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AI and IoT in the Healthcare Environment: Behavioral Impacts on Patients and Clinicians in Asian and African Contexts

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Abstract

The physical and digital healthcare environment shapes how patients seek care, how clinicians reason, and how trust is built between them. This paper examines the integration of Artificial Intelligence (AI) and Internet of Things (IoT) technologies into healthcare settings and the behavioral consequences for patients and clinicians in Asian, African, and Arabian contexts. We analyse how AI diagnostic tools, IoT-enabled monitoring, and AI-assisted records alter healthcare-seeking patterns, reshape trust, introduce cognitive overload, and reconfigure the clinical encounter. The paper argues that AI and IoT are not merely technical systems but environmental interventions requiring human-centred, culturally aware design frameworks.

Keywords: Artificial Intelligence, Healthcare Environment, Environment-Behavior, Patient Behavior, IoT

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1.0 Introduction

Health care facilities layout and planning have never been of minor importance. Natural light, noises, transparency of a ward plan these factors influence the way patients experience care, and the way in which clinicians interact with experience care (Devlin & Arneill, 2003). This home atmosphere has been layered over with something new in the past ten years: the digital infrastructure of Artificial.

The Internet of Things (IoT) and intelligence (AI). Nearly, and now and then quite. In dramatic terms, the technologies are transforming the behaviour ecology of hospitals, clinic, and community health centres. In the loosest sense, AI is a collection of computational techniques machine learning, deep learning, natural language processing that can be applied to get systems to work. this includes tasks which would otherwise be done through human judgement such as reading a chest. Recommending a treatment pathway (Topol, 2019). IoT is the web of sensor-equipped physical. gadgets to collect and transfer real-time information: wearable heart rate devices, smart. infusion pumps, environmental sensors in the intensive care units. Together, they are not only changing the nature of the clinical information available, but also the way it is created, read and then applied.

The rate of adoption has risen at a very high rate since 2020. The COVID-19 pandemic has forced health systems to remote care sooner than most had expected, and the burden of chronic disease and the insatiable demand on the workforce made the allure of automated monitoring and decision support hard to resist (World Health Organization, 2021). According to industry projections, the industry is likely to keep expanding at a very high rate throughout the decade, but such forecasts should perhaps be read with some caution market estimates vary considerably depending on how "health AI" is defined

The behavioural and environmental-psychological aspects of AI and IoT in healthcare how these systems transform the manner in which patients seek care, how they alter clinical reasoning, what they do to trust have received much less attention than questions of diagnostic accuracy or cost efficiency. This is especially so in the case of healthcare systems in Asia, Africa, and the Arab world, where the stakes are arguably higher: workforce shortages, lack of specialists coverage, and the very real risk of importing technologies based on population data that is not representative of the local realities.

In this paper, the questions are addressed. It poses two questions: how do AI and IoT alter patient behaviour in healthcare facilities and how do they alter clinician behaviour? The area is specifically regional. The contexts of Asian, African, and Arabian are not merely underrepresented in this literature but present unique challenges and dynamics that a globally generic analysis would miss.

2.0 Literature Review

2.1 Environment-Behaviour Research in Healthcare

Environment-behaviour (E-B) studies has a well-established body of work examining how physical healthcare environments influence patient wellbeing and staff performance. Studies consistently show that natural light, noise control, spatial way-finding clarity, and privacy in consultation spaces affect patient anxiety, pain perception, and satisfaction, as well as clinician stress and cognitive load. Ulrich et al.'s landmark review of evidence-based healthcare design demonstrated that physical design features are not merely aesthetic but clinical determinants (Ulrich et al., 2008). The rapid digitisation of care spaces calls for extending this established framework to encompass digital environmental features as well.

2.2 AI Diagnostic Tools and Behavioural Consequences

The application of AI to clinical decision-making has been one of the most intensively researched areas in health technology over the past five years. In specific imaging tasks, deep learning models have reached a level of performance that genuinely rivals specialist clinicians diabetic retinopathy screening, skin cancer classification, chest X-ray reading (Gulshan et al., 2016). AI-driven clinical decision support systems can also flag drug interactions, propose differential diagnoses, and in some cases predict patient deterioration several hours before conventional clinical indicators would raise an alarm (Bates et al., 2020).

