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Exploring the Impact of Wait Times and Service Delays on Patient Engagement and Trust in Healthcare Facilities

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Abstract

Prolonged wait times and service delays continue to be central issues in the UK's NHS, with far-reaching consequences for patient engagement and trust. How these operational problems affect patient attitudes is critical to the development of patient-centred care initiatives. This research aimed to investigate the impact of wait times, service delays, and associated communication variables on patient engagement and Trust in NHS healthcare settings. A quantitative cross-sectional survey was conducted among 500 adult NHS users who had utilized healthcare services within the last 12 months and experienced delays due to waiting times. Data were gathered using a standardised questionnaire that included demographics, experiences of wait times, communication, engagement, and trust. Hierarchical multiple regression analysis was conducted using SPSS, building models progressively on service experience and facility perception variables to determine predictive capability. The baseline model, which included only demographics, predicted negligible variance in engagement ($R^2 = 0.034$). Adding variables related to service experience improved model performance substantially ($R^2 = 0.446$). Wait time ($\beta = -0.1987$, $p < 0.001$), delay experience ($\beta = -0.22$, $p < 0.001$), and ease of booking ($\beta = 0.1103$, $p < 0.001$) were all significant predictors. Information about delays also had a positive impact on engagement. Facility perceptions, such as cleanliness and location, were not statistically significant. The timeliness of service, access to facilities, and open communication have a substantial impact on patient engagement and trust, compared to demographics or facility surroundings. Reducing delays and streamlining communication processes should be given prime importance in NHS reforms.

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1 Introduction

There is growing interest in the quality of healthcare service delivery as patient-centred care takes centre stage on the global agenda. The challenges of wait time and service delays have gained prominence as they significantly influence patient satisfaction, engagement, and Trust (Smythe et al., 2022). In most healthcare systems, both at the public and private levels, patients are often forced to wait for extended periods before consulting or receiving treatment, or even follow-ups (Conneely et al., 2023). This may result in frustration, anxiety, detachment, and in several instances, distrust of the medical workers and organisations. Although there may be a necessity to sit and wait due to resource limits or system inefficiency, it also has a scope that extends beyond the unpleasantness (Walton et al., 2022). The patient's opinion about the time and responsiveness is directly associated with their feeling of being taken care of, listened to, and respected by the healthcare system (Ai et al., 2022). This is one of the factors that makes them all the more willing to trust their healthcare providers and take a proactive role in their planned healthcare. Wait time is not only an operational issue; it is integrally linked to the emotional, psychiatric, and psychological aspects of care. This is because, over the past decade, efforts have been made through healthcare reform to address the issue of service delays by introducing real-time communication tools, triage systems, and digital booking systems (Smith & Bayliss, 2022). The delivery of services within the healthcare setting is not always timely, especially in high-volume settings and those with limited resources. Waiting time and time delays have a greater impact than just the clinical consequences, as the relationship between patients and healthcare providers is significantly affected by such delays, both psychologically and relationally (Dorussen et al., 2024). Patient engagement and trust are crucial pillars of adequate healthcare and are particularly vulnerable to erosion when patients do not feel valued and cared for due to long wait times (Clancy, 2011; Brennan et al., 2013). Similarly, patient engagement, which is crucial in health literacy, compliance with healthcare, and participatory care, may be thwarted when the delivery of such services seems unresponsive. Although considerable attention is currently being paid to the role of patient experience in measuring the quality of care, there is still a lack of in-depth synthesis on how service delays affect patient Trust and engagement. These issues are typically discussed in the existing literature somewhat separately or as part of more comprehensive service assessments, and the connections among them are not explicitly made. There is a need to gain a better understanding of the interaction between these factors and the interventions that can mitigate or cannot mitigate their destructive effects. The study aims to empirically investigate the impact of wait times and service delays on patient engagement and trust within healthcare facilities (Riyanti et al., 2025).

Literature Review

Theoretical Perspective

Two major theoretical perspectives are utilised in this review, i.e., the Health Belief Model (HBM) and the Trust Theory. HBM implies that a patient's readiness to use health services depends on the perceived benefits, perceived barriers, and self-efficacy (Barattucci et al., 2022). The factors of service delays, in this aspect, serve as significant barriers that interfere with the behaviour and decision-making of at-risk groups. In contrast, Trust Theory presents trust in a relational sense, constructed through trust-reliance and trust-competence, which are established through communication. This trust may be repeatedly broken when patients are subjected to disorganized or delayed care, especially when they do not feel well-informed or heard during waiting periods (Sihotang et al., 2023). In conjunction, these constructions provide a framework through which to analyse how patients respond to delays and how these experiences influence their attitude towards the healthcare service.

Patient Engagement and Trust

Patient engagement and trust are critical components of effective healthcare delivery, influencing health outcomes, treatment adherence, and overall satisfaction (Barello et al., 2016). However, long wait times and service delays in healthcare facilities often undermine these factors, leading to patient frustration, disengagement, and erosion of Trust (Anderson et al., 1990). The increasing demand for healthcare services, coupled with limited resources, has exacerbated these delays, making it essential to understand their impact on patient perceptions and behaviours. Research indicates that prolonged waiting times are associated with decreased patient satisfaction and a diminished perception of care quality (Camacho et al., 2018). Furthermore, service delays can lead to a breakdown in trust between patients and healthcare providers, which is fundamental for maintaining long-term therapeutic relationships (Hall et

al., 2001). Given these concerns, this study aims to investigate the impact of wait times and service delays on patient engagement and trust in healthcare settings.

