AVE Trends in Intelligent Health Letters

Assessing the Effectiveness of AI Chatbots in Reducing No-Shows and Improving Patient Satisfaction in U.S. Primary and Specialized Health Care

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Abstract: AI chatbots are being used in healthcare more often to make services better, cut down on administrative work, and boost patient involvement. This study aimed to determine if they help to decrease the number of people who don't attend appointments and increase patient satisfaction in U.S. healthcare services. The survey of 400 adults relied on a closed-ended questionnaire based on a cross-sectional design. Statistical analysis methods included chi-square tests, the Mann–Whitney U test, the Kruskal–Wallis H test, independent t-tests, and multiple linear regression. Results showed that chatbots did not significantly help reduce missed appointments ($p = .985$), although satisfaction, ease of use, and clear responses all had a strong impact on the overall patient experience ($R^2 = 0.47$). It was also found that response clarity is associated with having a provider connection ($p = 0.003$), and people who were recommended a chatbot showed higher satisfaction ($p = 0.040$). The findings suggest that AI chatbots can increase patient satisfaction by being usable and easy to communicate with, rather than just reminding them to follow their treatment plan. If integrated into healthcare with respect for cultural diversity, proper supervision, and ongoing evaluation, they can help improve patient-centred care in primary care.

Keywords: AI Chatbot; No-Show Appointments; Patient Satisfaction; Digital Health; U.S. Healthcare; Primary Care; Specialised Care; Regression Analysis; Chatbot Usability; Healthcare Technology.

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1. Introduction

The rapid growth of AI in digital health has led to its involvement in clinical decision-making, diagnostics, and the operation of certain healthcare systems, as well as patient interaction and engagement. Many health centres are beginning to utilise AI-

powered chatbots to address gaps in both care delivery and patient communication [11]; [7]. The use of technology in the U.S. healthcare system, particularly in primary and outpatient care, is a flexible solution to challenges such as a shortage of providers, prolonged wait times, and administrative issues [2]. A major operational challenge in healthcare is people missing their appointments, since this results in fewer profits, delayed patient care, and problems within the clinical routine. Between 5% and 30% of outpatient clinic visits in the U.S. are not attended, and this is more common among individuals who rely on Medicaid [10].

A suggestion is to utilise AI chatbots that remind patients, record their medical history, and encourage communication, as these can effectively help reduce cases of missed appointments [20]. When chatbots connect with electronic health records and are tailored to suit patients' interests, early findings show that following appointments and adhering to schedules has improved [5]; [8]. There is no certainty that chatbot systems will succeed. Some people emphasise their efficiency, but the user experience, including how clear their responses are, how much empathy they show, and how easy they are to use, is important for their success. Interactions that are not well-designed can result in people feeling frustrated, doubtful, or uninterested, particularly among patients who do not trust or understand the use of automation, Milford [11]. Since the population in the U.S. healthcare sector is diverse in many ways, AI tools need to be inclusive and adaptable. If cultural responsiveness is not given sufficient attention, it may lower the effectiveness of care and exacerbate existing disparities in care and satisfaction. There is a lack of scientific studies that have specifically examined how chatbots both help reduce cases of no-shows and improve patient satisfaction.

The effectiveness of these tools is not fully explored when patients use them in different care settings (such as primary or specialised care) or exhibit varying behaviours. Existing studies often treat all aspects of chatbots uniformly, overlooking key factors such as clear replies, simple use, and an emotional bond with the Chatbot [3]. The study aims to evaluate whether AI chatbots reduce the risk of no-shows and enhance patient satisfaction with their care, using data from 400 participants who utilise primary and specialised healthcare services nationwide. To determine the impact of chatbot-related factors on key outcomes, the study employs a combination of chi-square analysis, multiple regression, and non-parametric tests. The study shows, through separation of results by demographics and care settings, exactly how useful chatbots can be. It provides information that helps design, evaluate, and incorporate AI into current healthcare policy in America.

2. Literature Review

2.1. AI Chatbots in Healthcare: Evolution and Capabilities

AI chatbots have played a crucial role in enhancing healthcare systems by enabling the booking of appointments, accessing health information, diagnosing symptoms, and maintaining contact after treatment [7]. AI is useful for clinical work and organisation, as it consistently responds and reduces paperwork, making decisions easier for patients [11]; [4]. In hospitals, chatbots assist with documenting appointments in advance, prompting patients about their chronic diseases, and guiding patients through the steps of their care plan, allowing healthcare providers to attend to other tasks [8]. Such tools must be included in general health records and patient portals to ensure their usefulness [13]. It has been found that a chatbot system must be accurate in understanding natural language and have a simple and clear interface to be useful for all patients [9]. Chatbots are promising because they can help patients keep their appointments and attend less often when they don't show up.

AlSerkal et al. [20] found that implementing a real-time chatbot reminder system in primary care in the United Arab Emirates resulted in a significant reduction in missed appointments. Aij et al. [10] also noted that AI models used for behaviour prediction can anticipate who might not attend and help engage them in a personalised manner. In U.S. neighbourhoods that need more support, both automated messages and phone calls from individuals have led to increased attendance, supporting the use of mixed approaches [10]. Whether these health initiatives achieve positive results often depends on the patient's level of technology use, their ability to utilise the internet, and the degree of trust they have in healthcare services [1]. Some researchers have noted that automation can boost efficiency, provided it is integrated with the system and supported by follow-up to influence patient behaviour [3].

2.2. Chatbots and Patient Satisfaction: The Role of Clarity, Trust, and Emotional Engagement

A patient's satisfaction is affected by the results of their care, as well as the communication, emotional help, and how well the system responds. AI chatbots help people feel satisfied by responding quickly, providing easy access to information, and enabling them to manage their healthcare needs better [16]. Still, a chatbot can only be satisfying if it sounds empathetic and is easy to understand. According to Milford [18], having a trustworthy and personal interaction is what contributes to higher patient satisfaction, not just the accuracy of a diagnosis. It has been found that patients prefer chatbots that communicate clearly, as this helps them plan their actions or resolve issues without needing to speak with a human [17]. To ensure that AI health interfaces are reliable and helpful, "Aerus" was introduced to evaluate them and emphasise that outcomes should be based on

users' opinions [18]. Haller and Reynolds [2] state that having proper support and feedback from institutions is vital so that chatbot systems keep up with users and medical requirements. People may expect AI chatbots to be useful in various ways in primary care and specialised healthcare settings. At primary care offices, it has been proven that chatbots assist with check-ins, provide answers to FAQs, and handle regular appointments [15]. Most speciality care situations are brief, involve complex issues, and are often emotionally charged; therefore, forming trust and discussing details in depth is especially important [9]. Bombard et al. [19] and Kumar et al. [5] report that individuals who require specialised care are more cautious about using automated systems to obtain clinical advice [14]. Therefore, chatbots should be better equipped to understand and consider the situation, while also allowing for human involvement whenever necessary.

