
# INNOVATION AND DESIGN THINKING

# ARTIFICIAL INTELLIGENCE FOR MENTAL HEALTH

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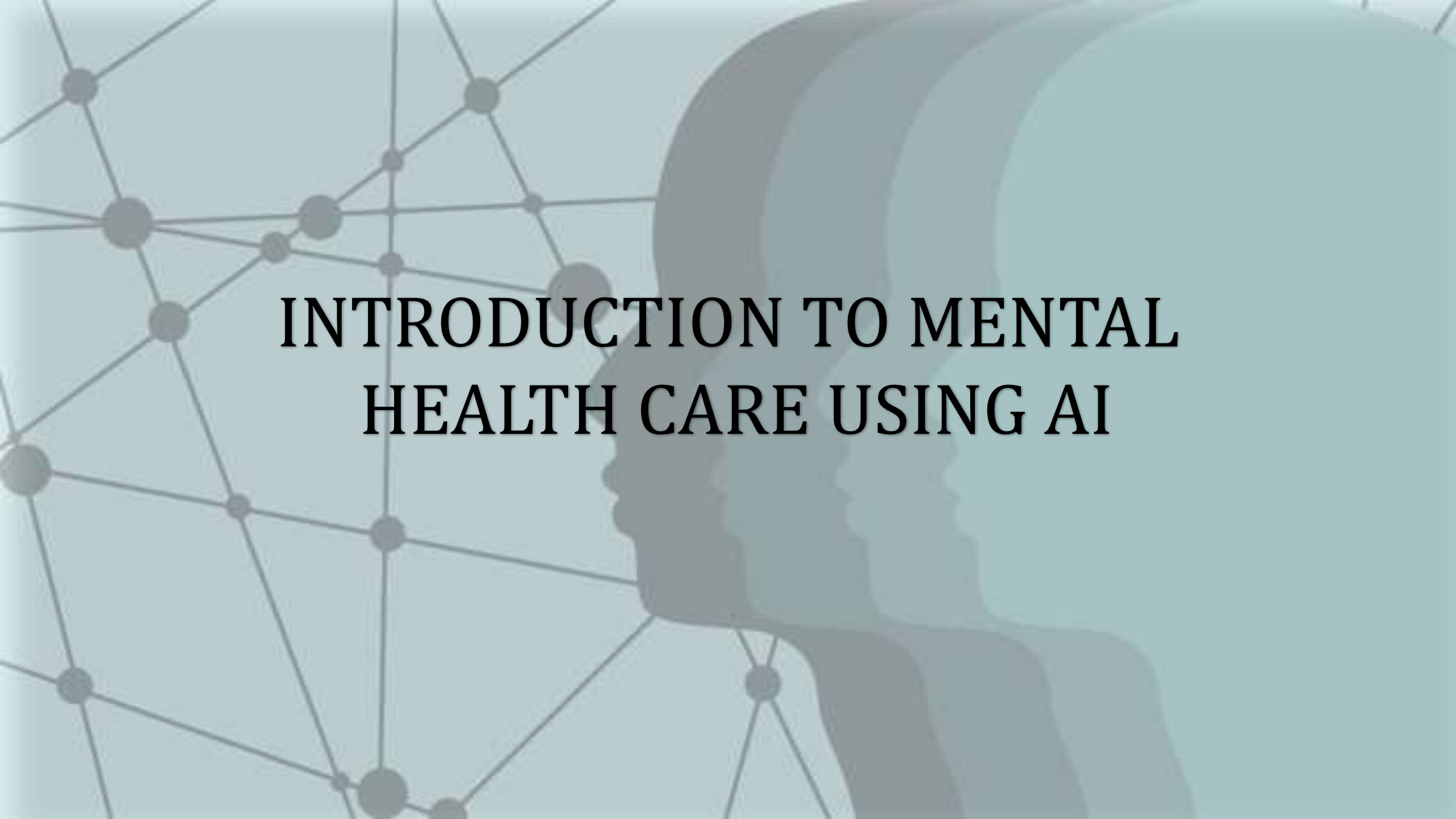


# INTRODUCTION TO MENTAL HEALTH CARE USING AI

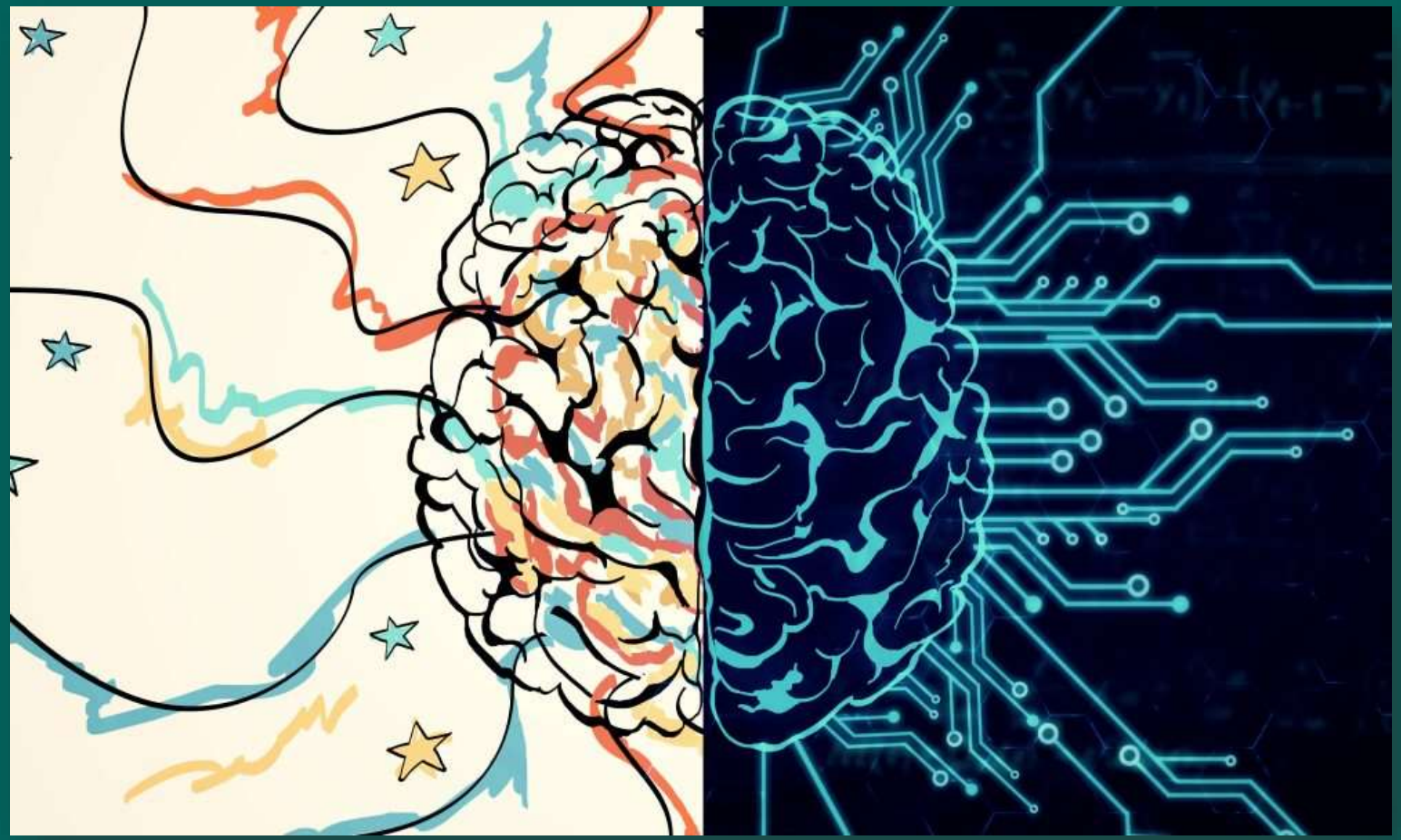
- Introduction to mental health care using artificial intelligence (AI) represents an innovative approach to addressing the growing demand for mental health services and improving access to care.

