



## TELEMENTAL HEALTH AND ARTIFICIAL INTELLIGENCE: KNOWLEDGE AND ATTITUDES OF SAUDI ARABIAN INDIVIDUALS TOWARDS AI-INTEGRATED TELEMENTAL HEALTH

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### Abstract

**Introduction:** In the ever-evolving healthcare landscape, integrating technology has opened new avenues for improving mental health services.

**Aim and Objective:** This study delves into Saudi Arabian individuals' perspectives on utilizing telemental health services based on artificial intelligence (AI). Through a comprehensive investigation, this research assesses participants' familiarity with these technologies, their perceptions of ease of use and usefulness, and their intentions to adopt such services.

**Materials and methods:** The Technology Acceptance Model (TAM) is a guiding framework for understanding the intricate interplay between familiarity, perceptions, and behavioral intentions. The study's cross-sectional design involved surveying 1403 Saudi Arabians aged 18 and over through online questionnaires. The participants' diverse demographics ensured comprehensive insights into the population's knowledge, opinions, and attitudes.

**Results:** The majority exhibited at least moderate familiarity, setting the foundation for further exploration. Users perceived learning to use telemental health based on AI as manageable, while positive attitudes towards clarity, ease of use, and overall utility were evident. This positive perception extended to the services' potential effectiveness, ease of healthcare utilization, and access to electronic health information. The study also highlighted the significance of trust and privacy concerns in influencing users' acceptance of AI-driven mental health services. While participants demonstrated moderate levels of trust, addressing privacy concerns and building robust security measures emerged as imperatives for cultivating higher trust levels.

**Conclusions:** This study offers valuable insights into Saudi Arabian individuals' awareness, attitudes, and intentions regarding telemental health services based on AI.

## INTRODUCTION

There has never been a decrease in the importance of developing human health. Every society depends on the health of its members. Many initiatives are being undertaken to improve the population's mental health. We are increasingly surrounded by technology and use it in various ways. Electronic health (eHealth), also called telehealth, is an example of how technology benefits individuals. Through information and communication technologies (ICTs), e-health can improve individuals' and communities' quality of life and well-being <sup>1</sup>. Telehealth refers to the provision of health services remotely. Technology refers to various technologies, from the simplest, such as email, to the most advanced.

Telehealth can improve health outcomes, reduce costs, and improve care delivery, which applies to telemental health. Saudi Arabia's telemental service can help healthcare professionals provide behavioral interventions and support to rural caregivers <sup>2</sup>. Telemental health refers to using information and communications technologies, including videoconferencing, to deliver mental health care remotely, including evaluations, medication management, and psychotherapy.

Artificial intelligence (AI) is used in various disciplines, including medicine, education, accounting, marketing, games, and others <sup>3-8</sup>. AI is autonomous intelligent technologies designed to perform activities by specialized smart functions capable of reasoning and learning (9). AI is a technology designed to operate activities that typically require human intelligence. AI is additionally described as the multidisciplinary area of science concerned with this technology's development and learning. In clinical medicine and healthcare, AI is increasingly used to support medical decisions, generate new knowledge, and increase patient engagement <sup>10-12</sup>. The study aims to assess the Knowledge, opinions, and attitudes of individuals in Saudi Arabia regarding using telemental health based on artificial intelligence (AI) in the Kingdom of Saudi Arabia (KSA).

## LITERATURE REVIEW

### A. MENTAL HEALTH

Mental health disorders are often left untreated or receive inadequate treatment <sup>13</sup>. Many people have difficulty accessing mental health services. Treatment and services are nevertheless available to some individuals. People in South Asia suffer from depression in significant numbers <sup>14</sup>. The prevalence of psychological disorders in post-conflict settings is about one in five <sup>15</sup>. Depression is associated with higher; for example, Saudi university students suffer from depression, anxiety, and stress. Saudi Arabian universities should provide psychological counseling and support to students <sup>16</sup>. Almajali et al. (2017) found that Saudi medical students are often stressed and do not sleep well. Since technology has advanced tremendously over the past century, now is a perfect time to use it to improve human health services <sup>17</sup>. To address individuals' varying needs and geographical locations, it is essential to implement and operate online healthcare. Mental health can be enhanced through telemental services.

By addressing these objectives, this research aims to contribute to understanding privacy and confidentiality issues in electronic health and medical information systems in Saudi Arabia, ultimately leading to improved privacy measures and enhanced patient experience.