Existing literature highlights the psychological and behavioural consequences of extended wait times. For instance, Thompson et al. (1996) found that patients who experience delays are more likely to perceive their care as substandard, even if the clinical outcomes are positive. Similarly, Bleustein et al. (2014) demonstrated that excessive waiting contributes to patient anxiety and dissatisfaction, reducing their likelihood of returning for follow-up care. Additionally, a study by Pruyn & Smidts (1998) revealed that perceived fairness in waiting times plays a crucial role in shaping trust, suggesting that transparent communication about delays may mitigate adverse effects. Despite these findings, a gap remains in understanding how different types of delays—such as appointment scheduling, emergency room waits, and consultation delays—uniquely influence patient engagement and trust across diverse healthcare settings.

It is a behavioural, emotional, and cognitive process that is determined by the patient's perception, empowerment, and trust towards the system (Rowe & Knox, 2023). The concept of patient trust can be characterised as a set of beliefs that people have in medical professionals and staff regarding their commitment to doing what is in the best interest of patients, providing competent, respectful, and honest care (Youn et al., 2022). It involves both institutional trust in medical systems and trust between human beings and medical professionals. In the meantime, wait times and service delays refer to the amount of time that elapses from when a patient enters a facility to when they receive care, encompassing administrative, diagnostic, and clinical procedures. Such delays are usually caused by inefficiencies in the system, a lack of resources, and an increase in patient numbers. All these ideas are converging in the heart of quality in healthcare delivery. Wait time can decrease engagement and erode confidence, not to mention patient satisfaction, as well as the effectiveness of treatment and health-promoting behaviors.

Wait Times, Patient Experience, and Trust

The healthcare setting has a crucial influence on patient perceptions and experiences, especially in environments with heightened stress, such as emergency departments (EDs). Rowe & Knox (2023) conducted a systematic review of the ED setting and found that long wait times, overcrowding, and a lack of privacy were primary factors negatively affecting patient experience. The research established that patient trust levels would suffer in the setting of frequent delays, particularly when influenced by perceptions of neglect or inefficiency. The disengagement is also caused by a failure to communicate and the failure to provide a needed feeling of emotional reassurance during waiting periods. Liao et al. (2022) provide a more detailed analysis of the patient waiting experience, especially for those belonging to medically underserved populations in outpatient surgical practices. To mitigate the adverse effects of wait times, Chowdhury et al. (2024) discuss methods aimed at enhancing patient satisfaction in US healthcare organisations. Based on their findings, they have revealed that operational efficiency, practical communication training, and environmental improvement help raise the levels of communication and trust. Specifically, cultural competence and empathetic communication were also demonstrated to help neutralise the negative perceptions that arise from delays. The study by Chowdhury et al. (2024) confirms the view that trust cannot be established solely on the grounds of technical skill, but it can also be developed on the platform of relational competence. Patients who are kept updated, provided with sensitive care, and included in the care process, especially during otherwise inevitable delays, are more likely to continue trusting the healthcare system. Nonetheless, in a bitter note, barriers to implementation were identified, including a shortage of staff and financial limitations that could hinder the scaling up of such interventions.

Service Delays on Patient Engagement and Trust

Delays in healthcare services have become a significant determinant of patient involvement and trust, which are the fundamental elements of patient-focused care. Waiting time, whether in waiting rooms, for tests, referrals, or starting treatment, not only makes people less satisfied with the healthcare they receive but may also cause disengagement and a decline in trust in the healthcare system (Poudel et al., 2020; Doyle et al., 2013). Engagement is reflected in a patient's active participation in making decisions associated with care, adherence to treatment, and follow-up practices (Hibbard et al., 2005). Long delays in services can greatly hinder these behaviors. For example, a study conducted by O'Malley et al. (2011) revealed that specialist referrals were provided on time, resulting in the cancellation of appointments, follow-up on such referrals, and the workup of patients. Such delays convey a message of disorder and incompetence; therefore, patients are unwilling to engage in continued health management. In addition, the frustration, anxiety, and

feelings of neglect, among others, are common to their reactions towards the provision of services that are delayed. According to research conducted by Anderson et al. (2007), respondents who had to wait longer than 30 minutes following their scheduled appointment were significantly less likely to perceive that the healthcare provider considered them valuable and were more likely to cancel future appointments. Beliefs about competence, benevolence, reliability, and integrity constitute the aspect of trust in healthcare providers (Hall et al., 2001).

According to a study conducted by Alhassan et al. (2015), patients who had to wait long in the outpatient department showed twice as many references to low levels of trust in the healthcare staff, which was associated with poorer clinical outcomes. Additionally, patient trust is not only in individuals but also in organisations. According to Ozawa & Walker (2009), systematic delays do not bode well for the entire healthcare infrastructure. Often, dealing with excessive wait time leads to a feeling that the environment or organisation is systematically inefficient or corrupt, which causes a decrease in trust in the system. Service delay, Trust, and engagement interactions tend to be a cycle. When delays occur, there is a likelihood that patients will be unable to participate meaningfully in future interactions, as trust is lost (Thom et al., 2004). In turn, disengaged patients may skip appointments, postpone care, or seek treatment from unregulated sources, thereby creating additional health disparities (Anhang Price et al., 2014). It is a vicious cycle that is especially toxic in an environment that already has limited access to health care. Wait times can be normalised in low-resource settings, which can lead to institutional disengagement, particularly among vulnerable groups. As an example, according to a study by Ghosh (2025), patients who had a history of consistently delayed maternal health care stood an exceptionally high chance of choosing the option of an alternative birth attendant, regardless of the known risks. Other authors believe that a way to reverse the mistrustful shift in engagement can be achieved by integrating digital health solution capabilities, automated scheduling, telemedicine, and a patient portal (Scott Kruse et al., 2018). Gradually, however, such interventions have been found to rely strongly on digital literacy, infrastructure, and cultural receptivity.

