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Cognitive Behavioral Therapy (CBT) Delivered via AI and Robotics

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Abstract: ***The current study aims to examine the efficacity of Woebot against three control conditions, including ELIZA, a introductory (non - "smart") conversational bot, a journaling app, and a unresistant psychoeducation control group. They emphasize that using a no - treatment control group study design to request clinical services should no longer be respectable nor serve as an respectable precursor to selling a chatbot as functionally original to psychotherapy. compulsive – obsessive complaint (OCD) is characterized by the presence of unwanted and repetitious studies driving significant anxiety, as well as the presence of ritual actions or internal acts carried out in response to prepossessions to reduce the associated torture. In the impurity subtype, individualities are spooked of origins and bacteria, are exorbitantly concerned with cleaning, fear impurity and the spread of complaint, and may have a veritably strong aversion to fleshly concealment. Findings reveal that Woebot does not offer benefit above and beyond other tone - help behavioral intervention technologies. Many studies on virtual reality (VR) have been conducted with people suffering from OCD, but they all concentrate on the subtype characterized by checking rituals***

Keywords: Cognitive Behavioral Therapy (Cbt), Virtual Reality (Vr), Grown - Ups, Robotics, Depression and Anxiety

1. Introduction

Depression and anxiety are common in adolescents. However, these common ails can affect in significant sequelae including academy powerhouse, substance abuse, if left undressed. At any one time, 18 of adolescents report depressive symptoms, and about 3 are diagnosed with a depressive complaint. Depression and anxiety frequently co - occur; 1 in 3 teens will witness clinically significant anxiety symptoms. The goods of the epidemic on internal health in general has been unknown; prepandemic internal health pool dearths have come direr. therefore, there's an critical need to give prompt, effective treatments that can be readily integrated into the day - to - day lives of adolescents and circulated ever during ages of counterblockade and ongoing pool issues. substantiation - grounded treatments for pediatric depression and anxiety include picky serotonin and serotonin - norepinephrine reuptake asset (SSRI, SNRI) specifics and cognitive behavioral remedy (CBT), used independently or in combination. Yet, many teens admit treatment with these curatives [1]. CBT is generally handed through a series of face - to - face relations with a trained therapist over several months and is frequently preferred by families over drug. still, CBT is infrequently used due to pervasive and patient problems with access, cost, and smirch. Internet and mobile health (mHealth) interventions reduce these walls to application and are respectable and effective druthers to live CBT for the treatment of depression and anxiety in grown - ups. Conversational agents or "chatbots" that deliver CBT via a textbook - grounded, semiautomated algorithm are known to reduce mild - to - moderate depressive symptoms in nonclinical populations. still, many have been estimated in clinical populations, with scarce rigorous study in youth [2].

2. Literature Review

Sharon Graham (2022) Symptoms of depression and anxiety, suicidal ideation, and self - harm have escalated among adolescents to crisis levels during the COVID - 19 pandemic. As a result, primary care providers (PCPs) are often called on to provide first - line care for these youth. Digital health interventions can extend mental health specialty care, but few are evidence based. We evaluated the feasibility of delivering an evidence - based mobile health (mHealth) app with an embedded conversational agent to deliver cognitive behavioral therapy (CBT) to symptomatic adolescents presenting in primary care settings during the pandemic. In this small study, we demonstrated the feasibility, acceptability, usability, and safety of using a CBT - based chatbot for adolescents presenting with moderate depressive symptoms in a network of PBRN - based primary care clinics. This pilot study could not establish effectiveness, but our results suggest that further study in a larger pediatric population is warranted. Future study inclusive of rural, socioeconomically disadvantaged, and underrepresented communities is needed to establish generalizability of effectiveness and identify implementation - related adaptations needed to promote broader uptake in pediatric primary care [1].

