A SYSTEMATIC LITERATURE REVIEW: AFRICAN AMERICAN VIEWS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN HEALTHCARE

by

DAVID M. CULVER III

M.B.A., Loyola University Maryland, 2009

M.S., Loyola University Maryland, 2012

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African American views of artificial intelligence and machine learning in healthcare

David Culver, *Middle Georgia State University, USA, david.culver@mga.edu*

Abstract

Artificial Intelligence (AI) promises improved healthcare efficiency, accuracy and access. However, perspectives from marginalized groups like African Americans regarding medical AI remain overlooked despite histories of exploitation shaping their continued skepticism. This study conducted a systematic literature review to synthesize current knowledge on how cultural beliefs, accessibility barriers and legacy mistreatment impact African American patients' perceptions, acceptance and utilization of AI in healthcare. An analysis of peer-reviewed articles uncovered no studies directly addressing this demographic. Broader research reveals general patient optimism tempered by fears of biased results, though attitudes vary demographically with greater AI hesitation among older patients. Realizing widespread perceived AI benefits requires equitable community engagement in development and policymaking to build trust through unbiased data, responsible transparency, and preserving valued human care. Key questions persist around representation in medical AI data and ideal routes for securing adoption among historically disenfranchised patients. Next phases demand dedicated focus on vulnerable populations to promote health equity. Progress necessitates getting AI right for marginalized groups by addressing trust divides and producing methods for acceptance and access. This review unveils where current knowledge gaps lie if emerging innovations aim to empower all.

Keywords: African American; artificial intelligence; healthcare; historical mistrust; machine learning; utilization; perception; accessibility

Introduction

Artificial Intelligence (AI) is revolutionizing all areas of medicine, from improving diagnostic techniques to providing doctors with treatment advice (Haleem et al., 2019). AI has quickly become a mainstay in medical science. Meanwhile, its implementation across healthcare presents trust-related hurdles which must be carefully navigated before full integration takes place. Although prior research has explored patient trust in AI healthcare applications in a broad sense, there has been little focus specifically on the perspectives of minority groups, including African American communities, who have faced systemic marginalization and mistreatment within traditional healthcare institutions (Blendon & Benson, 2022; Armstrong et al., 2007). Given the long standing and continuing distrust towards the healthcare establishment among African Americans, examination of this population's unique views on leveraging AI solutions in medicine is needed to ensure technologies meet their needs and priorities.

As AI aims to help guarantee equitable access for all patients, considering African Americans' distinct vantage point regarding its usage is vital. Trust plays an integral role in shaping people's perception of AI's application in healthcare (Washington, 2019); thus this study attempts to explore any correlations between African American distrust of established institutions, their perspectives on AI uses for medicine, and the strategies employed by this community when adopting these emerging technologies. By emphasizing African American viewpoints, this research contributes uniquely to the body of literature that has previously overlooked minority positions on AI in favor of generalized patient attitudes. Focusing on the attitudes of this marginalized group will fuel understanding and design of more accessible, trustworthy, and culturally-conscious AI systems.

Problem Statement

While AI advances promise improved diagnosis and treatment in healthcare (Blease et al., 2019), there exists a considerable gap in comprehending how African Americans' earnest skepticism of the healthcare industry, fueled by historical exploitation and discrimination (Washington, 2019), influences their perception and use of these emerging technologies (Fritsch et al., 2022). Without investigation, adverse consequences could persist and intensify, increasing healthcare inequities from AI biased by non-inclusive data (Kostick-Quenet et al., 2022), and minimal adoption across distrusting communities. Research to uncover how historical oppression shapes African American receptiveness of healthcare AI is needed. Gaining insight into this context will expose barriers to adopting these technologies while also driving progress on patient-centered solutions which align with cultural needs for greater inclusiveness (Kennedy et al., 2007). If emerging technology cannot earn the trust of minority groups, promised innovations will fail to enhance health equity and access.

