



AI-DRIVEN APPROACHES TO CLINICAL TREATMENT OF MENTAL HEALTH

*Kshitij Gupta, Ph.D.**

Abstract

Although there has been a gradual change over the past two decades in recognition and public acceptance of the importance of mental health problems, there is a persistent translational gap between preclinical research and psychiatric treatment. Novel strategies are being implemented to utilise technology and Artificial Intelligence (AI) to detect, monitor, and treat mental health issues. The World Health Organisation states that mental health problems affect more than 5% of the population worldwide, whereas in India, mental health services report estimates that 7.5 percent Indians suffer from some mental disorder and predicts that by the end of this year roughly 20 per cent of India will suffer from mental illnesses. According to the numbers, 56 million Indians suffer from depression and another 38 million Indians suffer from anxiety disorders. The COVID-19 pandemic has upended every facet of our lives, including causing a tectonic shift in where and how we work. As more people receive the vaccine, workplaces are exploring what the new normal will look like and how to best support their staff during this transition. The latest interactive technologies of social robots and virtual reality, powered by AI promises new approaches for clinical treatment of psychiatric, developmental and cognitive problems. This article highlights AI, computing and mental health that works towards the development of new, computing based methodologies for detection, treatment and analysis of mental health issues. Besides providing an extensive overview of the state-of-art in the domain, the article aims at assisting young researchers, raise awareness of multidisciplinary opportunities of computing and medical sciences in mental health, and explore the future of mental health care in-tandem with artificial intelligence in India and share best practices for how organisations can foster mental health and resilience during the next phase of recovery.

KEYWORD(S): AI Systems; Behavioural Challenges; Mental Health Care; Triage; India

I. INTRODUCTION

A little over a year ago many of us were in our respective office spaces and were sent home one day and have not been back in over a year; it has been a rapid shift for all of us. The COVID-19 pandemic has disrupted the Indian workplace in unprecedented ways and has been a cause of increased anxiety and stress for many employees. Ignoring mental health concerns can hurt productivity and professional relationships at the bottom line. But many employees feel uncomfortable sharing their mental health struggles and may be reluctant to get the help they deserve. When we practice good mental health, it is easier to handle stress and other problems. Emotional and mental health is important because it is a vital part of your life and impacts your thoughts, behaviours and emotions. Being healthy emotionally can promote productivity and effectiveness in activities like work, school or caregiving. It plays an

* Ph.D. - M.S. - B.S. - Stanford University (USA), LL.M. Candidate - B.A. LL.B. (New Delhi - India).
Author may be contacted at: emailkshitijgupta@gmail.com.



important part in the health of your relationships, and allows one to adapt to changes in one's life and cope with adversity. Mobile technology applications, such as smartphones and smartwatches, are increasingly being adopted as mental health interventions to increase treatment and improve mental health outcomes. Inducting AI systems into mental health care sector provides a robust framework with changing technological, reimbursement and policy landscape for telehealth and other virtual behavioural health solutions.

In India, the Mental Health Care Act¹ came into effect on May 29, 2018. One of the main reasons for the enactment of the Mental Health Care Act of 2017 is the ratification of United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) by India in October 2007, as the earlier Act of 1987 was not adequate to protect and promote the human rights of persons with mental illness. The mental health care in India has come a long way with the paradigm shift from custodial care of persons with mental illness to the treatment of persons with psychiatric disorders. Earlier, human rights were completely ignored, hence the new legislation aligning with the UNCRPD plans for providing care and services under the relief of providing human rights that means providing care with protection and promotion of human rights.² The heart and soul of the Mental Health Care Act, 2017 lies in the chapter five consisting of sections 18 to 28. For the first time the Act clearly articulates the rights of persons with mental illness. With the passing of the Act, decriminalising suicide under section 115³ took a landmark paradigm from the earlier state where attempted suicide under section 309⁴ of the Indian Penal Code was a punishable offence. However, the point is clear that a person who is suffering from stress will be presumed to have stress, if the police is able to prove that it is not because of stress and the reason is something other than stress, then section 309 will be upheld and will not be completely squashed in such a scenario. Of course, the legislation is fairly decent one but completely borrowed from the western model where the individual rights take precedence over the collective rights that means a person with mental illness will decide about his or her treatment including duration of treatment, type of treatment, advance

¹ The Mental Health Care Act, 2017 (Act No. 10 of 2017).