- Mental health care involves a comprehensive approach to promoting, maintaining, and restoring mental well-being.

- AI technologies, such as machine learning, natural language processing, and data analytics, can be leveraged to enhance various aspects of mental health care delivery, including assessment, diagnosis, treatment, and support.

- Could smart, machine learning-powered technology be a part of the solution - possibly reducing the need for patients to be given medication or to have their freedoms restricted by confinement in mental health hospitals?

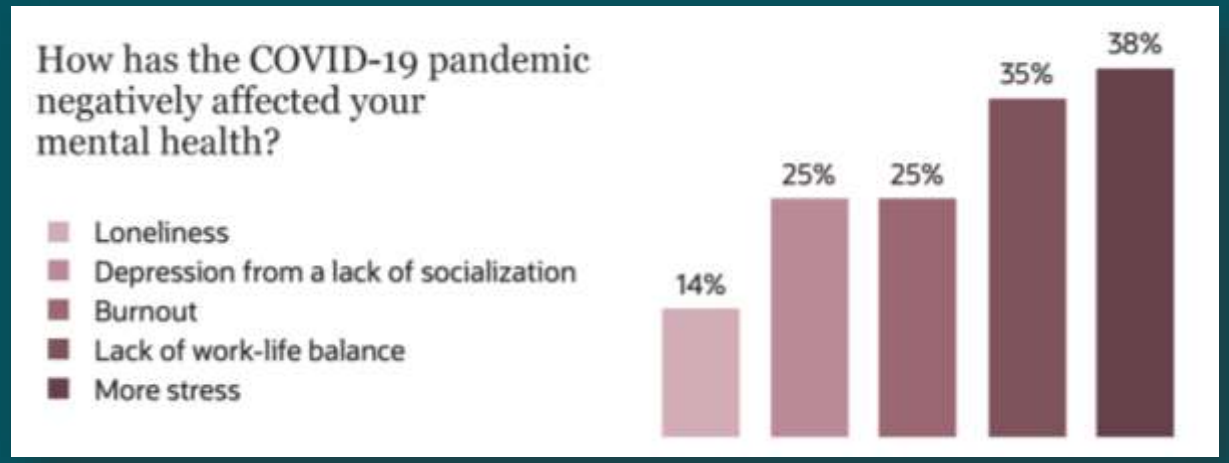
# LITERATURE REVIEW



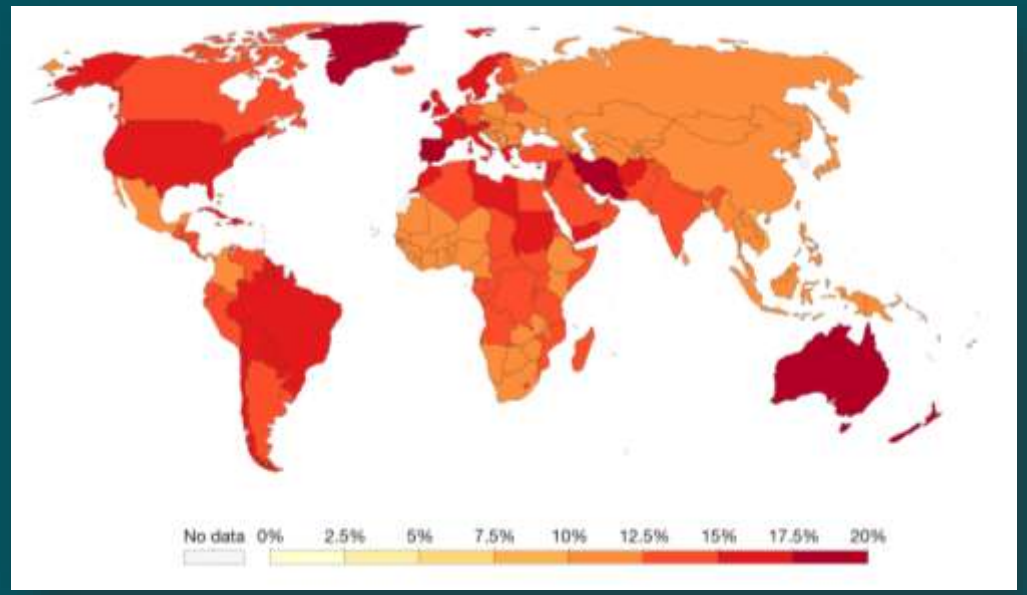
| S.NO | TITLE/YEAR/AUTHOR | SUMMARY |
|---|---|---|
| 1. | Sec. Digital Public Health<br>Volume 11 - 2023<br>https://doi.org/10.3389/fpubh.2023.1110088<br>J Andrew, Madhuria Rudra, Jennifer Eunice, R.V Belfin | It summarizes the use of artificial intelligence in adolescents mental health disorder diagnosis, prognosis, and treatment |
| 2. | https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10690520/<br>2023<br>Catherine K Ettman, Sandro Galea | It summarizes the potential influence of AI on Population Mental Health |
| 3. | https://itrexgroup.com/blog/ai-mental-health-examples-trends/<br>2022<br>Yelena Lavrentyeva | It summarises the mental health statistics and talks about the technologies used in treatment of mental illness |
| 4. | https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7358693/<br>2020<br>Croat Med J | It summarizes the artificial intelligence in prediction of mental health disorders induced by the COVID-19 pandemic. |

