Data-Driven AI in Social Care Wales: Identifying Gaps and Opportunities

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Abstract: This study presents a narrative synthesis of the available evidence of the role of data-driven artificial intelligence (AI) in shaping social care in Wales, UK. The increasing integration of AI technologies across various sectors has raised critical questions about their potential impact on social care services, particularly concerning decision-making processes, ethical considerations, and the overall quality of care provided to vulnerable populations. While AI has been widely adopted in healthcare and other industries, its application within social care remains relatively underexplored with limited empirical evidence regarding its effectiveness in supporting professionals, caregivers, and service users, making it imperative to establish a solid evidence base to guide future implementation and policy decisions. Data collection involved comprehensive searches across multiple databases, including SCOPUS, PubMed, Social Care Online, and Google Scholar, alongside grey literature to ensure a thorough review of existing studies. The search strategy utilised specific keywords related to 'Artificial Intelligence' or 'AI', 'Social Care', and other relevant terms such as 'data-driven' or 'data driven', 'old age', 'caregivers', and 'service users', combined primarily using the Boolean operator 'AND,' with selective use of 'OR' to refine results, particularly around the topic of 'old age.' This focused approach yielded 642 studies, with 148 addressing AI in Social Care. Following rigorous screening, 22 studies were ultimately included, revealing substantial variability in quality, settings, and outcomes. Majority of studies focused on older people in care settings. While some studies demonstrated that AI could enhance efficiency, personalise care, and ease caregiver burdens, others highlighted significant ethical and practical obstacles. Key concerns included data privacy and security, algorithm biases, the digital divide, and a lack of trust and understanding of emerging technologies among older adults. Findings suggest AI has the potential to revolutionise social care, improving outcomes for service users, caregivers, and professionals, and highlight the need for evidence-based policymaking to integrate AI into social care and focus on long-term studies and interdisciplinary collaboration to address ethical and accessibility issues in the future.

Keywords: Artificial Intelligence, Social Care, Innovation, Care Delivery

1.   Introduction

This paper analyses the literature that discusses the role of data-driven artificial intelligence in shaping up the future of Social Care in Wales, United Kingdom, and attempts to identify gaps, challenges and opportunities that can help the sector overcome its challenges in the area of innovation which is critical in improving care and support, and increasing public confidence in care (Social Care Wales, 2022).

Artificial intelligence (AI) and data-driven technologies offer considerable potential within the social care sector due to their ability to rapidly analyse complex datasets and generate insights that can enhance service delivery and individual outcomes. Their adoption may address pressing sectoral challenges, including cost reduction through extended independent living, the delivery of remote services to support self-management of chronic conditions, and decreased reliance on domiciliary care. Furthermore, these technologies can facilitate closer integration between health and social care systems and enable more personalised, preventive interventions through the use of data analytics and algorithmic decision-making (Wright, 2020).

The UK social care sector is currently facing a critical shortage of care professionals, a challenge that has prompted increasing calls for the adoption of innovative technologies to enhance service delivery and sustainability (Ravalier et al., 2019). In this context, artificial intelligence (AI) and data-driven technologies are frequently cited as potential enablers of transformation, particularly in improving efficiency, supporting decision-making, and delivering more personalised care. Targeted investment, such as funding from the Welsh Government, and collaboration between Social Care Wales and medical technology (MedTech) firms may play a pivotal role in fostering innovation, especially in rural areas where access to services remains a persistent challenge. Such efforts can contribute to the development of more resilient, community-based models of health and social care (Best & Myers, 2021).

Despite this potential, recent engagement by the NHSX AI Lab with technology providers and care organisations has revealed that the social care sector remains underdeveloped in its application of AI, likely due to its fragmented provider landscape and the continued reliance on manual data collection processes (NHS, 2024).

Given these gaps, there is a pressing need to assess the current state of evidence surrounding AI applications in social care.