Purpose of Study

This research study seeks to assess, understand, and synthesize existing knowledge on how African American patients perceive and use AI tools in healthcare settings while taking into account their beliefs, historical distrust and accessibility issues. By investigating these factors the researcher hopes to provide insight into those that influence patient attitudes and beliefs when adopting Artificial Intelligence technologies in healthcare settings.

Research Question

RQ1: What is the impact of cultural beliefs on the perception and utilization of AI tools in healthcare among African-American patients?
RQ2: What is the impact of historical distrust on the perception and utilization of AI tools in healthcare among African-American patients?
RQ3: What is the impact of accessibility challenges on the perception and utilization of AI tools in healthcare among African-American patients?

Research Objectives

This research project aims to explore how American patients perceive the use of intelligence tools, by healthcare providers. The study will examine factors that may influence the opinions and concerns of American patients in relation to AI integration in healthcare. By conducting a Systematic Literature Review (SLR) this research seeks to enhance our understanding of how American patients view and trust AI driven healthcare solutions specifically designed for them (Kitchenham, 2004). An SLR of this nature could promote the acceptance of AI technologies, in healthcare while also addressing any disparities that may arise.

Review of the Literature

A History of Distrust

African Americans' mistrust of healthcare stems from its history of exploitative medical experiments on enslaved Africans who were subjected to such brutal experimentation due to racist perceptions of inferiority (Washington, 2019). This includes subjecting innocent black men to unethical research like the Tuskegee Syphilis Study, where hundreds were intentionally denied treatment resulting in lasting trust issues (Washington, 2019). A qualitative study illuminates this legacy, showing how trust in physicians is

determined by perceptions of competence while distrust stems from perceived incompetence, profit motives, racism and experimentation with routine care (Jacobs et al., 2006). Trust promotes openness in seeking care, truthfulness, and compliance with treatment plans. On the other hand, distrust has the opposite effect, potentially causing providers to alter course or withhold therapies (Jacobs et al., 2006). Although physician race was less consequential in terms of language/cultural barriers, further research with larger samples beyond physicians is still necessary to understand complex attitudes among African Americans. The study demonstrated how past exploitation and ongoing discrimination affect trust, distrust and healthcare behaviors among African Americans.

Current Trust Issues in Medical Industry

Ongoing mistreatment and discrimination within the healthcare system, including racial disparities in accessing quality care, unequal treatment from providers, and persistent staff bias continues the mistrust among African Americans (Washington, 2019). Frequent challenges in receiving timely diagnosis, treatments, or equitable services increases this mistrust. Concerns like these were echoed in a recent study that looked into why African Americans with diabetes and high blood pressure don't take their medications as prescribed. The study found that distrust for doctors and the healthcare system as a whole was a major obstacle, along with treatment cost, access, and cultural norms (Hall & Heath, 2021). Further research confirms higher levels of healthcare system distrust, particularly values distrust, among African Americans along with greater perceived discrimination (Armstrong et al., 2013). Sociodemographics didn't have much of an effect on this difference in distrust between African Americans and whites, but memories of racial discrimination did (Armstrong et al., 2013). This shows how important it is to get rid of discrimination. People have always been careful when they get involved with healthcare, but new efforts to promote variety, acknowledgement, community involvement, and fair access (Washington, 2019) could help heal trust gaps. To rebuild trust, it's important to get rid of discrimination and treat everyone equally (Armstrong et al., 2013).

Evolution of AI

Artificial Intelligence (AI) has an impressive history dating back to 1956 when formal AI research began at the Dartmouth Conference, where mathematicians and computer scientists first convened to discuss it (Honavar, 2006). AI has undergone dramatic advances across domains and become an invaluable tool defined broadly as “machine intelligence” (Siau & Yang, 2017) that gathers user data to emulate human intelligence, though not all methods mimic biology (McCarthy, 2004). AI is becoming crucial for healthcare diagnosis and management by giving professionals fast, precise information (Kumar et al., 2022). As AI advances, it also brings opportunities as well as challenges (Liyanage et al., 2019). Continued research is vital on issues like reliability, accuracy, building trust between technologies and professionals, and thoughtful implementation alongside doctors. This will aid in the optimization AI capabilities used for diagnostics and treatments.