| S.NO | TITLE/YEAR/AUTHOR | SUMMARY |
|---|---|---|
| 5. | https://binariks.com/blog/ai-mental-health-examples-benefits/<br>2023<br>Helen Zhuravel | It summarizes the Revolutionizing Mental Health Care: The Role of Artificial Intelligence |
| 6. | https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10230127/<br>2023<br>Francesca Minerva, Alberto Giubilini | It summarizes artificial intelligence in the Future of Mental Healthcare |
| 7. | https://www.forbes.com/sites/bernardmarr/2023/07/06/ai-in-mental-health-opportunities-and-challenges-in-developing-intelligent-digital-therapies/?sh=6775011f5e10<br>2023<br>Bernard Marr | It summarizes AI In Mental Health: Opportunities And Challenges In Developing Intelligent Digital Therapies |
| 8. | https://link.springer.com/article/10.1007/s11245-023-09932-3<br>2023<br>Francesca Minerva, Alberto Giubilini | It summarizes the problems faced by people to overcome mental illness as well as lack of information about mental healthcare facilities provided using AI |

# CURRENT AI TRENDS IN MENTAL HEALTH




*Effect of Covid-19 on mental health*




*Mental health illness around the world*

# CURRENT AI TRENDS IN MENTAL HEALTH

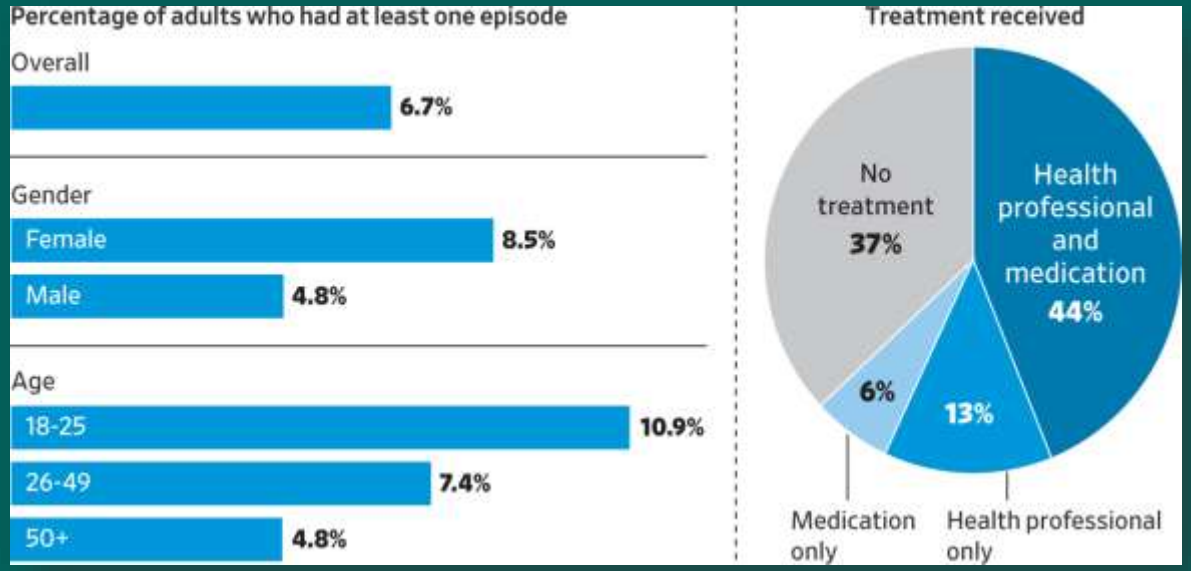
- Mental health disorders are on the rise globally. At least 10% of the population is affected, with almost 15% percent of adolescents experiencing a mental health condition and suicide being the fourth leading cause of death among those aged between 15 and 29.

- Mental illnesses are projected to cost the world's economy around $16 trillion between 2010 and 2030.

- Mental health tech continues to be the best-funded in digital health despite ongoing impacts such as inflation, supply chain disruptions, and high interest rates.

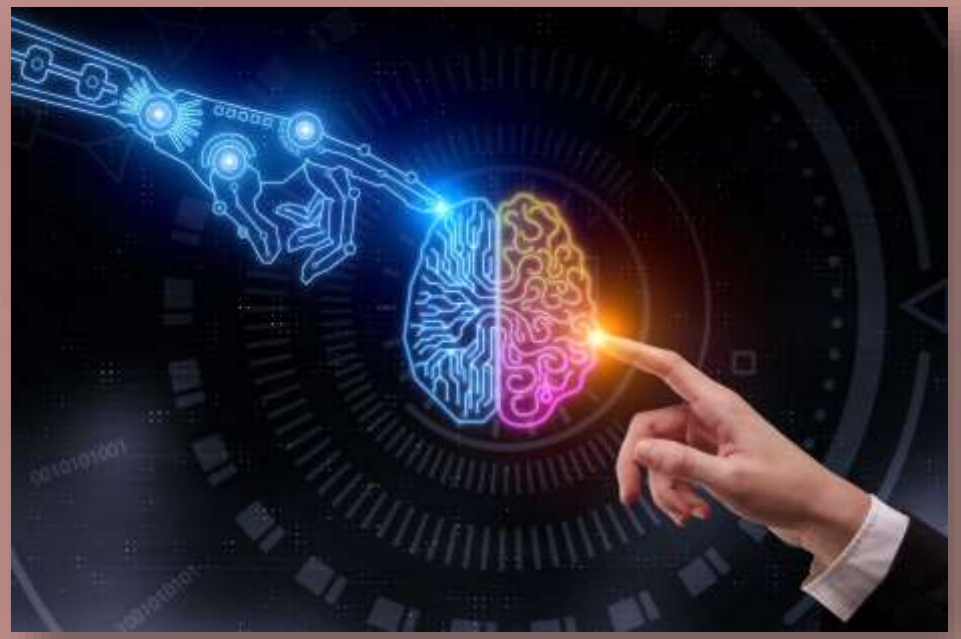
- A number of startups are using AI in mental healthcare of which some are AI chatbot Wysa , BlueSkeye , Upheal and Clare&me.