² Duffy, R.M., Kelly, B.D., "Concordance of the Indian Mental Healthcare Act 2017 with the World Health Organization's Checklist on Mental Health Legislation" 11 *IntJ Ment Health Syst* (2017).

³ Sneha, V & Madhusudhan, Shivappa & Prashanth, NRudra & Chandrashekar, Hongally, "Decriminalization of suicide as per Section 115 of Mental Health Care Act 2017" *Indian Journal of Psychiatry* (2018).

⁴ The Indian Penal Code, 1860 (Act No. 45 of 1860), s. 309.



directives, and the naming of the nominated representatives which may or may not include family members, therefore the role of family is completely ignored in the Mental Health Care Act of 2017. However, the Act provides many checks and balances, but at the same time it increases the documentation of the assessment by psychiatrists, ultimately increasing time and cost incurred by persons with mental illness more than the psychiatric care and treatment. In a nutshell, Mental Health Care Act is a massive step in the right direction as this rights-based approach needs right amount of commitment from the government and there is a need to enhance the workforce and technological resources to fulfil the obligation of right to access for treatment.

II. A PUBLIC HEALTH CONCERN

We know healthcare is a public health concern and one of them is psychiatric disorders that are maladaptive patterns that lead to significant dysfunctional aspects of an individual's life caused by significant disturbances in thinking, mood, and/or behaviours that increase risks of disability, pain, loss of freedom, or death, interact to impact different levels of functioning. One of the reasons we must be concerned about the prevalence of mental health disorders in India, especially serious mental illnesses, is the increased odds of developing chronic conditions including coronary heart disease, however there is some disagreement in the literature that all mental health disorders have an impact, but there is ample other data to show that serious mental illness for instance, schizophrenia, major depressive disorder, bipolar disorder, anxiety disorders and substance use disorders tend to have very serious impact on one or more areas of functioning. The importance of understanding mental health care access is because we know life expectancy is shortened by 10 - 17.5 years in psychiatric population and part of it can be partially explained by high risk of various chronic diseases, including heart disease, cancer, respiratory conditions and metabolic disorders such as obesity and diabetes amongst psychiatric population than the general population. Although obesity is often associated with psychotropic medication that is used to treat mental illness with psychotherapy and pharmacology, and some of the antipsychotic medication that is used for example, schizophrenia and it can be used in the context of depression because within depression one can have psychosis which is associated with weight gain, but it is used because there is less prevalence for psychomotor issues that we see with other type of antipsychotic drugs. Another public health concern is suicidality which is high amongst people with psychiatric disorders



and is a major factor in reduced life expectancy among psychiatric populations. Therefore, we need to assess the state of our mental health and its treatment.

Comorbidity is not just psychiatric disorder or chronic condition, but typically when one treats psychiatric patients, the patients are not going to present themselves with one psychiatric disorder. It is not just depression, so within that co morbidity one has co-occurring psychiatric disorders such as bipolar disorder and alcohol use disorder that are prevalent. They may cause complexity in presentation and assessment of the treatment approach. In addition, when we have comorbidity of co-occurrence of psychiatric disorders and medical conditions like obesity, certain cancers, and type II diabetes, it is observed that there is poor health outcome for these sets of patients. Part of the high risks that are associated and are prevalent among psychiatric population can be partly explained to the physiological impact that certain disorders and their expanses have within our body. Normal anxiety is normal for our preservation as it makes us aware about personal and professional deadlines and makes us work better, whereas clinical anxiety makes the body react as if it is under attack, it is not thinking that there is nothing in the environment, in fact it is reacting as if one is being chased by an enormous animal that can pose serious injury, so as a result the nervous system is impacted and as a result the body tends to experience reactions that are psychological; perceiving fear of the situation and such symptoms can be understood as psychophysiological impact of anxiety state of the body.