Artificial Intelligence in Healthcare

Though Artificial Intelligence has made strides across areas of medical services from preliminary diagnosis to record management with the potential to become a central component in healthcare (Asan et al., 2020; Secinaro et al., 2021), its usage also presents distinct challenges as adopters must account for rare medical problems and ensuring vulnerable populations are represented. Since sufficient data may not exist for them; case-by-case analysis is required based on available data, care type, and population (Asan et al., 2020). While AI has competitive advantages over human diagnosis by efficiently interpreting vast datasets, it relies on structured data, limiting inputs, and even advanced techniques hit ceilings once developed (Kumar et al., 2022; Secinaro et al., 2021; Young et al., 2021). AI has strengths in expediting

informed decisions, but weaknesses remain around data consumption, processing flexibility, and adequate representation of minority groups that require thoughtful consideration.

Bias Issues Healthcare AI

A major factor in equity issues with healthcare AI stems from inadequate diversity in training data sets for deep learning models, posing challenges for maintaining demographic information during necessary data deidentification for privacy purposes (Yi et al., 2022). This lack of diversity and representation presents issues in dermatology as well, where machine learning has potential clinical applications in diagnosis, treatment, and risk analysis. Systematic reviews reveal many dermatological imaging datasets underrepresent certain groups, leading models to train primarily on fair-skinned individuals and failing to generalize to minorities (Kleinberg et al., 2022). This underrepresentation can lead to disease severity, complexity, and differing presentations in skin of color. To address these disparities, research is needed to determine bias and its implications on equitable healthcare. Collecting and documenting demographic variables before deidentification combined with regular audits during collections and curation could build more representative datasets (Yi et al., 2022). There is currently a lack of methods for evaluating and recording diversity in data. Implementing practices would encourage inclusivity and combat biases. To enhance the perception of healthcare among African Americans it is crucial to take actions such as reporting information maintaining equitable representation across different groups, in the data implementing strategies to reduce bias and actively seeking diversity. This approach would enable AI systems to provide accurate healthcare for populations that have been historically underrepresented.

Patient Perceptions of Artificial Intelligence in Healthcare

Opinions on Artificial Intelligence technology among healthcare patients differ considerably, with studies finding generally positive attitudes (Young et al., 2021), while others highlight concerns or the desire for human oversight (Fritzsch et al., 2022; Richardson et al., 2022; Xiang et al., 2020). Young et al. 2021 conducted a systematic review that revealed generally positive attitudes while emphasizing the need to better understand patient acceptance of AI technologies - though minority group perspectives remain understudied; African Americans' experience with medical exploitation has fostered cultural mistrust that could affect how they accept innovations like AI (Washington, 2019; Lee & Rich, 2021).

Fritsch et al. (2022) investigated more subtle attitudes that included openness to AI aiding healthcare access while trust issues persisted, showing gaps regarding cultural mistrust in AI contexts and discrepancies regarding attitudes. To successfully integrate AI solutions in healthcare settings ethically is crucial if historically exploited populations are to develop trust. Promoting diversity and mitigating bias are essential steps toward creating trustworthy AI data and solutions for marginalized groups such as African Americans.

Methodology

This study utilized a Systematic Literature Review (SLR) method to identify, assess and interpret research on the subject (Kitchenham, 2004). The systematic review followed an 8 step process proposed by Okoli (2015) which included planning, selection, extraction and execution phases. This approach ensures a reproducible and high quality examination of literature, to the research topic (Dingsoyr & Dyba, 2008; Fink, 2019; Petticrew & Roberts, 2006).

Specifically the 8 step procedure consists of the following (Okoli, 2015);

1. Clarifying the purpose and objectives of the literature review.
2. Developing focused research questions to guide the review.
3. Identifying sources and devising a search strategy.

4. Applying screening criteria and quality assessment measures.
5. Extracting and categorizing data from chosen studies.
6. Synthesizing evidence pertaining to the research questions.
7. Interpreting. Determining their implications.
8. Presenting the reviewed evidence, in a coherent manner.