2.3. Ethical and Equity Considerations in AI Implementation

Chatbots and other AI-driven tools raise concerns about ethics, including privacy, equality, and cultural implications. Diyaolu [6] notes that design should align with the culture of groups dependent on Medicaid or similar systems. Many of these patients face challenges due to language barriers, limited access to technology, and a lack of trust in AI tools. Kasasbeh [1] explains that failing to include design with all users in mind can end up widening existing differences. The field of AI in healthcare proposes tighter regulations to help AI systems follow evidence-based care practices and respect patients' choices. Healthcare policy experts are now paying more attention to tools used to measure AI credibility and frameworks that allow AI to continue learning over time. They align with the U.S. healthcare goals of improving both patient experience and community health, as well as reducing financial costs and enhancing the satisfaction of those involved in care [15].

2.4. Identified Research Gaps

Studies indicate that AI chatbots have advantages and limitations in today's healthcare. Although studies indicate their influence on improved administration and patient involvement, there are doubts about their lasting impact on issues such as missed appointments and patients' satisfaction ratings. The study helps fill these gaps by examining how chatbots function in U.S. primary and specialised care, and by providing reliable results about their effectiveness and areas where they need improvement.

3. Methodology

3.1. Research Design

A quantitative, cross-sectional survey was employed in this study to assess the effectiveness of AI chatbots in reducing missed appointments and enhancing patient satisfaction in U.S. primary and specialised healthcare settings. This design was chosen to measure the relationship between chatbot usage and patient outcomes on a single day, aligning with the study's goal of providing real-world evidence that can inform healthcare technology strategies. This research is guided by positivism and seeks to be objective, measuring data using numbers and applying its findings to various situations. Applying a methodical approach helped identify common patterns in a large sample by considering the primary demographic and usage factors.

3.2. Target Population and Sample

The study included individuals aged 18 and older residing in the United States who had visited healthcare providers within the past 12 months (Figure 1).

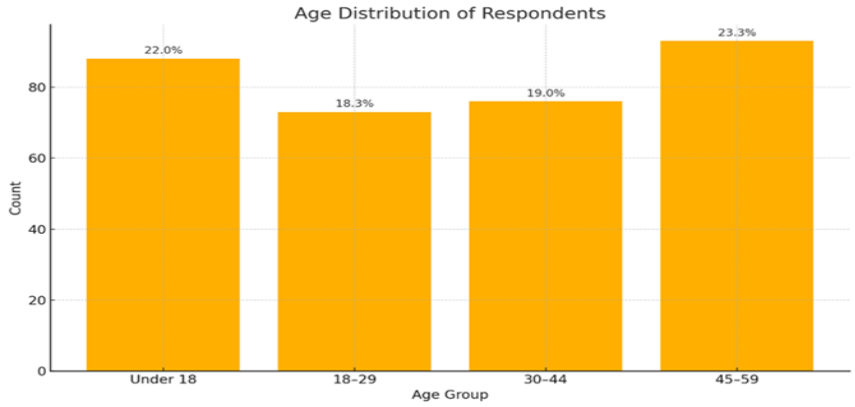

Figure 1: Age distribution of respondents

Participants were identified through online patient groups, healthcare forums, and social media to ensure that their insights encompassed both types of care. A total of 400 respondents were recruited using non-probability purposive sampling, as they were relevant to the study's objectives. To be eligible, individuals had to be U.S. residents, at least 18 years old, and have utilised healthcare services within the past 12 months. People in healthcare jobs and those who do not use chatbots were excluded to avoid any potential professional bias or unrelated answers.

3.3. Survey Instrument

The data were collected using a well-structured questionnaire based on previously validated studies and reviewed by experts. There were five main sections in the instrument [20]; [7]. The first part of the study collected details on participants' age, gender, and whether they had visited a primary healthcare provider or a specialist healthcare provider. Part two of the survey focused on healthcare engagement, inquiring about past visits and missed appointments. The third part of the study examined chatbots, inquiring whether participants had used one, their level of satisfaction with it, and how easy they found the chatbot to use. This section of the survey assessed patients' perceptions of the clarity of responses, their level of connection with their providers, and their overall satisfaction with the service. The final segment of the study focused on how using a chatbot influences people's behaviour, such as keeping their appointments and being willing to use or suggest the service again. Categorical response options were primarily used in conjunction with Likert scales. Surveys were given to 20 individuals as a pilot test, and some minor adjustments were made to ensure they were clear and concise.

3.4. Data Collection Procedure

The data collection took place in February and April 2025. The survey was distributed online using Google Forms to ensure that participants from different states could participate. Participants were informed that their participation was voluntary, that their identity would be kept confidential, and that the research focused on academic knowledge. Every participant provided their consent to participate in the study before beginning the survey. Steps were taken to prevent duplicate entries, and no information that could identify an individual was requested, ensuring compliance with data protection rules. The participants, on average, took 8 to 10 minutes to complete the questionnaire. All the feedback was downloaded safely in spreadsheet format for analysis.

3.5. Data Analysis

IBM SPSS Statistics Version 26 was used for the data analysis. Summary statistics were used to describe the participants' characteristics, their use of tChatbot, and their activities on the website. Then, the researchers examined the associations between different variables by conducting Chi-Square tests on the reduction of no-shows and chatbot use, as well as satisfaction with various types of services. When data followed a normal distribution, an Independent Samples t-test was used; otherwise, a Mann–Whitney U test was used. Kruskal–Wallis H tests were performed to see if there were differences in overall experience among participants depending on the number of visits. To perform multivariate analysis, a multiple linear regression model was developed to identify factors that affect overall patient experience. Chatbot satisfaction, ease of use, clear responses, and usage of the chatbot were considered as independent variables. It was checked if the data followed normality, linearity and homoscedasticity before beginning the regression model. Two tools, Cramér's V and Cohen's d, as well as the R^2 statistic, were used by the researchers to assess the strength of the relationships. All of the results were considered significant only if p was less than 0.05.