## **B. TELEMENTAL HEALTH**

Telemental provides psychological services using communication technologies, including mobile phones, email, text messages, video conferencing, smartphone applications, and internet-based software. Video therapy services have been implemented in many countries to help those who require mental health care<sup>18</sup>. With the COVID-19 pandemic, many clinics and hospitals have converted to digital mental health services in the Arab MENA region. Several non-governmental organizations provide remote counseling and support services. It was found that the use of telepsychiatry was hindered by three factors: the patient, the healthcare system, and the system itself<sup>19</sup>

Patients suffering from anxiety and depression showed clinical improvement and symptom reduction following six to eight weekly sessions of online cognitive-behavioral therapy (25). The ability of tele-mental to reach geographically distant patients is one of its most significant advantages, according to a group of therapists<sup>20</sup>. Telemental health interventions are not used or accepted by people, emphasizing the need for further investigation<sup>21,22</sup>. The acceptance of such services has been largely overlooked in previous studies. The long-term viability and benefits of telepsychiatry services must be demonstrated more clearly by Hailey et al. (2008)<sup>23</sup>. It is also necessary to examine the strengths and weaknesses of telemental applications for individual and group mental health care<sup>24</sup>. The socio-cultural factors preventing individuals from embracing digital mental health must also be explored<sup>19,25</sup>

## **C. MENTAL HEALTH BASED ON ARTIFICIAL INTELLIGENCE**

Artificial intelligence encompasses a wide range of programs and algorithms. In artificial intelligence (AI), machine learning (ML) is a method of developing algorithms to learn from and make predictions based on data. There are three types of learning: (1) Supervised learning, which involves humans knowing and labeling the outcome and training the algorithm accordingly, (2) unsupervised learning, which involves the program learning from the data to anticipate specific outcomes likely to occur based on the patterns identified; (3) reinforcement learning, which involves trial and error<sup>11</sup>. Natural Language Processing (NLP) NLP is a subfield of AI that uses algorithmic methods; however, it refers explicitly to how computers process and analyze human language in unstructured text and involves language translation, semantic understanding, and information extraction<sup>26</sup>. AI has multiple functionalities in healthcare, diagnosis, treatment, health management, patient engagement, health systems organization support, and simulation<sup>5,27-29</sup>.

Also, using drug levels, this sub-study demonstrates the potential of AI platforms to increase adherence, rapidly detect nonadherence, and predict future nonadherence in phase 2 clinical trials in subjects with schizophrenia<sup>29</sup>. Recent research indicates that AI can be used for speech signal characteristics and can be one of the objective indicators for early recognition of depression<sup>30</sup>. Embedded AI applications for mental health have many potential benefits, including developing new treatments, engaging hard-to-reach populations, and improving patient response rates<sup>12</sup>. Depression can be treated with e-mental health in many ways with varying degrees of human involvement. Globally, depression is predicted to cause the most significant disease burden by 2030, according to a World Health Organization (WHO) report<sup>31</sup>. Therefore, it's important to maximize the acceptance of AI in mental health to assess its effectiveness in reducing mental health problems.

#### D. Technology Acceptance Model (TAM)

Davis (1989) proposed the TAM model to explain or predict the factors that affect a user's decision to accept or reject information technology<sup>32</sup>. Several models, including the TAM, examine people's attitudes, behaviors, and social intentions<sup>33-36</sup>. Further, the choice to use a particular system influences people's behavior toward adopting information systems. According to Davis (1989), two primary beliefs affect how people use information technologies: the perception of their usefulness and the perception of their ease of use. A person's perception of the help of a system is defined as how much they believe it will enhance their performance at work<sup>32</sup>. The degree to which a person perceives ease of use refers to the degree to which they believe using a particular system would be effortless<sup>32</sup>.

This study examines individuals' perceptions and attitudes of using telemental health based on AI. The study will provide recommendations for improving telemental health and AI utilization in mental health services. The main research questions are:

1. What is the level of understanding among individuals regarding telemental health services, Artificial Intelligence, and the application of AI in telemental health?
2. How do individuals perceive the ease of using telemental health services that incorporate Artificial Intelligence features?
3. What are the perceived benefits and utility that individuals associate with telemental health services integrated with Artificial Intelligence?
4. What factors influence the behavioral intentions of individuals towards adopting telemental health services integrated with AI?
5. What motivates individuals to consider utilizing AI-enhanced telemental health services for their mental well-being?
6. How do individuals evaluate the extent of trust they place in telemental health services that utilize Artificial Intelligence components?
7. What are individuals' privacy-related perceptions and concerns regarding the implementation of AI in telemental health services?

Based on the survey responses, the perceptions will be determined by applying the technology acceptance model (TAM).