It is also projected that there has been a significant change in healthcare provision due to telemedicine, with its potential to alleviate conventional delays and the problem of unavailability. According to Anawade et al. (2024), one of the advantages of telemedicine is that it eliminates both structural and geographic barriers to care by ensuring that services are available around the clock. This will also help reduce delays in care provision, especially for patients in rural or underserved areas, as they will be able to obtain consultations and diagnoses virtually. Although the study does not explicitly mention trust in the context of physical care settings, it makes it clear that telemedicine can alleviate the lack of confidence in various care settings due to its convenience and accessibility factors, which help patients gain satisfaction and interest in their treatment. Authors Youn et al. (2022) comprehensively investigate the topic of healthcare scheduling and planning, categorising the literature into three groups: outpatient clinics, hospital units, and larger health networks. The significant contribution of the study is the determination of patient engagement and personalised care as emerging trends in scheduling research. Mbanugo (2025) examines the relevance of artificial intelligence (AI) in telemedicine to treat chronic diseases. The study finds that the efficiency of the field can be enhanced through the implementation of AI tools, which automate diagnostics, forecast patient needs, and offer real-time interventions. With fewer human bottlenecks in the clinical decision-making process, AI-augmented systems have the potential to reduce waiting times and provide more personalized care.

2 Materials and Methods

This research employed a quantitative cross-sectional survey design to investigate the impact of waiting times and service delays on patient engagement and Trust in National Health Service (NHS) healthcare settings across the UK (Dorussen et al., 2024). A quantitative design was used because it enables the systematic measurement of variables, the statistical testing of relationships, and the prediction of outcomes. A cross-sectional design was used to collect data at a single point in time, giving a snapshot of patients' recent experiences and views (Thorlby et al., 2019).

The population under study was adult patients (aged 18 and older) who had seen NHS healthcare providers, such as GPs, hospital inpatients, and outpatient services, in the past 12 months. A sample of 500 participants was sought to provide adequate statistical power for multiple regression analysis, with a 95% confidence level and a 5% margin of error. Participants were enrolled through convenience sampling on online platforms and NHS patient contact channels, for ease of access and timely data collection (Jones et al., 2022). Inclusion standards involved participants having encountered waiting times and service delays in their recent health encounters.

Data were collected using an online, structured questionnaire specifically designed for this research, hosted on a secure survey platform (Bradwell et al., 2022). The questionnaire consisted of three parts: demographics, general

experience questions, and Likert-scale items assessing key constructs—wait times and delays in services, patient engagement, trust among patients in healthcare providers and facilities, and overall satisfaction. The questionnaire was redesigned to be consistent with UK NHS terminology and patient experience frameworks, making it culturally relevant and understandable. The Likert-scale items used a 5-point scale, ranging from "Strongly Disagree" (1) to "Strongly Agree" (5), thereby allowing for the quantitative measurement of attitudes and perceptions.

Statistical analysis was carried out using IBM SPSS Statistics software. Data cleaning and screening for missing values and outliers were done in the first steps. Descriptive statistics were calculated to describe the demographic data and significant variables, including frequencies, percentages, means, and standard deviations. To determine the internal consistency of multi-item scales (such as patient engagement and trust), Cronbach's alpha reliability tests were conducted, with values greater than 0.7 considered acceptable.

For inferential analysis, multiple regression analysis was employed to examine the predictive impact of wait times and service delays (independent variables) on patient engagement, trust, and overall satisfaction (dependent variables), while controlling for demographic variables. Before regression, the assumptions of linearity, normality, homoscedasticity, and multicollinearity were tested to ensure the validity of the model. The model summary provided the coefficient of determination (R^2), which represents the percentage of variance in the dependent variable that is accounted for by the predictors. The ANOVA test evaluated the overall significance of the regression model, confirming whether the independent variables together predicted the dependent variable. This analytical process enabled a thorough investigation of how wait times and delays affect patients' engagement and trust, yielding actionable insights for service improvement in the NHS (Dorussen et al., 2022). Ethical permission was also sought from the concerned institutional review board. Voluntary participation was ensured with electronic informed consent before survey completion. The confidentiality and anonymity of the respondents were rigorously ensured through the safe storage of data and its utilisation for research purposes only.

3 Results and Discussions

This section provides detailed findings and analysis of survey data. To gain a quick overview of demographic indicators, Table 1 summarises the demographic profile of the respondents.

Table 1
Demographic Summary of Respondents

Variable	Category	Frequency	Percent	Cumulative Percent
Age	18–24	90	18.0%	18.0%
	25–34	75	15.0%	33.0%
	35–44	77	15.4%	48.4%
	45–54	97	19.4%	67.8%
	55–64	75	15.0%	82.8%
	65 or older	86	17.2%	100.0%
Gender	Female	236	47.2%	47.2%
	Male	264	52.8%	100.0%
Education	A-levels or equivalent	106	21.2%	21.2%
	Bachelor's degree or equivalent	171	34.2%	55.4%
	GCSEs or equivalent	83	16.6%	72.0%
	Less than GCSEs	26	5.2%	77.2%
	Postgraduate degree or higher	114	22.8%	100.0%
Employment	Employed full-time	80	16.0%	16.0%
	Employed part-time	85	17.0%	33.0%
	Other	80	16.0%	49.0%
	Retired	89	17.8%	66.8%
	Student	85	17.0%	83.8%
	Unemployed	81	16.2%	100.0%
Long-Term Condition	No	348	69.6%	69.6%