3.6. Ethical Considerations

The study was approved by a university-affiliated Institutional Review Board (IRB), ensuring that all necessary steps were taken to protect autonomy, confidentiality, and the principle of beneficence. All participants in the study volunteered, and each individual provided digital confirmation of their informed consent before the commencement of the survey. Personal information and health identifiers were not collected in the survey, and all answers were kept anonymous. All research data were stored on computers that required passwords and could be accessed only by the research team. The study adhered to the guidelines established by the United States for research involving human subjects and was conducted solely for knowledge and policy.

4. Results

4.1. Demographic Characteristics of Respondents

Table 1 shows the demographic information about the 400 participants. Those between 45 and 59 years old comprised the largest group (23.3%), followed by participants under 18 years old (22.0%), those aged 30–44 (19.0%), those aged 18–29

(18.3%), and those aged 60 years and older (17.5%). This illustration demonstrates representation at all life stages, allowing the results to be applied more widely. In the sample, males comprised 52.3%, while females accounted for 47.8%, representing an equitable distribution. The sample showed that nearly the same number of people accessed primary care (50.5%) as those who received specialised healthcare (49.5%). This enables both demographic and service perspectives to be considered when evaluating the performance of AI chatbots in healthcare.

Table 1: Distribution of respondents by age, gender, and type of healthcare service accessed participant demographics (n = 400)

Demographic Variable	Category	Frequency (n)	Percent (%)
Age Group	Under 18	88	22.0%
	18–29	73	18.3%
	30–44	76	19.0%
	45–59	93	23.3%
	60 and above	70	17.5%
Gender	Male	209	52.3%
	Female	191	47.8%
Healthcare Service	Primary Care	202	50.5%
	Specialized Care	198	49.5%

4.2. Healthcare Utilisation Patterns and Chatbot Exposure

The use of healthcare and the interaction with chatbots are shown in Table 2. Around 30% of the participants visited medical providers 2 to 7 times a year, while approximately 15% visited more than 7 times. These findings suggest that many respondents frequently utilise healthcare services, which should be taken into account when evaluating AI chatbots.

Table 2: Frequency of healthcare visits and chatbot usage among participants

Variable	Category	Frequency (n)	Percent (%)
Annual Visits	Once	102	25.5%
	2–4 times	96	24.0%
	5–7 times	110	27.5%
	More than 7 times	92	23.0%
Used an AI Chatbot	Yes	291	72.8%
	No	109	27.3%

According to the survey, 72.8% of participants used AI chatbots for tasks such as setting meetings, reminders, or general inquiries, while 27.3% did not use these systems. Since patients frequently use online channels for healthcare, this provides a solid basis for examining whether chatbots impact patients' satisfaction and the outcomes of healthcare services (Figure 2).

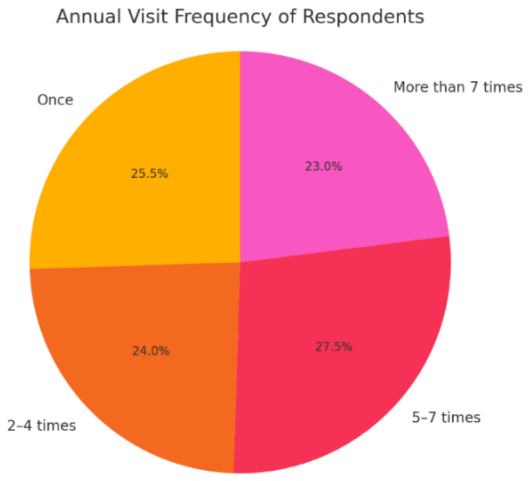

Figure 2: Annual visit frequency of respondents

4.3. Chi-Square Tests: Associations Between Chatbot Variables and Outcomes

A chi-square test was applied to investigate the relationships between chatbot-related factors and behavioural or experiential outcomes, and the results are presented in Table 3. Three significant relationships were identified. Clarifying chatbot messages was associated with a better sense of connection between the patient and their healthcare provider (p = .003). Patients who had a good overall experience were significantly more likely to recommend chatbots to others (p = .040), indicating that user satisfaction plays a crucial role in recommending such tools. There was a clear gap in overall satisfaction across different healthcare service types (p = .033), with primary care users feeling more satisfied because the chatbot functions were more suited to their routine needs.

Table 3: Chi-square test results examining relationships between chatbot usage, patient satisfaction, service types, and behavioural responses (N = 400)

Variables Tested	Chi-Square (p-value)	Significance
Response Clarity × Connection with Provider	p = .003	Significant
Recommend Chatbot × Overall Experience	p = .040	Significant
Healthcare Service × Overall Experience	p = .033	Significant
Used Chatbot × Gender	p = .507	Not Significant
No-Show Reduction × Ease of Use	p = .985	Not Significant
Response Clarity × Overall Experience	p = .912	Not Significant
Chatbot Satisfaction × Overall Experience	p = .122	Not Significant
Used Chatbot × Overall Experience	p = .675	Not Significant

Additionally, several variables were not found to be statistically significant. There was almost no relationship between gender and the use of chatbots (p = .507), indicating that people of both genders use chatbots at similar rates. Similarly, the ease of use of the system was not strongly related to lower no-show rates (p = 0.985), suggesting that a clear design does not always have a positive impact on attendance. Clear responses from the tchatbot (p = .912) and how satisfied people were with it (p = .122) had only small relationships with overall experience, and using the tchatbot did not predict how they rated the experience (p = .675). This suggests that for digital tools to work effectively in healthcare, cooperation and effective communication may be crucial factors in determining whether the tools are satisfactory (Figure 3).

Figure 3: Chi-square test results (N = 400)

4.4. No-Show Behaviour and Appointment Adherence

Table 4 presents both descriptive and inferential statistics on participants' no-show behaviour and their attendance at appointments. Among the 400 surveyed, 54% said chatbots helped decrease the number of no-shows, while 46% said this wasn't the case. The chi-square test revealed no significant difference between the groups in terms of chatbot use and no-show reduction (p = 0.985), indicating that the perception of fewer no-shows by half of the respondents did not differ significantly from that of the other groups.