III. TREATMENTS AND LIMITATIONS

From a cognitive behavioural therapy approach, how one is treating psychiatric illness is that there is stimulus happening in the environment, for instance, a person is looking for jobs online and his or her computer stops working, and the instinctive thought is of hopelessness and overgeneralization of this situation to overall life, and then the behaviour of throwing the computer away or stop looking for jobs and all of these construct behaviours impact body sensations and emotions, therefore, there is a direct relationship among these factors, meaning they interact to impact one another. In other words, behaviour can impact thoughts in a manner that emotions can impact thoughts. The primary interest of cognitive behavioural psychologist to intervene is at the thought level as the maladaptive thought level is what is helping to maintain the psychiatric issues, and if the professional intervention is at the thought level, then



one is more likely to have a better behaviour and a positive outcome. This is an echelon approach using cognitive behavioural therapy for treating psychiatric disorders.

Standard approaches to treatment within psychiatry is that the initial assessment as to how disorders are diagnosed is either conducted in-person or over the phone, and even with the COVID-19 pandemic limiting the resources with clinicians, the standard and delivery of therapy is in-person traditionally ranging from thirty minutes to one-hour weekly sessions over many months. Symptom improvement measures typically rely on past, self-report data, for example, “how is the depression of an individual over the past two weeks” is an approach where patients recall data from the past. There is a traditional way of delivering assessment and treatment in-person, but the problem is that in most parts of India, there are no mental health providers due to lack of access and limited medical infrastructure, and even if there are places where there is access to a therapist or a psychologist, evidenced-based treatments are not used in primary care or community health settings, especially those in predominantly minority and low-income communities.⁵ If there are situations where evidence-based treatment is being used, there is also lack of attention to cultural and linguistic contexts in assessments and treatments that could provide better assessment and relevant insight to presence of certain disorders and data about informed treatment,⁶ subsequently enabling mental health care providers to engage better with patients and retain them in therapy because low-engagement with patients and no-shows for therapy would lead to inconsistency in improvement, subsequently patients dropping-out from the therapy and wellness programmes.

Feasibility relates to how we deliver mental health care which primarily is an in-person modality, but even with evidence-based treatments available, regular in-person sessions may not be feasible for some groups as people have competing demands and this poses a barrier in receiving psychiatric therapy. Standard assessments may not capture true symptoms as we need to understand that symptoms, emotions, feelings and behaviour co-occur together so a patient may not be able to recollect past behavioural patterns and details precisely, and not registering

⁵ Mapanga W, Casteleijn D, Ramiah C, Odendaal W, Metu Z, et al., “Strategies to strengthen the provision of mental health care at the primary care setting: An Evidence Map” 14 *PLoS ONE* (2019).

⁶ Maulik PK, Tewari A, Devarapalli S, Kallakuri S, Patel A , “The Systematic Medical Appraisal, Referral and Treatment (SMART) Mental Health Project: Development and Testing of Electronic Decision Support System and Formative Research to Understand Perceptions about Mental Health in Rural India” 11 *PLoS ONE* (2016).



all the necessary and important information impacts the quality of treatment that one requires. Therefore, in assessing the status and quality of mental health care it is important to examine how fragmented the mental health care is. There is limited attention given to medical conditions in psychotherapy despite the known fact that people with psychiatric disorders have co-occurring medical condition like type II diabetes which will initially impact the mood of the patient if it is not well-managed, and this interactive relationship can present a barrier to the outcome of mental health care. Furthermore, oftentimes clinicians do not have access to pertinent health history of their patients to determine diagnoses that would have otherwise aided mental health care providers understand the trajectory of symptoms and inform treatment approaches help facilitate the delivery of integrative care that has shown to have a positive impact on treatment engagement and greater outcome.