This literature-informed narrative synthesis explores the early application of data-driven AI technologies in the social care sector, aiming to pinpoint areas where these tools could bring significant improvements. While current evidence is still emerging, the review uncovers promising directions for future investigation and underscores the need for a solid, ethical framework to support the responsible adoption of AI in social care practices.

1.1 Research Question and Objectives

The main research question (RQ) is generated as follows:

> *RQ: What are the current gaps and potential opportunities in the implementation of data-driven AI technologies in the social care sector in Wales?*

The key objectives of this research are:

2. To investigate the ethical and emotional implications of using data-driven AI in social care, particularly concerning the loss of human touch, empathy, and interpersonal connection.
3. To assess the level of digital literacy, trust, and acceptance of AI technologies among caregivers, service users, and stakeholders in social care settings.
4. To identify existing gaps and opportunities in the policy, infrastructure, and stakeholder engagement frameworks that influence the effective and equitable implementation of AI in social care in Wales.

2. Methodology

This study adopts a literature-informed, qualitative methodology to explore the landscape of artificial intelligence (AI) applications within social care contexts. Findings are presented according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines, to enhance transparency, methodological quality, and reduce bias in the report (Page M. J. & Moher D, 2017). Instead of a rigid systematic review protocol, this study followed a structured yet flexible approach to explore academic and grey literature to capture thematic insights. Due to the heterogeneity and early-stage nature of the evidence, no formal quality appraisal was conducted. The study is therefore best described as a narrative synthesis.

2.1 Eligibility Criteria

The literature reviewed spans the period from 2014 to 2025, capturing developments aligned with the growing demand for technological solutions in aging societies. Studies were included if they focused on AI implementations in long-term care, home care, and nursing home environments, and if they addressed implications for service users and care professionals. Publications that lacked empirical grounding, focused exclusively on technical innovation without application in care settings, or were not published in English were excluded from consideration. Refer to Table 1 for clarity.

Table 1: Inclusion and Exclusion Criteria

Included	Excluded
Publications focusing on social care sector	Publications focusing on sectors other than social care
Publications since 2014	Publications before 2014
Publications in English	Publications in languages other than English
Publications based on Peer reviewed, Open access, Grey literature materials, Systematic literature reviews.	Publications that don't have open access
Publications based on keywords such as Artificial Intelligence or AI, Social Care, Data-driven, Old Age, Caregivers, Long-term care, Homecare.	Keywords other than those mentioned as 'Included'

2.2 Information Sources

Relevant literature was sourced from multiple academic and interdisciplinary databases, including PubMed, IEEE Xplore, Scopus, Google Scholar, and some grey literatures as shown in Table 2. Inclusion of these databases was based on the disciplinary breadth they cover across social care within the context of data-driven artificial intelligence.

Table 2: Databases used

Search Engine	Database Type	Reason
Scopus	Abstract and Indexing	Enhances the visibility and recognition of researchers and institutions.
PubMed	Public biomedical database	Supports scientific and medical research.
Social Care Online	Online database on all aspects of social care	Offers information and research on all aspects of social care from a range of resources including journal articles, websites, research reviews, legislation and government documents, and service user knowledge.
Grey Literature	Outside of peer-reviewed journals	Look for any important studies outside the recognised database, i.e., that may not have been published. Considering the limited studies on the research area of AI in social care, Grey Literatures were not to be ignored.
Google Scholar	Web search engine	Provides a simple way to broadly search for scholarly literature. Moreover, it offers a vast selection of scholarly works, including journal articles, conference papers, theses, dissertations, and preprints. Google Scholar is widely used by researchers due to its sophisticated algorithms and comprehensive selection of scholarly material from various sources.

2.3 Search Strategy

The search strategy was guided by key terms such as "Artificial Intelligence" or "AI", "Social Care", and other terms such as "data-driven" or "data driven", "old age", "caregivers", and "service users" were also used as, shown in Table 3, to refine the scope of the review and ensure breadth in coverage. Boolean operators were applied to construct effective search queries, with particular attention given to themes related to aging and community-based care.

