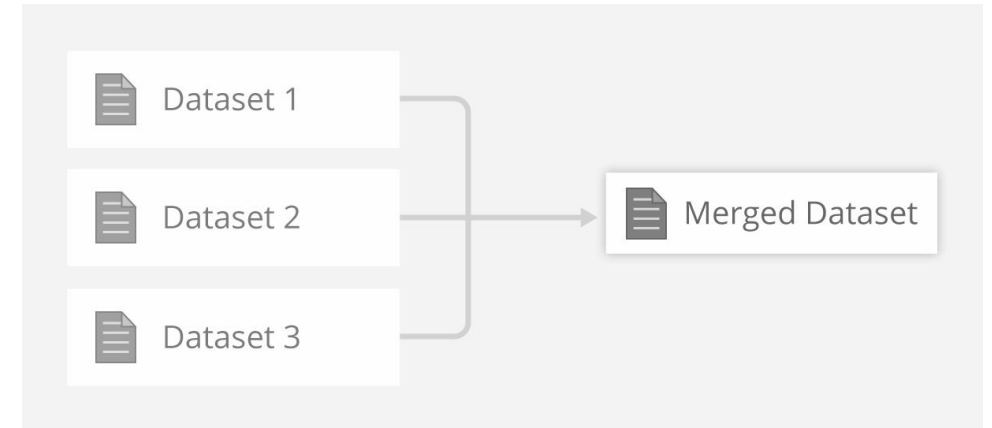
Unique Predictors of Suicide Planning and Attempts: Parental Academic Support and Monitoring



AI makes it easier to

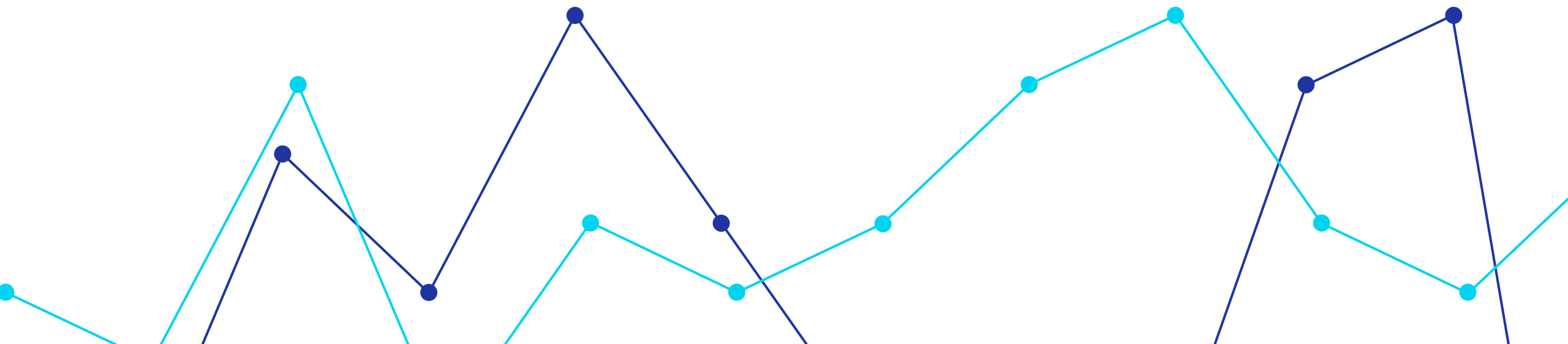
**create more representative
global youth data**

