

Harnessing Artificial Intelligence: The Impact of the Marcus Chatbot on Mental Health Screening and Support in College Students

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

The integration of Artificial Intelligence (AI) into mental health care, specifically through chatbots, marks a transformative era in addressing the pervasive challenges of depression, anxiety, and various psychiatric conditions. This research investigates the broader impacts of AI chatbots in mental health care by utilizing the Marcus chatbot as a pivotal case study. Situated within the realm of higher education, the mental health needs of students represent a critical area of concern influenced by academic pressures, personal transitions and the distinctive social dynamics of college life. As a targeted intervention, the Marcus chatbot leverages AI to offer accessible, personalized and timely mental health support with a particular focus on screening for and detecting depression among college students (Kaywan et al., 2023; Klos et al., 2021). This case study serves to explore the effectiveness of AI-driven interventions in enhancing mental health support systems in academic settings.

The significance of this research is underscored by the heightened susceptibility of college students to mental health challenges and the urgent need for early detection and intervention. Marcus strives to bridge the gap between the escalating demand for mental health services on college campuses and the available resources, embodying a vision of leveraging technology to provide tailored and timely support (Cartwright et al., 2023). The introduction of Marcus is a proactive response to the escalating mental health crisis among college students, marking a paradigm shift in addressing these challenges.

Background and Significance

Delving into the context of this research necessitates recognizing the distinctive challenges encountered by college students. The contemporary educational environment introduces stressors that, when combined with personal transitions, can contribute to heightened levels of stress, anxiety, and depression. Notably, the American College Health Association's survey found that over 60% of college students felt overwhelming anxiety in the past year, emphasizing the urgent need for targeted mental health interventions (Abrams, 2022).

In the current educational milieu, Marcus chatbot emerges as a trailblazer, embodying a seamless integration of technology and psychological support within the academic sphere. Its deployment symbolizes a radical transformation in university-level mental health strategies, offering discreet, accessible, and individualized support tailored to the digital-native student body. This study probes deeper than the mere creation of a technological solution; it scrutinizes a significant shift in the delivery of mental health care, attuned to the dynamic needs and digital proclivities of today's college students.

Moreover, the Marcus chatbot aligns with broader societal trends in AI integration in healthcare. Studies by Dosovitsky et al. (2020) and Klos et al. (2021) showcase the promise of AI chatbots in reducing symptoms of anxiety and depression, offering a scalable and engaging alternative to traditional therapeutic methods. The work of Ahmed et al. (2022) and Chin et al. (2023) contributes insights into user experiences and cultural adaptability, which directly inform the design and implementation of Marcus. The burgeoning interest in the application of AI in mental health care, as evidenced by the literature, underscores the need for innovative solutions

like Marcus. The gap between the demand for mental health services and the resources available necessitates a comprehensive and technology driven approach, and Marcus aims to fill this void.

Methodology

To address the research question concerning the effectiveness and implications of the Marcus chatbot in screening for depression among college students, a comprehensive methodology has been employed. This research adopts a mixed methods approach, combining quantitative analysis of user interactions with qualitative insights from user reviews and feedback.

This research draws upon a rich body of literature examining the role of AI chatbots in mental health care. Dosovitsky et al. (2020) conducted a pioneering study, shedding light on the transformative potential of an AI chatbot designed for individuals dealing with depression. The investigation delved into the nuances of user engagement over extended periods, emphasizing the viability of digital interventions as sustainable mental health support tools. Dosovitsky et al.'s findings underscore the critical importance of sustained user interaction, a facet integral to Marcus's approach as a screening tool requiring consistent engagement for precise monitoring and assessment of college students' mental health status.

Building upon this, Klos et al. (2021) significantly advanced our understanding through a pilot randomized controlled trial. Their research not only demonstrated the effectiveness of AI chatbots in reducing symptoms of anxiety and depression but also positioned these digital tools as primary interventions, especially within the context of university students. The success of AI based interventions among this demographic reaffirms the relevance of Marcus as a screening

tool, emphasizing the potential for early detection and timely support in the unique setting of higher education.

Ahmed et al. (2022) contributed a machine learning driven thematic analysis of user reviews for depression and anxiety chatbot apps. Their study uncovered critical user experience themes, particularly emphasizing the importance of personalization in digital mental health interventions. These insights directly inform the user centered design of Marcus, highlighting the need for tailored interactions and interventions that align with individual mental health journeys.

The research employs the Social Construction of Technology framework within Science, Technology, and Society studies to examine how societal influences, user practices, and institutional contexts co-construct the development and integration of the Marcus chatbot for mental health care in the academic environment.

