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Review Article

The Digital Age of Aging: Artificial Intelligence, Ethical Boundaries, and Social Work in Elderly Care

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Abstract

Objective: The rapid growth of the global elderly population, termed the "silver tsunami" in the literature, is profoundly transforming health and social service systems. This study aims to examine the opportunities and ethical challenges of Internet of Things (IoT) and artificial intelligence (AI)-based technologies in elderly care within the framework of Thompson's (2009) Freedom-Control Dilemma.

Method: A qualitative systematic literature review was conducted, analyzing 53 peer-reviewed articles and two academic books published between 2020 and 2025. The review focused on studies related to elderly care, health services, social work, ethics, and technology, using databases such as Scopus, PubMed, Web of Science, and ScienceDirect.

Results: The findings highlight core ethical issues in elderly care technologies, including privacy, data security, transparency, accountability, autonomy, deception-manipulation, accessibility, and technology acceptance. The analysis also emphasizes the functional layers of IoT systems and the potential of AI-supported care applications to enhance safety, health monitoring, reduce social isolation, and ease caregiver burden.

Conclusion: IoT and AI-based solutions not only improve quality of life for older people but also have the potential to establish an ethically legitimate care model within the freedom-control balance. The study underscores that these technologies must be developed in line with ethical design principles and structured to empower individuals in decision-making processes. From a social work perspective, it is essential that such processes uphold human dignity, foster participation, and ensure sustainability Therefore, social workers must actively engage in the development, implementation, and evaluation of these technologies to ensure that ethical values and human rights remain central to elderly care practices.

Keywords: Artificial intelligence, Elderly care, Ethics, Freedom-control dilemma, Internet of things

INTRODUCTION

The global population is expected to continue growing until 2080; however, this growth is proceeding at a significantly slowed pace. In 2024, the total fertility rate declined by 0.94% compared to the previous year (United Nations, 2024); the proportion of the population aged 65 and over has risen to 10.3% as of 2024. This proportion is projected to reach 20.7% by 2074 (United Nations Population Fund, 2024). This trend is similarly observed in Turkey. As of 2024, the elderly population constitutes 10.6% of the total population, and it is estimated that this rate will rise to 33.4% by 2080 (TÜİK, 2025).

The rapidly increasing rate of aging is referred to in the literature as the "silver tsunami" (Calasanti, 2019). Currently, at least one chronic disease is present in 80% of older adults, while 77% have two or more chronic conditions (Philip et al., 2021). The most common chronic diseases include diabetes, hypertension, and heart disease (Kosuva Öztürk & Şahin, 2021), whereas geriatric syndromes that escalate with aging comprise physical and cognitive declines (Tan, 2024), social isolation (Boulahia et al., 2024), and physical and cognitive frailty (Yamazaki et al., 2021). Furthermore, while there are currently five working-age individuals for every person aged 65+, this ratio is expected to drop to 2.5 by 2050. This indicates that in subsequent years, the elderly care workforce itself will increasingly consist of older individuals (aged 48–50) (Zhang et al., 2022).

Given the anticipated rise in healthcare demands, the mounting burden on social security systems, and the expected difficulties in recruiting sufficient staff for elderly care, it becomes inevitable to reconsider the quality of elderly care in preparation for the forthcoming "silver tsunami."

Technological advancements can ease the monitoring of health and daily routines of older people, assist caregivers and healthcare workers, alleviate the burden on health and social security systems, help mitigate employment challenges by minimizing the need for human labor, and enable rapid response in emergencies.

However, alongside the advantages of employing technological developments in elderly care, there are also notable limitations. In addition to barriers such as cost, technological literacy, access to technology, and technology acceptance, environmental and ethical concerns are also ongoing points of discussion. The continued debate over ethical issues such as privacy, data security, accountability, transparency, and autonomy necessitates a comprehensive examination of technology use in elderly care from societal, individual, and legal perspectives.

The purpose of this study is to examine not only the opportunities provided by IoT devices and artificial intelligence used in elderly care but also the ethical challenges they pose, within the framework of Thompson's Freedom-Control Dilemma. From a social work perspective, the study will explore to what extent these technologies support the independence and autonomy rights of older people and how they impact the balance between intervention and control in care processes.

This research seeks to answer the following questions:

- What IoT and AI-based devices are used in elderly care?
- What are the benefits and limitations of these devices?
- What current ethical issues are encountered in the literature?
- Within the framework of Thompson's Freedom-Control Dilemma, how do these technologies

support the independence and autonomy of older people, and how do they affect the balance between intervention and control in care processes?

METHOD

In this study, a qualitative systematic literature review method was employed to examine academic articles published on the use of technology in elderly care. The databases Scopus, PubMed, ResearchGate, Sagepub, Science Direct, and Web of Science were utilized. The literature review included:

- Studies published between 2020 and 2025,
- Articles in peer-reviewed journals,
- Articles directly related to elderly care, healthcare services, social work, ethics, and technology (IoT/AI),
- Peer-reviewed works in the relevant fields, and
- Books indexed in Web of Science that are directly related to elderly care, healthcare services, social work, ethics, and technology (IoT/AI).

Subsequently:

- Studies that were not directly related to the topic,
- Articles written solely in the field of engineering,
- Articles published before 2020 and deemed outdated,
- Articles not published in peer-reviewed journals,
- Conference and congress proceedings,
- Books that did not include peer-reviewed academic studies and were not directly related to the specified subject areas were excluded from the analysis.