Table 3: Search Strategy

Search Engines	Search Strings
Scopus	(TITLE-ABS-KEY (data-driven) AND TITLE-ABS-KEY (artificial AND intelligence) AND TITLE-ABS-KEY (social AND care) OR TITLE-ABS-KEY (old AND age))
	(TITLE-ABS-KEY (data-driven) AND TITLE-ABS-KEY (artificial AND intelligence) AND TITLE-ABS-KEY (social AND care) AND TITLE-ABS-KEY (caregivers))
	(TITLE-ABS-KEY (data-driven) AND TITLE-ABS-KEY (artificial AND intelligence) AND TITLE-ABS-KEY (social AND care))
	(TITLE-ABS-KEY (artificial AND intelligence) AND TITLE-ABS-KEY (social AND care) AND TITLE-ABS-KEY (care AND home))
PubMed	(((data-driven) AND (artificial intelligence)) AND (social care))
Google Scholar	"data-driven artificial intelligence in social care"
Social Care Online	"data-driven artificial intelligence in social care"

2.4 Data Analysis

Data from the selected sources were extracted and organised according to their focus areas, including AI methodology, type of social care setting, and reported outcomes. Given the emerging nature of literature on AI in the care sector (Gholizadeh et al., 2023), we broadened our data collection beyond the UK to gain a global perspective. This approach enabled the identification of higher-quality studies on AI applications in social care

and their relevance to improving systems in Wales. Due to the qualitative nature and diversity of the data, meta-analysis was deemed unnecessary; instead, we focused on key findings that highlighted both opportunities and limitations of AI in this field. A thematic analysis was employed to identify recurrent patterns, implementation barriers, ethical considerations, and areas where further research is required. These findings were synthesised into a structured narrative, supported by summary tables that reflect trends across the literature and highlight underexplored dimensions of AI adoption in social care.

It was noted that these studies differed substantially in terms of quality, settings, and outcomes. Some explored the need for AI in social care, while others addressed its potential challenges. To assess and relate these diverse findings, a narrative synthesis was conducted. This involved reviewing and integrating results to identify patterns and draw conclusions, using a thematic framework and tabular format. This method provided a comprehensive understanding of the topic by revealing key themes and discrepancies across the studies.

This methodological approach enables a nuanced understanding of the interface between emerging AI technologies and the complex needs of social care environments, while also drawing attention to the gaps in evidence and areas ripe for future innovation.

3. Results

A total of 648 records were initially identified, 646 through database searches and 2 from additional sources. After removing duplicates, 647 records were screened, resulting in the exclusion of 499 based on language, date, and relevance. Of the 148 full-text articles assessed, 126 were excluded due to being outside the scope of social care, lacking specific reference to AI, or reporting irrelevant outcomes. A final set of 22 studies was included in this narrative synthesis (see Figure 1, PRISMA diagram), which provided the foundation for analysing current applications, opportunities, and challenges of AI in the social care sector.
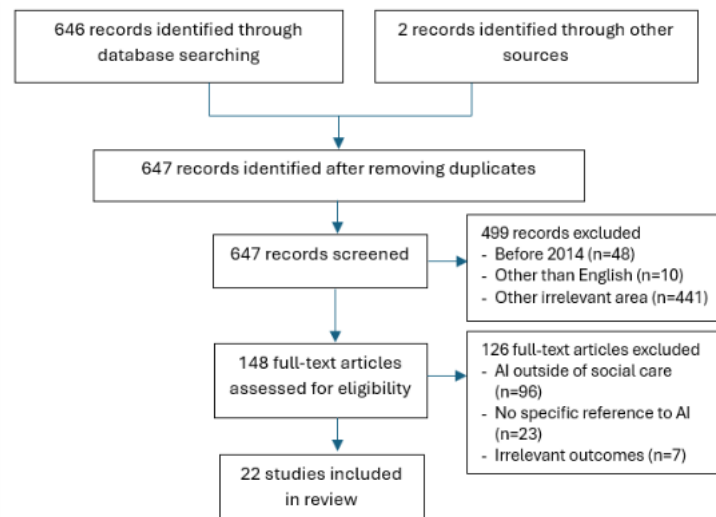

Figure 1: PRISMA flow diagram (Source: Page M. J. & Moher D, 2017).