Peter Mozelius (2020) Cognitive behavioral therapy (CBT) has become a successful treatment to improve management of stress and anxiety in social situations. One of the most widespread social anxiety disorders is speech anxiety, and there are also studies reporting that speech anxiety is increasing among younger adults. An emerging trend in CBT treatment is virtual reality (VR), a technology that today also could involve the use of artificial intelligence. The aim of this position paper is to present and discuss the idea of using explainable artificial intelligence to improve CBT treatment of speech anxiety in virtual reality environments. The proposed CBT and VR concept builds upon identification of

individuals for whom a scientifically grounded treatment can be predicted to have a larger effect than the average. The identification of these individuals should be conducted with the use of Explainable artificial intelligence (XAI). However, the effect of providing XAI - based information on actual treatment outcome has not been fully investigated and established [2].

Philip Lindner (2018) Public speaking anxiety (PSA) is a common condition which can be treated effectively with exposure therapy. However, inherent difficulties in stimuli presentation and control limits dissemination and the therapeutic potential. Virtual Reality (VR) technology has the potential to resolve these issues and provide a scalable platform for self - help interventions. No previous study has examined whether this can be achieved using the first generation of consumer VR hardware and software. In the current trial, n = 25 + 25 participants were randomized to either one - session therapist - led VR exposure therapy for PSA followed by a four - week internet - administered VR to in - vivo transition program, or a waiting - list. Linear mixed effects modeling revealed significant, large (within Cohen's d = 1.67) decreases in self - reported PSA. The waiting - list was then given access to an internet - administered, self - led version of the same VR exposure therapy to be conducted at home, followed by the same transition program. Dual - slope mixed effects modeling revealed significant, large (d = 1.35) decreases in self - reported PSA [4].

Cristina Botella (2017) This review is designed to systematically examine the available evidence about virtual reality exposure therapy's (VRET) efficacy for phobias, critically describe some of the most important challenges in the field and discuss possible directions. Evidence reveals that virtual reality (VR) is an effective treatment for phobias and useful for studying specific issues, such as pharmacological compounds and behavioral manipulations, that can enhance treatment outcomes. In addition, some variables, such as sense of presence in virtual environments, have a significant influence on outcomes, but further research is needed to better understand their role in therapeutic outcomes. We conclude that VR is a useful tool to improve exposure therapy and it can be a good option to analyze the processes and mechanisms involved in exposure therapy and the ways this strategy can be enhanced. In the coming years, there will be a significant expansion of VR in routine practice in clinical contexts [5].

Stéphanie Dumoulin (2016) People with social anxiety disorder (SAD) fear social interactions and may be reluctant to seek treatments involving exposure to social situations. Social exposure conducted in virtual reality (VR), embedded in individual cognitive - behavioural therapy (CBT), could be an answer. Participants were randomly assigned to either VR exposure (n = 17), in vivo exposure (n = 22) or waiting list (n = 20). Participants in the active arms received individual CBT for 14 weekly sessions and outcome was assessed with questionnaires and a behaviour avoidance test. Improvements were found on the primary (Liebowitz Social Anxiety Scale) and all five secondary outcome measures in both CBT groups compared with the waiting list. Conducting exposure in VR was more effective at post - treatment than in vivo on the primary outcome measure and on one secondary measure. Improvements were maintained at the 6 - month follow - up. VR was significantly more practical for therapists than in vivo exposure. Using VR can be advantageous over standard CBT as a potential solution for treatment avoidance and as an efficient, cost - effective and practical medium of exposure [6].

Cognitive Behavioral Therapy

Cognitive behavioral therapy (CBT) is a form of psychological treatment that has been demonstrated to be effective for a range of problems including depression, anxiety disorders, alcohol and drug use problems, marital problems, eating disorders, and severe mental illness. Numerous research studies suggest that CBT leads to significant improvement in functioning and quality of life. In many studies, CBT has been demonstrated to be as effective as, or more effective than, other forms of psychological therapy or psychiatric medications. It is important to emphasize that advances in CBT have been made on the basis of both research and clinical practice. Indeed, CBT is an approach for which there is ample scientific evidence that the methods that have been developed actually produce change. In this manner, CBT differs from many other forms of psychological treatment [4].