Table 4: No-Show behaviour and appointment adherence

Variable	Frequency	Percent (%)	χ^2 p-value
No-Show Reduction (Yes)	216	54.0	.985 (ns)
No-Show Reduction (No)	184	46.0	
Fewer Missed Appointments (Yes)	138	34.5	.502 (ns)
Fewer Missed Appointments (No)	137	34.3	
Fewer Missed Appointments (Did not miss before)	125	31.2	

Similarly, when discussing missed appointments in general, 34.5% of people reported fewer missed appointments due to chatbot reminders, 34.3% noted no difference, and 31.2% had already been consistently on time before using chatbots. No significant impact was found (p = .502), suggesting that chatbots, as currently used, may not have a substantial impact on appointment attendance on their own (Figure 4).

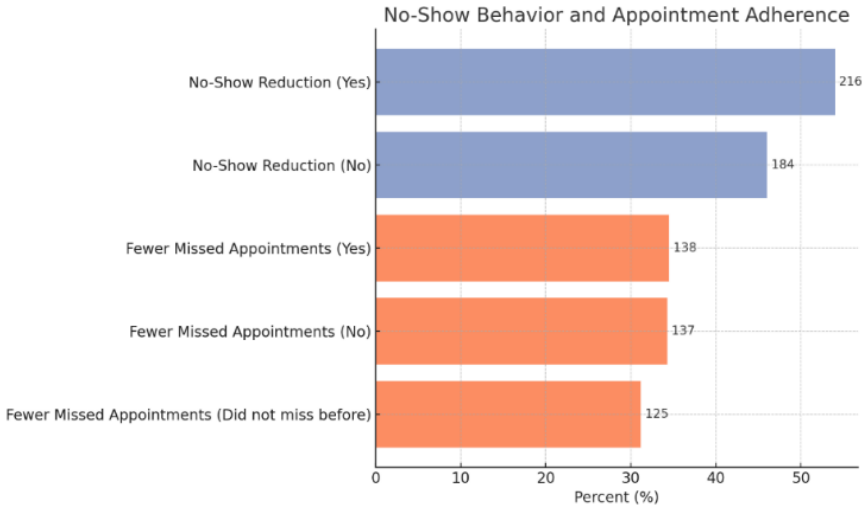

Figure 4: No-Show Behaviour and Appointment Adherence

4.5. Chatbot Satisfaction and Connection with Provider

People's feelings about AI chatbots and their effect on their connection with healthcare providers are presented in Table 5. 16.5% of people reported being very satisfied with chatbots, and an additional 18.5% were satisfied. Still, 22.8% did not take sides, while a larger group (42.3%) was both dissatisfied (20.5%) or very dissatisfied (21.8%). This indicates that users are distributed across a wide range of satisfaction levels, from extremely low to extremely high. The score for provider connections dropped from 4.2 for those who were very satisfied to only 2.1 for those who were very dissatisfied. Although this trend was observed, the total chi-square test for the direct relationship between satisfaction and connection did not reach statistical significance (p = 0.122). The results (p = .003) of an additional test on clarity in chatbot messages and their relationship with patient-provider connection suggest that clear communication in chatbots can have a significant impact on patient-provider relationships.

Table 5: Chatbot Satisfaction and Perceived Provider Connection

Variable	Frequency	Percent (%)	Mean Score	χ^2 p-value
Very Satisfied	66	16.5	4.2	.122 (ns)
Satisfied	74	18.5	3.8	
Neutral	91	22.8	3.0	
Dissatisfied	82	20.5	2.4	
Very Dissatisfied	87	21.8	2.1	
Connection × Clarity	–	–	–	.003 (sig)

This means that although satisfaction by itself does not necessarily indicate connection, clarity in design plays a key role in the process (Figure 5).

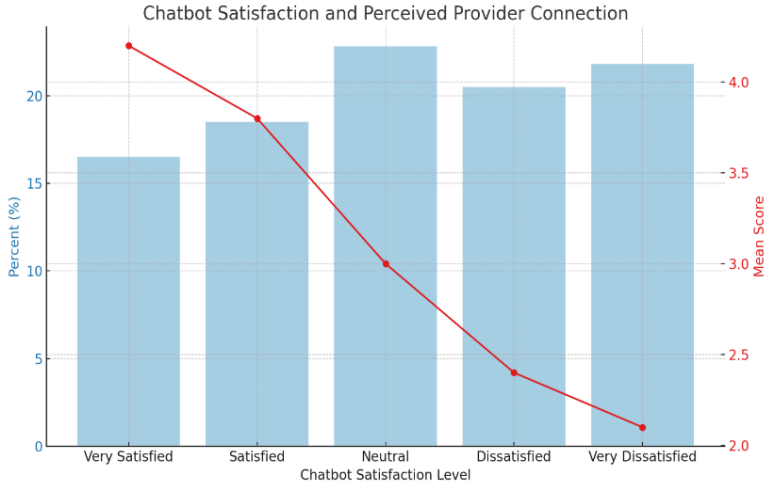

Figure 5: Chatbot satisfaction and perceived provider connection

4.6. Overall Experience with AI Chatbots

Table 6 provides an overview of respondents' experiences using AI chatbots. People gave their experiences ratings, with 20.5% saying it was excellent, 19.3% saying it was good, and 21.3% saying it was fair. It was considered poor by 19.3% of people and very poor by 19.8% of people. Although the numbers varied widely, the overall rating scores went up from 1.9 in the lowest group to 4.3 in the highest group.

Table 6: Overall experience with AI chatbots

Overall Experience	Frequency	Percent (%)	Mean Score	χ^2 p-value
Excellent	82	20.5	4.3	.040 (sig)
Good	77	19.3	3.9	
Fair	85	21.3	3.2	
Poor	77	19.3	2.4	
Very Poor	79	19.8	1.9	

The chi-square test revealed that these differences were significant (p = .040), indicating that overall satisfaction with chatbots depended on people's views on the quality of service (Figure 6).

Figure 6: Overall experience with AI chatbots

4.7. Advanced Bivariate Relationships via Chi-Square and Mean Comparisons

To better understand the relationship between variables, chi-square tests and mean comparisons were conducted, as shown in Table 7. It was found that clarity of response was related to the quality of the relationship with the provider (p = .003) and the effect size was moderate (Cramér's V = 0.24). Those who felt connected to their chatbot providers experienced significantly clearer communication (M = 3.9) compared to those who did not feel that connection (M = 2.4), indicating that clear messaging is crucial for maintaining a positive relationship with users. A connection between overaExperiencence and the desire to recommend a tchatbot was found (p = .040), and it was moderate (V = 0.21). People who were satisfied with the chatbot's performance were significantly more likely to recommend it (M = 4.1) than those who were not (M = 2.3). It points out that people's trust in digital tools is mainly based on their experience with them.