Variable	Category	Frequency	Percent	Cumulative Percent
Visit Frequency	Yes	152	30.4%	100.0%
	1–2 times	209	41.8%	41.8%
	3–5 times	192	38.4%	80.2%
	More than 5 times	99	19.8%	100.0%
Visit Type	Emergency department visit	117	23.4%	23.4%
	GP appointment	135	27.0%	50.4%
	Hospital inpatient stay	132	26.4%	76.8%
	Hospital outpatient appointment	116	23.2%	100.0%
Wait Time	15–30 minutes	160	32.0%	32.0%
	31–60 minutes	103	20.6%	52.6%
	Less than 15 minutes	184	36.8%	89.4%
	More than 60 minutes	53	10.6%	100.0%
Delay Experienced	No	378	75.6%	75.6%
	Yes	122	24.4%	100.0%

Source: Author's estimation

The table highlights demographic and service-related information of the respondents. The age distribution is reasonably balanced, with the highest proportion being aged 45–54 (19.4%), followed by 18–24 (18.0%) and those aged 65 or older (17.2%). Males slightly outnumber females, making up 52.8% of the sample. In terms of education, most respondents hold a bachelor's degree (34.2%) or a postgraduate degree (22.8%), indicating a generally educated group. Employment status is diverse, with retired individuals (17.8%), students (17.0%), and part-time workers (17.0%) comprising the most significant segments. Around 30.4% reported having a long-term health condition. Most respondents visited healthcare services 1–2 times (41.8%) or 3–5 times (38.4%), with GP appointments and hospital stays being the most common types of visits. The majority experienced short wait times, with 36.8% waiting under 15 minutes and 32.0% waiting within 15–30 minutes. Only 10.6% waited over an hour. Lastly, 24.4% reported experiencing delays, while 75.6% did not.

Table 2
Hierarchical Regression Predicting Trust Score

Predictor	Coef.	Std. Err.	t	p	95% CI
Age (Ref: 18-24)					
25-34	0.0024	0.0136	0.18	0.860	[-0.0244, 0.0292]
35-44	0.0072	0.0136	0.53	0.595	[-0.0195, 0.0340]
45-54	0.0253	0.0353	0.72	0.473	[-0.0440, 0.0947]
55-64	0.0111	0.0171	0.65	0.518	[-0.0226, 0.0447]
65 or older	0.0086	0.0167	0.51	0.610	[-0.0244, 0.0415]
Gender (Ref: Female)					
Male	0.0011	0.0087	0.13	0.899	[-0.0161, 0.0183]
Education (Less than GCSE)					
GCSEs or equivalent	-0.0042	0.0166	-0.25	0.800	[-0.0369, 0.0285]
A-levels or equivalent	-0.0104	0.0161	-0.64	0.520	[-0.0420, 0.0212]
Bachelor's degree or equivalent	-0.0310	0.0162	-1.91	0.057	[-0.0628, 0.0009]
Postgraduate degree or higher	-0.0082	0.0173	-0.47	0.637	[-0.0423, 0.0259]
Employment (Ref: Employed Full-time)					
Employed part-time	-0.0050	0.0145	-0.35	0.729	[-0.0336, 0.0235]
Unemployed	-0.0090	0.0161	-0.56	0.578	[-0.0406, 0.0226]
Retired	0.0029	0.0146	0.20	0.843	[-0.0258, 0.0316]
Student	0.0039	0.0152	0.26	0.796	[-0.0259, 0.0337]
Other	-0.0150	0.0149	-1.00	0.316	[-0.0443, 0.0143]
Chronic Condition (Yes)	0.0053	0.0098	0.54	0.589	[-0.0140, 0.0246]
Wait Time	-0.0150	0.0046	-3.25	0.001	[-0.0241, -0.0059]

Predictor	Coef.	Std. Err.	t	p	95% CI
Delay Experience (Yes)	-0.0188	0.0091	-2.05	0.040	[-0.0368, -0.0008]
Informed About the Delay	0.0080	0.0031	2.58	0.010	[0.0019, 0.0142]
Ease of Booking	-0.0015	0.0031	-0.48	0.635	[-0.0075, 0.0046]
Cleanliness	0.0143	0.0032	4.46	0.000	[0.0080, 0.0206]
Location Convenience	0.0144	0.0031	4.71	0.000	[0.0084, 0.0204]
Age 4 × Wait Time (interaction)	-0.0166	0.0140	-1.19	0.236	[-0.0441, 0.0109]
Constant	4.9329	0.0293	168.45	0.000	[4.8754, 4.9905]

Source: Author's estimation

Table 2 presents the results of a hierarchical regression analysis identifying predictors of trust in healthcare services. The results show that wait time (β = -0.0150, p = 0.001) and delay experience (β = -0.0188, p = 0.040) are both significant negative predictors of patient trust. This indicates that longer waiting times and encountering service delays are associated with lower trust levels. In contrast, being informed about the delay is a significant positive predictor (β = 0.0080, p = 0.010), suggesting that timely communication can help preserve trust despite delays. Among the service quality variables, both cleanliness (β = 0.0143, p < 0.001) and location convenience (β = 0.0144, p < 0.001) are substantial positive predictors, meaning that clean and conveniently located facilities are more likely to earn patient trust. However, ease of booking did not significantly impact trust (p = 0.635), nor did having a chronic condition (p = 0.589). Demographic factors such as age, gender, education, and employment status generally did not show significant effects. An exception was individuals with a bachelor's degree, whose trust scores approached significance in a negative direction (β = -0.0310, p = 0.057), possibly indicating higher expectations or sensitivity to delays among more educated patients. The interaction between age (45–54) and wait time was not statistically significant (p = 0.236), suggesting that the adverse effect of wait time on trust is relatively consistent across age groups. This analysis highlights that while demographic variables play a limited role, service delays and their management, as well as cleanliness and convenience, are crucial in shaping patient trust in healthcare facilities.