- An ongoing research suggests that we are likely to see the emergence of more emotionally intelligent AI therapists and new mental health applications driven by AI.




*This is a graph showing the percentage of adults who have had at least one mental episode and the types of treatments received.*

# AI DRIVEN MENTAL HEALTH TECHNIQUES

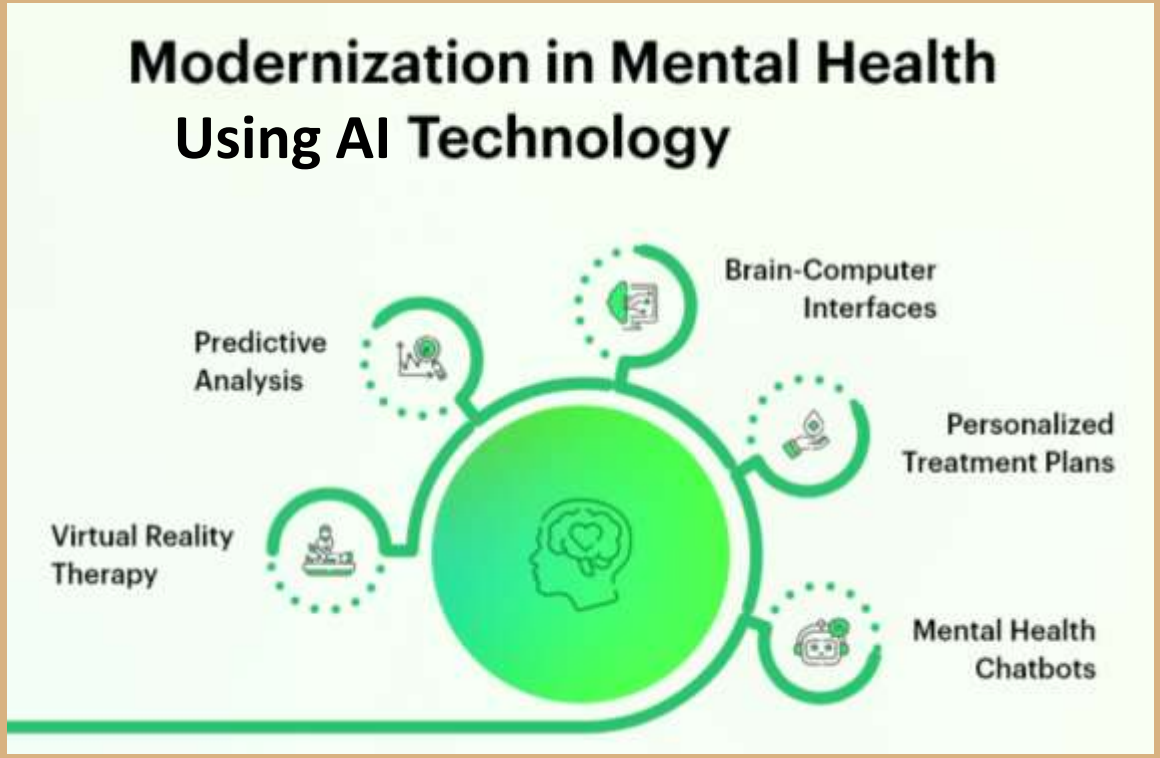


# AI DRIVEN MENTAL HEALTH TECHNIQUES

AI for mental health is gaining a foothold across clinical practice, already now

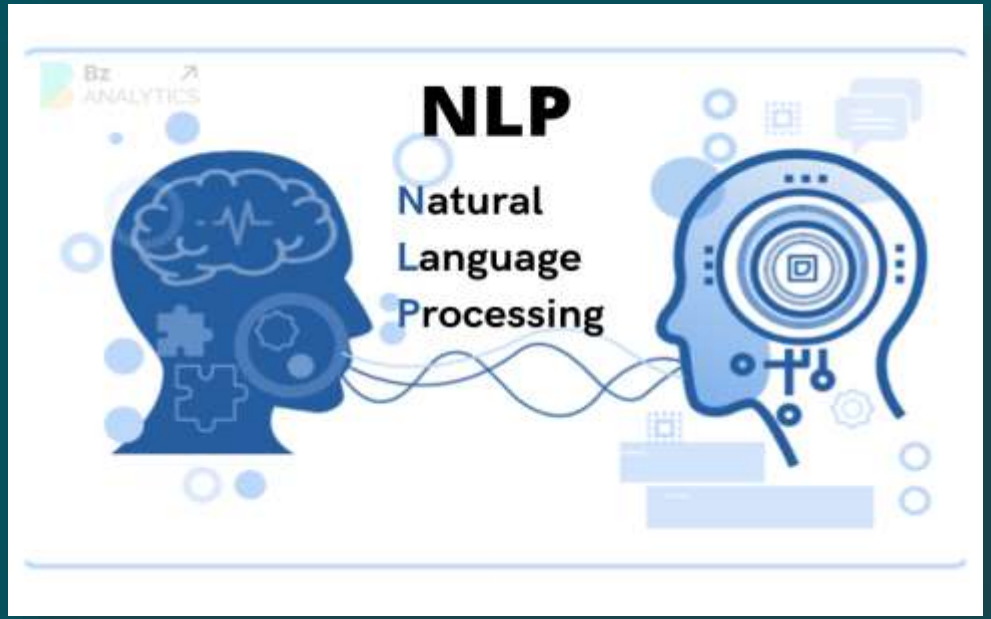
In particular, the following technologies have the most potential for an impact

- Machine Learning (ML) and Deep Learning (DL) are used to provide greater accuracy in diagnosing mental health conditions and predicting patient outcomes




*This image talks about the modern ways to treat mental illness using AI technology*

- Computer Vision(CV) for imaging data analysis and understanding non verbal cues, such as facial expressions, gestures, eye gaze or human postures




- Natural Language Processing (NLP) for speech recognition and text analysis that is used for stimulating human conversations via chatbot computer programs, as well as for creating and understanding clinical documentation