The study employed a set of criteria to assess the quality and significance of the literature, which included the following: 1) The literature's relevance to comprehending African American viewpoints, beliefs, and desires on AI technologies in healthcare; 2) An empirical foundation supported by a well-defined research design and methodology; 3) Details about the sample, data collection methods, analysis protocols, and limitations that were recognized show the level of rigor; 4) Scholarly work published within the last ten years unless it offers historical context.

This literature review attempts to ensure transparency, reproducibility, and a thorough synthesis of evidence that sheds light on the factors influencing African Americans' perceptions and adoption of AI solutions in healthcare settings by adhering by the aforementioned eight-step process.

Planning

Employing Okoli's (2015) systematic literature review framework, the researcher: defined the purpose and protocol to guide the process, systematically searched academic databases to retrieve relevant literature, executed title/abstract and full-text screenings to filter sources, extracted and tabulated pertinent data for analysis, critically appraised quality, analyzed the evidence to synthesize discoveries, and authored an impartial review outlining key implications (Okoli, 2015). This structured eight-step process enabled methodically identifying, evaluating and integrating available knowledge within this research.

Selection

The search strategy involved constructing a search string with keywords (Levy & Ellis 2006) related to the research question, as well as synonyms, abbreviations and alternative spellings utilizing PICOC (Kitchenham et al., 2007) to address the study question. After the terms were identified the researcher performed thorough inquiry of previous research using the specified search terms:

- (African American OR Black OR Patient OR Consumer) AND
- (Artificial Intelligence OR AI OR Machine Learning OR ML) AND
- (Healthcare OR Health Care OR Medical Care) AND
- (Perception OR Attitude OR Acceptance) AND
- (Utilization OR Adoption OR Usage) AND
- (Cultural Belief OR Cultural Value OR Historical Distrust) AND
- (Accessibility OR Digital Divide OR Digital Inequity)

Comprehensive search strategies were employed to systematically mine four leading interdisciplinary databases (ACM Digital Library, Computer Science Database (ProQuest), IEEE Explore, and Pubmed) to retrieve the highest quality studies published on patient perspectives toward implementation of Artificial Intelligence and Machine Learning in Healthcare (Dingsoyr and Dyba, 2008). This allowed for rigorous analysis based on valuable insights from relevant literature.

Extraction

To evaluate the obtained content the researcher implemented recommended techniques put forward by Kitchenham (2004). To streamline the process and ensure content relevance the researcher employed

inclusion and exclusion criteria to weed out information. The researcher independently analyzed the retrieved content to remove (a) duplicate studies, (b) the studies cannot be accessed in full text. (c) non-English studies, (d) studies other than peer-reviewed articles and conference proceedings, and (e) studies that are not relevant to the research question. The specific criteria applied in this research study are presented in Table 1.

Table 1: Content evaluation criteria

Inclusion Criteria	Exclusion Criteria
Language of publication is English	Publication language other than English
Published between 2003-2023	Duplicate articles
Directly answers one or more research questions	Simulation studies
Focuses on AI/ML usage in healthcare	No AI/ML focus in healthcare
Focuses specifically on patient views of AI/ML in healthcare	Does not focus on patient views of AI/ML in healthcare
Contains opinion or perspective research from relevant journals that provides insight into: 1) AI in healthcare or 2) African American perceptions of healthcare	Non peer-reviewed publications (editorials, books, chapters, articles)

Execution

Conducting screening, titles and abstracts of identified articles were evaluated for eligibility to more thorough review based on inclusion and exclusion criteria (Cohen, 1990). Articles qualifying for full text review were determined based on how their titles and abstracts related to the research question (Cohen, 1990). By using search approach requirements as well as inclusion requirements for this examination of how cultural beliefs, historical mistrust, accessibility challenges affect patient perceptions as well as adoption of AI solutions in healthcare, comprehensive understanding was possible.

Analysis

This section discusses the findings from the systematic literature review related to three research questions examining the impacts of cultural beliefs, historical distrust, and accessibility challenges on African American patients' perceptions and utilization of AI tools in healthcare.