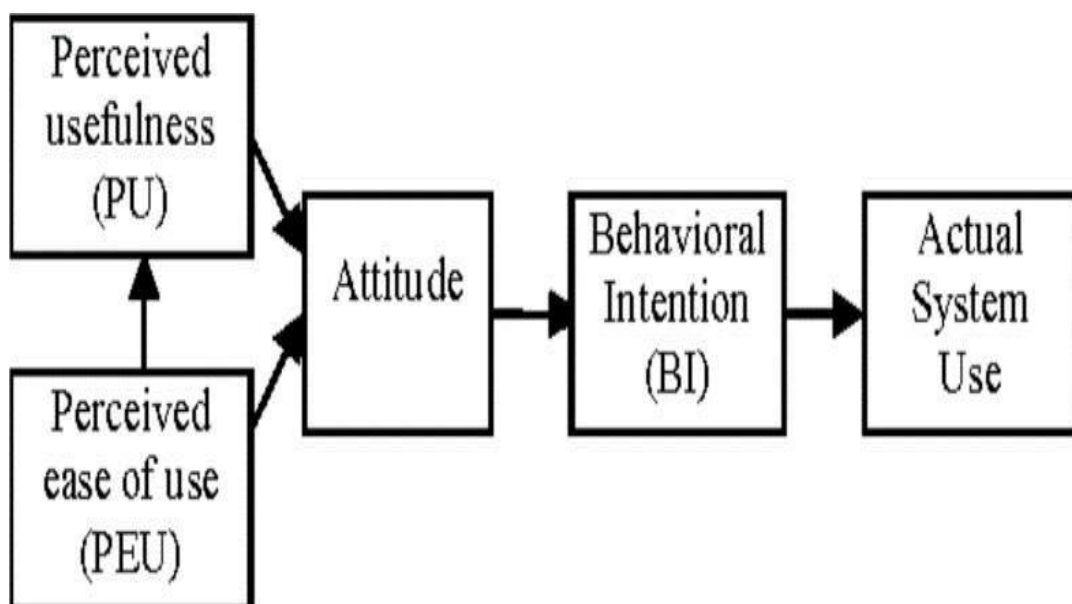
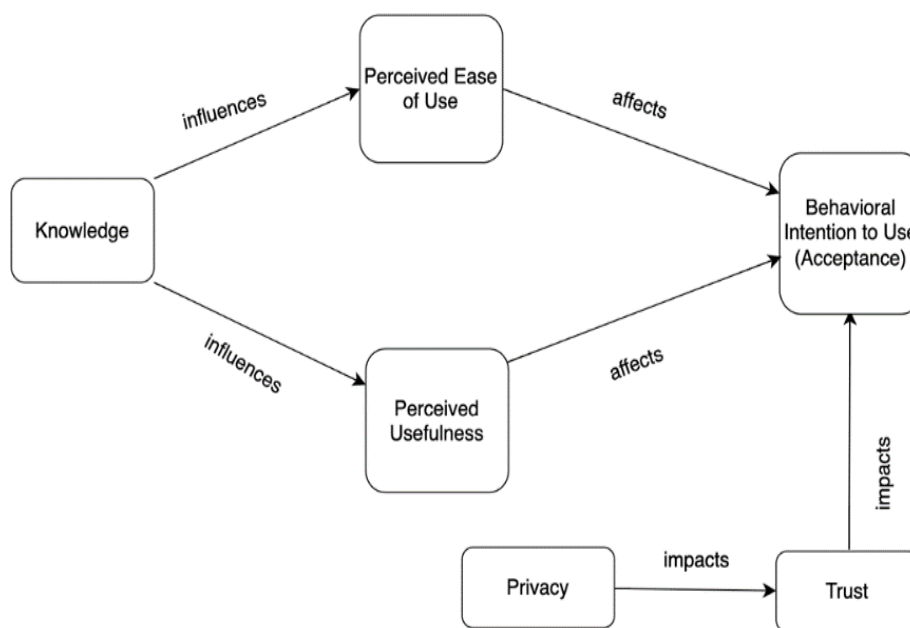


Figure 1. Technology Acceptance Model (TAM) (Davis, 1989)



**Figure 2.** Developed by the authors based on the literature review (2022)

## MATERIALS AND METHODS

A cross-sectional study examined knowledge, perceptions, and attitudes regarding telemental health based on AI in the Kingdom of Saudi Arabia. 1403 Saudi Arabians aged 18 and over were surveyed online using a questionnaire designed and validated by experts, including two professors' assistances. A total of 23 questions were included in the questionnaire regarding demographic information, then knowledge, perceptions, and attitudes regarding telemental health based on AI.