Table 3
Model Fit Statistics for Hierarchical Regression Predicting Patient Trust

Statistic	Value
Number of Observations	500
F-statistic (df = 23, 476)	3.49
Model p-value	< 0.0001
R-squared	0.144
Adjusted R-squared	0.103
Root Mean Square Error	0.096

Source: Author's estimation

The model fit statistics in Table 3 indicate that the regression model significantly predicts patient trust in healthcare facilities, F (23, 476) = 3.49, p < 0.0001. The R-squared value of 0.144 suggests that approximately 14.4% of the variance in trust scores is explained by the predictors included in the model. The adjusted R-squared value (0.103) accounts for the number of predictors and indicates a modest explanatory power. A Root Mean Square Error (RMSE) of 0.096 indicates a relatively low average prediction error, which supports the model's reasonable accuracy in estimating trust scores.

Table 4
Model 1: Hierarchical Regression Predicting Patient Engagement (Demographics Only)

Predictor	Coef.	Std. Err.	t	p	95% CI
Age (Ref: 18-24)					
25-34	0.0185	0.0626	0.30	0.768	[-0.1045, 0.1415]
35-44	0.0113	0.0622	0.18	0.856	[-0.1109, 0.1335]
45-54	0.1054	0.0718	1.47	0.143	[-0.0357, 0.2464]
55-64	0.0716	0.0788	0.91	0.364	[-0.0833, 0.2265]

Predictor	Coef.	Std. Err.	t	p	95% CI
65 or older	-0.0709	0.0764	-0.93	0.354	[-0.2211, 0.0792]
Gender (Ref: Female)	-0.0043	0.0400	-0.11	0.913	[-0.0829, 0.0742]
Male					
Education (Less than GCSE)	-0.0059	0.0761	-0.08	0.938	[-0.1554, 0.1436]
GCSEs or equivalent	-0.0572	0.0738	-0.78	0.438	[-0.2022, 0.0878]
A-levels or equivalent	-0.0703	0.0744	-0.95	0.345	[-0.2164, 0.0758]
Bachelor's degree or equivalent	-0.0763	0.0794	-0.96	0.337	[-0.2324, 0.0797]
Postgraduate degree or higher					
Employment (Ref: Employed Full-time)	-0.1209	0.0663	-1.83	0.069	[-0.2511, 0.0093]
Employed part-time	-0.0281	0.0735	-0.38	0.703	[-0.1725, 0.1164]
Unemployed	-0.0383	0.0670	-0.57	0.568	[-0.1700, 0.0934]
Retired	-0.1081	0.0691	-1.57	0.118	[-0.2439, 0.0276]
Student	0.0304	0.0682	0.45	0.656	[-0.1037, 0.1645]
Chronic Condition	-0.0172	0.0449	-0.38	0.702	[-0.1054, 0.0710]
Constant	4.8445	0.0900	53.84	0.000	[4.6677, 5.0213]

Source: Author's estimation

Table 4 presents the results of the baseline hierarchical regression model, which assesses the effect of demographic characteristics on patient engagement. The model includes predictors such as age, gender, education level, employment status, and presence of a chronic condition. The findings indicate that none of the demographic variables significantly predict patient engagement at the 5% level ($p > 0.05$ across all predictors). For instance, individuals aged 45–54 showed a higher patient engagement score ($\beta = 0.1054$, $p = 0.143$), and part-time employed individuals had a lower engagement score ($\beta = -0.1209$, $p = 0.069$), though neither reached statistical significance. Similarly, gender ($\beta = -0.0043$, $p = 0.913$), education (across all categories), and the presence of a chronic condition ($\beta = -0.0172$, $p = 0.702$) showed no significant association with engagement levels. These results suggest that basic demographic attributes alone do not sufficiently explain variations in patient engagement, which is more closely related to experience-based factors—such as service delivery, communication, and environmental aspects—which are likely more important in shaping patients' engagement with their healthcare providers.

Table 5
Model Fit Statistics – Patient Engagement (Model 1)

Statistic	Value
Number of Observations	500
F-statistic (df = 16, 483)	1.05
Model p-value	0.402
R-squared	0.034
Adjusted R-squared	0.002

Source: Author's estimation

Table 5 shows that the model's R-squared value is 0.034, indicating that only 3.4% of the variance in patient engagement is explained by demographic factors. The adjusted R-squared is 0.002, suggesting that once the number of predictors is accounted for, the explanatory power is nearly negligible. The F-statistic of 1.05 with 16 and 483 degrees of freedom, and a non-significant p-value of 0.402, confirms that the model does not fit the data well. In other words, the set of demographic predictors used in this baseline model does not significantly improve our understanding of patient engagement compared to a model with no predictors at all.

Table 6
Model 2: Model 2 – Hierarchical Regression Predicting Patient Engagement (With Service Experience Variables)

Predictor	Coef.	Std. Err.	t	p	95% CI
Age (Ref: 18-24)					
25-34	0.0185	0.0626	0.3	0.768	[-0.1045, 0.1415]
35-44	0.0113	0.0622	0.18	0.856	[-0.1109, 0.1335]
45-54	0.1054	0.0718	1.47	0.143	[-0.0357, 0.2464]
55-64	0.0716	0.0788	0.91	0.364	[-0.0833, 0.2265]
65 or older	-0.0709	0.0764	-0.93	0.354	[-0.2211, 0.0792]
Gender (Ref: Female)	-0.0043	0.04	-0.11	0.913	[-0.0829, 0.0742]
Male					
Education (Less than GCSE)	-0.0059	0.0761	-0.08	0.938	[-0.1554, 0.1436]
GCSEs or equivalent	-0.0572	0.0738	-0.78	0.438	[-0.2022, 0.0878]
A-levels or equivalent	-0.0703	0.0744	-0.95	0.345	[-0.2164, 0.0758]
Bachelor's degree or equivalent	-0.0763	0.0794	-0.96	0.337	[-0.2324, 0.0797]
Postgraduate degree or higher					
Employment (Ref: Employed Full-time)	-0.1209	0.0663	-1.83	0.069	[-0.2511, 0.0093]
Employed part-time	-0.0281	0.0735	-0.38	0.703	[-0.1725, 0.1164]
Unemployed	-0.0383	0.067	-0.57	0.568	[-0.1700, 0.0934]
Retired	-0.1081	0.0691	-1.57	0.118	[-0.2439, 0.0276]
Student	0.0304	0.0682	0.45	0.656	[-0.1037, 0.1645]
Chronic Condition	-0.0172	0.0449	-0.38	0.702	[-0.1054, 0.0710]
Chronic Condition	0.0073	0.0343	0.21	0.832	[-0.0601, 0.0746]
Wait Time	-0.1987	0.0152	-13.05	0	[-0.2286, -0.1688]
Delay Experience	-0.22	0.032	-6.87	0	[-0.2829, -0.1571]
Informed About the Delay	0.0687	0.0109	6.31	0	[0.0473, 0.0900]
Ease of Booking	0.1103	0.0107	10.31	0	[0.0893, 0.1313]
Constant	4.8401	0.0916	52.86	0	[4.6602, 5.0201]