IV. POTENTIALLY VIABLE TECHNOLOGIES

AI-driven technologies and systems can facilitate both clinicians and patients identify signs and symptoms of some of the more prevalent mental illnesses as well as figure an action plan to provide support to a person experiencing mental health challenges.⁷ One of the reasons to use AI systems is augmenting dissemination of what mental health treatments is. For instance smart phone is a potential viable platform for delivering mental health care as it is saturated; its ownership is ubiquitous among various demographic groups so people are widely using this platform in their daily lives. Similarly, smartphone app usage among various age groups provides an opportunity that can leverage to augment dissemination of evidence-based care.⁸ Currently there are roughly four hundred thousand mental health apps in existence and they are being used to assess and monitor symptoms. However, the psychiatric care apps are rarely used, not even as adjunctive treatment. On the other hand, smartwatches have been identified as a viable platform to not only deliver but to assess various behavioural biomarkers as objective measures that can be taken to conduct in-time assessment that can facilitate in understanding symptoms - how patients are doing over the course of the treatment, and therefore deliver tailor care to increase outcome. There is ample evidence that people who are wearing their smartwatches are exercising more so there is a possibility for passive intervention

⁷ Lovejoy, Chris & Buch, Varun & Maruthappu, Mahiben. "Technology and Mental Health: The Role of Artificial Intelligence" 55*European Psychiatry* 1-3 (2019).

⁸ Brunn, M., Diefenbacher, A., Courtet, P. et al., "The Future is Knocking: How Artificial Intelligence Will Fundamentally Change Psychiatry" 44*Acad Psychiatry* 461-466 (2020).



through such AI-based devices fostering digitalised psychiatric treatment in mental health care.⁹ When we look at artificial intelligence it can appear to be complex to understand, but it is evident in everything we do as it is a combination of technologies based on certain algorithmic codes that predict various models of behaviour, so it pulls information for example from an AI system that informs decisions based on labelled datasets that identifies risks pattern with patients suffering from psychiatric disorders, and this could trigger tailored intervention treatment based on these risks.

Mobile device apps could be used to leverage initial clinical assessment especially in the resource environment by having apps being part of psychiatric care where patients are completing assessments and therefore, that information is being used to triage patients most at risk and in immediate need of care. In low-resource communities, low-resource healthcare centres move along the assessment process because assessment is key to prognosis measures of treatment, and this is the stage where mental health care app can be valuable by eliminating the waiting period for scheduling an in-person appointment with clinicians. Another worthwhile feature of mental health care app is to deliver psychoeducation programmes that are beneficial to newly diagnosed patients, since the information on the symptomatology of a panic disorder will decrease individuals' fear of having a heart attack and decrease further panic and manage their respective disorders better. Therefore, by ensuring increased access in translation of evidence-based treatments to mobile device app platforms will deliver quality mental health treatment by embracing approaches that appropriately address symptomatology of the disorders and constructs associated with change in improvement and let patients have access to these types of treatments. These programmes can be self-paced for newly diagnosed patients such as patients suffering from depression or time constrained intervention for patients who have completed substantial part of their therapy. Features within mental health care apps such as electronic diaries through voice dictation makes it easy to monitor symptoms as a crucial aspect of formulating treatment and identifying patterns to accurately address them.

⁹ Benoit, James PhD; Onyeaka, Henry MD; Keshavan, Matcheri MD; Torous, John MD, “MBI Systematic Review of Digital Phenotyping and Machine Learning in Psychosis Spectrum Illnesses” 28 *Harv Rev Psychiatry* 296-304 (2020).



Scientific support for mobile device app-based health programmes for dissemination of quality mental health care and increasing the access to psychiatric prognosis, consultation and therapy have generated high interest amongst developers and users.¹⁰ There is empirical evidence to show that there is significant decrease in depression symptoms,¹¹ and a sizable impact in terms of outcome when compared to smartphone app-based programmes to non-smartphone programmes. Although, there have been few randomised controlled trials to determine efficacy of an intervention of a programme to draw conclusion over the advancement of newly deployed smartphone app-based programme in contrast to the current standards of uncontrolled environment.¹² The pilot randomised trials have stringent guidelines for confirming that comfortable participants have similar psychiatric conditions, for instance participants in smartphone app-based programmes must have similar anxiety levels for equitable outcomes.

