



**'AI In Mental Health: Opportunities and Challenges in Developing Intelligent Digital Therapies', Bernard Marr, Forbes, Jul 6 2023.**

### **Introduction**

Artificial Intelligence (AI) has the potential to support and enhance the provision of mental health care. This digest summarises some ways that AI is predicted to, or is already working to predict conditions, provide therapies, and personalise approaches and treatments.

### **The problem and opportunity**

Compared to three years ago, [more people](#) than ever have been seeking help for mental health problems, including depression and anxiety. Since the pandemic, suicide is now the fourth leading cause of death among 15 to 29-year-olds worldwide.

Our already-stretched healthcare and therapeutic services is under increasing pressure, and there is an equity gap in accessing services.

Could AI (smart and machine learning-powered technology) be a part of the solution? Could it be part of early interventions? Could it reduce the need for patients to be medicated or wind up in hospital?

### **Examples of AI Mental Health interventions**

#### **AI Therapists**

*What:* Chatbots are mini robots that you chat with (text based) and they generate answers (on the screen). Therapeutic chatbot are increasingly being used to offer advice (such as how to cope with symptoms) and be a line of communication for mental health patients during their treatment.

*How:* They can be programmed to look out for keywords that could trigger a referral or direct a person to contact a mental healthcare professional.

*Examples:* Woebot is a chatbot that learns to adapt to its users' personalities and can talk to them through a number of therapies and talking exercises commonly used to help patients learn to cope with a variety of conditions. Tess is another chatbot that offers free 24/7 on-demand emotional support and can be used to help cope with anxiety and panic attacks whenever they occur.

#### **Wearables**

*What:* Are something you put on your body, like a smart band or a watch, and they can read and monitor physiological signs. AI mental health solutions include wearables which can interpret bodily signals using sensors and step in to offer help when it's needed.

*How:* Wearables collect information on sleeping patterns, physical activity, and variations in heart rate and rhythm to assess the user's mood and cognitive state. Predictive warnings about when an intervention may be necessary can be generated by comparing data with aggregated and anonymized data from other users. This is fed back to users so they can adjust their behaviour or seek assistance from healthcare services.

*Example:* Biobeat



### **Predicting patient outcomes**

AI is not yet at the stage of diagnosing MH conditions, but studies and innovations are pointing to its increasing capacity to predict. AI has been used to:

- Analyse data from various sources (patient medical data, behavioural data, voice recordings from telephone calls to intervention services etc) via 'machine learning' to flag warning signs of mental problems before they progress to an acute stage.
- Predict cases where patients are more likely to respond to cognitive behavioural therapy (CBT), and therefore be less likely to require medication.

In addition, studies have found:

- Machine learning can predict and classify mental health problems, including suicidal thoughts, depression, and schizophrenia, with "high accuracy." Data sources used in the 28 studies that were reviewed included electronic health records, brain imaging data, data taken from smartphone and video monitoring systems, and social media data.
- Hospital admission data, demographic data, and clinical data could be parsed with machine learning to predict whether a person will take their own life with 80% accuracy.
- There is currently a study underway that is looking into ways of using large-scale datasets from individuals who have not shown symptoms of mental health issues to predict which of them are likely to develop symptoms during their lifetimes.

### **Improving Patient Compliance**

Making sure patients comply with prescribed treatments, including taking medication and attending therapy sessions, is a challenge.

AI is being used to predict when a patient is likely to slip into non-compliance and either issue reminders or alert their healthcare providers to enable manual interventions. This can be done via chatbots like those mentioned previously or via SMS, automated telephone calls, and emails.

Algorithms have also been developed to identify patterns of behaviour or occurrences in patients' lives that are likely to trigger non-compliance. This information can then be passed to healthcare workers who can work with the patient to develop methods of avoiding or countering these obstacles.

### **Personalised Treatments**

AI has been used provide insights that can be used to adjust individual treatment plans by monitoring symptoms and reactions to treatment. One research project created personalised treatment plans for children suffering from schizophrenia based on computer vision analysis of brain images.

### **Challenges around Using AI in Mental Health Treatment**

While showing potential, AI brings specific challenges including:

- *AI diversity bias*: inaccuracies or imbalances in the datasets used to train algorithms could perpetuate unreliable predictions or perpetuate social prejudice. For example, it may overlook gender or ethnic differences in how mental health issues are expressed, and in treatment preferences. AI engineers and mental healthcare professionals need to work



*better together*

together to implement checks and balances to promote diversity and inclusion in data used for algorithm development.

- *AI subjective bias*: Diagnosing mental health issues often requires subjective judgments based on subtle and intuitively known data or else medical test data. Physiological data from wearables can be open to different interpretations and data based on self-reported feelings can be misleading.
- *Preferences*: Would you feel more comfortable talking to a robot than a human when it comes to unloading your deepest and most personal feelings?

### **Conclusion**

A World Health Organisation report found that still “significant gaps” in our understanding of how AI is applied in mental healthcare, as well as flaws in how existing AI healthcare applications process data, and insufficient evaluation of the risks around bias.

In sum, there are signs that AI has the potential to make a positive impact in many areas of mental healthcare, yet progress must be made with care, and models and methodologies need to be thoroughly assessed for risk of bias, and other ethical concerns.