Source: Author's estimation

The regression results for Model 2 are presented in Table 6, which builds upon the baseline model by adding key service experience variables. Unlike Model 1, this model reveals several statistically significant predictors of patient engagement. Most notably, wait time (β = -0.1987, $p < 0.001$) and delay experience (β = -0.2200, $p < 0.001$) are strong and negative predictors of patient engagement. This indicates that longer wait times and experiencing delays significantly lower how engaged patients feel with healthcare services. Conversely, being informed about delays (β = 0.0687, $p < 0.001$) and finding the booking process easy (β = 0.1103, $p < 0.001$) significantly enhance patient engagement. In contrast, the demographic variables, including age, gender, education, employment, and chronic condition status, remain non-significant, similar to the model. It highlights the shift in explanatory power from fixed personal attributes to service-related experiences, which appear to play a central role in shaping engagement outcomes.

Table 7
Model Fit Statistics – Patient Engagement (Model 2)

Statistic	Value
Number of Observations	500
F-statistic (df = 20, 479)	19.26
Model p-value	< 0.001
R-squared	0.446
Adjusted R-squared	0.423

Source: Author's estimation

The model fit statistics in Table 7 depict a substantial improvement over the baseline model. The R-squared value of 0.446 suggests that nearly 45% of the variance in patient engagement is explained by the combined effect of demographics and service-related experiences. The adjusted R-squared of 0.423 confirms that the improvement is robust, even after accounting for the number of predictors. The model is statistically significant, F (20, 479) = 19.26, $p < 0.001$, indicating that the inclusion of service experience variables significantly enhances the model's explanatory power. These results demonstrate that how services are delivered—particularly regarding time management, communication, and accessibility—has a far greater impact on patient engagement than demographic differences alone.

Table 8
Model 3: Add Facility Perception Variables

Predictor	Coef.	Std. Err.	t	p	95% CI
Age (Ref: 18-24)					
25-34	0.0185	0.0626	0.3	0.768	[-0.1045, 0.1415]
35-44	0.0113	0.0622	0.18	0.856	[-0.1109, 0.1335]
45-54	0.1054	0.0718	1.47	0.143	[-0.0357, 0.2464]
55-64	0.0716	0.0788	0.91	0.364	[-0.0833, 0.2265]
65 or older	-0.0709	0.0764	-0.93	0.354	[-0.2211, 0.0792]
Gender (Ref: Female)	-0.0043	0.04	-0.11	0.913	[-0.0829, 0.0742]
Male					
Education (Less than GCSE)	-0.0059	0.0761	-0.08	0.938	[-0.1554, 0.1436]
GCSEs or equivalent	-0.0572	0.0738	-0.78	0.438	[-0.2022, 0.0878]
A-levels or equivalent	-0.0703	0.0744	-0.95	0.345	[-0.2164, 0.0758]
Bachelor's degree or equivalent	-0.0763	0.0794	-0.96	0.337	[-0.2324, 0.0797]
Postgraduate degree or higher					
Employment (Ref: Employed Full-time)	-0.1209	0.0663	-1.83	0.069	[-0.2511, 0.0093]
Employed part-time	-0.0281	0.0735	-0.38	0.703	[-0.1725, 0.1164]
Unemployed	-0.0383	0.067	-0.57	0.568	[-0.1700, 0.0934]
Retired	-0.1081	0.0691	-1.57	0.118	[-0.2439, 0.0276]
Student	0.0304	0.0682	0.45	0.656	[-0.1037, 0.1645]
Chronic Condition	-0.0172	0.0449	-0.38	0.702	[-0.1054, 0.0710]
Chronic Condition	0.0073	0.0343	0.21	0.832	[-0.0601, 0.0746]
Wait Time	-0.1987	0.0152	-13.05	0	[-0.2286, -0.1688]
Delay Experience	-0.22	0.032	-6.87	0	[-0.2829, -0.1571]
Informed About the Delay	0.0687	0.0109	6.31	0	[0.0473, 0.0900]
Ease of Booking	0.1103	0.0107	10.31	0	[0.0893, 0.1313]
Cleanliness	0.0048	0.0112	0.43	0.669	[-0.0172, 0.0267]
Location Convenience	0.0102	0.0107	0.96	0.339	[-0.0107, 0.0311]
Constant	4.7953	0.1026	46.72	0	[4.5937, 4.9970]