CBT is based on several core principles

- Psychological problems are based, in part, on faulty or unhelpful ways of thinking.
- Psychological problems are based, in part, on learned patterns of unhelpful behavior.
- People suffering from psychological problems can learn better ways of coping with them, thereby relieving their symptoms and becoming more effective in their lives [4].

Using Conversational AI to deliver CBT

- Conversational AI creates a safe, non - judgmental space for patients to work through their difficulties using proven CBT strategies
- Wysa's AI is clinically proven to create a therapeutic alliance equivalent to a human therapist within the first week
- The program is augmented by psychoeducational videos and written materials
- Patients who are in crisis can access local and national helplines as well as grounding exercises and the option of creating an individualised safety plan

AI and Robotics conceivably ameliorate internal health

The current AI systems could be used to support the capacity to distinguish between the same primary clinical donations but with different treatment styles. An illustration is feting bipolar as against unipolar depression depending on the brain imaging aspects or determining the discrimination madness types using structural MRI reviews. also, the data - driven approach could prop in relating the new complaint subtypes by considering the diversity of donations, demographic features, and environmental rudiments. The third fashion is having the AI approaches to make models from new data sources and synthesize them from miscellaneous data aqueducts similar as Electronic Health Record (EHR) and behavioral information from the wearable detectors' social media feeds, among others. The end is to combine the

descriptive and automatic models of internal illness across the tone - report sources to the molecular evaluations [5].

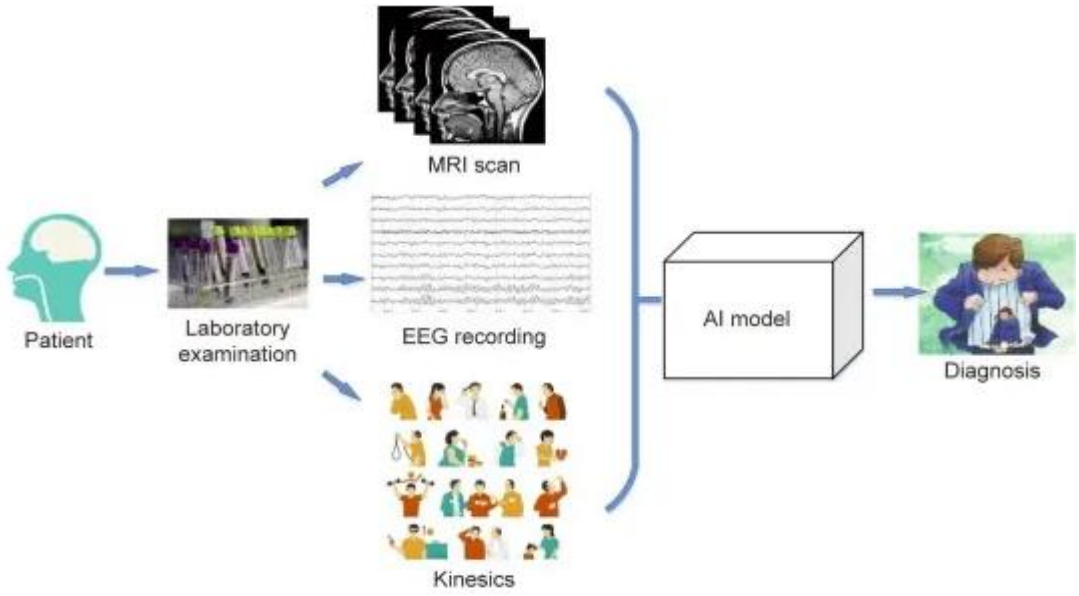

Figure 1: Observation Techniques for Psychiatric Disorders

MRI has been the predominant fashion for behavioral and cognitive neuroscience as it allows the disquisition of common psychiatric abnormalities which cannot be detected by reckoned tomography. presently, the generally used AI ways similar as multimodal literacy and deep literacy ways used in brain imaging could also be used in the practical analysis of complaint information to identify the crucial biomarkers and increase the capacity to treat brain conditions [7].

