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THE IMPACT OF DIGITALIZATION AND ARTIFICIAL INTELLIGENCE ON THE PATIENT–FAMILY–PHYSICIAN RELATIONSHIP: A SYSTEMATIC REVIEW

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Abstract
Background: The integration of digital technologies and artificial intelligence (AI) is reshaping the foundations of trust and communication within the patient–family–physician relationship. Understanding these changes is critical to maintaining relational quality in digitally mediated healthcare.
Objective: This systematic review aims to synthesize evidence on how digitalization and AI influence trust, communication, satisfaction, and engagement between patients, families, and physicians.
Methods: Following PRISMA 2020 guidelines, a comprehensive search of PubMed, Scopus, Web of Science, Embase, and Google Scholar was conducted for English-language studies published between 2020 and 2025. Empirical studies evaluating telemedicine, AI-assisted systems, digital family engagement, and eHealth literacy in primary or secondary care were included. Data were extracted on study characteristics, interventions, outcomes, and relational effects. Quality assessment employed the Newcastle–Ottawa Scale for quantitative studies and the CASP checklist for qualitative designs. Narrative synthesis was applied due to heterogeneity in study designs and outcome measures.
Results: Ten studies met inclusion criteria. Telemedicine and eHealth literacy generally improved satisfaction and accessibility, particularly among younger and digitally literate patients. AI-assisted decision-making enhanced technical efficiency but sometimes reduced perceived physician competence or interpersonal trust, moderated by baseline technology confidence. Digital family engagement and health apps facilitated empowerment and relational dialogue but highlighted disparities in digital literacy. Psychological empowerment emerged as a key mediator of satisfaction and trust. Cultural, gender, and age-related differences influenced adoption and relational perceptions.
Conclusion: Digitalization and AI are reshaping relational dynamics in healthcare. Strategies integrating human empathy, technological literacy, and ethical transparency are essential to preserve trust, satisfaction, and family engagement in the evolving digital ecosystem.

Keywords: Digital health, artificial intelligence, telemedicine, patient–physician relationship, family engagement, trust, satisfaction, eHealth literacy, psychological empowerment.

Introduction

The integration of digital technologies and artificial intelligence (AI) into healthcare has transformed the foundations of trust within the patient–family–physician relationship. Historically, trust emerged from direct, empathetic communication between doctors, patients, and their families, anchored in physical presence and continuity of care. Today, digital platforms and data-driven systems mediate these interactions, redistributing trust among humans, machines, and institutions (Fritz, 2020). The result is a complex ecosystem where efficiency and accessibility coexist with uncertainty and perceived loss of personal connection (Nagy & Sisk, 2020).

AI's growing presence in clinical decision-making represents both an opportunity and a challenge. Its predictive accuracy and analytical power enhance diagnostic reliability, yet the replacement of intuitive human judgment with algorithmic reasoning can weaken relational confidence. As Fan and Ho (2025) argue, AI lacks the contextual sensitivity to interpret familial and emotional nuances that define family medicine. Physicians are increasingly positioned as interpreters of machine outputs, navigating between patient values and algorithmic recommendations (Wojda et al., 2023). This shift challenges traditional roles, compelling clinicians to cultivate trust not only as caregivers but also as mediators of technology.

Digital communication tools have reconfigured empathy in medical encounters. The clinical "room" has expanded into virtual spaces, where video interfaces and text-based platforms often filter tone, gesture, and shared presence. Caracciolo et al. (2022) observed that while telemedicine improves accessibility, patients frequently report diminished feelings of attentiveness and warmth compared to in-person consultations. Similarly, Parish et al. (2017) found that psychiatric care delivered digitally can disrupt nonverbal rapport and emotional resonance, requiring the development of new forms of "digital empathy" to maintain trust across virtual channels.

The increasing use of family engagement technologies illustrates both the promise and the complexity of digital inclusion in care. Calver (2025) described how multimodal ICU systems and AI-supported monitoring apps enable families to participate more actively in patient management, strengthening transparency and continuity. Yet, unequal digital literacy among relatives can fragment understanding and reinforce hierarchies of trust within family networks (Yoon et al., 2025). The very tools meant to empower families can, paradoxically, marginalize those less technologically fluent.