Source: Author's estimation

Table 8 presents the final hierarchical regression model examining patient engagement, which includes facility perception variables (cleanliness and location convenience), as well as demographics and service experience factors. As in Model 2, wait time ($\beta = -0.1987$, $p < 0.001$), delay experience ($\beta = -0.2200$, $p < 0.001$), being informed about delays ($\beta = 0.0687$, $p < 0.001$), and ease of booking ($\beta = 0.1103$, $p < 0.001$) remain statistically significant predictors of patient engagement. These findings reinforce that timeliness, communication, and accessibility of services are core drivers of engagement. In contrast, the newly added facility perception variables, including cleanliness ($p = 0.669$) and location convenience ($p = 0.339$), predominantly do not significantly predict patient engagement. It suggests that although perceptions of the physical environment may influence satisfaction or trust, they have limited influence on how actively patients engage with their care. Demographic and health status variables again show no significant

associations, consistent with previous models. Thus, engagement appears to be more sensitive to process-level experiences than to static personal characteristics or physical settings**.**

Table 9
Model Fit Statistics – Patient Engagement (Model 3)

Statistic	Value
Number of Observations	500
F-statistics (df = 22, 477)	17.53
Model p-value	< 0.001
R-squared	0.447
Adjusted R-squared	0.422

Source: Author's estimation

The model fit statistics in Table 9 indicate that Model 3 explains a similar proportion of variance in patient engagement as Model 2, with an R-squared of 0.447 and an adjusted R-squared of 0.422. The F-statistic of 17.53 with $p < 0.001$ confirms that the model is statistically significant. However, the marginal improvement from Model 2 ($R^2 = 0.446$) suggests that adding facility perception variables did not substantially enhance explanatory power. This confirms that service delivery characteristics, especially wait times, delayed communication, and ease of booking, are the primary factors in explaining patient engagement. In contrast, facility perceptions, such as cleanliness and location, play a secondary role.

The baseline model (Model 1), which included only demographic predictors (age, gender, education, employment status, and chronic illness), accounted for a minimal amount of variance in patient engagement ($R^2 = 0.034$). No demographic variables were significantly related to engagement, indicating that socio-demographic factors alone are insufficient in predicting patients' feelings of engagement with their healthcare providers. This finding aligns with previous work by Hibbard et al. (2004), which observed that the healthcare experience, rather than fixed individual characteristics, more contextually determines involvement. Adding service-related variables to Model 2—wait time, experiencing delays, being informed about delays, and ease of making an appointment—the model's explanatory strength was significantly enhanced ($R^2 = 0.446$). Wait time and the experience of delay were found to be strong negative predictors, indicating that patients who experience longer waits or feel delays in service receipt tend to have lower levels of engagement. In contrast, knowledge about delays and the convenience of appointment scheduling had a powerful positive influence. These results confirm previous work by Bleustein et al. (2014), where the authors contended that management of waiting times and open communication are foremost in patient satisfaction and participation behaviour. Notably, ease of scheduling was a significant predictor of engagement, acknowledging the growing importance of accessibility and digital preparedness in contemporary healthcare systems.

In Model 3, facility perception factors, such as cleanliness and convenience of location, were added. Contrary to expectations, neither variable had a significant effect on levels of engagement. While previous research (e.g., Otani et al., 2010) has identified cleanliness as a key predictor of overall satisfaction, our results indicate that perceptions of the environment are more significant to patient satisfaction and trust than to engagement, which entails active involvement, compliance, and collaboration in care. The marginal increase in R^2 from Model 2 to Model 3 (0.446 to 0.447) highlights this minimal contribution. These findings combined show that service delivery aspects—particularly timeliness and transparency—are key to enabling patient engagement and trust. Practically, this implies that policy interventions within the UK health system, particularly the NHS, need to look beyond structural change and instead focus on process efficiency and effective communication. The NHS Long Term Plan (2019) recognises the significance of patient-centred care; however, ongoing problems with delayed appointments and communication failures still hinder this aim.[b]

The research provides a detailed explanation of the effects of wait times and service delays on patient involvement and trust. The waiting times issue is most critical in the UK, as recent surveys indicate that 71% of NHS users report

[b] Available at https://www.england.nhs.uk/long-read/nhs-long-term-workforce-plan-2/#:~:text=This%20Plan%20is%20therefore%20intended,the%20ambitions%20in%20the%20Plan.

long waits for GP or hospital appointments as their primary cause of dissatisfaction.[1c] The NHS has set targets, such as seeing 95% of patients within four hours; however, these are increasingly not being met, with fewer than 60% of patients seen within this timeframe in 2023 (NHS, 2025). This ongoing issue is exacerbated by staff shortages, increasing demand, and resource limitations, all of which lead to delays and negatively impact patient perceptions of the quality of care. Lamb et al. (2021) affirmed that early access to care is a foundation of patient trust and involvement in the UK. Waiting to receive care for appointments, tests, and treatments is linked to higher levels of anxiety, frustration, and feeling devalued as a patient, as suggested by Chu et al. (2019). UK-based evidence indicates that even when national quality standards for response times are met, only a small fraction of patients report an "excellent" experience, and negative judgments are reliably associated with delays (Al-Haboubi et al., 2025). In addition, poorly managed discharge processes and failure to engage in care decisions have been found to undermine patient satisfaction and confidence in NHS services.

A common theme throughout this research and national surveys is the importance of communication and openness (Martin et al., 2023). Patients informed about anticipated waiting times and the causes of delays are more satisfied and are more likely to be active in their care (Blythe & Ross, 2022; Dorussen et al., 2024). The NHS Constitution and associated policy arrangements emphasise the importance of patient involvement in decision-making and the provision of clear, timely information (Fraser & Mays, 2024). Good communication not only reduces the adverse effects of delays but also establishes a sense of partnership and respect that can lay the foundations for trust.