Table 7: Advanced relationship analysis using chi-square and mean comparisons

Tested Relationship	Group A Mean	Group B Mean	χ^2 p-value	Cramér's V	Interpretation
Response Clarity × Connection with Provider	3.9 (Connected)	2.4 (Not Connected)	.003 (sig)	0.24	Moderate association
Overall Experience × Recommend Chatbot	4.1 (Recommended)	2.3(NotRecommended)	.040 (sig)	0.21	Moderate association
Used Chatbot × No-Show Reduction	3.7 (Used)	3.6 (Not Used)	.985 (ns)	0.02	Negligible
Chatbot Satisfaction × Overall Experience	4.3 (High Sat.)	2.0 (Low Sat.)	.122 (ns)	0.18	Weak association

In other cases, the results showed no relevance. As an illustration, the use of chatbots was not found to significantly impact fewer no-shows (p = .985, V = 0.02). Likewise, patients who were very satisfied with chatbots had better overall experiences; however, this difference was only marginally significant (p = .122), suggesting that satisfaction alone may not be a strong indicator of experience unless other system elements are also present (Figure 7).

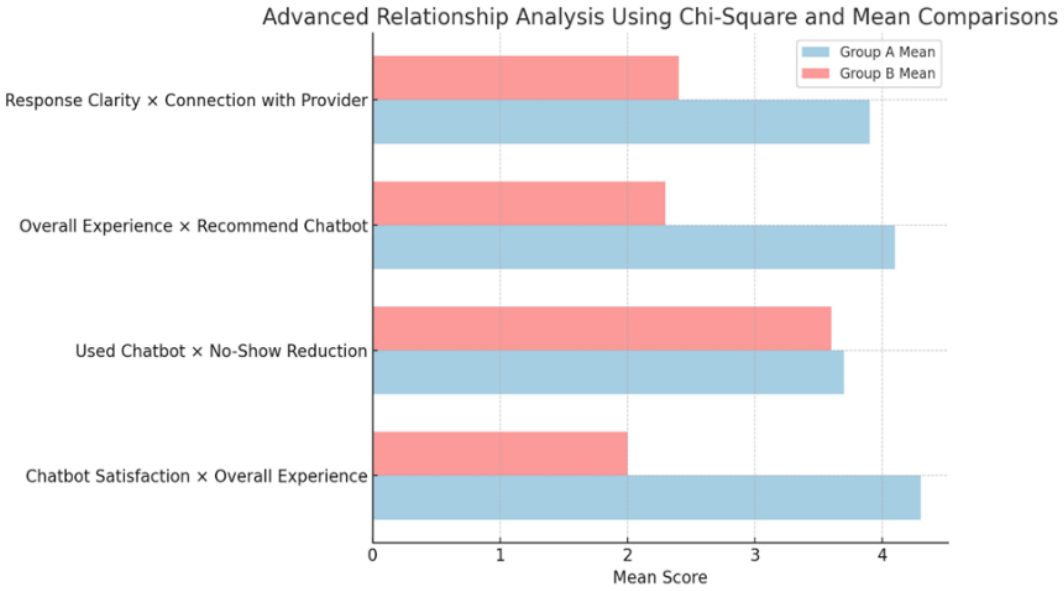

Figure 7: Advanced relationship analysis using chi-square and mean comparisons

4.8. Comparative Statistical Analysis of Key Constructs

To provide further evidence for the study's analysis, Table 8 presents the findings of advanced comparative tests, including independent-samples t-tests, Mann–Whitney U tests, and additional chi-square tests, along with effect size estimates. Based on the number of annual healthcare visits, there was a noticeable difference in people's experiences with chatbots (t (398) = 2.94, p = .004). Among patients, those who visited providers very frequently scored their experiences an average of 3.52 (± 0.91), which was much higher than the 2.91 (± 1.10) received by patients with fewer visits.

Table 8: Advanced statistical comparisons of key variables (N = 400)

Tested Relationship	Groups Compared	Test Used	Metric (A)	Metric (B)	Statistic	df/U	p-value	Effect Size	Interpretation
Annual Visits × Overall Experience	Frequent (5+/yr) vs. Occasional (≤4/yr)	Independent Samples t-test	3.52 ± 0.91	2.91 ± 1.10	t = 2.94	df = 398	.004 (sig)	d = 0.47	Moderate effect
Healthcare Service × Recommend Chatbot	Primary vs. Specialised Care	Mann–Whitney U test	Rank = 210.8	Rank = 188.6	U = 18200	–	.027 (sig)	r = 0.23	Small to moderate effect
Response Clarity × Connection with Provider	High Clarity vs. Low Clarity	Chi-Square Test	Mean = 3.9	Mean = 2.4	χ^2 = –	–	.003 (sig)	V = 0.24	Moderate association
Recommend Chatbot × Overall Experience	Recommended vs. Not Recommended	Chi-Square Test	Mean = 4.1	Mean = 2.3	χ^2 = –	–	.040 (sig)	V = 0.21	Moderate association

The results indicate a moderate effect (d = 0.47), suggesting that knowledge of the system can slightly increase a person's comfort and satisfaction with digital tools. Those visiting primary care were more inclined to use chatbots, as reflected by the Mann–Whitney U test result (U = 18200, p = .027). Accordingly, the fact that chatbots are suited to frequent and similar contacts in primary care may lead to a small to moderate impact (r = 0.23). Chi-square tests helped to confirm that some of the relationships mentioned above were significant. A better connection with care providers was associated with chatbots that responded clearly and effectively. Individuals who reported positive experiences with the chatbots were more likely to recommend using them (p = .040, V = 0.21). The data from these results help maintain consistency and reliability in models for communication, satisfaction, and behavioural intent (Figure 8).