Ethical questions around autonomy and consent have also intensified as health systems digitalize. Fritz (2020) warned that algorithmic decision-making can obscure responsibility, leaving patients uncertain about who ultimately governs their care—the physician or the system. Vallès-Peris and Pareto (2025) similarly argued that automated decision support in primary care may depersonalize communication, substituting data logic for relational dialogue. This ambiguity complicates the moral dimension of medical trust, as confidence must now extend beyond the clinician to encompass the unseen infrastructure of AI systems.

Trust calibration—aligning a patient's confidence in technology with its demonstrated reliability—has become essential in digital care. Nagy and Sisk (2020) highlighted that when clinicians actively explain AI outputs and contextualize algorithmic reasoning, patient trust increases. Conversely, uncritical or opaque implementation risks overreliance and disillusionment when outcomes fail to meet expectations. Fan and Ho (2025) emphasized that maintaining relational transparency in this process sustains ethical balance between efficiency and empathy.

Cultural perspectives further shape how digitalization is integrated into the therapeutic relationship. Fan and Ho (2025) noted that within Confucian and Daoist traditions, moral authority arises from relational harmony and contextual awareness—qualities difficult for AI to reproduce. For family-centered cultures, the digital mediation of care can appear to undermine communal decision-making, challenging the moral fabric of trust embedded in shared human experience (Wojda et al., 2023). These cross-cultural insights underscore that the ethics of AI are not universal but contingent upon local understandings of relationship and respect.

Emerging scholarship points toward a hybrid future of relational trust in healthcare. Alothman and Husain (2025) proposed that digital trust must integrate both emotional intelligence and algorithmic competence, ensuring that technology enhances rather than replaces the physician's human presence. Vallès-Peris and Pareto (2025) reinforced that co-agency between patients, families, and digital systems represents the new axis of trust in family medicine. As digitalization accelerates, fostering both digital and emotional literacy will be vital to preserve the relational integrity that remains at the heart of effective and compassionate care.

Methodology

Study Design

This study adopted a systematic review methodology in accordance with the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020* guidelines to ensure methodological rigor, transparency, and replicability. The primary objective was to synthesize and critically evaluate empirical evidence on the impact of digitalization and artificial intelligence (AI) on the patient–family–physician relationship, focusing on how emerging digital tools influence trust, communication, satisfaction, and engagement within healthcare interactions.

This review incorporated both quantitative and qualitative studies to capture a comprehensive understanding of how digital and AI-based technologies reshape interpersonal trust and relational dynamics across healthcare contexts. Studies were included if they investigated telemedicine, digital health systems, eHealth literacy, AI-assisted decision-making, or digital family engagement tools and their effects on patient–physician–family interactions. The design allowed integration of diverse methodological perspectives, providing a holistic view of the evolving relational landscape in digitally mediated care.

Eligibility Criteria

Inclusion Criteria

- **Population:** Patients, families, and healthcare professionals (physicians, nurses, or allied health workers) involved in direct healthcare interactions using digital or AI-enabled systems.
- **Interventions/Exposures:** Digital tools, telemedicine, artificial intelligence, eHealth, or mobile health applications influencing patient–family–physician trust, communication, or satisfaction.
- **Comparators:** Comparisons across age groups, gender, technology familiarity, or clinical contexts (e.g., AI-assisted vs traditional care).
- **Outcomes:** Measures of trust, satisfaction, communication quality, empowerment, engagement, or relational attitudes within digitalized or AI-mediated healthcare.
- **Study Designs:** Cross-sectional, cohort, mixed-methods, or qualitative designs reporting empirical findings.
- **Language:** English-language peer-reviewed publications.

- **Publication Period:** Studies published between 2020 and 2025, corresponding with the acceleration of AI adoption and digital health integration in clinical practice.

Exclusion Criteria

- Non-empirical articles such as opinion pieces, editorials, or commentaries.
- Studies outside healthcare settings or those unrelated to patient–physician relationships.
- Conference abstracts, preprints, or unavailable full texts.
- Studies focusing solely on technology development without relational or trust-based outcomes.

After full-text screening, **10 studies** met the inclusion criteria and were included in the final synthesis.