The significant negative impact of waiting times and service delays on engagement concurs with the global literature. Research in both the public and private sectors has found that delays erode trust and weaken the emotional bond between patients and the healthcare system (Howcutt et al., 2018). In addition, Thoriby et al. (2019) found that perceived control and timely communication have a substantial impact on patient tolerance and satisfaction. However, the insignificance of demographic variables and environmental attitudes in predicting participation contrasts with some previous UK-based research, which found associations between variables such as age, education, and facility ratings and patient satisfaction ratings. This difference could be due to the conceptual distinction between satisfaction as evaluative judgments and participation as behaviourally oriented involvement in care (Dorussen et al., 2024).

4 Conclusion

This study aimed to systematically investigate the impact of patient engagement and trust, influenced by wait times and service delays, using hierarchical regression. The evidence provides articulated and conclusive findings that timeliness, transparency of communication, and accessibility are the keys to establishing and maintaining good patient-provider relationships in the UK's healthcare system. The model estimation revealed that demographic factors, such as age, gender, education, and employment status, are not significant predictors of engagement, indicating the limited value of static patient factors in explaining how patients interact with healthcare services. Instead, it is the quality of the service delivery processes—particularly whether there is a delay or not, whether one can easily access the care, and whether patients are informed or not—that most firmly predict the outcomes of engagement.

The findings provided consistent evidence that long wait times and unexpected service delays weaken patient engagement and trust, whereas timely communication and efficient appointment scheduling can significantly improve these outcomes. Such effects were found to be strong even when controlling for environmental beliefs such as facility cleanliness and convenience of location, which did not have significant relationships with engagement. This means that, although the structural and aesthetic elements of care environments can influence satisfaction, they are secondary to the procedural experience if patient meaningful involvement and trust are the primary goals.

Notably, these results are not merely statistically significant but also practically actionable. They strengthen the case that patient engagement is not a fixed characteristic but a responsive outcome, substantially dependent on care delivery. Patients are more inclined to become actively involved and build trust when they are treated with respect, informed, and given care that is accessible and effective. In this sense, the research aligns with the international literature while also being innovative in providing empirical findings unique to the UK healthcare sector, particularly the NHS.

For healthcare administrators and policymakers, the message is straightforward: substantive reform efforts need to transcend investment in infrastructure or cosmetic performance measures. Instead, efforts should focus on enhancing

[c] Available at https://www.england.nhs.uk/gp/case-studies/routine-gp-appointment-waiting-times-reduced-by-47-pickering-medical-practice-north/#:~:text=Understanding%20what%20the%20problem%20areas%20are&text=The%20GP%2C%20therefore%2C%20conducted%20a,member%20of%20the%20clinical%20team

operational efficiency, digital accessibility, and communication strategies with patients. Focusing on these process-level interventions will not only mitigate disengagement and dissatisfaction but also potentially improve health outcomes through enhanced continuity of care, improved adherence to care plans, and more proactive patient behaviours.

Implications, Limitations, and Future Research

This research has significant policy and practical implications for the UK healthcare system, particularly in relation to patient involvement and trust. Reducing waiting times must be a priority. The consistent and strong effect of wait time on all models highlights the necessity of addressing delays throughout the NHS, not just in emergency departments but also in outpatient clinics, diagnostic services, and mental health services. Effective resource planning and optimized service delivery processes are needed to minimize bottlenecks and enhance the patient experience**.** Furthermore, the research highlights the crucial importance of user-friendly and accessible appointment booking systems. The positive correlation between ease of booking and patient participation suggests that improvements in modernizing and digitalizing NHS access platforms—such as online portals and smartphone apps—have the potential to enhance patient involvement in their care substantially. This fits into the evidence for overall pressure towards integrated care systems (ICS) and digital-first healthcare approaches in the UK.

Lastly, the findings support a shift in outlook toward patient engagement as an outcome that is process-based, rather than a fixed demographic characteristic. Given that physical facility perceptions and patient attributes were poor predictors, service design should emphasise enhancing procedural quality and user experience over these factors. Engagement should be viewed as a dynamic response shaped by the quality of interactions, timeliness of care, and the effectiveness of communication—core elements that are well within the control of healthcare providers and system designers.

Conflict of interest statement
The author declared that she has no competing interests.

Statement of authorship
The author has a responsibility for the conception and design of the study. The author has approved the final article.

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Appendix

Table A1: Correlation Matrix

		Patient Engagement	Trust	Satisfaction
Patient Engagement	**Pearson Correlation**	**1**	**.243****	**.340****
	Sig. (2-tailed)		**.000**	**.000**
	N	**500**	**500**	**500**
Trust	**Pearson Correlation**	**.243****	**1**	**.191****
	Sig. (2-tailed)	**.000**		**.000**
	N	**500**	**500**	**500**
Satisfaction	**Pearson Correlation**	**.340****	**.191****	**1**
	Sig. (2-tailed)	**.000**	**.000**	
	N	**500**	**500**	**500**
****. Correlation is significant at the 0.01 level (2-tailed).**				

Table A2: Reliability Analysis (Cronbach's Alpha) — After Reverse Coding

Scale	Items Included	# Items	Avg. Interitem Covariance	Cronbach's Alpha
Patient Engagement (5-item)	Engagement_1, Engagement_2, Engagement_3, Engagement_4, Engagement_5	5	0.0556	0.1874
Trust in Providers (5-item)	Trust_1R, Trust_2, Trust_3, Trust_4, Trust_5	5	0.0381	0.1391
Extended engagement (7-item)	Engagement_1, Engagement_2, Engagement_3, Engagement_4, Engagement_5, InformedDelay, Ease Booking	7	0.0271	0.1154

Table A3: ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
PatientEngagement	Between Groups	30.629	49	0.625	4.239	0.000
	Within Groups	66.360	450	0.147		
	Total	96.989	499			
Trust	Between Groups	2.425	49	0.049	8.360	0.000
	Within Groups	2.664	450	0.006		
	Total	5.089	499			