Electroencephalography (EEG) is another essential AI - grounded technology that could diagnose and treat the mortal brain's nervous system diseases. substantially, the technology allows the discovery and recording of mortal EEG signals necessary to understand the processes of the mortal brain and diagnose psychiatric conditions. EEG has demonstrated a advanced temporal resolution than MRI and CI hence essential in exploration and diagnostics in the studies concentrated on assessing anxiety, depression, and psychosis. thus, applying the classical machine learning algorithms to reuse EEG information is pivotal in classifying cases with internal health diseases [8].

The Development of a Multimodal Robotic System

The multimodal robotic frame will integrate verbal/ contextual speech with verbal social cues to more engage in mortal - robot commerce and grease internal health telemedicine. This system will have an affective mongrel face robot that integrates a digital face that could show facial expressions and a 3D published face demanded to demonstrate literalism and depth, which could flexibly be added to the robot [9].

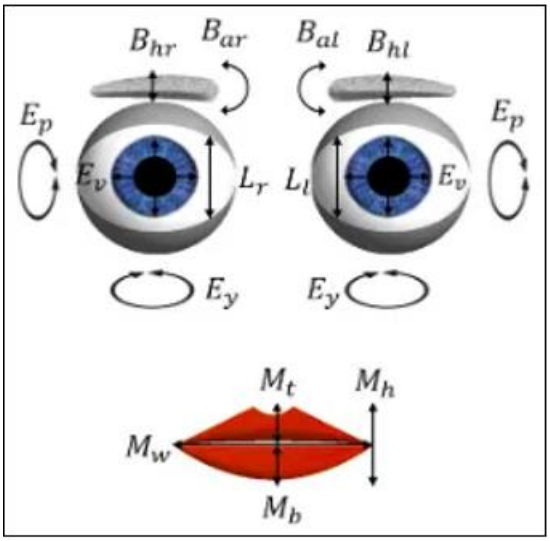

Figure 2: Thirteen Degrees for the Facial Expressions

It is also prudent to note that the robot's software design depends on mathematical methods to map emotions. The approach would allow manually or remotely controlled modeling of emotions through selecting every expression's intensity.

3. Objectives

- To understand CBT and the process of brief CBT
- To identify crucial treatment considerations and problems most suitable for brief CBT
- To learn how to assess the case's felicity for brief CBT

4. Research Methodology

The concurrence/ assent process was initiated by phone due to epidemic - related walls to in - person participation. Formal concurrence/ assent was conducted using a Research Electronic Data Capture (REDCap) – grounded electronic

concurrence form. The stoner experience is centered around mood tracking and thing - acquainted, acclimatized exchanges. Woebot checks in with the stoner, and depending on the stoner's reported mood or desire to work on a problem or learn commodity new, Woebot will offer and guide the stoner through CBT - grounded psychoeducation and tools, acclimatized to the reported need in that moment. diurnal drive announcements prompt druggies to check in. Following a pre - screening phone call, the parents or legal guardians of implicit adolescent actors entered an dispatch with a unique link to review the informed concurrence form online. After the exploration platoon explained the study and answered any questions, parents or legal guardians and implicit actors clicked an "agree" button, which was accompanied by textbook indicating that by clicking the button, they were furnishing concurrence/ assent to share. They were also asked to class their full name, which served as their electronic hand attesting concurrence/ assent. Using personal neurolinguistic programing and artificial intelligence, the platform designs a substantiated program to meet the stoner's requirements in real time.

5. Data Analysis

Anxiety Depression and Stress Scale

The present bid was to study the effect of CBT and ICBT intervention and to compare on Emotional capability, Disaffection and Life Satisfaction amongst subjects with Depression in relation to Personality type. Each point is scored 1 if championed "Yes" and 0 if championed "No". The range of the score is 0 - 19 for anxiety subscale, 0 - 15 for depression subscale and 1 - 14 for stress subscale.

Advanced score indicates passing lesser anxiety, depression and stress andvice - versa. Interpretation of the scoring - Interpretation of the attained scores is done on the base of mean and SD, cut off points that are in terms of percentile scores and quartile diversions.