The final set of 22 studies (from Figure 1) yielded a total of 38 findings, contributing to multiple thematic areas as illustrated in Figure 2. These categories were developed based on the principal insights derived from the included studies. Notably, many studies addressed multiple thematic areas, resulting in a higher number of findings (n=38) than studies (n=22). The thematic framework facilitated these findings into interconnected domains such as ethical implications, emotional impact, stakeholder engagement, and AI readiness in social care. Considerable variations were observed across the studies in terms of methodological quality, contextual settings, and reported outcomes. To systematically explore these dimensions, a narrative synthesis was undertaken. This involved organising the data and synthesising findings into a structured, tabular narrative. The synthesis approach enabled a comprehensive analysis, allowing for the identification of key patterns, thematic overlaps, and points of divergence across the evidence base.

As shown in Figure 2, the most frequently cited theme was the necessity of digital literacy and a multidisciplinary approach (n=7), underscoring the need for cross-sector collaboration and digital capacity-building within the social care workforce. Understanding, preconceptions, and acceptability of AI emerged as the second most

prominent theme (n=6), reflecting the importance of addressing public perceptions and cultural readiness for AI adoption.
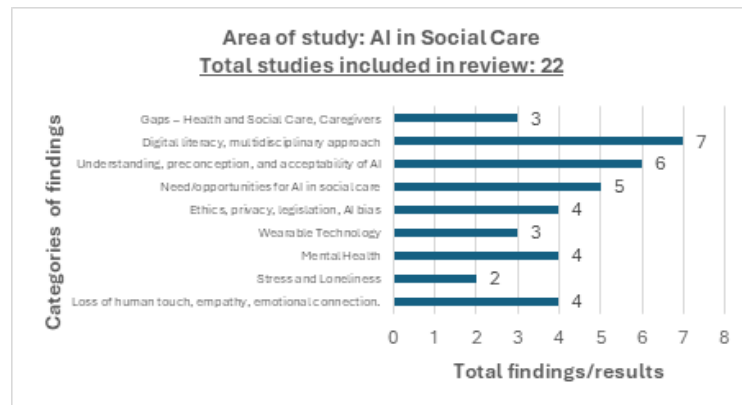
Figure 2: Frequency of key themes identified in the reviewed studies on AI in Social Care.

Further thematic clusters included identified needs and opportunities for AI integration in social care (n=5), and concerns related to ethics, privacy, legislation, and algorithmic bias (n=4), highlighting ongoing debates around the responsible and equitable deployment of AI technologies. Additional themes such as mental health support, loss of human touch and emotional connection, and wearable technology (n=3–4) point to both the potential and the sociotechnical challenges of AI use in person-centred care. The theme of stress and loneliness was least represented (n=2), indicating a relative gap in the literature that warrants further investigation.
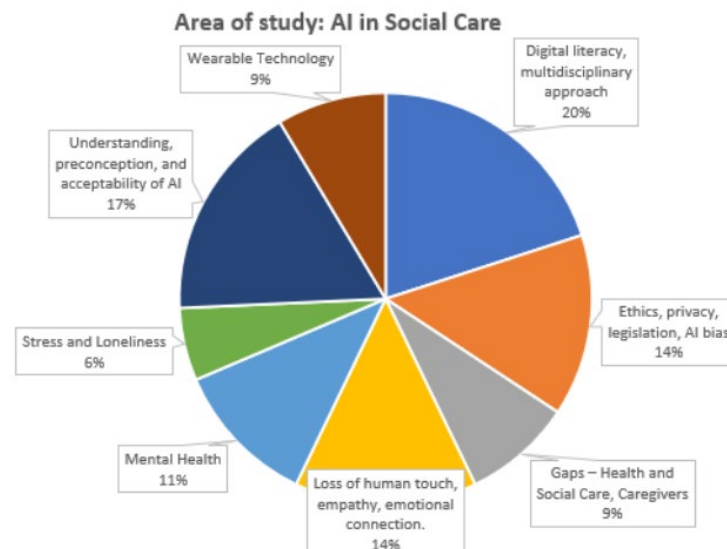
Figure 3: Distribution of research focus areas in AI and Social Care.