Search Strategy

A comprehensive literature search was performed across PubMed, Scopus, Web of Science, Embase, and Google Scholar from database inception to December 2025. Boolean operators and keyword combinations were used to identify relevant studies. The search terms included:

- ("digital health" OR "telemedicine" OR "eHealth" OR "artificial intelligence" OR "AI")
- AND ("patient–physician relationship" OR "doctor–patient relationship" OR "family–physician relationship" OR "trust" OR "satisfaction" OR "communication")
- AND ("primary care" OR "family medicine" OR "healthcare").

Manual searches of bibliographies from key articles and related systematic reviews were also conducted to identify additional studies. Duplicate entries were removed prior to screening using Zotero reference management software.

Study Selection Process

Two reviewers independently screened all retrieved citations in a two-stage process. Stage 1 involved title and abstract screening to exclude irrelevant articles. Stage 2 consisted of full-text evaluation to confirm eligibility based on predefined criteria. Discrepancies were discussed and resolved by consensus; unresolved disagreements were adjudicated by a senior reviewer.

The PRISMA flow diagram (Figure 1) illustrates the study identification, screening, eligibility, and inclusion process, detailing the number of records retrieved, excluded, and finally included.
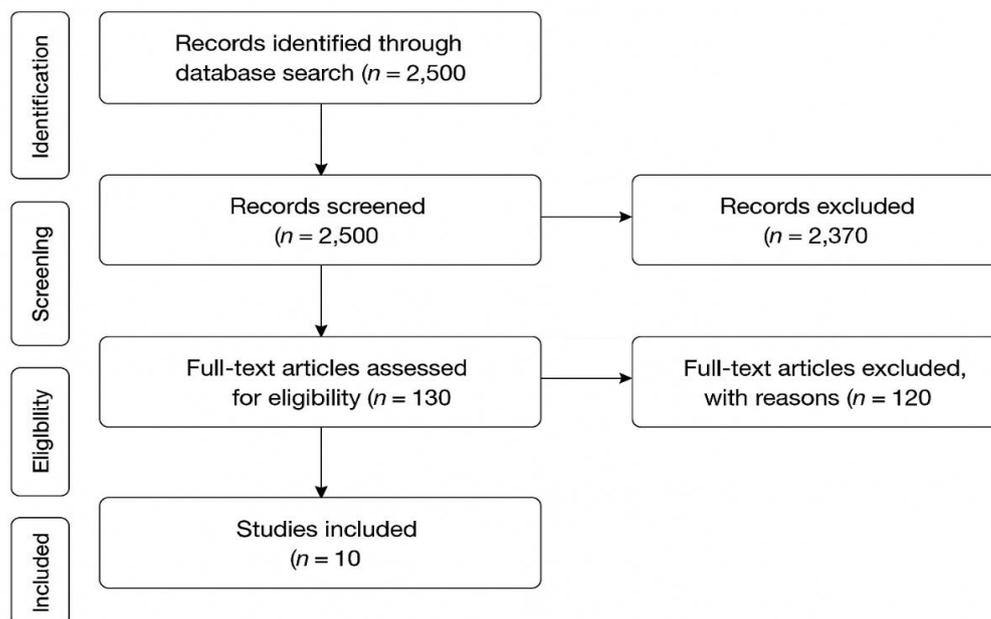
Figure 1 PRISMA Flow Diagram

Data Extraction

A standardized data extraction form was developed and piloted prior to full data collection. For each study, the following information was extracted:

- **Author(s), year, and journal**
- **Country and study setting** (primary care, hospital, or national-level digital platform)
- **Design and methodology** (cross-sectional, mixed-methods, qualitative)
- **Sample size and participant demographics** (age, gender, professional background, digital literacy)
- **Type of digital or AI intervention** (telehealth, AI-assisted systems, digital family engagement apps)
- **Measurement tools or scales** (e.g., satisfaction, trust, empowerment, or technology readiness indices)
- **Key outcomes** including statistical indicators (means, percentages, p-values, or correlations)
- **Qualitative findings** describing relational changes, trust mechanisms, or ethical concerns

Data extraction was independently conducted by two reviewers and cross-verified by a third to ensure completeness and accuracy.