An online survey was conducted through Google Forms utilizing a self-completion questionnaire. The Sample Size was determined using a confidence level of 95% and a margin of error of 5%. The calculation took into account the estimated population size and expected response rate. Participant recruitment was recruited through Google Forms and multiple social media applications, including Twitter, Telegram, and WhatsApp, to distribute the survey among the respondents. A diverse range of participants was targeted to ensure representation from different age groups, genders, educational backgrounds, and geographical locations.

The survey included 24 items, and all aligned with the study objectives. Participants in the survey were asked demographic questions to provide essential study information, including their age and location. In the second part, data on t knowledge, perceptions, and attitudes regarding telemental health based on AI. The researchers applied the Davis (1989) TAM to determine the perceived usefulness, perceived ease, behavioral intention, perceived trust, and perceived privacy of telemental health based on AI.

Ethics, guidelines, and procedures were strictly observed throughout this research project to protect participants' rights and privacy. Before their participation, informed consent was collected from all respondents detailing the purpose, voluntary participation, confidentiality of responses collected, and anonymization practices used during storage in accordance with ethical standards to maintain participant anonymity and data integrity.

## RESULTS

The study examined individuals' perceptions and attitudes of using telemental health based on AI. Table 1 presents the reliability statistics, showing a high Cronbach's Alpha value of 0.911, indicating good internal consistency among the survey items.

Furthermore, Table 1 provides the item-total statistics for each item in the survey. The mean values of each item were deleted from the scale, ranging from 80.06 to 82.99. The scale variance if each item was deleted ranges from 133.344 to 152.251. These statistics offer insights into the contribution of each item to the overall scale, with higher values indicating a greater impact on the scale's mean and variance.

Additionally, the corrected item-total correlation values range from -0.099 to 0.843. Positive correlations indicate that the items are positively related to the overall scale, while negative correlations suggest an inverse relationship. A higher corrected item-total correlation indicates a stronger association between the item and the overall scale.

Furthermore, Cronbach's Alpha if each item was deleted ranges from 0.902 to 0.925. These values indicate the potential improvement in the internal consistency if specific items were removed from the scale. Items with lower Cronbach's Alpha values, when deleted, might contribute less to the overall scale's internal consistency.

**Table 1:** The Coefficient Value of Cronbach’s Alpha

Reliability Statistics	
Cronbach's Alpha	N of Items
0.911	24

**Table 2:** Reliability and Item- Statistics for each Item

Item-Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Do you agree to participate?	82.99	150.705	0.023	0.913
Gender	82.33	150.768	-0.019	0.915
Age	81.25	152.251	-0.099	0.925
To what extent are you familiar with tele mental health services?	80.78	143.889	0.19	0.917
To what extent are you familiar with Artificial intelligence (AI)?	80.87	147.065	0.084	0.919
To what extent are you familiar with telemental health use based on AI?	80.24	150.695	-0.046	0.923
Learning to use telemental health based on AI will be easy for me	80.29	136.405	0.667	0.905
My interaction with telemental health based on AI will be clear and understandable	80.28	137.335	0.701	0.905
It is easy for me to become skillful at using telemental health based on AI	80.18	137.932	0.651	0.906
Using telemental health based on AI will not be frustrating	80.25	135.712	0.686	0.905
Overall, I find telemental health based on AI will be easy to use	80.17	136.729	0.688	0.905
Using telemental based on AI will enhance my effectiveness in utilizing health services	80.16	135.563	0.76	0.904
Using telemental health services based on AI will make it easier for me to utilize healthcare services	80.11	136.14	0.806	0.903
Using tele mental health services based on AI will enable me to access my electronic health data more quickly	80.08	137.561	0.671	0.905
I find telemental health services based on AI will be useful in aiding my health decisions	80.22	136.23	0.728	0.904
Using telemental health services based on AI will make it easier for me to satisfy my health needs	80.12	134.571	0.812	0.903
Overall, telemental health services based on AI will be useful for me to utilize healthcare services	80.06	134.737	0.843	0.902
I have a positive intention to adopt the tele mental health services based on AI	80.17	133.344	0.814	0.902
I intend to use telemental health services based on AI in the future if needed	80.06	135.646	0.762	0.904
I am planning to use telemental health services based on AI frequently	80.27	135.246	0.722	0.904
I trust in using telemental health services based on AI	80.27	133.617	0.761	0.903
I trust telemental health services based on AI as an inventive way of mental healthcare systems	80.21	134.938	0.774	0.903
I am not worried about my personal information in telemental health services based on AI	80.33	133.963	0.668	0.905
I trust in the ability of telemental health services based on AI to protect my privacy	80.24	134.883	0.658	0.905

Table 1 presents our survey results, providing an overall snapshot of respondents' answers.