The narrative synthesis also revealed considerable variation in methodological quality and focus across the included studies. While some were exploratory and technology-focused, others engaged with sociocultural and ethical dimensions of care. The absence of formal quality appraisal in this synthesis reflected the heterogeneity and formative state of the literature. As such, the synthesis prioritised breadth of insight over uniform methodological rigour.

Figures 2 and 3 illustrates a broad but uneven research focus, suggesting that while technological and ethical dimensions are gaining traction, emotional, relational, and experiential aspects of AI in social care remain underexplored.

Table 4 presents representative findings organised thematically and by study. It captures how AI is currently positioned across multiple dimensions of social care, ranging from decision support and service efficiency to emotional wellbeing and caregiver relief, while also drawing attention to persistent challenges around ethics, inclusivity, and implementation.

Table 4: Characteristics of Included Studies

Category	Author(s)	Findings
Loss of human touch, empathy, emotional connection (n=4)	• Neves, B. B., Petersen, A., Vered, M., Carter, A., & Omori, M. (2023). • Fernando, N., & Ranasinghe, P. (2023). • Meskó et al. (2018). • Wimbarti et al. (2024).	• AI may support care elements such as dementia care, but concerns exist about loss of empathy and the human element. • AI lacks the emotional understanding needed for accurate diagnosis and meaningful care relationships.
Stress, Loneliness (n=2)	• Vuppalapati et al. (2018). • Neves et al. (2023).	• AI models can detect stress and loneliness using EEG and social technologies (e.g., voice assistants, robots) to support isolated residents.
Mental health, learning disability, dementia (n=4)	• Yadav et al. (2024). • D'Alfonso (2020). • Yoo et al. (2024). • Social Care Wales (2024).	• AI shows promise in assessing quality of life, predicting mental health issues, and offering personalised therapy. • Data-driven AI methods can be employed to develop prediction/detection models for mental health conditions. • SAR (Social Assistive Robots) like Hyodol can reduce depression suggesting its potential as a supportive companion for solitary older adults. • AI apps such as "PainChek" improves pain assessment and care planning. It could lead to a reduction in the use of medication as it can provide more accurate pain measurements for people with dementia. Care homes in other regions of Wales and in England are also looking to adopt the technology.
Understanding, preconception, and acceptability of AI (n=6)	• Maguire et al. (2021). • Milovich et al. (2024). • Neves et al. (2023). • Lanne, M., & Leikas, J. (2021). • Loveys et al. (2022). • Neves et al. (2023).	• Lack of user engagement and trust, concerns over data use, stereotypes, and insurance coverage can affect AI adoption, especially in LTC (Long-term Care) settings. • Acceptability of AI-enhanced interventions seems to be limited especially in old-age care or LTC leading to difficulty in getting follow-up data due to loss of physical and mental capacity of old age people. • Anxiety related to age-related stereotypes about present older generations and their distrust of and inability to use technology could possess a barrier to AI in social care.
Gaps – Health and Social Care, Caregivers (n=3)	• Cresswell et al. (2020). • Zuschnegg et al. (2021). • Maguire et al. (2021).	• Limited and inconsistent evidence of AI effectiveness to support decision-making in health and social care settings. • Research gaps in social care and a lack of Randomised Control Trials (RCT). • Replacing human caregivers with SARs (social assistive robots) is not the aim; the aim is to fill the gaps where humans are not available, amplify human work, and offer relief for caregivers. • NHS and social care differ in digital maturity.