Artificial Intelligence and technology can be potentially utilised to address the problems within mental health assessment and treatment segments as in to assess the attention to language and meaning of language that could really help clinicians to provide better informed treatment. Qualitative and quantitative data on symptomatology and anxiety experiences may help capture language, culture and meaning by identifying hallmark psychiatric symptoms in construct that are not different but the features of psychiatric symptoms are present in unique ways for certain groups. Somatic symptom disorders (SSD) are persistent distressing physiological symptoms that can be associated with depressive disorder, but in certain clinical settings when somatic symptoms are reported and not the psychological hallmark such as depression, feeling-low, suicidal ideation, major depressive symptoms for some reason are not explored in these settings, therefore patients are misdiagnosed and at times disorders remain untreated. Patients suffering from psychiatric disorders are asked to talk about their experience, utilising various models, and developed models label data and feed them to identify clusters of symptoms and these clusters are used for inform psychiatric care.

¹⁰ Bowie-DaBreo, D., Sünram-Lea, S. I., Sas, C., & Iles-Smith H, "Evaluation of Treatment Descriptions and Alignment With Clinical Guidance of Apps for Depression on App Stores: Systematic Search and Content Analysis" 4 *JMIR formative research* (2020).

¹¹ Torous J, Wisniewski H, Liu G, Keshavan M., "Mental Health Mobile Phone App Usage, Concerns, and Benefits Among Psychiatric Outpatients: Comparative Survey Study" 5 *JMIR Ment Health* (2018).

¹² Dimeff L, Jobes D, Koerner K, Kako N, Jerome T, Kelley-Brimer A, Boudreaux E, Beadnell B, Goering P, Witterholt S, Melin G, Samike V, Schak K. "Using a Tablet-Based App to Deliver Evidence-Based Practices for Suicidal Patients in the Emergency Department: Pilot Randomized Controlled Trial" 8 *JMIR Ment Health* (2021).



Relational Agents are human-like computerised characters that have been or are being used in delivering mental health care treatment as these entities are programmed in such a manner that they memorise specific patients details, interact with them and mimic the proficiency of real therapists and care providers, augmenting psychiatric care. For instance, robots, including relational agents like "Laura"¹³, have shown to be efficacious in treatment for schizophrenia and other disorders like anxiety. Participants are receptive to these platforms because they view them as "trustworthy", "supportive and encouraging" and "a virtual friend", and in some cases, relational agents were preferred instead of a human health coach or a counsellor. The goal is to have this part of health care for all those suffering from psychiatric disorders, and it might be expensive to develop and implement AI systems,¹⁴ but overall the analysis that is done over time in comparison to the number of people required as staff and time needed to disseminate mental health care to the affected population of the community, the overall cost analysis of relational agents is very optimal. However, relational agents can prove to be costly and are not considered feasible for the long-term care, so what is being utilised now is the chatbot,¹⁵ also known as a computerised interactive robot that intermingles with patients taking a text-based approach to AI-based mental health intervention, and over the period of time there is low engagement because the interactive nature of the chatbot is related with interest as compared to regular in-person engagement and psychiatric care. Relational agents delivered treatments show efficacy in the management of social phobia such as public speaking anxiety, panic disorder, and agoraphobia.¹⁶

As we move further and examine the status of mental health in India, better assessment allows us to better understand the pattern of behaviour and predict overall mental health. However, the manner in which data is being collected may not be sufficient and quality data for informed treatment. Passive data collection opportunities kindle enhanced assessment and superior

¹³ Bickmore, Timothy & Gruber, Amanda, "Relational Agents in Clinical Psychiatry" 18 *Harv Rev Psychiatry*. 119-30 (2010).

¹⁴ Gamble, A., "Artificial intelligence and mobile apps for mental healthcare: a social informatics perspective" 72 *AJIM* 509-523 (2020).

¹⁵ Fitzpatrick K, Darcy A, Vierhile M, "Delivering Cognitive Behaviour Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial" 4 *JMIR Ment Health* (2017);

¹⁶ Marsch, L. A., Lord, S. E., & Dallery, J. (eds.) *Behavioural Healthcare and Technology: Using Science-Based Innovations to Transform Practice* (Oxford University Press, 2015).