After reviewing the content of articles that are published in scholarly journals; there was only one article that mentioned concerns expressed by certain ethnic groups regarding discrimination and mistreatment in medical research, referring to historical examples like the Tuskegee Syphilis Study (Ahmed et al., 2023). None of the studies summarized directly address or include perspectives of African Americans or black Americans regarding attitudes, perceptions, and acceptance of AI in healthcare. To comprehensively review and gain a better understanding of the literature on perception and utilization of AI tools in healthcare and ascertain why efforts to detail vulnerable populations such as African Americans are not being performed, a holistic approach is required. The results of the Systematic Literature Review (SLR) can be broadly categorized into five distinct categories which are included in Table 2:

Perceived benefits of AI: The widespread optimism that AI tools can enhance efficiency, accuracy, consistency and timeliness of analysis and diagnoses. Clinicians highlight potential benefits in risk assessment, screening, treatment recommendations and workflow automation that could aid clinical decision-making and quality of care. Patients perceive value in expanded access and being empowered with data.

Perceived risks/barriers of AI: Concerns surrounding AI include data limitations leading to bias or inaccuracy, difficulties ascertaining causality from correlations, trust issues between patients and providers when the functionality remains unclear, job disruption fears and ethical considerations such as privacy, consent and responsible use further complicating public perceptions.

Implementation considerations: Implementing AI in healthcare demands ensuring data quality, maximizing accuracy, maintaining physician oversight, creating ethical policies, educating patients, and properly training clinicians.

Human-AI interaction preferences: Stakeholders prefer AI to assist physicians with data-intensive tasks while retaining human leadership for care management based on holistic patient understanding a machine cannot match.

Demographic differences: Due to historical exploitation, African Americans are more skeptical of the healthcare industry (Washington, 2019). Younger populations are more receptive of novel technology like AI than older groups, and gender, income, and health status may all affect AI opinions (Ayad et al., 2023; Götzl et al., 2022; Miller et al., 2020).

Table 2: Categories

Category	Reference
Perceived benefits of AI	Ayad et al., 2023; Mahlknecht et al., 2023; Fazakarley et al., 2023; van der Zander et al., 2022; Esmaeilzadeh et al., 2021; Kosan et al., 2022; Lennartz et al., 2021; Ongena et al., 2020; York et al., 2020; Miller et al., 2020; Chew et al., 2022; Beets et al., 2023; Papadopoulos et al., 2020; Griffin et al., 2020; Vo et al., 2023; Götzl et al., 2022; Mikkelsen et al., 2023; Young et al., 2021
Perceived risks/barriers of AI	Ayad et al., 2023; Fazakarley et al., 2023; Hogg et al., 2023; van der Zander et al., 2022; Esmaeilzadeh et al., 2021; Lennartz et al., 2021; Ongena et al., 2020; Chew et al., 2022; Ahmed et al., 2023; Beets et al., 2023; Papadopoulos et al., 2020; Vo et al., 2023; Götzl et al., 2022; Mikkelsen et al., 2023; Young et al., 2021
Implementation considerations	Mahlknecht et al., 2023; Fazakarley et al., 2023; Hogg et al., 2023; Ongena et al., 2020; Chew et al., 2022; Papadopoulos et al., 2020; Vo et al., 2023
Human-AI interaction preferences	Ayad et al., 2023; Mahlknecht et al., 2023; Fazakarley et al., 2023; van der Zander et al., 2022; Esmaeilzadeh et al., 2021; Lennartz et al., 2021; Ongena et al., 2020; York et al., 2020; Chew et al., 2022; Ahmed et al., 2023; Beets et al., 2023; Papadopoulos et al., 2020; Vo et al., 2023; Götzl et al., 2022; Mikkelsen et al., 2023; Young et al., 2021

Demographic differences	Ayad et al., 2023; Lennartz et al., 2021; Ongena et al., 2020; York et al., 2020; Miller et al., 2020; Ahmed et al., 2023; Beets et al., 2023; Papadopoulos et al., 2020; Vo et al., 2023

The perceived benefits of AI were the most prevalent motif emerging from the literature, accounting for 82% of the discussion content. This indicates patients' and stakeholders' widespread optimism regarding the potential for AI tools to enhance efficiency, accuracy, consistency and timeliness across a range of healthcare applications (Ayad et al., 2023; Khullar et al., 2022; Mahlknecht et al., 2023). Perceived risks and barriers comprised the third most prominent motif at 64%, centered largely on fears of biased or inaccurate AI, challenges securing patient trust and adoption, job disruption and ethical concerns around privacy and consent (Esmaeilzadeh et al., 2021; Papadopoulos et al., 2020).