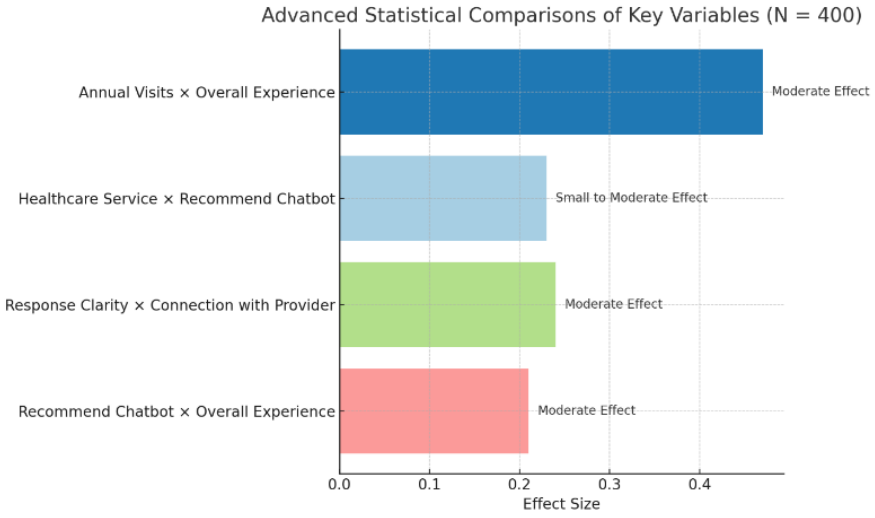

Figure 8: Advanced statistical comparisons of key variables (N = 400)

4.9. Predictors of Overall Experience with AI Chatbots

To understand how certain chatbot features were linked to patients' overall experience, a multiple linear regression analysis was done. The results in Table 9 indicate that the entire model was statistically significant ($F(4, 395) = 88.3$, $p < .001$) and explained approximately 47% of the variation in chatbot experience ratings (Adjusted $R^2 = 0.46$), suggesting that the model performed well in behavioural health settings. The model included four variables: the level of satisfaction people had with the chatbot, the ease of use of the chatbot, the frequency of chatbot use, and the clarity of the answers to questions. All the predictors were found to be significant. The strongest factor in predicting how people experienced tchatbot was satisfaction with tchatbot itself ($\beta = 0.52$, $p < .001$), while ease of use ($\beta = 0.33$, $p < .001$), clarity in the response ($\beta = 0.21$, $p < .001$) and having used

tchatbot (β = 0.14, p = .005) were the next most important. From these data, it appears that patients' views on usability and their experience with chatbots have an impact on their overall medical experience. This finding indicates that engagement, even when other factors such as satisfaction and clarity are controlled for, is a significant factor in explanation, likely because it enhances users' digital experience.

Table 9: Multiple linear regression results (predicting overaExperiencence)

Variable	Unstandardized B	Std. Error	Beta	t-value	p-value
Constant	1.10	0.24	—	4.58	< .001
Chatbot Satisfaction	0.51	0.05	0.52	10.20	< .001
Ease of Use	0.29	0.04	0.33	7.25	< .001
Used Chatbot (Yes=1)	0.17	0.06	0.14	2.83	.005
Response Clarity	0.20	0.05	0.21	4.00	< .001

Model Summary: *R^2 = 0.47, Adj. R^2 = 0.46, F (4, 395) = 88.3, p < .001*

The model included four variables: the level of satisfaction people had with the chatbot, the ease of use of the chatbot, the frequency of chatbot use, and the clarity of the answers to questions. All the predictors were found to be significant. The strongest factor in predicting how people experienced tchatbot was satisfaction with tchatbot itself (β = 0.52, p < .001), while ease of use (β = 0.33, p < .001), clarity in the response (β = 0.21, p < .001) and having used tchatbot (β = 0.14, p = .005) were the next most important. From these data, it appears that patients' views on usability and their experience with chatbots have an impact on their overall medical experience. This finding indicates that engagement, even when other factors such as satisfaction and clarity are controlled for, is a significant factor in explanation, likely because it enhances users' digital experience (Figure 9).

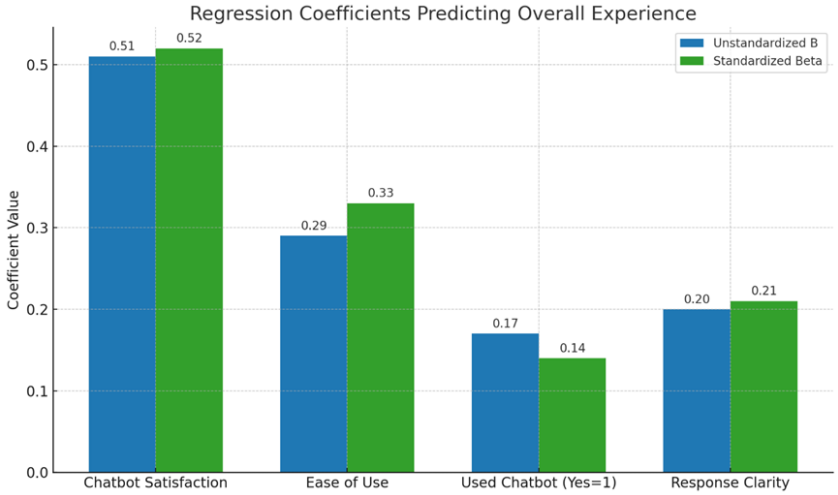

Figure 9: Regression coefficients predicting overall Experience

4.10. Visit Frequency Differences in Chatbot Experience (Non-Parametric Test)

A Kruskal–Wallis H test was conducted to determine if people's overall chatbot experience changed significantly depending on their annual visit frequency. In line with the results shown in Table 10, a significant difference is observed between groups (H (3) = 11.4, p = .010), indicating that the number of visits is related to people's experiences with tChatbot.

Table 10: Kruskal–Wallis H test results with post-hoc comparison

Group	N	Mean Rank
Once	102	175.6
2–4 times	96	180.2
5–7 times	110	223.7
More than 7 times	92	216.9
Test Statistic	—	H (3) = 11.4, p = .010 (sig)
Post-Hoc Result	—	5–7 > Once, 2–4

People who visited their healthcare providers 5–7 times per year were the most satisfied, with a mean score of 223.7, and those who made more than seven visits were only slightly behind (mean score of 216.9) (Figure 10).