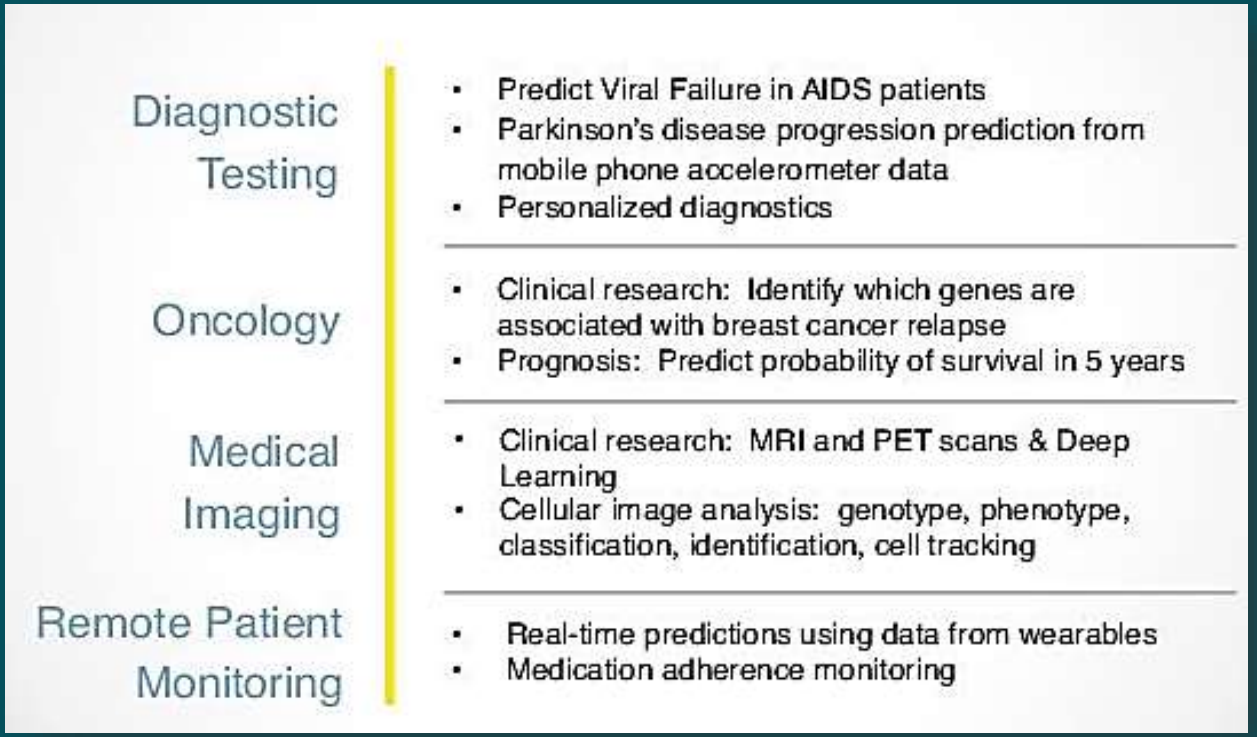
# Machine Learning For Big Data Analysis

- Machine learning (ML) is an AI approach that involves various methods of enabling an algorithm to learn.

- The most common styles of learning used for healthcare purposes include supervised, unsupervised, and deep learning (DL).

- There are other ML methods like semi-supervised learning and reinforcement learning where the algorithm acts as an agent in an interactive environment that learns by trial and error using rewards from its own actions and experiences.

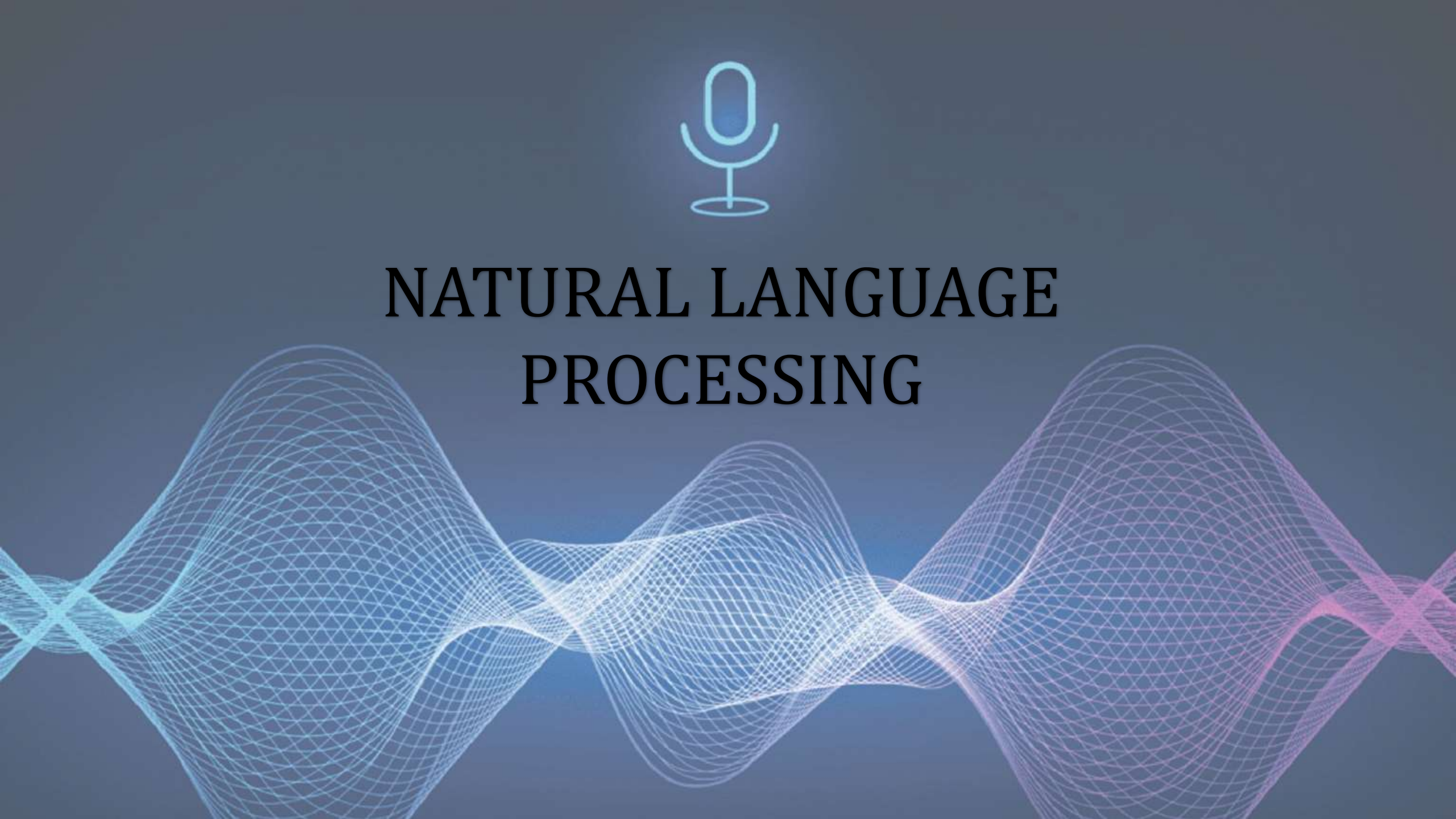
AI In Machine Learning




*This image talks about the applications of Machine Learning in the field of medicine*