Question 1 assessed participants' familiarity with telemental health services, with responses distributed as follows: 14.60% reported being "Extremely familiar," 14.20% were very familiar, 32.70% moderately familiar, 23.50% slightly familiar, and 14.90% "Not at all familiar." The mean familiarity score for telemental health services was 3.1, with a standard deviation of 1.245; these findings demonstrate that most participants possess at least moderate familiarity while an appreciable portion lacks it altogether.

Question 2 assessed participants' familiarity with Artificial Intelligence (AI), and results showed that 15.40% reported being "Extremely familiar," 20.80% were very familiar, 32.60% were moderately familiar, 22.60% somewhat familiar, and 8.40% not at all familiar; with an average familiarity score for AI of 2.88 with standard deviation 1.172; suggesting that many remain unfamiliar with this technology despite some becoming acquainted over time.

Question 3, which explored participant familiarity with telemental health based on AI use, yielded the following responses from respondents: 6.70% reported being "Extremely familiar," 11.20% as "Very familiar," 26.00% as "Moderately familiar," and 25% as "Slightly familiar." The mean familiarity score for AI telemental health use was 3.62 with an SD value of 1.218; these findings indicate that all participants showed some level of familiarity, with many showing moderate to high familiarity levels.

When applying the Technology Acceptance Model (TAM) to the provided data on familiarity with telemental health services AI and telemental health use based on AI, we can understand how individuals' perceptions may impact their acceptance of these technologies.

**Familiarity with Telemental Health Services:** The data shows that respondents' familiarity with telemental health services varies. TAM suggests that this initial level of familiarity can influence their perceptions of the technology's usefulness and ease of use. Those more familiar with telemental health services may be more likely to perceive its potential benefits and, thus, have a more positive attitude towards using it.

**Familiarity with Artificial Intelligence (AI):** Similar to telemental health services, the data reveals different levels of familiarity with AI. According to TAM, individuals' perception of AI's usefulness and ease of use can be influenced by their level of familiarity. Those who are more familiar with AI may better understand its capabilities and are more likely to perceive it as a valuable tool.

**Familiarity with telemental Health Use Based on AI:** The data on familiarity with telemental health use based on AI also shows variability among respondents. TAM suggests that individuals' familiarity with this specific application of AI in mental health services can impact their perception of its potential benefits. Those more familiar with the concept may be more inclined to perceive it as a useful and efficient approach to mental health care.

By analyzing the familiarity data through the lens of TAM, we gain insights into how individuals' initial perceptions of these technologies may influence their attitudes and intentions to adopt them. To encourage the adoption of telemental health services and telemental health based on AI, developers, and practitioners may need to address users' perceptions of usefulness and ease of use, especially for those who are less familiar with these technologies. Additionally, targeted education and communication initiatives can help raise awareness and familiarity among potential users, potentially leading to higher acceptance rates.



**Table 2** Familiarity with Telemental Health Services and Artificial Intelligence (AI)

Question	Response	Frequency	Percent	Mean	Std. Deviation
To what extent are you familiar with telemental health services?	Extremely familiar	205	14.60%	3.1	1.245
	Very familiar	199	14.20%		
	Moderately familiar	460	32.70%		
	Slightly familiar	331	23.50%		
	Not at all familiar	210	14.90%		
To what extent are you familiar with Artificial intelligence (AI)?	Extremely familiar	217	15.40%	2.88	1.172
	Very familiar	293	20.80%		
	Moderately familiar	459	32.60%		
	Slightly familiar	318	22.60%		
	Not at all familiar	118	8.40%		
To what extent are you familiar with telemental health use based on AI?	Extremely familiar	94	6.70%	3.62	1.218
	Very familiar	158	11.20%		
	Moderately familiar	365	26.00%		
	Slightly familiar	352	25.00%		

The survey items in Table 2 were designed based on the TAM to assess users' perceptions of various aspects of telemental health based on AI. Each item was measured on a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." The mean scores and standard deviations for each item were calculated to understand users' overall perceptions and the degree of agreement or disagreement with each statement. The results of the survey are as follows:

Learning to use will be easy for me: Participants, on average, reported a moderately positive perception (mean = 3.54, SD = 0.985), indicating that they believe learning to use telemental health based on AI would be relatively easy. The Interaction will be clear and understandable: Respondents expressed a similar level of positive perception (mean = 3.53, SD = 0.907) regarding the clarity and understandability of the interaction with telemental health services. Becoming skillful will be easy: Participants reported a positive perception (mean = 3.58, SD = 0.884) that becoming skillful at using telemental health services based on AI would be easy. Not frustrating: Users exhibited a moderately positive perception (mean = 3.61, SD = 0.882) that telemental health services based on AI would not be frustrating to use. Overall, easy to use: The overall perception of ease of use for telemental health services was positive (mean = 3.66, SD = 0.89), indicating that participants find these services user-friendly.