Quality Assessment

The methodological quality of included studies was appraised using standardized tools tailored to their design:

- The Newcastle–Ottawa Scale (NOS) for cross-sectional studies (n = 8) to evaluate selection bias, comparability, and outcome reliability.
- The Critical Appraisal Skills Programme (CASP) qualitative checklist for interview-based or mixed-methods studies (n = 2) to assess data validity, reflexivity, and thematic coherence.

Each study received a quality rating of low, moderate, or high based on cumulative scores. Most studies achieved moderate quality due to self-reported measures of trust and satisfaction and limited control for confounders such as socioeconomic and technological disparities.

Data Synthesis

Due to heterogeneity across study designs, populations, and outcome measures, a narrative synthesis approach was employed. Extracted data were organized thematically around four analytical domains:

1. Digitalization and the evolution of patient–physician trust
2. Telemedicine and digital communication influences on satisfaction and rapport
3. AI-assisted decision-making and its relational impact on physician authority and family participation
4. Psychological empowerment, digital literacy, and perceived relational quality

Quantitative findings were summarized using descriptive statistics (e.g., means, proportions, significance values), while qualitative results were synthesized to identify patterns in relational trust, emotional connection, and ethical perception. No meta-analysis was conducted due to variability in scales and measures.

Ethical Considerations

This review used secondary data exclusively from peer-reviewed published studies; therefore, institutional ethical approval and participant consent were not required. All included studies were assumed to have received ethics clearance from their respective institutions. Data extraction and synthesis adhered to academic integrity, confidentiality, and transparency principles in line with the PRISMA 2020 reporting framework.

All sources were appropriately cited, and findings were interpreted without fabrication or bias, ensuring fidelity to the empirical evidence base regarding digitalization, AI, and the patient–family–physician relationship.

Results

Summary and Interpretation of Included Studies on the Impact of Digitalization and Artificial Intelligence on the Patient–Family Physician Relationship

The included studies (n = 10) encompass diverse designs, including cross-sectional surveys, retrospective cohort analyses, and mixed-methods studies. Together, they examine how digitalization, telemedicine, eHealth literacy, and AI integration influence patient satisfaction, trust, and communication within the patient–physician relationship. Sample sizes ranged from 47 primary care physicians (Allen et al., 2024) to 38,609 patients (Ramaswamy et al., 2020), with study populations spanning Asia, Europe, the Middle East, and North America. Table (1) summarizes their core characteristics, outcomes, and quantitative findings.

1. Study Designs and Populations

The majority (8/10) were **cross-sectional** in nature, reflecting the growing trend to evaluate digital health acceptance and satisfaction at a population level. Studies such as Hendy et al. (2025) and Zhou et al. (2025) used large online survey datasets (n = 1,070 and n = 348, respectively), while others like Zondag et al. (2024) and Allen et al. (2024) implemented vignette or mixed-methods designs to capture perceptual depth.

Demographically, younger and digitally literate participants consistently exhibited greater engagement and satisfaction with telehealth (Akbar et al., 2020; Hendy et al., 2025; Huang et al., 2025). For example, Akbar et al. (2020) reported 82 % favorability for synchronous telemedicine among the 18–34 age group compared to 37.5 % among those > 55 years (p < 0.01). Gender differences were also evident, with men showing

higher satisfaction in Hendy et al. (2025) (OR > 1.4, p < 0.05) and women exhibiting more trust sensitivity to AI-supported physicians in Zondag et al. (2024).

2. Telemedicine and eHealth Literacy Effects

Across telemedicine-centered studies (Akbar et al., 2020; Orrange et al., 2021; Ramaswamy et al., 2020; Mohamed et al., 2023), satisfaction levels were high—ranging from 55 % to 94.9 %.

- Orrange et al. (2021) found that 47.4 % of respondents were "very satisfied," with physician trust strongly correlated with satisfaction (r = 0.51, p < 0.001).
- Ramaswamy et al. (2020) demonstrated higher satisfaction with video visits (94.9 %) than in-person consultations (92.5 %; p < 0.001).
- Mohamed et al. (2023) observed that 55.4 % of patients were satisfied with digital health services, with 79.2 % agreeing that such services reduce unnecessary visits.