*This image shows the various applications of machine learning in the field of Psychiatry*

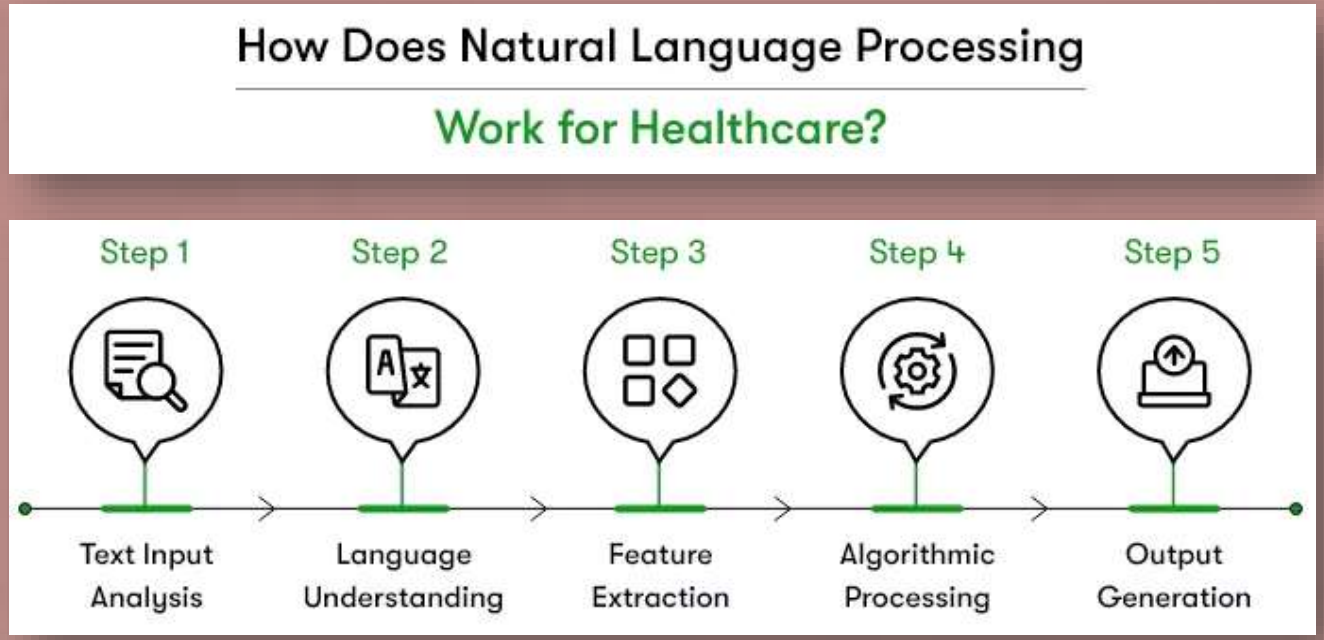
- Supervised Machine Learning (SML) Here data are pre-labeled and the algorithm learns to associate input features derived from a variety of data streams to best predict the labels.
- Unsupervised Machine Learning (UML) Here algorithms are not provided with labels; thus, the algorithm recognizes similarities between input features and discovers the underlying structure of the data, but is not able to associate features with a known label.
- Deep Learning (DL) algorithms learn directly from raw data without human guidance, providing the benefit of discovering latent relationships.


NATURAL LANGUAGE
PROCESSING

# NATURAL LANGUAGE PROCESSING

- Natural language processing algorithms track the use of language in conversations (chats, emails, social media posts) and detect patterns that might correlate with mental issues such as depression or anxiety.

- NLP is a way for a computer to analyze text and speech, process semantic and lexical representations, as well as recognize speech and optical characters in data.




*This image talks about the working of Natural Language Processing in the field of mental healthcare*

- They can be used to detect changes in the language and to track a patient's mental health, to see if they are improving or regressing.

- The very widespread use of smartphones makes natural language processing a relatively cheap way to track mental health.


*This image talks about the various functions of Natural Language Processing*

# DIAGNOSING AND PREDICTING PATIENT OUTCOMES


- AI can also be used to analyse patient medical data, behavioural data, voice recordings collected from telephone calls to intervention services, and numerous other data sources, using machine learning to flag warning signs of mental problems before they progress to an acute stage.

- AI has also been used to predict cases where patients are more likely to respond to *Cognitive Behavioural Therapy* (CBT) and therefore be less likely to require medication.

- Artificial Intelligence has been found to be advantageous in the process of diagnosis of medical disorders. With the application of various techniques involving machine learning diseases are detected and diagnosed.

- The diagnosis of a new patient is predicted using the training dataset of the diagnosis of the previous patients.

- Furthermore, artificial intelligence can also differentiate between diagnosis of diseases with similar symptoms but divergent methods of treatment.

- Data-driven AI methods based on various factors such as demographic features, neurocognitive and biomarker profiles can aid in identifying novel disease subtypes.

*Providing support to the patients*

HIPAA

HEALTH INSURANCE POLICY AND ACCOUNTABILITY ACT

# POLICIES, REGULATIONS AND GUARDRAILS



# POLICIES, REGULATIONS AND GUARDRAILS

The policy environment we live in, along with the values that drive our policies, will inform how AI can influence mental health.

- Policies, standards, and regulations should consider how to safeguard sensitive patient information and individuals' privacy.

- Given rapidly evolving technology, services, and functions, regulation has not yet kept up with the potential use and misuse of targeted data.

- Alignment on values and implementation of policy to reduce the influence of bias in AI will be critical to ensure that existing gaps are not exacerbated and that groups are not targeted, mistreated, or maligned intentionally or unintentionally.

- A growing awareness of the importance of algorithmic fairness has prompted discussion on the appropriate use of AI and machine learning; in the absence of thoughtful intervention, existing algorithms could perpetuate bias and heighten health disparities across groups.

- Guardrails around AI-generated responses can prevent harm. Suicide attempts are more successful when the means used are more lethal.

- Ensuring that AI has built-in guardrails to prevent the proliferation of lethal means and to instead leverage resources to create a pathway to treatment may help to prevent unfavorable outcomes of AI-human engagement.