The similarity of these capabilities, however, is a silent supposition concerning who the patient is. Most of the high-performing diagnostic models have been trained using data mostly of less than. The populations of North America and Europe, and there are good reasons to be concerned about. how they generalise to Asian, African, or Arab world patients, where disease presentations, comorbidity patterns and imaging characteristics may vary in a manner that the model has never come across (Norori et al., 2021). The issue is not a hypothetical one. Obermeyer et al. found that a widely used commercial algorithm consistently underestimated illness severe in black patients in the United States a systematic error that had real. implications of who was taken care of (Obermeyer et al., 2019).

2.3 IoT Patient Monitoring and Trust

Monitoring using IoT is a long way compared to the bedside telemetry units of previous decades. The new systems create the interconnected ecosystems: smart wearables that constantly measure the heart rate, blood oxygen saturation, blood glucose, and physical activity, feeding data in real-time to clinical platforms and warning systems (Qi et al., 2018). Now infusion pumps are controlled with help of the IoT infrastructure, environment is monitored and movement of patients through spaces is tracked. The physical and digital care environment is in a large scale interwoven.

A systematic review of the IoT-based remote monitoring of chronic disease patients in Asia has revealed that there were consistent improvements in medication adherence, reduced absenteeism, and improved glycaemic control (Emaliyawati et al., 2025).

The implementation image is also complicated by a corresponding body of evidence on AI-driven algorithmic systems more generally. A systematic review in The Lancet Regional Health reported data security, patient privacy, alert fatigue, and information overload to be prevalent in healthcare settings (Wilhelm et al., 2024). More sobering perhaps, it also concluded that the benefits that are relevant to the patient are not necessarily synonymous with enthusiasm about a technology, and evidence of its real-world value.

2.4 Behavioural Dimensions of AI and IoT Adoption

Considering how rapidly AI and IoT have entered clinical settings, the behavioural literature has been tardy in following suit. There is reasonable coverage of technology acceptance and usability whether a system is easy to use by clinicians, whether a system is easy to use by patients. are ready to interact with it but much less work on what these technologies actually do to. the mental and behavioural habits of the individuals within care settings previously. adoption has occurred (Venkatesh et al., 2003).

A study on automation bias has reported a. specific and troubling tendency: the clinicians working with algorithmic decision are troubled by a specific tendency. support may slowly change to accepting its recommendations without the. independent review such recommendations are entitled to. That is a gentle wearing away, and not in practice always easy to detect. On the patient side, a

large-scale multinational study provides the best overview possible, based on the answers of 13,806. patients across 43 countries (Busch et al., 2025). Its results are instructive. Trust in AI-generated diagnoses is not homogenous it changes significantly based on the cultural background, age, and. digital literacy. Patients throughout the board indicated a strong desire to have physician- made decisions, despite being willing to involve AI in decision-making.

3.0 Methodology

3.1 Research Design

The PRISMA was used as the review process. structure principles of narrative and integrative reviews.

3.2 Search Strategy and Selection Criteria

The literature search was performed in four databases PubMed, Scopus, Web of. Science, and IEEE Xplore with publications dating back to 2018 to 2024. Search terms were collected systematically and comprised: "artificial intelligence, machine learning, IoT, "Internet of Things", "healthcare behavior", "patient behavior", "clinician behavior", clinical decision support, smart hospital, Africa, Asia, Middle East and "environment-behavior". Hand-searched reference lists of accessed papers were searched to capture. relevant work that may have been missed by the indexing of the database. Throughout, priority was given to empirical studies, systematic reviews, and meta-analyses exceeding peer-reviewed empirical studies. opinion or commentaries.