prediction of behaviours and overall mental health of patients. People are using various AI-driven technologies and their interaction with them generates viable data of understanding symptoms and intervention, these include think sensors, geolocation, search histories, and social media searches.¹⁷ For example, think sensor data through a Fitbit¹⁸ and the built-in light-emitting diode (LED) that flashes into patient's skin creates biomarker data such as heart rate facilitates the purpose of integrating data within clinical setting advancing certain areas of research, and digital phenotype¹⁹ is developed by collecting these datasets that gives clinicians an idea and ample information from various sources to develop a clinical profile that shows factors that led to the development or onset of the disorder factors that contribute to the maintenance of the disorder, prior to treating participants. Therefore, clinicians are informed on how to tackle these various factors and why strategies that are more effective, that is, similar in case of phenotyping where each dataset is helpful in developing a pattern for a particular participant and based on that when clinicians observe the heart rate is elevated and consistent with normal pattern that triggers an ecological assessment. Ecological assessment is basically an in-time assessment of a participant's whereabouts for data collection on various factors such as stimuli and behaviours that occur close in time, and therefore, clinicians can deliver intervention that address these maladaptive thoughts and behaviours. Another area of ways that phenotyping is being used for is alcohol use disorder.²⁰ For example, if you are targeting someone with excessive alcohol use depending on the information you have had in a participant help us un-define and also un-deter or identify a risk profile based on where they are and their other risks, therefore delivering intervention not only that will alert the participant of the risk but also providing information about what they could do to decrease excessive drinking. Identified and potentially phenotyping can identify triggers and temporal of triggers in participants but whether the triggers that we collect and identify are the same at home versus at work or when we map these patterns do we see that they differ during the week or the weekends. Now with all of this information, mental health care providers access the datasets

¹⁷ Glen Debar, Nele De Witte, Romy Sels, Marc Mertens, Tom Van Daele, Bert Bonroy, "Making Wearable Technology Available for Mental Healthcare through an Online Platform with Stress Detection Algorithms: The Care wear Project" *Journal of Sensors* (2020).

¹⁸ Ng A, Reddy M, Zalta A, Schueller S. "Veterans' Perspectives on Fitbit Use in Treatment for Post-Traumatic Stress Disorder: An Interview Study" *5 JMIR Ment Health* (2018).

¹⁹ Andrea A, Agulia A, Serafini G, Amore M. "Digital Biomarkers and Digital Phenotyping in Mental Health Care and Prevention" *30 Eur. J. Public Health* (2020).

²⁰ Colombo, Matteo, and Andreas Heinz. "Explanatory Integration, Computational Phenotypes, and Dimensional Psychiatry: The Case of Alcohol Use Disorder." *29 Theory & Psychology* 697–718 (2019).



that could essentially provide care, with the assistance of blockchain technology which is a centralised way to store datasets and health professionals have access to data that eliminates the third party as previously a clinician had to get consent faxed over to get the patient's information. Blockchain is a form of digital ledger technology used to share and store data in a decentralised way upholding storage or management of information in transparent, secure and trusted manner. It connects to various blocks from various metadata and the amount of metadata consisted is a huge amount of data whether it is treatment history, personal history, various treatments that one is using including history from ever since the first to the most recent care provider can really inform and provide clinicians easy access of information, and within that there is an ecosystem where primary care physicians (PCP) need not call the psychologist or call the PCP of the psychologist because one has the access to care and this is significant because of adequate intervention, it is going to prevent inadequate intervention which can usually lead to frustration and eventual attrition, for instance, some patients will discuss somatic symptoms with their primary care physician and not with their psychologist or psychiatrist and this is where the blockchain technology is effective because the centralised information remains accessible by authorised personnel, transparent and well-defined that could potentially help patients to inform care. The way blockchains are being used could have great implication on genomic sequencing²¹ and help us understand aetiology of various psychiatric and medical disorders,²² for example, we know there is some chromosomal abnormalities for people with schizophrenia and this is a way to increase that amount of metadata and we can really have an established understanding of various technology and factors that are impacting the disorder, and therefore develop prevention even though public health in India is not of a primary prevention programme system; it is more tertiary where people already have disorders but we can identify people that are at most risk for this disorder and intervene, which is really important to decrease human suffering. Artificial Intelligence has the ability to enhance mental health care in India by forecasting onset and course of psychiatric disorders through means of social media metadata and clinical assessments that

²¹ Barbara Bowles Biesecker, Holly Landrum Peay, "Genomic sequencing for psychiatric disorders: promise and challenge" 16 *Int. J. Neuropsychopharmacology* 1667-1672 (2013).