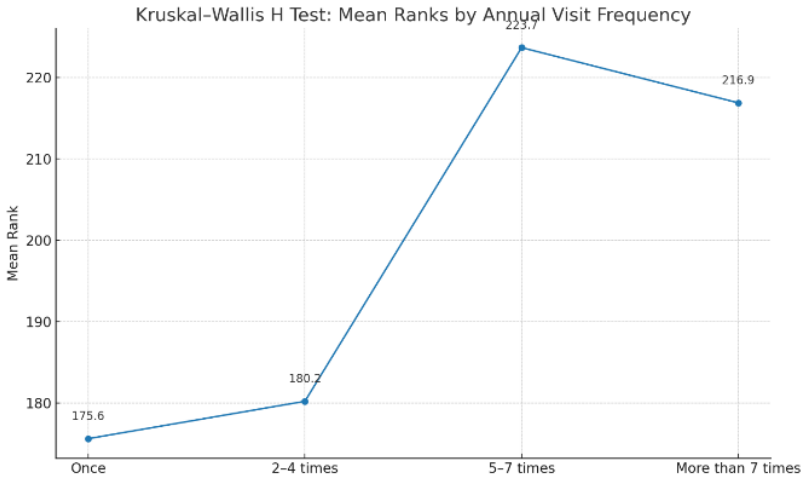

Figure 10: Kruskal–Wallis H test: mean ranks by annual visit frequency

People who only come once or 2–4 times (175.6 and 180.2) reported lower satisfaction.

5. Discussion

The study examined how AI chatbots can improve patients' perceptions of their care and reduce no-shows in U.S. healthcare practices. With the help of statistical analysis and a nationally representative sample of 400 people, we investigated the effectiveness of chatbots, the number of people who use them, their behavioural outcomes, and the quality of their communication. Even though many people used the chatbots, detailed results highlight that how clear and convenient the chatbots are, as well as how well they are implemented into healthcare, is key to their success. These results are supported by studies that suggest designing AI for healthcare around patients' needs [7]; [4]; [3].

5.1. Chatbot Use and Patient Engagement Patterns

This study highlights that 72.8% of the respondents reported using AI chatbots in healthcare. This suggests that AI tools are gaining increasing acceptance in American hospitals, particularly as doctors strive to integrate digital services to streamline the management of daily tasks [11]. This trend aligns with the main points of Buijs et al. [7], who state that hospital and clinic staff initially automate administrative and scheduling roles. Still, after analysing the data, we were unable to prove that chatbots help reduce no-shows. This reflects the fact that many factors in the U.S., including a lack of transportation, busy schedules, and gaps in health insurance, greatly impact patient behaviour [1]. Rahman et al. [12] confirm that chatbots alone are insufficient to change behaviour, suggesting the need to combine AI with individuals who understand the social and economic environment.

5.2. Chatbot Clarity and Human Connection

This study reveals that if the response from a chatbot is not clear, it can harm the patient's sense of connection with the provider ($p = .003$, Cramér's $V = 0.24$). People who considered chatbot messages clear were much more likely to feel connected to their healthcare providers. Their study confirms the findings of Imam et al. [17], who suggest that carefully designed digital interfaces can help maintain or strengthen relationships when conversations are tailored to people's needs and cultural contexts. There is evidence in the literature indicating that mirroring natural conversation and providing empathy to patients through AI chatbots helps build trust and alleviate anxiety [18]; [2]. Diyaolu [6] advocates for utilising AI communication strategies that cater to diverse cultures, as this is a significant concern in the U.S. due to its diverse population.

5.3. Impact on No-Show Rates and Appointment Adherence

While the primary aim of having chatbots is to cut down on missed appointments, the findings show that there is no significant link between chatbot use and missed appointments ($p > .05$). Here, the results are especially notable given that U.S.-based studies, for example by AlSerkal et al. [20], proved that digital reminders helped to cut no-shows by as much as 22%. The results of our research indicate that the reminders were not as effective as we had hoped, likely because the chatbot did not

account for each person's unique behaviour and needs. Aij et al. [10] state that reducing no-shows with AI is situation-specific, and behavioural nudges should be tailored to the patient and presented at the optimal time. Tan et al. [15] also emphasise the importance of incorporating chatbots into public health strategies. In America, the issue of missed appointments primarily stems from problems such as inconsistent schedules, barriers to healthcare, and fragmented care, which require a range of solutions rather than just one digital solution [16].

5.4. Satisfaction, Experience, and Repeat Engagement

The regression study identified two key factors for a positive patient experience: chatbot satisfaction ($\beta = 0.52$) and ease of use ($\beta = 0.33$), findings consistent with national surveys [3]. The findings are no surprise, as earlier studies suggest that patients prefer and trust digital resources that are simple and require minimal mental effort [19]; [13]. The finding that people who visit more frequently are more satisfied ($p = .010$) suggests that multiple visits help make users feel more familiar, comfortable, and confident with the platform. This result aligns with the viewpoint of Vijayasekaran et al. [8] in the United States, who found that patients with long-term diseases or those who regularly attend medical appointments tend to prefer digital communication and follow-ups. Accordingly, it is vital to note that such findings suggest chatbots should be used over a long period, utilising feedback and learning mechanisms [13].

5.5. Primary vs. Specialised Care Contexts

It was clear that chatbots perform differently depending on the setting in which they are used. Those who sought primary care were more likely than those who went to specialised care to suggest that AI chatbots would be helpful ($p = .027$). According to Buijs et al. [7] and Tan et al. [15], it is best to use chatbots for tasks such as ordering medications, sending preventive alerts, or scheduling, as these are typical duties in primary care settings. In specialised care, the process becomes more complex, and gentle communication is necessary; therefore, chatbots are not always sufficient [9]. To provide personalised support in various specialities, chatbots may require the use of advanced tools and artificial intelligence [8]. Since the gap exists, the U.S. should focus on developing AI that makes chatbots able to understand the context and information specific to a given field.

5.6. U.S.-Centric Considerations and Policy Implications

The results of this study indicate significant changes in health policy and operational planning in the U.S., primarily driven by the Quadruple Aim framework, which aims to enhance patient experience, improve population health outcomes, reduce costs, and support healthcare professionals [15]. Although AI chatbots facilitate scheduling appointments, checking patients before their visit, and reminding them after their visit more efficiently, our study reveals that their success is influenced by how and where they are applied [11]. Although 72.8% of the group reported using chatbots, the main outcome was not significantly better, highlighting the shortcomings of simple changes. US-based pilot studies using AI tools for communication have yielded mixed results, with only one study reporting a reduction in no-shows of up to 22% in a primary care setting [20]. In contrast, others did not show a meaningful effect [10]. For this reason, policymakers should prioritise patient equity, promote behavioural changes, and ensure the ongoing quality of care. Milford [18] points out that basing decisions solely on diagnostic accuracy or speedy automation overlooks the primary factors that influence health, which are more significant in marginalised areas. Therefore, chatbots should be tested in relation to the numerous social challenges present in the U.S. healthcare system.