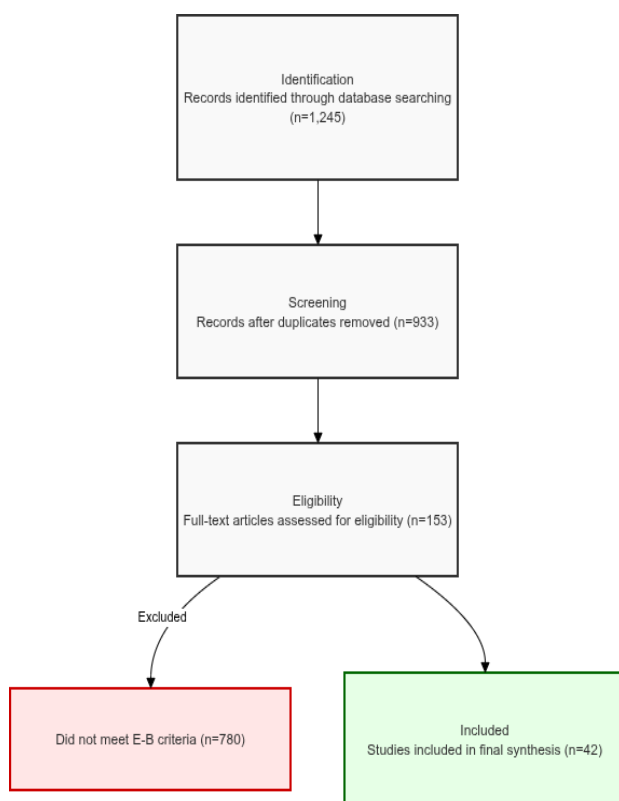


Figure 1:

PRISMA flow diagram detailing the literature search and selection process.

3.3 Analytical Framework

The analysis is organised around Ulrich's Theory of Supportive Design and the Technology Acceptance Model (TAM), adapted for healthcare settings (Ulrich, 1997). Ulrich's framework identifies three categories of supportive environmental features namely perceived control, access to social support, and positive distraction which we apply to digital as well as physical environmental features. TAM's core constructs of perceived usefulness and perceived ease of use, originally proposed by Davis (Davis, 1989) and subsequently extended by Venkatesh et al. (Venkatesh et al., 2003), are employed to interpret clinician and patient behavioural responses. This dual-framework approach bridges the environment-behaviour tradition with technology adoption scholarship.

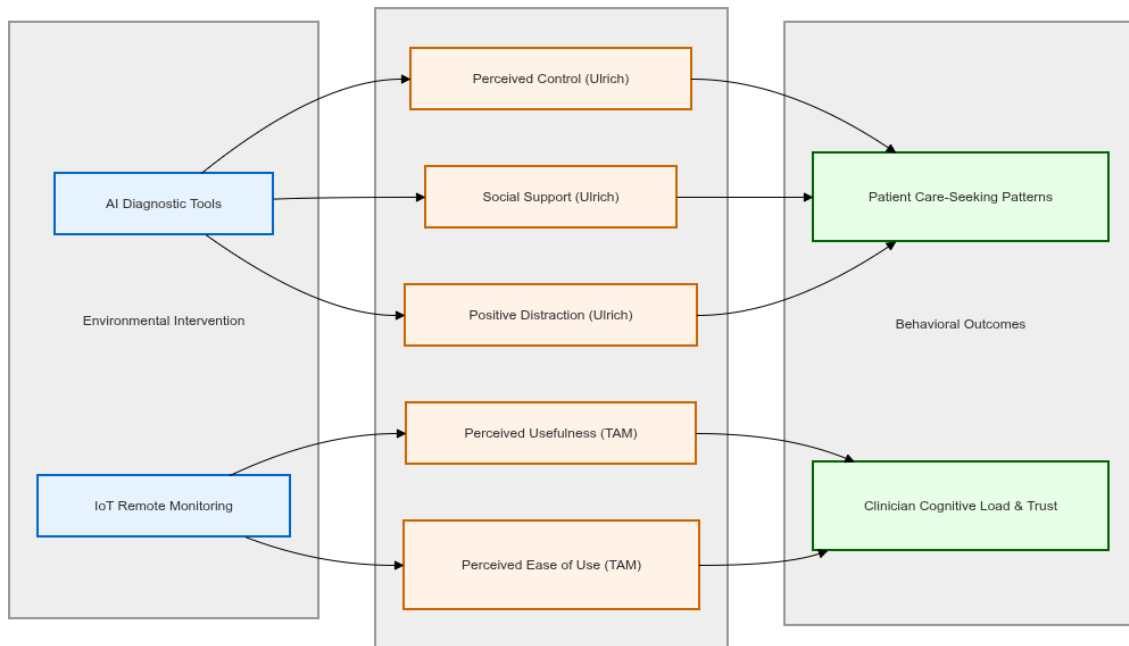


Figure 2: Integrated Conceptual Framework adapting Ulrich's Theory of Supportive Design and TAM for digital healthcare environments. Source: Authors' conceptualisation, adapted from Ulrich (Ulrich, 1997) and Davis (Davis, 1989).