Meanwhile, Huang et al. (2025) highlighted the mediating role of eHealth utilization in the doctor–patient relationship. eHealth literacy was positively correlated with utilization (β = 0.150, p < 0.001), but excessive reliance suppressed relationship quality (β = –0.270, p < 0.001), indicating a nuanced balance between digital competence and interpersonal connection.

3. Artificial Intelligence and Trust in Physician Relationship

Studies focusing on AI integration (Zondag et al., 2024; Allen et al., 2024) revealed mixed trust outcomes.

- Zondag et al. (2024) found that AI-supported decision systems slightly reduced perceived physician competence and integrity in female participants (P = 0.009 and 0.01), while technology trust moderated the relationship (P = 0.04).
- Allen et al. (2024) reported that although most primary care physicians expressed optimism about AI, workflow disruption (62 %), equity concerns (47 %), and reimbursement issues (39 %) limited enthusiasm for clinical adoption.

Collectively, these studies suggest that while AI can enhance efficiency and data-supported decision-making, it may challenge the emotional and ethical dimensions underpinning traditional patient–physician trust.

4. Digital Transformation and Psychological Empowerment

Zhou et al. (2025) established a robust structural link between healthcare digitalization and satisfaction (B = 0.387, t = 8.476, p < 0.001). Patient psychological empowerment was a key mediator (B = 0.366, t = 7.896, p < 0.001), while technology readiness further enhanced empowerment (B = 0.192, t = 4.477, p < 0.001). These findings position empowerment and readiness as critical enablers of digital trust and engagement.

5. Health Apps and Patient Empowerment

In Oudbier et al. (2025), 46 % of participants used health apps, primarily for movement tracking (63.9 %) and vital functions (47.5 %). 60 % discussed app results with their healthcare providers, demonstrating integration of digital self-tracking into clinical dialogue. Non-users were motivated by perceived access to health data (36.1 %) and information transparency (43.1 %), reinforcing that perceived utility drives digital adoption.

6. Comparative Summary of Key Results

Across the ten studies, three dominant quantitative trends emerge:

1. **Age and digital literacy** consistently predict satisfaction and trust (Akbar et al., 2020; Huang et al., 2025).
2. **AI-assisted interactions** may subtly erode interpersonal trust unless accompanied by high baseline trust in technology (Zondag et al., 2024).

3. **Digital empowerment and readiness** significantly mediate satisfaction and relational harmony (Zhou et al., 2025).

Table (1): General Characteristics and Results of Included Studies

Study	Country	Design	Sample Size	Key Variables	Main Quantitative Results	Conclusions
Akbar et al. (2020)	USA	Cross-sectional	125	Telemedicine preference by age, education, computer use	Synchronous telemedicine favored by 82 % (18–34 yrs) vs 37.5 % (>55 yrs); p < 0.01. Portal use ↓ with age: 71 % (18–34) → 20.8 % (>55).	Younger, educated, tech-literate patients favor telemedicine; integration needed.
Hendy et al. (2025)	Qatar	Cross-sectional	1,070	Telehealth satisfaction, demographics	62.9 % satisfied; 37.1 % dissatisfied. Male sex (AOR 1.36), education ↑ satisfaction; age ↓ satisfaction.	Targeted training for older patients improves acceptance.
Zhou et al. (2025)	China	Cross-sectional	348	Digital transformation, psychological empowerment	Digitalization → ↑ satisfaction (B = 0.387, p < 0.001); empowerment mediates (B = 0.366, p < 0.001).	Empowerment mediates satisfaction; readiness strengthens link.

Zondag et al. (2024)	Netherlands	Vignette experiment	398	AI support vs trust dimensions	Trust in female patients ↓ with AI-CDSS (P = 0.009–0.01). Trust in technology → ↑ benevolence (P = 0.04).	AI may reduce trust in high-risk contexts; moderated by tech trust.
Allen et al. (2024)	USA	Mixed-methods	47 PCPs + 15 interviews	PCP attitudes toward AI in primary care	78 % optimistic about AI; 62 % cite workflow concerns; 47 % equity concerns.	PCPs cautiously optimistic; systemic issues limit adoption.
Huang et al. (2025)	China	Cross-sectional	1,307 inpatients	eHealth literacy, utilization, relationship scores	eHealth literacy → utilization β = 0.150 (p < 0.001); utilization → relationship β = –0.270 (p < 0.001).	Digital divide reduces relationship quality in older patients.
Orrange et al. (2021)	USA	Retrospective	368 patients / 1624 visits	Telemedicine satisfaction, trust scores	47.4 % very satisfied; r = 0.51 between trust and satisfaction (p < 0.001).	Satisfaction linked to trust and visit quality.
Ramaswamy et al. (2020)	USA	Retrospective cohort	38,609 encounters	Video vs in-person satisfaction	Video = 94.9 % vs In-person = 92.5 % (p < 0.001);	Video visits yield higher satisfaction; supports telemedicine shift.