4. Discussion

The integration of artificial intelligence (AI) in social care presents a dynamic landscape marked by both potential and concern. Drawing from the synthesised data in Table 4, several key themes emerge, each bearing implications for policy, practice, and future research.

4.1 Emotional, Relational, and Experiential Aspects of AI in Social Care

Multiple studies have highlighted the potential erosion of human empathy and the emotional connection inherent to caregiving as one of the key concerns. Neves et al. (2023) and Meskó et al. (2018) emphasise that while AI can aid in daily living activities and clinical decision-making, it cannot replicate the nuanced understanding that comes from human interaction. Wimbarti et al. (2024) reinforce this by highlighting how AI lacks alignment with subjective human reasoning, particularly in emotional contexts. These findings caution against over-reliance on AI tools, advocating instead for hybrid models where AI complements rather than replaces human care.

AI applications show promising advancements in supporting individuals with complex health conditions. For instance, Yadav et al. (2024) present a model that objectively assesses the quality of life for people with intellectual disabilities (ID), addressing caregiver challenges. Similarly, the use of social assistive robots (SARs), as explored by Yoo et al. (2024), demonstrates reductions in depression among older adults, illustrating AI's potential to enhance mental health outcomes. Tools like the PainChek app (Social Care Wales, 2024) further showcase AI's utility in pain assessment, leading to more precise treatment decisions and resource optimisation in care homes.

Vuppalapati et al. (2018) and Neves et al. (2023) examine AI's capacity to monitor and mitigate stress and loneliness, notably through EEG-based stress detection and AI companions like chatbots and voice assistants. These interventions could play a crucial role in addressing the psychological dimensions of aging and institutional living, although their long-term effectiveness and ethical implications remain areas for continued scrutiny.

The acceptability of AI technologies among service users and other stakeholders is significantly shaped by understanding, trust, and systemic readiness. Maguire et al. (2021) and Milovich et al. (2024) point to critical barriers such as data privacy concerns, technological unfamiliarity, and lack of institutional support (e.g., insurance coverage). Moreover, Neves et al. (2023) highlight how ageist stereotypes and digital distrust among older populations compound these challenges, suggesting that educational and participatory design strategies are essential for meaningful adoption.

4.2 Gaps in Research and Practice

Despite these developments, substantial gaps persist. Cresswell et al. (2020) reveal a striking lack of robust evidence, especially in social care settings, regarding the effectiveness and contextual adaptability of AI. The absence of randomised controlled trials (RCTs) and implementation studies limits our understanding of AI's true impact. Additionally, the divide in digital maturity between NHS providers and social care systems (Maguire et al., 2021) suggests a systemic inequity that must be addressed through policy and infrastructure investment. Zuschnegg et al. (2021) reinforce that the goal of AI is not replacement, but augmentation of human care, i.e., filling gaps where caregivers are unavailable and alleviating workload pressures. This perspective reorients the debate from automation to augmentation, which is critical for ethical and practical AI integration.

4.3 Implications for Practice and Policy

The findings highlight that while AI offers significant potential in social care, its implementation must be grounded in human-centred principles. Policymakers and practitioners should ensure that AI enhances, rather than replaces, personal interactions. Strengthening digital literacy and trust, particularly among vulnerable groups, is essential, alongside addressing ethical concerns related to data use and accountability. Inclusive, co-designed approaches involving stakeholders at all stages are also crucial to ensure equitable and effective deployment.

4.4 Barriers and Enablers

Table 5 shows set of challenges that can potentially hinder adoption of data-driven AI in Social Care.