4.0 Findings: Patient Behaviour

4.1 Shifts in Healthcare-Seeking Patterns

One of the most significant behavioural changes associated with AI and IoT in healthcare is a shift in when and how patients seek care. AI-powered symptom checkers, now widely available as mobile applications, have enabled patients to conduct preliminary self-assessments before deciding whether to visit a clinic. Studies in sub-Saharan Africa suggest that mobile health (mHealth) interventions can support health-related behavior change and improve engagement with healthcare services, particularly in areas such as maternal health and chronic disease management. However, evidence remains limited and context-dependent, with variability in adoption and outcomes across settings. However, they have also been associated with self-dismissal of serious symptoms in groups where health literacy is low or where applications have not been validated for local disease contexts.

IoT-enabled remote monitoring has created new categories of healthcare interaction that occur entirely outside clinical facilities. A 2024 systematic review of IoT-based remote monitoring systems found that connected devices shift patient engagement from episodic to continuous care by enabling, engaging, and empowering patients across three sequential stages of participation. Evidence from chronic disease contexts in Africa corroborates this behavioural shift, showing that patients using connected monitoring tools interact with the healthcare system more frequently and more proactively than those without (Agu et al., 2023). The clinic is no longer the sole site of clinical encounter.

4.2 Trust, Anxiety, and the AI-Patient Relationship

Patients trust in AI diagnostic systems is a complex of cultural, educational, and experiential factors that are not easily generalised. According to the data of multinational surveys, the attitudes towards AI in healthcare are, overall, positive but vary significantly across sociodemographic and contextual dimensions. Some evidence exists of quite high acceptance in some East Asian contexts, although cross-regional variation is not sufficiently regular to rank reliably, and context tends to dominate broad patterns (Busch et al., 2025). The only thing that seems to be in agreement is that this trust is weak. A single perceived misdiagnosis by an AI system may be enough to generate lasting distrust and avoidance of AI-enabled services in the future.

The African healthcare environments are very different in terms of dynamics. Nigerian, Kenyan, and Rwandan research indicates that patients are more likely to accept AI-generated recommendations when presented by a trusted human clinician, instead of directly by an application interface (Atairo et al., 2023). The clinician, as it were, is a bridging requirement.

IoT surveillance brings with it its unique set of concerns. Connected monitoring does reassure many patients, but a significant minority experience the opposite: surveillance-related anxiety, worry about what happens to their data, and the silent psychological burden of being under constant observation (Saka & Das, 2025). This techno-anxiety, as it has been called, is more apt to be more pronounced in older patients and those who belong to small groups of digital literacy.

4.3 Cognitive Overload and Information Design

AI-generated health information does not automatically help patients make better decisions presentation matters enormously. A study of AI-driven patient portals in Malaysia found that patients who received algorithmic risk scores without any accompanying explanation showed higher rates of disengagement and appointment non-attendance compared to those who received the same results with structured, human-readable context (Ahmad et al., 2023). The implication is worth taking seriously: the design of an AI interface is itself a form of environmental intervention, one that can either open a pathway toward appropriate care-seeking or quietly close it off.

5.0 Findings: Clinician Behaviour

5.1 Cognitive Offloading and Automation Bias

The most consistently documented behavioural effect of AI and IoT on clinicians is cognitive offloading: the delegation of cognitive tasks, including pattern recognition, differential diagnosis generation, and risk stratification, to algorithmic systems. When well-designed, this can free clinician cognitive resources for higher-order tasks such as communication and complex case management. However, a systematic review of AI-related algorithmic decision-making systems published in *The Lancet Regional Health* found that patient-relevant benefits remain uncertain and that automation bias—uncritical acceptance of algorithmic outputs—represents a persistent and under-measured risk in real-world implementation (Wilhelm et al., 2024).