²² Alexander Arguello, P., Addington, A., Borja, S. et al. "From Genetics to Biology: Advancing Mental Health Research in the Genomics ERA" 24 *Mol Psychiatry* 1576-1582 (2019).



show temporal order of first depressive episode,²³ advance understanding of biological structure, behaviours and cognitions impacting schizophrenia, and primary prevention programmes inhibit manifestation of psychosis such as command hallucinations, or catatonia where patients are most at risks for suicide.

V. LIMITATIONS AND FUTURE RESEARCH

There are some limitations here that wide integration of various AI-driven technologies has, for instance, relational agents are costly and require multidisciplinary teams, and can be difficult to integrate into existing systems. Technical support staff may not be feasible for some settings. Data ownership and access raises ethical and legal compliance issues. There is lack of large randomised controlled trials as compared to the current small pilot trials with small samples in order to assess effectiveness of AI-based technology approaches, and technology ubiquity does not necessarily indicate that ownership of mobile phones or other emerging technology devices have high saturation ubiquity will boost development of mental health programmes because technology alone does not change behaviour and acceptability ratio as the content and information needs to be examined and made suitable that could assist clinicians in providing tailor treatment for patients, and that includes some groups where cognitive deficiencies exist and technology-based approaches alone may not be an appropriate way to disseminate treatment.

Technologies have created a culture of immediacy language and contexts that influence our behaviours and, how we interact with the world can provide us information about what are some underlying factors that interact and present symptoms and therefore should be addressed in care. How we interact with technologies, from what we search online, how long we stay on webpages, to what we purchase are not independent of our mental health. Such passive data collection opportunities can expand and revolutionise how an individual is treated for psychiatric disorders, and more importantly, prevent the onset of certain disorders and slow progress of existing conditions that will have a public health impact on India.

²³ Naslund, J.A., Bondre, A., Torous, J. et al. "Social Media and Mental Health: Benefits, Risks, and Opportunities for Research and Practice." 5 *technol. behav. sci.* 245–257 (2020).



VI. CONCLUDING REMARKS

In the digital age, and specifically during a global pandemic, there is a collective reliance on technology and social media to help stay connected with family, friends and colleagues. However, excessive use of social media and reliance on devices can contribute to negative impacts on mental health.²⁴ The challenges facing the mental health sector are well-known and undisputed, with the rates of young adults disclosing mental illness continue to rise.²⁵ Deaths which are result of intentional self-harm among young adults under thirty years are increasing. During the pandemic there have been heightened levels of anxiety, depression, substance abuse, domestic violence along with other psychological problems. It is important for mental health professionals to understand how pandemics and pandemic management affects the mental health of clients, and to be able to use this information to better support ourselves and our clients in a practical manner during this time. Guessing in mental health care can be avoided through data and interactive technology solutions. AI-driven mental health care projects must be initiated that surveys and augments innovative integration of AI systems, advanced data analytics, young adults relationship management, and young adults support to provide an understanding of the opportunities to ascertain whether a person is already experiencing or will have a mental health crisis. The purpose of the innovative research and development projects should be to identify actionable insights, to deliver holistic approaches to young adult health and well-being. The project should aim in providing answers to the questions the mental health sector with artificial intelligence is seeking on how to best identify and respond to young adults with poor mental fitness, and offer insights into opportunities for resilience and thriving approaches. All outputs from the AI-driven mental health project will be scalable sector wide, giving mental health care providers advanced mechanisms to make positive interventions and AI tools to engage their young adult community.

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²⁴ Koehler, Sarah Nichole and Parrell, Bobbie Rose, "The Impact of Social Media on Mental Health: A Mixed-Methods Research of Service Providers' Awareness" *Electronic Theses, Projects, and Dissertations* (2020).

²⁵ Berryman, C., Ferguson, C.J. & Negy, C., "Social Media Use and Mental Health among Young Adults" 89 *Psychiatr Q* 307–314 (2018).