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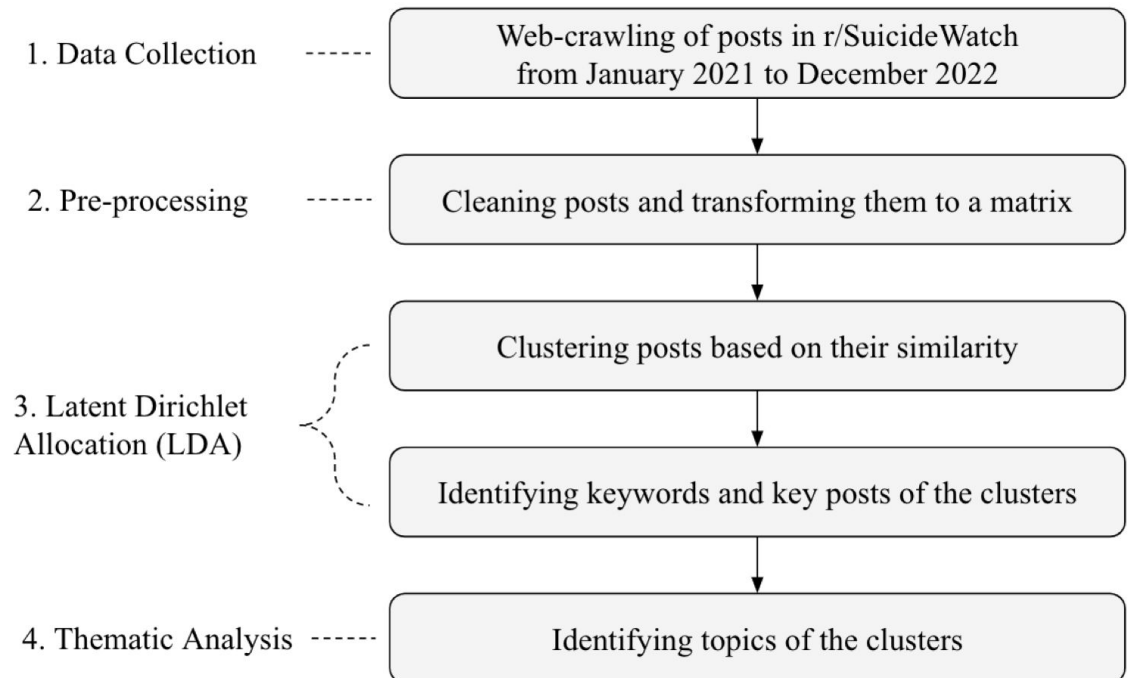
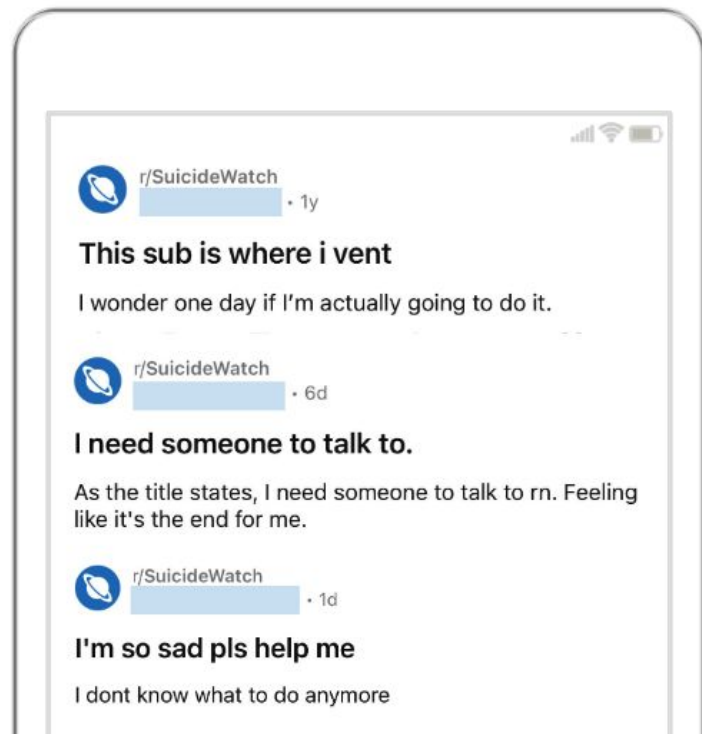
**find more powerful factors
in suicidal risk prediction.**