Enhance effectiveness in utilizing services: Users perceived that telemental health services based on AI would enhance their effectiveness in utilizing health services (mean = 3.73, SD = 0.876).

Make it easier to utilize healthcare: Participants reported a positive perception (mean = 3.82, SD = 0.88) that telemental health services would make it easier for them to utilize healthcare services.

Enable access to electronic health: Users expressed a high level of positive perception (mean = 3.88, SD = 0.807) that telemental health services would enable quick access to their electronic health data.

Useful in aiding health decisions: Respondents perceived telemental health services as useful in aiding their health decisions (mean = 3.7, SD = 0.948).

Make it easier to satisfy health: Participants reported a positive perception (mean = 3.72, SD = 0.897) that telemental health services would make it easier for them to satisfy their health needs.

Useful for utilizing healthcare: Users expressed a favorable perception (mean = 3.75, SD = 0.89) that telemental health services would be useful for them to utilize healthcare services.

A positive intention to adopt: Participants exhibited a positive intention to adopt telemental health services (mean = 3.67, SD = 0.938).

Intend to use in the future if needed: Users reported a positive intention to use telemental health services in the future if needed (mean = 3.78, SD = 0.91).

Planning to use frequently: Participants expressed a moderate level of intention to use telemental health services frequently (mean = 3.59, SD = 0.972).



Trust in using: Respondents displayed a moderately positive perception of trust in using telemental health services based on AI (mean = 3.52, SD = 0.933). Trust as an inventive way of mental healthcare: Users positively perceived (mean = 3.7, SD = 0.93) that telemental health services based on AI are an inventive way of mental healthcare. Not worried about personal information: Participants reported a moderate level of agreement (mean = 3.5, SD = 1.04) that they were not worried about their personal information when using telemental health services. Trust in the ability to protect privacy: Users positively perceived (mean = 3.53, SD = 1.021) that telemental health services based on AI can protect their privacy.

**Table 2: User Perception of Telemental Health Services**

Perception	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total Responses	Mean	SD
Learning to use will be easy for me	62	103	473	549	218	1405	3.54	0.985
Interaction will be clear and understandable	45	109	468	624	159	1405	3.53	0.907
Becoming skillful will be easy	34	103	456	639	173	1405	3.58	0.884
Not frustrating	35	109	389	707	165	1405	3.61	0.882
Overall, easy to use	42	83	375	716	189	1405	3.66	0.89
Enhance effectiveness in utilizing services	34	86	320	754	211	1405	3.73	0.876
Make it easier to utilize healthcare	36	67	276	761	265	1405	3.82	0.88
Enable access to electronic health	18	51	295	765	276	1405	3.88	0.807
Useful in aiding health decisions	54	85	326	703	237	1405	3.7	0.948
Make it easier to satisfy health	38	84	339	719	225	1405	3.72	0.897
Useful for utilizing healthcare	40	71	322	739	233	1405	3.75	0.89
Positive intention to adopt	55	81	358	695	216	1405	3.67	0.938
Intend to use in the future if needed	46	69	290	747	253	1405	3.78	0.91
Planning to use frequently	56	104	428	596	221	1405	3.59	0.972
Trust in using	47	120	467	596	175	1405	3.52	0.933
Trust as an inventive way of mental healthcare	49	77	354	689	236	1405	3.7	0.93
Not worried about personal information	84	129	399	590	203	1405	3.5	1.04
Trust in ability to protect privacy	74	120	414	582	215	1405	3.53	1.021

### Incorporating the Technology Acceptance Model (TAM) with the Above Results

The Technology Acceptance Model (TAM) is a theoretical framework designed to explain user acceptance and adoption of new technologies, such as telemental health, based on AI. TAM can provide valuable insight into users' attitudes and behavioral intentions surrounding these services. In the context of this research study, TAM may shed new light on user attitudes toward these services and the behaviors associated with them.

**Perceived Usefulness (PU):** Participants' knowledge and familiarity with telemental health services and AI (Table 1) can influence their perceived usefulness. People more familiar with these technologies tend to view them positively, and as perceived usefulness grows, users become more inclined to adopt telemental health based on AI.

**Perceived Ease of Use (PEOU):** Participants' familiarity with telemental health based on AI can impact their perceived ease of use (Table 1). Users who have become more acquainted with these technologies tend to find them more accessible, and as their perceived ease increases, so will their intentions of using these telemental health services positively influenced.