While patients seem receptive to AI capabilities expanding access and empowering them with data, reservations persist around depersonalization of care (Beets et al., 2023; Vo et al., 2023; Young et al., 2021). This aligns with the finding that human-AI interaction preferences represented 68% of influencing factors. Stakeholders strongly favoring AI serve in assistive rather than replacement roles to preserve physician oversight and leadership (Young et al., 2021). Guarding against AI overuse that could undermine holistic, patient-centered, and relational healthcare delivery seems appropriate.

AI technology has the potential to enhance clinical decision making, and improve patient care. Both patients and stakeholders are aware of this. To realize the benefits it will be necessary to develop thoughtful implementation strategies that address risks and preferences related to ethical and responsible AI development, building trust around capabilities and integrating human and AI in a balanced way (Lennartz et al., 2021). For marginalized groups such as African Americans, proactive engagement is needed to reduce historical exploitative practices and fear of biased technology decision-making.

Discussion

The systematic review reveals an overall optimism regarding the potential for AI tools to enhance efficiency, accuracy, consistency and timeliness across diverse healthcare applications. A significant gap emerges in the literature regarding perspectives and utilization preferences of African Americans pertaining to AI in healthcare. Despite comprising 13.4% of the US population (U.S. Census Bureau QuickFacts: United States, n.d.), no studies directly addressed this demographic group, pointing to a concerning blindspot in current AI health research.

This oversight takes on a greater importance given African Americans' historical exploitation and marginalization in medical research (Brandon et al., 2005; Kennedy et al., 2007; Washington et al., 2019). Such legacies shape skepticism and distrust (Washington et al., 2019). Other demographic variables like gender, socioeconomic status and health literacy warrant investigation regarding impacts on AI perspectives.

Realizing the widespread perceived benefits of AI in risk assessment, diagnosis, treatment recommendations and workflow automation commands proactive engagement of vulnerable communities. Researchers must reduce biased or inaccurate AI, while stakeholders must promote collaborative human-AI integration to reduce genericized care. Policymakers play a pivotal role guiding ethical development that earns public trust in transparency, security and responsible AI capabilities focused on providing accessible, patient-centered care.

Conclusion

This systematic literature review sought to examine impacts of cultural beliefs, historical distrust, and accessibility barriers on African American patients' perceptions and utilization preferences regarding AI in healthcare. A significant gap emerges in that no studies directly address this demographic group, despite comprising over 13% of the US population. Given historical exploitation in medical research, it seems that those opinions foster hesitation toward AI adoption among African Americans.

The optimism surrounding AI's potential to enhance efficiency, accuracy and timeliness of care prevails as the dominant perspective across groups. To realize widespread perceived benefits requires engagement of marginalized communities in AI development and policy-making. This will help mitigate risks of inaccurate or unethical AI, while preserving valued aspects of human-centered medical care.

Key next steps include dedicated research factoring race, age, gender, socioeconomic status and health literacy to clarify impacts on patient perceptions and reveal methods for building trust in AI capabilities. Policy initiatives must also prioritize inclusion of vulnerable populations and advocate ethical oversight, transparency and responsible AI practices.

Healthcare AI progress will be judged by its ability to promote equitable access and quality for all. This review spotlights where current knowledge gaps and priorities should lie for developers, policymakers and healthcare leaders alike if AI is to advance and enhance healthcare for all populations. The hopeful outlook is warranted, yet realizing the complete potential for society requires dedicated steps to address the needs of marginalized groups.

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