Research Example 2



Disclosure of Suicidal Drivers: A Natural Language Processing and Thematic Analysis Approach

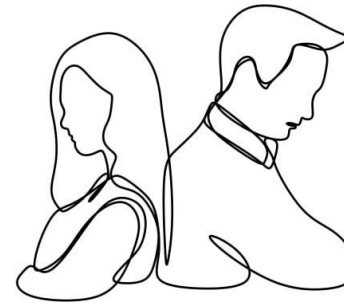
- **Research Questions:** What specific suicide-related topics are discussed on social media? How do suicide theories explain findings, and how can interventions be tailored to address each driver?
- **Data:** 128,587 posts by 76,547 users from Reddit (r/SuicideWatch) between January 2021 ~ December 2022
- **Methods:** Natural Language Processing with LDA and Thematic analysis



Results:
Six major
themes from
128,587 posts



Repetitive suicide ideation



Relational stress



**Suicide attempt and
negative healthcare
experiences**



Abuse



Contextual stress



**Philosophical and
Informative Discussion**

Where narratives from youth were observed?



Repetitive suicide ideation



Relational stress



Suicide attempt and
negative healthcare
experiences



Abuse



Contextual stress



Philosophical and
Informative Discussion



Relational Stress

“It’s not that my mom abuses me or harms me in any way, it’s the way that she treats me and how she shows 0 respect for me. today I turned 16....”

“My extended father family like to compare me with their children since I was teenager. They always said that I can’t speak eloquently to people compared to their family..”

“We had a couple of arguments and I don’t think we’re friends anymore....I honestly don’t know if the main problem of me barely having friends is myself”

“I (18M) had started dating an old friend from 3rd grade (17F)....Her best friend tells me everything that has been going on behind my back, She had cheated on my multiple times...”



Verbal, Physical, and Sexual Abuse

“Every morning my day starts with me waking up to a screaming mother. She screams like a demon. "You don't deserve to be my daughter" "I wish I had a son instead of you" "You're ugly" "You are a prostitute and it shows" "I just want to get rid of you" "You eat a lot" "You eat up all of my income" "Your father is dead for a reason""

“He (Step-father) would force me to call him dad, would beat me black and blue, wack me with belts, slippers, anything he could get hold of and he would drag me out of bed late at night while my mum was at work....”

“I just need someone to talk to but I never know how to ask. When I was 6 years old, I went to this house, I don't remember who these people were but I remember what happened, does that...He was around 20-25....You know- I'm like, "Stop it," COMING FROM A 6 YEAR OLD!! So he slaps me and screams for me to fuck off...”



Academic and Career-related Stress

“I started losing focus on my study”

“My grades were excellent but I was still disappointed”

“I failed a few units at university”

“I have been job hunting and interviewing for weeks and gotten mostly rejections or just gotten ignored for the most part.”

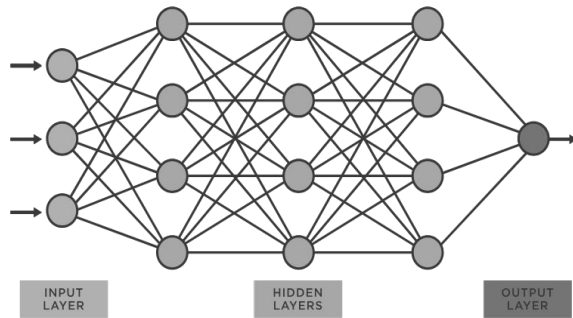
AI makes it easier to

gather naturally occurring data



explore large volumes of text data

Next Steps for Harnessing AI in Youth Suicide Research



Interpretable and
explainable AI design



Prediction not labeling
youth

Data-driven vs
Data-inspired decision
making



Bias and fairness in AI

Q&A

hayoung.donnelly@pennmedicine.upenn.edu