**Behavior Intention to Adopt:** Participants' positive perceptions of telemental health based on AI, as demonstrated in Table 2, such as agreement with statements related to ease of use, effectiveness, and utility, contribute significantly to behavioral intent to adopt telemental health based on AI, with relatively high mean scores and low standard deviations indicating widespread positive impressions of these services among participants.

Trust and privacy are critical factors influencing users' acceptance and adoption of AI-based telemental health. The data from the survey provides valuable insights into participants' perceptions regarding these aspects. Discuss the significance of trust and privacy and their implications for implementing AI-based telemental health.

**Trust:** Trust plays a crucial role in user acceptance and engagement with any technology, especially in the sensitive context of mental health services. The data shows that participants showed moderate trust in using telemental health based on AI (mean = 3.52, SD = 0.933). This indicates that users have some confidence in the technology, but there is room for improvement to strengthen trust further.

**Privacy:** Privacy concerns are prevalent in any technology that collects and processes personal data, especially in healthcare settings. The data shows that participants expressed a moderate level of agreement that they were not worried about their personal information in telemental health based on AI (mean = 3.5, SD = 1.04). While this is positive, it also suggests that a significant proportion of participants are still concerned about their privacy.

Overall, the Technology Acceptance Model (TAM) shows that users' familiarity with telemental health services and AI and positive perceptions of its usefulness and ease of use can strongly impact their intention to adopt and utilize telemental health based on AI. Understanding users' attitudes and preferences is integral for successfully implementing and accepting technological innovations within mental healthcare settings; policymakers and developers may utilize these findings in designing user-centric interventions and strategies that encourage widespread adoption of telemental health based on AI in the future.

## **DISCUSSION**

The study results comprehensively understand individuals' perceptions and attitudes towards telemental health services based on AI. The high Cronbach's Alpha value suggests that the survey items were consistent and reliable in measuring the constructs of interest. The participants in this study demonstrated various degrees of familiarity with telemental health, AI, and their integration, suggesting a wide variety of exposure and understanding among them. This variability can be attributed to various factors, including rapid technological innovation, resource access, individual preferences or experiences, etc. Research has consistently indicated that familiarity with technologies enormously influences the acceptance<sup>32</sup>. Therefore, the moderate to high familiarity

levels for both technologies indicate that some may be ready to embrace these technologies in future studies.

The Technology Acceptance Model (TAM) suggests that perceived usefulness and ease of use are the two primary determinants of technology acceptance<sup>32</sup>. In this study, positive perceptions of AI-powered telemental health, as seen through survey responses, closely align with this theory; literature indicates that when users perceive technology as practical yet easy to use, they're more likely to adopt it positive mean scores on ease-of-use/usefulness scale items indicating positive attitudes among participants towards AI services overall<sup>8,32</sup>. Furthermore, multiple Studies in KSA demonstrated that participants highly perceived telehealth services as applicable and have the technology to access these innovative electronic services<sup>35-40</sup>.

Trust and privacy play critical roles in the acceptance of health-related technologies. The moderate trust levels and privacy concerns expressed by participants echoed those seen in earlier studies: Li (2011) found that trust plays an essential part in adopting health information technologies<sup>41</sup>. Dinev and Hart (2006) pointed out how privacy concerns could prevent online services from taking off. These considerations become particularly pertinent when discussing AI telemental health services as addressing them becomes especially crucial given how sensitive mental health data can be<sup>42</sup>.

This study's findings echo existing literature on technology acceptance, particularly within health services. Positive perceptions of telemental health using AI combined with moderate trust and privacy concerns indicate a cautious optimism among participants, perhaps owing to potential benefits associated with increased accessibility and convenience as opposed to inherent risks related to data privacy<sup>43</sup>. This study underscored the significance of familiarity, which echoed research findings regarding technology adoption. Studies have demonstrated how understanding can help reduce anxiety and increase confidence when using new technology, leading to its acceptance<sup>44</sup>.

Due to a potentially non-representative sample demographic, the generalizability of this study's findings may be limited due to self-reported data being unreliable and participants providing socially desirable answers when providing self-reported data; cross-sectional design only captures temporal changes over time and does not reveal nuanced insights that qualitative methods might inform; participants could have misunderstood some technical survey items, and the study did not investigate actual usage patterns or outcomes for telemental Health using AI services.