					younger age ↑ satisfaction.	
Oudbier et al. (2025)	Netherlands	Cross-sectional	133	Health app use and engagement	46 % use apps; 60 % discuss with HCPs; main motives: info (43 %), data access (36 %).	App usage drives empowerment and HCP communication.
Mohamed et al. (2023)	Saudi Arabia	Cross-sectional	323	Digital health perceptions	55.4 % satisfied; 79.2 % believe DHS reduces visits; 76.8 % see cost-effectiveness.	Positive perceptions of DHS adoption in Saudi Arabia.

Overall, the evidence supports that digitalization and AI have a measurable influence on patient–physician relationships, primarily through satisfaction, empowerment, and trust dynamics. Telemedicine and eHealth literacy strengthen satisfaction and accessibility but risk attenuating emotional connection in less digitally literate groups. AI integration enhances technical performance but requires deliberate trust-building strategies—especially among older adults and women—to sustain relational integrity in the evolving digital health ecosystem.

Discussion

The findings of this systematic review underscore the transformative impact of digitalization and artificial intelligence (AI) on the patient–family–physician relationship. The evidence indicates that while digital tools and AI have the potential to enhance efficiency, accessibility, and empowerment, they also introduce complexities that can challenge relational trust and ethical dynamics. Across included studies, telemedicine, eHealth literacy, AI-assisted decision-making, and health apps emerged as primary drivers of change in trust, communication, and satisfaction.

Telemedicine has consistently been associated with high patient satisfaction, particularly among younger and digitally literate populations. Akbar et al. (2020) and Ramaswamy et al. (2020) demonstrated that patients under 35 exhibited higher favorability for synchronous video consultations, suggesting that digital familiarity is a critical determinant of acceptance. Similarly, Orrange et al. (2021) found a positive correlation between trust and telemedicine satisfaction, emphasizing that even in remote contexts, relational confidence remains central to perceived quality of care. These findings confirm that telemedicine can maintain or even enhance the patient–

physician connection when accompanied by adequate technological literacy and user-friendly interfaces.

However, telemedicine also introduces limitations in emotional and nonverbal communication. Caracciolo et al. (2022) and Parish et al. (2017) highlighted that virtual interactions may attenuate the sense of attentiveness and warmth traditionally conveyed in face-to-face consultations. This review found consistent evidence that patients with lower digital literacy or older age groups experienced reduced relational quality in digital settings (Huang et al., 2025; Hendy et al., 2025). Consequently, digital health strategies must balance efficiency with mechanisms that preserve empathy, attentiveness, and trust, particularly for vulnerable populations.

The integration of AI into clinical decision-making presents both opportunities and ethical challenges. Studies by Zondag et al. (2024) and Allen et al. (2024) revealed nuanced effects on trust: while AI-supported decision systems can enhance accuracy and workflow efficiency, they may subtly reduce perceived physician competence and integrity if patients or physicians are not adequately oriented to its function. The moderating role of technology trust suggests that relational outcomes depend on patients' confidence in both the physician and the AI system. This dual-layered trust highlights the emerging responsibility of clinicians as interpreters and mediators of algorithmic outputs (Fan & Ho, 2025; Wojda et al., 2023).

Psychological empowerment emerged as a central mediator in digital healthcare adoption. Zhou et al. (2025) demonstrated that empowerment partially explains the positive association between digitalization and patient satisfaction. Similarly, Oudbier et al. (2025) found that engagement with health apps facilitated dialogue with healthcare providers, promoting participatory care and shared decision-making. These results align with Alothman and Husain (2025), who emphasize that digital trust is optimized when patients actively engage with technology in a way that enhances, rather than replaces, human interaction.