Specific evidence from radiology reinforces this concern: a study of AI-assisted chest X-ray reading found that error rates increased when AI flagged images as normal, because clinicians shortened their review time in response to the algorithmic signal. This is particularly concerning in low-resource settings where clinicians already face high patient volumes and significant time pressure, conditions prevalent across much of Asia and Africa.

5.2 The Reconfigured Doctor-Patient Encounter

Electronic health records with AI capabilities provide automatic pre-population with notes, diagnostic code suggestions, and guideline recommendations that pop up during the consult itself, sometimes even before the patient has even finished explaining why he or she came (Bates et al., 2020). The pressure on clinicians from administration has been lifted off, this is not a small thing. But with it also comes an even darker trade-off in the form of the attention of the clinician, which was previously almost entirely devoted to the patient, slowly shifting towards the computer screen that he or she now faces. Quantified decreases in physical interaction with patients and in the experience of consultations have been recorded for clinicians working at South Korean teaching hospitals in a study after the introduction of AI documentation systems into practice (Kim et al., 2023).

In the case of a healthcare facility in Africa where the quality of interactions within consultations is not a secondary but an essential part of the therapeutic value of the consultation, this shift in priorities has serious consequences. This relationship, built on seeing and listening with a certain slowness and attentiveness, cannot be provided through algorithmic promptings. There is another, perhaps more direct challenge in the form of AI suggestions for treatments and diagnostics in places where those algorithms were never meant to work; suggestions of tests that facilities lack the infrastructure to carry out, treatments requiring equipment that simply isn't there (Okonkwo et al., 2022).

Table 1 below summarises the comparative behavioral implications of three categories of AI and IoT technology across the key dimensions identified in this review.

Table 1. Comparison of AI and IoT Technologies Across Behavioral and Cultural Dimensions

Factor	AI Diagnostic Tools	IoT Patient Monitoring	Ambient Clinical Intelligence
Patient Trust	Moderate – depends on explainability	High – continuous visibility	Low – often invisible to patients
Clinician Workload	Reduced (diagnostics)	Increased (data review)	Reduced (documentation)
Cultural Fit (Asia/Africa)	Low – trained on Western data	Moderate – hardware barriers	Very Low – language barriers
Risk of Over-reliance	High	Moderate	High

(Source: Authors' compilation based on literature review)

5.3 Dependency, De-Skilling, and New Competency Demands

There is a well-established pattern in human-automation research: when people delegate cognitive work to automated systems over time, the skills involved in doing that work independently can quietly atrophy. Clinical settings are not immune to this. As AI decision-support becomes more deeply embedded in routine practice, concerns about gradual de-skilling are worth taking seriously, even if the longitudinal evidence specific to healthcare remains thin (Lyell & Coiera, 2017). The risk is sharpest for trainees and early-career clinicians in high-volume environments, where the pressure of caseload may leave little room to practise independent reasoning when an algorithmic suggestion is already on the screen. At the same time, AI and IoT adoption is generating an entirely new set of competency demands: critically evaluating algorithmic outputs, explaining AI-generated information to patients in terms they can act on, and engaging with the ethical dimensions of delegating clinical judgement to a system (Whitelaw et al., 2020). The clinician of the near future will need both sets of skills, and training curricula have not yet fully caught up.

6.0 Discussion

6.1 AI and IoT as Environmental Interventions

What this analysis continues to revert to is a misleadingly simple concept: AI and IoT are not just tools which clinicians pick up and put down. They are characteristics of the care environment itself, and as any other aspect of the environment, they change the behavioural circumstances of the spaces they inhabit. The comparison with the physical design is informative. A dark ward, a noisy corridor, a consultation room that lacks privacy are not neutral backdrops. They shape anxiety, performance, and trust. The existence, design, and control of AI and IoT. The systems operate in a very similar manner and affect the way patients seek care, the way clinicians pressurized reason, and the process of building or destroying trust in clinical relationships.