This methodology aims to provide a holistic evaluation of the Marcus chatbot, considering its effectiveness in user engagement, the impact on mental health outcomes, and the ethical implications of integrating AI into mental health care. By combining quantitative and qualitative approaches within an STS framework, this research endeavors to contribute nuanced insights into the evolving landscape of digital psychiatry on college campuses. As the Marcus chatbot is designed with the specific needs of college students in mind, this research acknowledges the significance of understanding the intricacies of their experiences, challenges, and preferences. The incorporation of user centered design principles ensures that the Marcus chatbot aligns seamlessly with the unique demands of the university population.

The Marcus chatbot's development was informed by a meticulous consideration of the challenges faced by college students. Recognizing the prevalence of mental health issues in this demographic Marcus was designed to serve as a technological ally providing accessible and personalized support.

One of the distinguishing features of Marcus is its focus on screening and detecting depression. Unlike generic mental health chatbots, Marcus tailors its interventions to align with the specific indicators of depression and offering a nuanced and targeted approach. This emphasis stems from the recognition that early detection is pivotal in preventing the escalation of mental health issues among college students.

The development process of Marcus involved collaboration with mental health professionals, technology experts, and, significantly, the target users: college students. This collaborative approach ensured that Marcus not only incorporates evidence based mental health strategies but also resonates with the unique needs and preferences of its users.

The Science, Technology, and Society analytical framework serves as the theoretical backbone of this research. This framework positions the Marcus chatbot within the broader context of societal, technological, and ethical considerations. In adopting an STS lens, this research acknowledges that the deployment of AI in mental health care extends beyond technological innovation and it entails intricate interactions between technology and society. Within this framework, the Marcus chatbot is viewed as a socio-technical system that intertwines technological capabilities with societal implications. By scrutinizing the interplay between technology, mental health, and college life, the STS framework enables a nuanced understanding of the potential impacts and ethical dimensions of introducing AI into this context.

Moreover, STS facilitates an exploration of the cultural and societal norms that influence the acceptance and utilization of AI in mental health care. Understanding the socio-cultural dynamics ensures that the Marcus chatbot is not only technologically sophisticated but also culturally competent considering the diverse backgrounds and experiences of college students. In summary, the STS analytical framework acts as a guiding lens, enriching the research with a comprehensive understanding of the Marcus chatbot's role in the broader socio technological landscape of college mental health.

Literature Review

The advent of Artificial Intelligence (AI) in mental health care ushers in a pivotal transformation, challenging conventional paradigms and introducing a new era of accessible, personalized mental health interventions. This revolution is marked by the emergence of AI chatbots, which have demonstrated profound potential in enhancing patient engagement, a fundamental element of effective mental support. The works by Dosovitsky et al. (2020) and Klos et al. (2021) serve as cornerstone studies that illuminate the chatbots' ability to significantly sustain user engagement over prolonged periods. These studies not only demonstrate the chatbots' capacity to engage users but also highlight their potential to facilitate continuous mental health support which is an essential factor for enduring therapeutic success.

Next, the detailed thematic analysis by Ahmed et al. (2022) delves into user perceptions of depression and anxiety chatbot apps. Their research puts attention to the critical role of personalization in the efficacy of digital therapies. By scrutinizing user reviews, Ahmed and colleagues reveal a clear preference for interventions that offer a personalized user experience which signifies the importance of designing AI chatbots, like Marcus, that can forge a personal

connection with users. This insight is crucial for developing AI driven mental health solutions that not only engage users but also resonate with them on a personal level which would then thereby amplify the therapeutic impact.

Kaywan et al. (2023) broaden the application spectrum of AI in mental health by showcasing the feasibility of AI enabled chatbots in the early detection of depression. Their pioneering study introduces a scalable, AI driven approach to overcoming traditional barriers associated with mental health care access, such as cost, geographical limitations, and the stigma often attached to seeking mental health support. This study aligns with the overarching trend of employing AI to render mental health solutions more accessible to a wider audience which will reinforce the transformative potential of AI in democratizing mental health care.

Parallely, the exploration of AI's role in managing complex medical conditions like Multiple Sclerosis (MS) by Cartwright, Kipp, and Ng (2023) further exemplifies AI's versatility and transformative power across the healthcare continuum. Their research underscores the significant advancements AI has brought to diagnostic processes and treatment personalization in MS care and it shows the importance and the potential for AI to markedly improve patient outcomes through tailored treatment strategies.

In the realm of digital psychiatry, advancements by Wright and Mishkind (2020) shed light on the potential and challenges of integrating computer assisted cognitive behavioral therapy (CCBT) and mobile apps into mental health care. Their critical examination of digital tools in augmenting traditional psychotherapy highlights the necessity for meticulous evaluation and thoughtful implementation of these technologies to ensure they enhance, rather than supplant, the therapeutic process.