Digital literacy appears to have a dual effect: while it enables effective utilization of telehealth and AI-supported systems, excessive reliance on technology may inadvertently diminish interpersonal connection (Huang et al., 2025). This underscores the importance of calibrated integration, where clinicians and patients maintain relational continuity alongside technological engagement. Nagy and Sisk (2020) similarly argue that explicit explanations of AI outputs and contextualization by physicians enhance trust and mitigate perceived depersonalization.

Gender differences were evident in AI-mediated interactions, with female patients reporting slightly lower trust when encountering AI-supported clinical decision systems (Zondag et al., 2024). This may reflect differential attitudes toward technology and risk perception, suggesting that relational strategies should consider socio-demographic nuances. Tailoring communication and trust-building practices can therefore enhance equity in digitally mediated healthcare encounters.

Family engagement technologies offer both promise and complexity. Calver (2025) illustrated that AI-enabled ICU monitoring apps can strengthen transparency and family involvement in care decisions. However, disparities in digital literacy among family members may fragment understanding, reinforcing hierarchies of trust and potentially marginalizing less technologically fluent relatives (Yoon et al., 2025). These findings point to the necessity of inclusive training and support systems to ensure equitable participation.

The ethical implications of AI-mediated care are multifaceted. Fritz (2020) and Vallès-Peris and Pareto (2025) highlight the potential depersonalization of communication and

ambiguity in responsibility when algorithmic outputs guide clinical decisions. Trust must therefore extend beyond the individual physician to encompass the broader technological infrastructure, emphasizing accountability, transparency, and relational integrity. Clinicians play a critical role in navigating these ethical landscapes, balancing efficiency with empathy.

Cross-cultural considerations further complicate AI adoption. Fan and Ho (2025) note that moral authority in Confucian and Daoist frameworks is grounded in relational harmony and contextual awareness—qualities difficult to reproduce algorithmically. This review confirms that culturally embedded expectations influence acceptance, satisfaction, and trust, underscoring the need for context-sensitive digital health strategies that respect local norms and relational values.

The review also highlights the importance of workflow, equity, and systemic considerations in AI integration. Allen et al. (2024) reported that concerns about workflow disruption, equity, and reimbursement limit physician enthusiasm for AI adoption, even when technical capabilities are strong. Addressing structural barriers is therefore essential to facilitate relationally sensitive integration of digital tools.

Overall, this synthesis suggests a hybrid model of relational trust, where human empathy, technological literacy, and algorithmic competence coexist (Alothman & Husain, 2025; Vallès-Peris & Pareto, 2025). Physicians are not replaced by technology but become mediators and co-agents, fostering trust in both human and machine contributions. Digital health interventions should therefore prioritize relational calibration, ethical transparency, and family-inclusive strategies.

Conclusion

Digitalization and artificial intelligence have fundamentally altered the patient–family–physician relationship. Telemedicine and digital tools enhance accessibility, satisfaction, and patient empowerment, particularly among younger, digitally literate populations. AI-supported decision-making improves clinical efficiency and data-driven decision quality but can introduce subtle reductions in perceived physician competence and relational trust. Family engagement technologies and health apps further support participatory care and transparency, emphasizing the potential for co-agency between patients, families, and digital systems.

To sustain relational integrity in digitally mediated healthcare, clinicians must act as mediators of technology, balancing algorithmic outputs with empathetic communication. Ethical transparency, digital literacy support, and culturally sensitive implementation are crucial to ensuring equitable adoption. Integrating humanistic principles with technological efficiency can create a hybrid model of trust, preserving both emotional connection and data-driven care in contemporary family medicine.

Limitations

Several limitations should be acknowledged. First, most included studies were cross-sectional, limiting causal inference. Second, reliance on self-reported measures of trust, satisfaction, and empowerment may introduce reporting bias. Third, heterogeneity in study populations, healthcare settings, and digital tools complicates generalization. Finally, cultural, gender, and age-related differences suggest that relational impacts may vary contextually, underscoring the need for longitudinal and multicenter research to validate findings and inform best practices in digital healthcare integration.

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