# EXAMPLE OF HOW AI IS REVOLUTIONISING MENTAL HEALTH CARE

*AI used to analyse and store patient data*


# EXAMPLES OF HOW IS AI REVOLUTIONISING MENTAL HEALTH CARE

- Analysing patient data.

i. AI is used to analyse electronic health records, questionnaires, voice recordings, behavioural signs, and even information sourced from patient's social media accounts.

ii. Data scientists employ a variety of techniques, such as supervised machine learning, deep learning, and NPL, to parse patient data and flag mental and physical states associated with a particular mental health disorder.

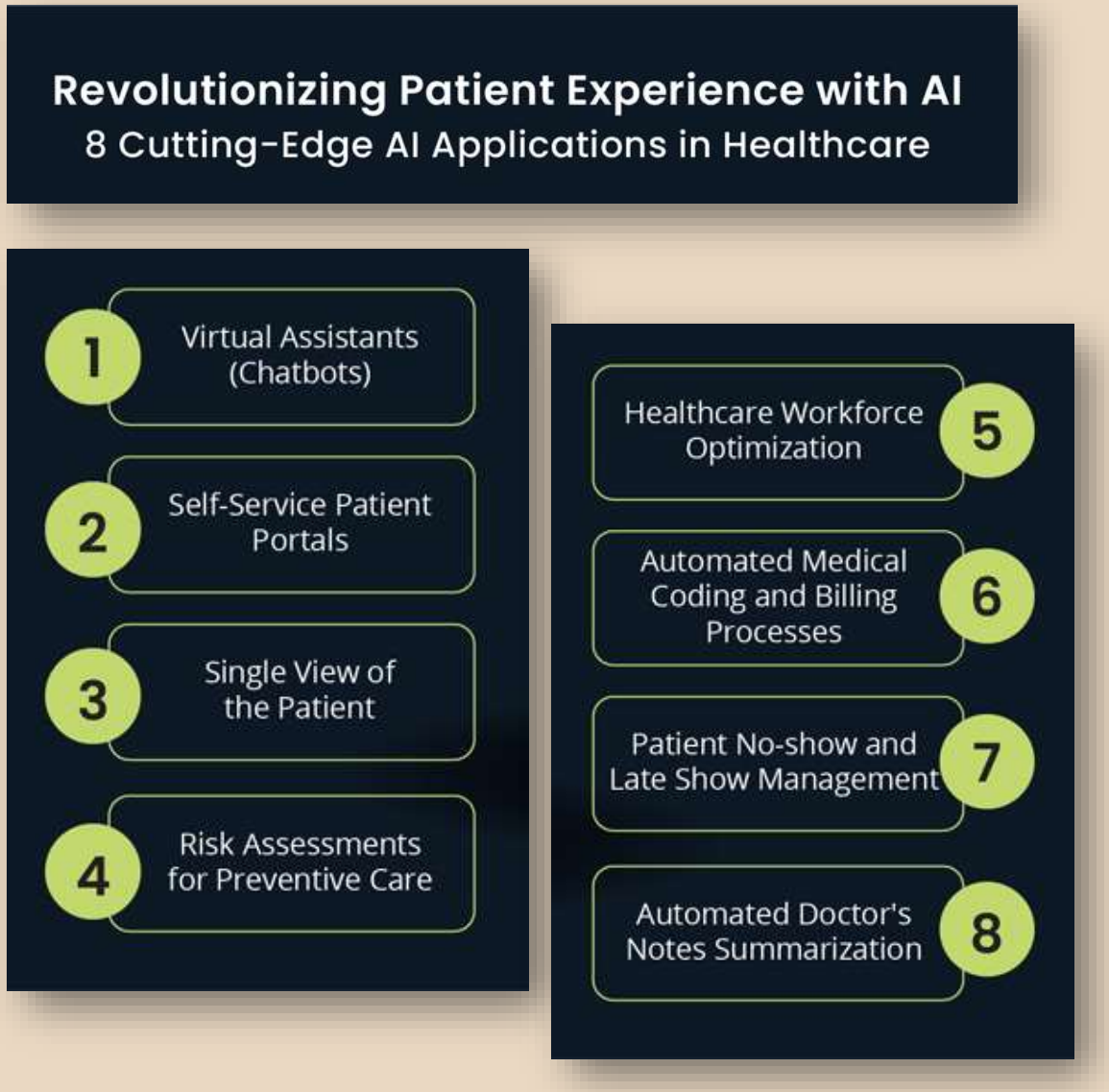
- Conducting self-assessment and therapy sessions.

i. This category is largely represented by keyword-triggered and NLP chatbots.

ii. They offer advice, track the user's responses, evaluate the progression and severity of a mental illness, and help cope with its symptoms

iii. The most popular AI-powered virtual therapists include Woebot, Replika, Wysa, Ellie, Elomia, and Tess.


*Therapy sessions conducted using AI chatbots*



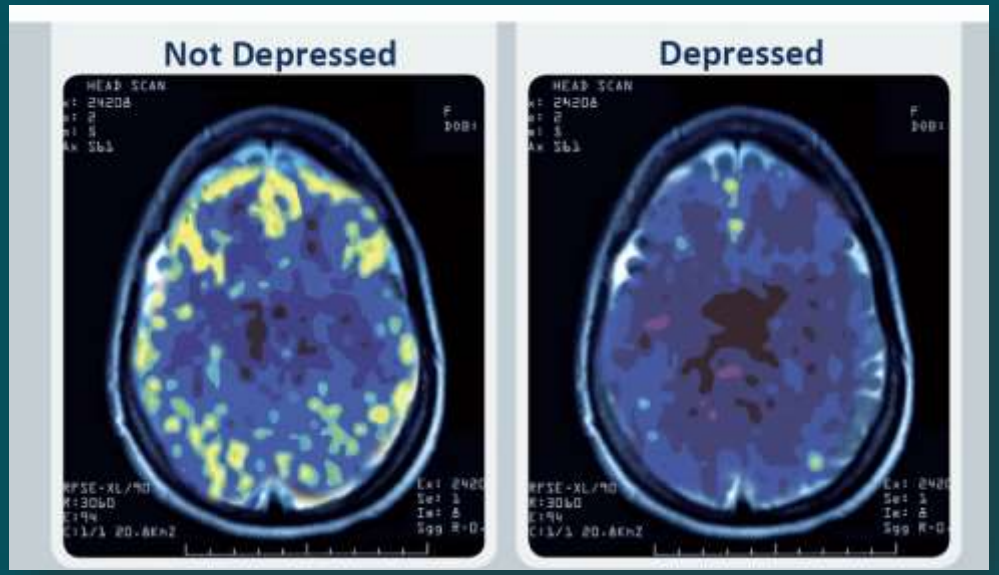

*This image provides us with a few applications of AI in healthcare which Revolutionizes Patient Experiences*

- Enhancing patient engagement

i. AI is becoming an integral part of patient engagement strategies to improve and personalize patient experience.

ii. AI chatbots are used to make access to care as simple and frictionless as it is in many other service sectors.

iii. Healthcare organizations are embracing conversational AI to process phone calls, make appointments, or deliver health education.