Lastly, the insightful analysis by Bubeck et al. positions GPT-4 as a groundbreaking model within a new cadre of large language models (LLMs) that exhibit a level of general intelligence surpassing previous iterations. They argue that GPT-4's proficiency in addressing complex, multidisciplinary problems without specific prompting not only underscores its immediate utility across various domains but also signals a significant leap towards the realization of artificial general intelligence (AGI). This advancement necessitates a paradigmatic shift in the development and application of AI technologies which is a promising future where AI's potential is fully harnessed to address some of the most pressing challenges in mental health care and beyond.

In summary, the integration of AI into mental health care, as evidenced by the studies reviewed, signifies a major leap forward in providing accessible, personalized, and effective mental health support. Each piece of research contributes to a growing body of evidence that underscores the transformative impact of AI on mental health interventions, laying the groundwork for future innovations that will continue to reshape the landscape of mental health care.

Results and Discussion

In envisioning the deployment of Marcus, we anticipate a tool that transcends traditional therapy's limitations by providing immediate, stigma free, and personalized support. Its design is predicated on the recognition that effective mental health care must be as dynamic and multifaceted as the individuals it seeks to assist. With AI at its core, Marcus is expected to engage students in meaningful conversations, offering them a safe space to express their

concerns, seek guidance, and explore solutions to their mental health challenges without fear of judgment.

The potential impact of the Marcus chatbot extends beyond just individual well being. By creating an environment where seeking help becomes a norm rather than an exception, it could significantly alter the campus culture surrounding mental health. This shift is crucial in dismantling the barriers to care, primarily stigma and accessibility, that many students face. Moreover, Marcus could serve as a valuable data source, offering insights into the prevalent mental health issues within the student body, thereby informing more targeted and effective wellness programs and policies.

The incorporation of insights from Kaywan et al. (2023) extends the conversation to the broader implications of AI in healthcare. The DEPRA chatbot exemplifies the power of AI to transcend traditional barriers to mental health care, offering a scalable and user friendly platform for early detection of depression. The integration of such technologies within Marcus not only enhances its existing capabilities but also positions it as a proactive tool in mental health monitoring and intervention, signaling a new era in healthcare where technology and empathy intersect to provide comprehensive support.

Similarly, the work of Cartwright, Kipp, and Ng (2023) showcases AI's capacity to personalize care in complex medical conditions like Multiple Sclerosis (MS). This personalized approach, when mirrored in mental health care through platforms like Marcus, signifies a paradigm shift towards treatments that acknowledge and adapt to the individuality of each user's experience and then, paving the way for more effective and user centric interventions.

The insights from Wright and Mishkind (2020) on the role of computer assisted cognitive behavioral therapy (CCBT) and mobile applications in combating depression further reinforce the potential of Marcus to serve as an adaptable therapeutic tool. By embedding the principles of CCBT and leveraging the ease of mobile technology, Marcus can offer a blend of convenience and efficacy which will extend the reach of traditional therapeutic methods to a wider audience.

The discussion on the GPT-4 model, as presented by Bubeck et al., highlights the forefront of AI capabilities in understanding and interacting with human emotions and nuances. Integrating GPT-4 into Marcus equips the chatbot with an unprecedented level of empathy and insight which will enable it to navigate complex emotional landscapes and provide support that is both relevant and resonant. This integration underscores the potential of AI to not just assist but to deeply understand and connect with users on a human level.

In discussing the Marcus chatbot's impact, it's vital to consider societal influences and institutional contexts, as outlined by the Social Construction of Technology (SCOT) framework. SCOT highlights how user practices and campus culture shape technology adoption. For Marcus, this means creating a culture of seeking help and integrating it into students' daily lives. Moreover, understanding institutional dynamics informs how Marcus is implemented within the academic environment which reflects broader shifts in mental health attitudes and technology acceptance. By applying SCOT, we gain insight into how Marcus interacts with and is shaped by social, cultural, and institutional factors which underscores its transformative potential in higher education mental health care.

The Marcus chatbot and similar AI driven interventions represent a significant leap forward in integrating AI into mental health care, particularly within the context of higher education. This research underscores the vital role of such technologies in bridging the gap between the growing demand for mental health services and the scarcity of traditional resources available to college students.

Conclusion

As we move forward, it is imperative to continue exploring the longitudinal impacts of AI chatbots on mental health outcomes and their adaptability across different cultural and educational contexts. This exploration is crucial for fully harnessing digital interventions' potential in fostering a mentally resilient student population.

In conclusion, AI chatbots like Marcus mark a paradigm shift towards more accessible, personalized, and stigma free mental health care for college students. The challenge moving forward lies not in the development of these technologies but in their ethical integration, acceptance, and use within our complex social fabric. Future research should aim to expand on these findings, exploring the scalability of AI interventions and their long term effects on mental health outcomes across diverse populations.

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