Table 5: Barriers and Enablers

Barriers	Enablers
Loss of Human Touch and Empathy- AI lacks empathy, intuition, and emotional connection.- Concern over replacing human caregivers.	Targeted Clinical Support- Supports people with dementia and intellectual disabilities via reminders and assessments.
Misalignment with Clinical Reasoning- AI doesn't align well with subjective, human-centred clinical decisions.	Mental Health and Wellbeing Monitoring- EEG-based and smartphone sensing models for stress/emotion detection.
Lack of Trust and Acceptability- Scepticism among users and families.- Poor communication and preconceptions, especially in LTC.	Social Connection- SARs, chatbots, and assistants can reduce loneliness in older adults.
Ethical and Privacy Concerns- Uncertainty around data use and third-party agreements.	Enhanced Pain Assessment- Tools like PainChek offer more accurate pain evaluations, reduce medication use.
Digital Divide and Training Gaps- Limited familiarity among users and support networks.- Financial barriers such as lack of insurance coverage.	Resource Optimisation- Frees up staff time and may reduce hospital admissions through better care management.
Limited Evidence and Research Gaps- Lack of high-quality trials and research on barriers/enablers.	Scalability Across Populations- AI tools effective beyond initial target groups (e.g., dementia to mental health).
Technology Maturity and Integration Issues- Social care lags behind NHS in digital readiness.- Inconsistent integration and use.	Addressing Workforce Shortages- AI can compensate for lack of available caregivers due to aging population.
	Vision for Augmentation, Not Replacement- AI supports and enhances human work, doesn't replace caregivers (per Mataric).

On the barriers side, concerns centre around the loss of human qualities, such as empathy and trust, along with technical limitations, like misalignment with clinical reasoning and a lack of digital readiness. Ethical issues, data privacy, and resistance from older adults also hinder adoption. Conversely, the enablers show that AI can enhance, not replace, care, especially through better diagnostics, pain assessment, and mental health support. It helps bridge workforce gaps, reduce loneliness, and improve efficiency if implemented thoughtfully and inclusively.

In essence, AI's success depends not just on what it can do, but how well it's integrated into human-centred care systems.

This narrative synthesis highlights a critical dual challenge in applying AI to social care: advancing innovation while preserving the human element and achieving ethical integration alongside scalable implementation. Existing literature demonstrates the potential of AI to address persistent issues in care delivery yet also underscores the risks of undermining essential human-centred practices.

5. Conclusion

This narrative synthesis of available evidence has explored the current body of research on data-driven AI in social care, revealing a growing interest in how such technologies can enhance care delivery, efficiency, and decision-making. Across various international contexts, AI has shown potential to support mental health interventions, facilitate pain assessment, reduce loneliness, and assist in managing complex conditions such as dementia and intellectual disabilities.

However, the review also identifies critical limitations in the existing literature. These include a lack of longitudinal evidence, insufficient stakeholder engagement, and limited attention to ethical, emotional, and systemic considerations. Most notably, while the global literature reflects increasing innovation in this field, there is a significant gap in research focused specifically on Wales. Despite the region's growing policy interest in digital transformation and social care reform, few studies have examined the opportunities, challenges, or readiness for implementing data-driven AI in Welsh social care settings.

This gap highlights a pressing need for future research that not only builds on international insights but also investigates the specific contextual, infrastructural, and policy factors shaping AI adoption in Wales. Such work should prioritise inclusive, human-centred design and contribute to the development of governance frameworks

that ensure ethical, equitable, and sustainable AI integration. Addressing these gaps will be essential to informing both strategic investment and responsible innovation in Welsh social care.

Ethics Declaration

Ethical approval was not required for this study, as it involved a narrative synthesis of publicly available literature and did not include any primary data collection involving human participants. All data analysed were drawn from published sources, including peer-reviewed articles, grey literature, and open-access materials, and therefore posed no ethical risk to individuals or organisations.

AI Declaration

AI tools were used in this review to assist with grammar correction, spelling, and improving clarity of expression. These tools also provided support in managing writing-related stress and focus challenges associated with the author's ADHD. All intellectual content, analysis, and interpretation were independently developed by the author.

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