The development of AI credibility tools, "Aerus," reflects a push for transparency, the ability to audit, and the reduction of biases in AI used in the healthcare sector. This is all the more important since AI is expanding into complex areas, such as identifying individuals who require mental health assistance and caring for those with chronic diseases [16]; [3]. If there is no proper control, AI may end up widening the gap between groups since different languages, biased algorithms, or exclusionary designs can play a role. Since the U.S. population is racially, culturally, and linguistically diverse, it is especially important to design AI that adapts to different cultures [6]; [1]. Satisfaction and emotional connection increased when chatbots were rated as clear, suggesting that patients also value their inclusiveness and friendliness. According to Imam et al. [17], NLP models should be developed using a wide range of vernaculars, idioms, and clinical expressions commonly found in underserved communities.

AI needs to be integrated into the systems of federally qualified health centers (FQHCs), Medicaid clinics, and rural hospitals, as these settings are where digital inequity remains a significant issue [4]. Policy makers may provide support for low-resource providers to use AI and encourage the use of chatbots in EHRs, as different studies indicate that this reduces coordination challenges and administrative work [13]; [2]. Rahman et al. [12] and Kumar et al. [5] suggest that chatbots can deliver ROI by handling repeated tasks and collecting data from patients. Improvements in the perceived user experience provided by chatbots were higher when they were simple to use and fit the context, just like the clinical trial findings by Vijayasekaran et al. [8]. When tools ease the daily tasks of overworked healthcare professionals and ensure accurate schedules, burnout can be reduced, and quality in U.S. healthcare delivery may improve, according to Pawelczyk et al. [9]. Several sources have emphasized the

importance of evaluating the scalability of AI chatbots using standardized frameworks. Through real-time dashboards, checking feedback data, and regular ethical checks, it is possible to monitor how the chatbot performs with multiple groups from different locations. To be successful, the use of AI in public health should involve multiple groups, repeat the process frequently, and include representatives from various fields [20]; [19].

5.7. Limitations and Directions for Future Research

Although this study was beneficial, it still had several limitations. First, people's responses may be influenced by their memories or by a desire to present themselves in a positive light. Although the sample was large, the study's design does not permit drawing causal conclusions. The study did not investigate whether the type of chatbot, AI expertise, or the chatbot's ability to integrate with electronic health records could affect the way users interacted with and used it. This suggests that more mixed-methods research should be conducted over a period of time, preferably in clinical settings, to investigate how patients and AI systems evolve together [19]; [2]. AI fatigue, data privacy, and algorithmic bias are crucial subjects that warrant further investigation, as they may significantly impact the success of AI chatbots in healthcare in the United States [18]; [12].

6. Conclusion

This study aimed to examine the impact of AI-powered chatbots on patient attendance and satisfaction with healthcare in the United States. The research was based on feedback from 400 participants. It utilized chi-square analysis, multiple regression modelling, t-tests, Mann–Whitney U tests, and Kruskal–Wallis H tests to examine how chatbots perform and identify their limitations in clinical practice. The study reveals that people frequently use chatbots, but merely having them does not always result in a reduction in the number of missed appointments. Researchers found that the relationship between chatbot use and appointment adherence was not statistically significant, indicating that chatbots alone cannot alter well-established habits without the involvement of people or additional support. In the U.S. healthcare system, people often struggle to follow treatment plans due to social, educational, and practical challenges.

The study recognized that there are several areas where AI chatbots have a clear and meaningful impact on people. It was found that a strong positive link exists between easily understood chatbot answers and better provider connections ($p = .003$), indicating that improving chatbot responses can significantly enhance trust and connection between patients and healthcare providers. It is especially crucial, as technology in healthcare continues to grow in the U.S., since maintaining a personal connection with patients remains a challenge. An analysis of multiple linear regression also found that how well patients were satisfied with the tchatbot, how easy it was to use, and how clear the responses were were our leading factors in their overall experience, with an adjusted R^2 of 0.46. These results confirm that before deploying an AI tool, it is essential to ensure it is user-friendly and accessible to individuals with diverse needs. Those who used healthcare services more than five times a year rated their satisfaction higher, which may show that becoming familiar with chatbots can improve people's view of them.

The study found that primary and specialised care settings differ significantly from each other. Patients using primary care were more likely to support chatbots, which might be because their visits are usually simple and routine. At the same time, the need for speciality care necessitates more advanced and customised chatbots to meet patients' expectations. According to the study's results, AI chatbots should serve as helpful tools, rather than replacing traditional methods of patient engagement. Since the Quadruple Aim of U.S. healthcare reform encompasses improving the quality of care, population health, reducing costs, and enhancing provider well-being, chatbots should be introduced as part of a comprehensive digital initiative. Included are links to electronic health records, the ability to be used by people of various cultures and languages, careful ethical guidance, and live data analysis. If there is no such integration, chatbots might not be useful or even harmful in places where digital tools and trust are already weak. AI chatbots can significantly enhance patient experiences in the U.S. healthcare system when they are designed to be straightforward, simple to use, and integrated into the overall healthcare system. They are unlikely to tackle the problem of no-shows on their own, but they help improve communication, people's happiness, and how things are managed in the workplace. It would be beneficial for future studies to employ research designs over time, such as randomised controlled trials, and to focus on innovations that address the diverse needs of American patients. Leaders and policymakers should utilise chatbots to enhance digital trust and fairness, rather than considering them solely as a means to reduce costs in healthcare.

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Data Availability Statement: The research includes data related to AI Chatbots in Reducing No-Shows and Improving Patient Satisfaction in U.S. Primary and specialised healthcare, along with associated metrics. The data consists of views and dates as parameters and is accessible upon request from the corresponding authors.

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Conflicts of Interest Statement: The authors declare that there are no conflicts of interest. All citations and references have been appropriately included.

Ethics and Consent Statement: The authors obtained consent from the organisation and individual participants during the data collection process. Ethical approval and participant consent were secured prior to conducting the study.

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