Table 1: Mean and SD of Total Sample on Depression

Variable	Mean	SD
Depression	4.53	2.01
Alienation	52.9	9.3
Life satisfaction	139.25	16.17

Table 1 indicates the mean scores of total sample on depression, disaffection and life satisfaction. The mean score of total sample on depression and disaffection was set up to be moderate. also, the mean score of total sample on Life satisfaction was also average. Table 2 indicates the mean scores and SDs of total sample on all the confines of Emotional capability. The loftiest mean score on improvement of positive emotion followed by capability to manage with problem feelings, capability to serve with feelings, acceptable expression and control of feelings, and acceptable depth of feeling.

Table 2: Total Sample on all the Dimensions for Emotional Competence of Mean and SD

Dimensions of Emotional Competence	Mean	SD
Adequate Depth of Feeling	19.33	4.46
Adequate Expression and Control of Emotions	19.66	4.55
Ability to function with Emotions	19.86	4.47
Ability to Cope with Problem Emotions	20.26	3.96
Enhancement of Positive Emotions	21.88	3.75
Total Emotional Competence	100.80	14.91

Subsequently, the mean score of total emotional competence was found to be average. It shows that the total sample has the highest level of enhancement of positive emotions and lowest level of adequate depth of feeling.

Table 3: Mean and SD of Types Personality on Depression, Life Satisfaction and Alienation

Variable	Type A		Type B	
	Mean	SD	Mean	SD
Depression	4.56	1.83	4.81	2.20
Alienation	52.97	10.17	52.36	8.75
Life satisfaction	140.46	14.80	138.13	16.7

Table 3 shows the mean scores and SDs of Type A and Type B personality on Depression, Alienation and Life satisfaction. The mean score of Type A personality on Life satisfaction was average. Similarly, the mean score of Type B personality on alienation was found to be moderate.

Table 4: Mean and SD of Intervention on all the Dimensions of Emotional Competence

Dimensions of Emotional Competence	ICBT		CBT	
	Mean	SD	Mean	SD
Adequate Depth of Feeling	19.02	4.56	19.53	4.22
Adequate Expression and Control of Emotions	19.36	4.37	20.06	4.42
Ability to function with Emotions	19.33	4.44	20.05	4.26
Ability to Cope with Problem Emotions	19.65	4.27	20.26	4.01
Enhancement of Positive Emotions	21.20	3.82	22.70	3.51
Total Emotional Competence	98.26	14.53	102.72	14.66

The capability to manage with problem feelings after ICBT intervention was set up to be was lower than capability to manage with problem feelings after CBT intervention. The improvement of positive feelings after ICBT intervention was low as compare to improvement of positive feelings after CBT intervention. Eventually, the total emotional capability of subjects after ICBT intervention was set up to be low as compare to the total emotional capability of subjects after CBT intervention.

6. Conclusions

AI and robotics have the eventuality to transfigure CBT by adding availability and bodying treatment, though careful consideration of ethical and practical counter accusations is necessary for effective perpetration. AI and robotics can enhance the delivery of CBT, making it more individualized, engaging, and accessible. still, integrating these technologies requires careful consideration of ethical counter accusations and the necessity of mortal oversight to insure effective and compassionate care. Different psychiatric diseases similar as SAD and speech anxiety are a massive problem for both individualities and the contemporary society. XAI styles have the eventuality to be a cost - effective volition to ameliorate being CBT treatments. Results from the proposed exploration design could also be a applicable donation for the understanding of how cases perceive information grounded on AI compared to information coming from traditional

psychology. A knowledge that can be precious for a unborn administration of VR - and AI - enhanced curatives. AI technologies and robotics are there to revise any existent's internal health, anyhow of their position. Considering the health sector, whose end is perfecting the health situations of its cases, the use of any technology remains abecedarian. In this case, AI technologies and ways give both ways and machines that could help dissect patient data, diagnose their complaint, and put them in the proper treatment plans.

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