Future research should aim for diverse and representative sampling and consider longitudinal designs to capture evolving attitudes. Incorporating qualitative methods, like interviews, can offer deeper insights. Surveys should be precise, especially when discussing technical aspects, and pilot testing can ensure clarity. Providing participants with hands-on experience with the technology before surveying can yield more accurate perceptions. Educational interventions can address AI unfamiliarity, and developers should prioritize robust data protection to address privacy concerns. Platform feedback mechanisms can lead to continuous improvements, and collaboration with mental health professionals ensures alignment with therapeutic goals. Lastly, public awareness campaigns can promote the benefits and address misconceptions about telemental health based on AI.

## CONCLUSION

This study sought to explore Saudi Arabian individuals' knowledge, perceptions, and attitudes towards AI-powered telemental health services through an online survey with 1403 participants aged 18 years or above. Utilizing TAM analysis and user attitudes and intentions, the analysis provided valuable insight into potential acceptance factors related to telemental health utilizing AI technologies.

This study revealed a broad array of participants' familiarity with both telemental health services and AI technology. A high Cronbach's Alpha value demonstrated the survey instrument's reliability and consistency in measuring constructs of interest. Perceived usefulness and ease of use emerged as critical factors affecting participants' intentions to adopt these services, aligned with the TAM framework. Positive perceptions regarding the convenience, effectiveness, and utility of AI-based telemental health services were evident in survey responses.

While participants demonstrated moderate levels of trust and perceived privacy when using both technologies, several participants raised issues regarding these two technologies that need to be addressed to ensure acceptance and adoption. Familiarity played a significant role in shaping users' perceptions and attitudes; this points out how educational initiatives and hands-on experience could aid adoption efforts.

Considering the revealed findings, future research should focus on increasing sample representativeness, employing longitudinal designs, and using qualitative methods for deeper insights. Addressing privacy concerns, increasing familiarity, and emphasizing benefits are vital in order to promote wide acceptance and success for telemental health services using AI technologies. Public awareness campaigns, collaboration between mental healthcare professionals, and ongoing feedback mechanisms can all contribute to improving accessibility and outcomes from these services.

This study provides valuable insight into individuals' perceptions and attitudes toward AI-driven telemental health services in Saudi Arabia. By understanding user perspectives and adapting strategies with respect to the Technology Acceptance Model, stakeholders can collaborate to reduce any gaps between technological advancement and effective mental healthcare delivery, ultimately improving the well-being of residents in this region.

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## Appendix 1

- Your participation in this study is voluntary, and you may choose not to participate or end your participation at any time without penalty. Do you agree to participate?

1. Agree
  2. Disagree
- 

## Demographic information

- Gender

1. Male
2. Female

- Age

1. 18-24
  2. 25-34
  3. 35-44
  4. 45-54
  5. Above 54
- 

- To what extent are you familiar with telemental health services?

1. Extremely familiar
  2. Very familiar
-

3. Moderately familiar
4. Slightly familiar
5. Not at all familiar

- To what extent are you familiar with Artificial intelligence(AI)?

1. Extremely familiar
2. Very familiar
3. Moderately familiar
4. Slightly familiar
5. Not at all familiar

- To what extent are you familiar with telemental health use based on AI?

1. Extremely familiar
2. Very familiar
3. Moderately familiar
4. Slightly familiar
5. Not at all familiar

- Learning to use telemental health based on AI will be easy for me

1. Extremely familiar
2. Very familiar
3. Moderately familiar
4. Slightly familiar
5. Not at all familiar

- My interaction with telemental health based on AI will be clear and understandable

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- It is easy for me to become skillful at using telemental health based on AI

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- Using telemental health based on AI will not be frustrating

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- Overall, I find telemental health based on AI will be easy to use

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree



5. Strongly Agree

- Using telemental based on AI will enhance my effectiveness in utilizing health services

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- Using telemental health services based on AI will make it easier for me to utilize healthcare services

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- Using telemental health services based on AI will enable me to access my electronic health data more quickly

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- I find telemental health services based on AI will be useful in aiding my health decisions

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- Using telemental health services based on AI will make it easier for me to satisfy my health needs

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- Overall, telemental health services based on AI will be useful for me to utilize healthcare services

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- I have a positive intention to adopt the telemental health services based on AI

1. Strongly Disagree
2. Disagree

3. Neutral
4. Agree
5. Strongly Agree

- I intend to use telemental health services based on AI in the future if needed

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- I am planning to use telemental health services based on AI frequently.

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- I trust in using telemental health services based on AI

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- I trust telemental health services based on AI as an inventive way of mental healthcare systems

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- I am not worried about my personal information in telemental health services based on AI

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

- I trust in the ability of telemental health services based on AI to protect my privacy.

1. Strongly Disagree
  2. Disagree
  3. Neutral
  4. Agree
  5. Strongly Agree
- 

Thank you for completing the survey! We appreciate your time and effort in providing us with your valuable responses.