6.2 Equity, Bias, and the Limits of Transferability

One of the threads that run through the findings more persistently than any other is the transferability of AI systems developed in a high-income healthcare setting to Asian, African, or Arabian settings. Most successful diagnostic models have been developed

largely based on data of populations in North America and Europe, leaving patients in other countries underrepresented in a way that can generate quietly inaccurate results (Norori et al., 2021). The most mentioned example is the bias reported by Obermeyer et al. (Obermeyer et al., 2019) but it is not the only one. What that research revealed was not a technical bug but a structural effect that training data distributions that reflect the health inequities that exist will result in the creation of algorithms that reproduce those inequities. That is not likely to be corrected by making adjustments in the margins of an imported model. Instead, what is required is an investment in locally trained, locally controlled AI systems that are built up out of, and answerable to, the clinical realities of the regions in which they will in fact be used.

6.3 Toward Human-Centred, Culturally Aware AI Design

The findings of this review suggest several principles for human-centred, culturally aware design of AI and IoT in Asian, African, and Arabian healthcare settings. First, patient-facing AI interfaces must be designed with health literacy as a primary design constraint, presenting information accessibly with clear explanations of uncertainty and next steps. Second, clinician-facing AI must be designed to support, not supplant, clinical judgment, with interface elements that actively prompt critical evaluation of algorithmic outputs. Third, the interpersonal dimensions of clinical encounters must be actively protected, ensuring that AI-driven documentation does not further reduce the time and attention clinicians give to direct patient communication.

6.4 Operational Framework for Culturally Aware Implementation

- **Environmental Analysis Prior to Deployment:** Conduct a localized workflow analysis prior to rolling out any new technology to determine cognitive bottlenecks and establish a trust network amongst existing relationships.
- **Adaptation through Co-Design and Localization:** Customize generic interfaces for artificial intelligence applications through co-designing the product with the assistance of patients from local demographics, including consideration of their language, health literacy skills, and culture (family involvement).
- **Testing of Behavior Through Simulation:** Test the behavior-changing technology in a simulated clinical setting to observe how clinicians interact with technology through the amount of eye contact, screen time, and automation bias.
- **Ecological Monitoring Following Deployment:** Create feedback loops following deployment to assess alert fatigue on the part of healthcare professionals and techno-anxiety experienced by patients.

7.0 Conclusion and Recommendations

The main thesis of this paper has been that AI and IoT are not a neutral addition to the clinical setting. They vigorously remodel its behavioural ecology. To patients, that re-shaping manifests in new patterns of care-seeking, reconfigured trust relationships, and new vulnerabilities to cognitive overload and techno-anxiety. On the one hand, it manifests itself in the form of cognitive offloading and decreased documentation burden, whereas on the other side, it is expressed in the form of automation bias, reduced patient engagement, and the lack of familiarity with the competencies. All these effects are not homogenous. They are quite different across the cultural, economic, and systemic contexts, and they are especially layered in Asian, African, and Arabian healthcare settings, where the adoption of technologies intersects with the shortage of workforce, data inequity, and relational norms of care that are not incidental but foundational.

This has a number of recommendations. The AI and IoT systems in healthcare must be considered not only in terms of clinical performance, but in terms of their behavioural and environmental-psychological effects, using the conceptual tools that environment-behaviour research has developed to precisely this type of question.

AI and IoT do hold real promise, particularly in settings where specialist shortages and resource constraints make extending care reach both urgent and difficult. The potential to support clinical decision-making, widen service access, and reduce workflow friction is genuine. But that promise and the risk of deepening existing inequities are inseparable realising one while avoiding the other demands that these technologies be designed, deployed, and governed with human behaviour, cultural context, and the therapeutic relationship at the centre.

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Paper Contribution to Related Field of Study

This paper makes an original contribution to environment-behaviour studies by extending the field's conceptual framework to encompass digital healthcare environments. It introduces AI and IoT as categories of environmental intervention subject to E-B research methods and evaluation, and provides an integrative review of the behavioural impacts of these technologies specifically focused on Asian, African, and Arabian healthcare contexts. The paper's dual-framework synthesis of Supportive Design Theory and the Technology Acceptance Model offers a replicable analytical structure for future empirical work in this domain.

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