*One of the examples of high-end technology is this image that shows reduced brain activity in a person suffering from depression*

- Equipping therapists with technology to automate daily workflows

i. Due to the nature of mental health conditions, psychiatrists can rely on legacy tech tools when interpreting medical data and devising treatment plans for patients.

ii. One way to lessen the administrative burden could be the implementation of AI-driven mental health platforms

iii. These automatically retrieve information from miscellaneous IT systems within a hospital and generate reports about every patient's progress, current condition, and possible outcomes.

# BENEFITS OF AI IN MENTAL HEALTH


*This image talks about the importance of affordable and accessible mental health services*

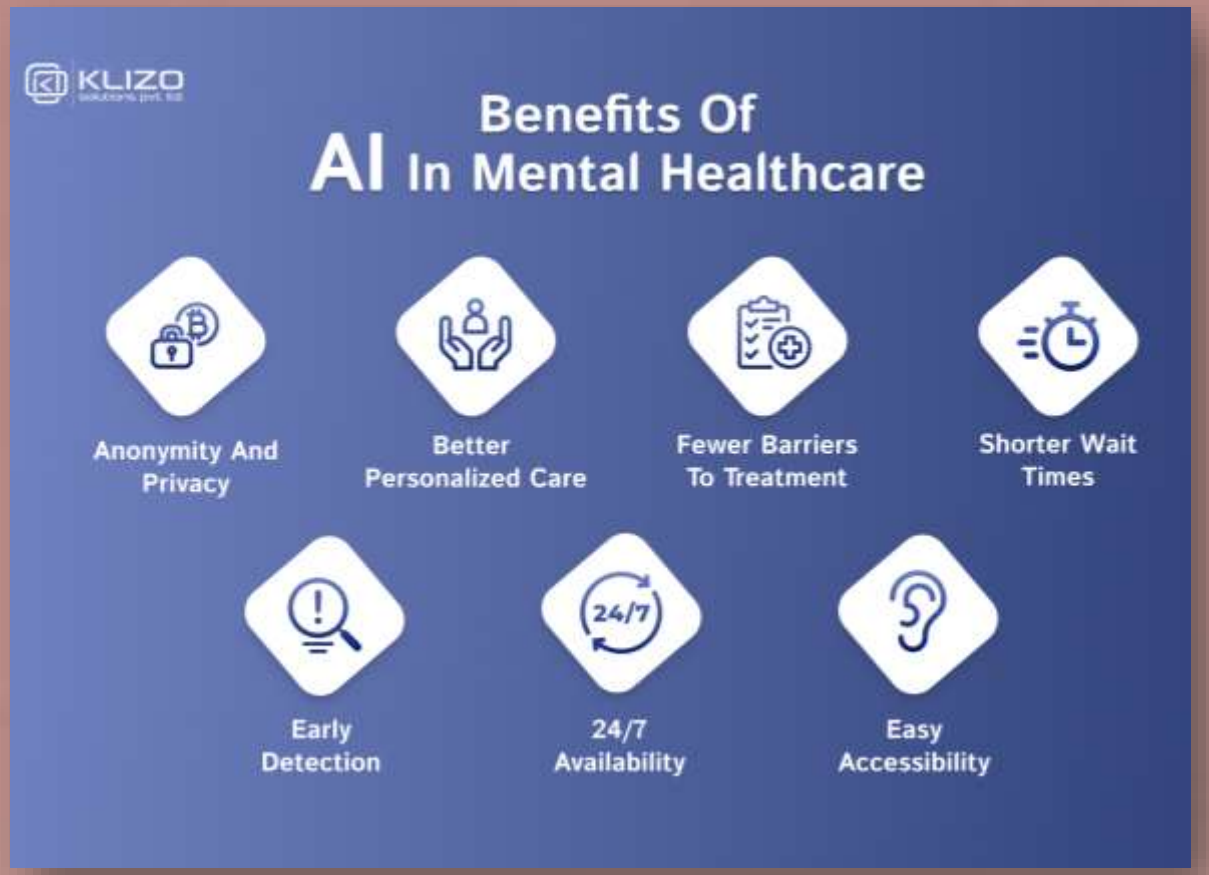
- Affordability
  i. Unlike traditional counseling where you need to schedule and travel for appointments, AI-based and other mental health apps allow users to access therapeutic help anywhere, anytime.
  ii. Moreover, they provide help at little or no cost, compared to costs associated with in-person therapy.

- Accessibility
  i. AI-based apps remove such barriers to mental health treatment as staff shortages across the board and a lack of providers in rural and remote areas.
  ii. Location-agnostic AI chatbots and platforms can see you whenever you need and spend as much time with you as you need.

➢ Efficiency

i. Artificial intelligence algorithms for mental healthcare have been proven to be successful in detecting symptoms of depression, PTSD (*Post Traumatic Stress Disorder*), and other conditions by analyzing behavioral signals.

ii. Other studies have shown that algorithms can spot behavioral symptoms indicative of anxiety with over 90% accuracy and are 100% accurate at predicting who among at-risk teens are likely to develop psychosis.




*The above image talks about the advantages of using AI in healthcare over the traditional methods*

➢ Privacy and ease to open up.

i. AI-based therapists make people feel less self-restrained when they may need to share personal details.
ii. This is especially important for those who can feel shame in face-to-face interactions because of stigma or fear of being judged.
iii. For many, it's easier to admit the true extent of their behavior to a robot because the robot won't judge.



# CONCLUSION

i. It's clear that progress must be made with care, models and methodologies need to be thoroughly assessed for risk of bias before they are allowed to be used in situations where they could affect human lives.

iii. As our understanding and ability to implement AI solutions continue to improve, it is believed that we will gradually be able to build a stronger case for implementing more widespread use of these potentially groundbreaking technologies.

iv. Overall, we hope that it will eventually lead to improved outcomes for conditions that are currently very difficult to treat and help to relieve the devastating impact that mental health problems often have on the lives of patients

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# THANK YOU!