Searches were conducted in the databases using the keywords and combinations of: “IoT and elderly care,” “artificial intelligence and elderly care,” “social work’s ethics,” and “AI ethics.”

A notable limitation of this study is the inability to include publications prior to 2020. While older literature may offer valuable historical perspectives, the swift advancements in AI and IoT technologies in recent years have made earlier studies less relevant to the present ethical and practical challenges in elderly care.

A total of 145 publications were identified, 20 duplicate studies were removed, and 50 records were excluded after title-abstract screening. The full text of the remaining 75 articles was reviewed; 22 articles that did not meet the inclusion criteria were excluded, and 53 articles were ultimately analyzed. In these 53 articles, a total of 1,321 codes (themes and sub-themes) were identified. The process is illustrated with a PRISMA diagram.

The study was not limited solely to articles; to deepen the discussion, two books containing peer-reviewed articles in relevant fields were also included.

In the reviewed literature, 6 studies were identified in the field of elderly care and engineering, 8 in health and engineering, 3 in public policy and social sciences, 6 in gerontology and engineering, and 5 in health sciences and health technologies. Since the study also compares technology and social work ethics, 6 studies on IoT and artificial intelligence ethics, 4 in the field of elderly care ethics, 4 in the field of social work ethics, and 5 in gerontology and social work were examined. In contrast, only 4 studies focusing specifically on technology and social work were included. This distribution indicates that technology-focused research within the social work discipline is limited and highlights the need for further studies in this area.

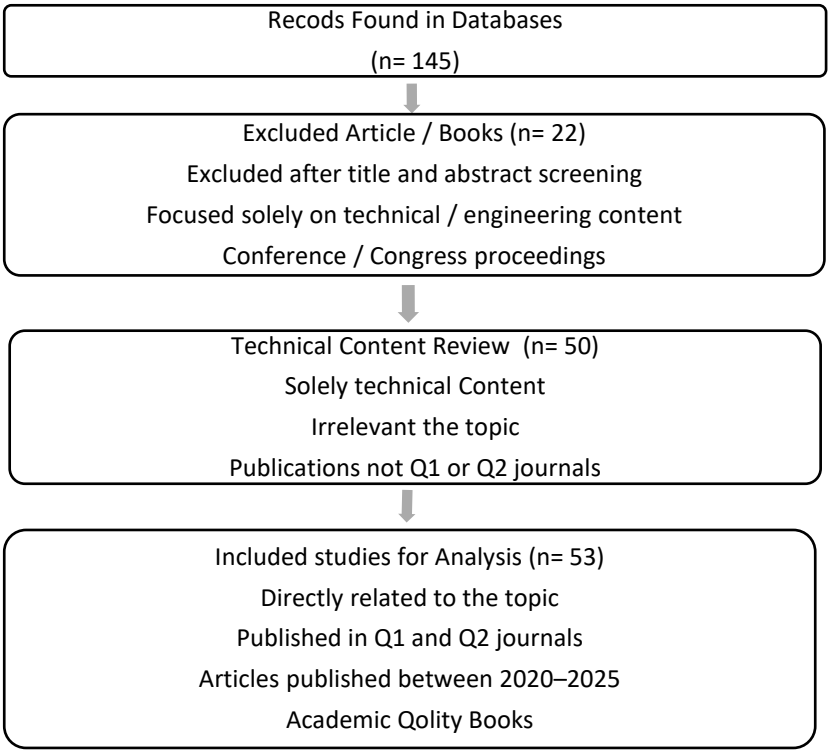

Figure 1. PRISMA Diagram

What Are IoT Systems and Artificial Intelligence? How Do They Work?

In the field of elderly care, IoT (Internet of Things)-based systems and AI (Artificial Intelligence)-based data processing systems are used both preventively and therapeutically in smart homes (Mallinson & Shafi, 2022), for health monitoring, imaging, and diagnosis (Huang et al., 2022); in tracking daily activities (Boulahia et al., 2024), reducing social isolation (Bouaziz et al., 2022), and in cognitive therapy and support services (Zanella et al., 2020).

The ultimate goal of IoT-based technologies, which enable communication between devices by integrating IT (Information Technology)—comprising "things" such as servers, databases, and applications—and OT (Operational Technology), consisting of sensors and devices attached to machines or other equipment, is to make environments "smarter" through methods of data collection, connectivity, computation, and data storage (Rayes et al., 2017). In summary, the "Internet of Things" refers to the interaction of everyday devices with each other and with the internet to exchange data and produce more comprehensive solutions (Tun et al., 2021).

IoT systems fundamentally consist of three layers. The sensing layer comprises physical systems (sensors, devices) and is responsible for collecting data from the environment or user. The data collected by the sensing layer is transmitted through the network layer, which also ensures its security before relaying it to other devices. The network layer is where devices communicate with each other via communication protocols such as Wi-Fi and Bluetooth. Security protocols (TSL/SSL, IPSec/DTSL) are implemented in this layer to ensure data security, and when necessary, data is sent and stored in the cloud or on servers via a gateway. This layer optimizes data communication and prevents delays in data transmission (Lombardi et al., 2021). The

application layer is the final layer where the collected and transmitted data is processed into meaningful information and presented to the user via an interface, enabling actions to be taken when needed (Baldominos et al., 2018). In the application layers, artificial intelligence can be used to process and interpret the collected data and, in some cases, to perform predictive analytics (Zhang & Tao, 2020). Artificial intelligence not only interprets data in the application layers but also conducts predictive analyses to foresee potential future scenarios. For instance, IoT devices used in elderly care can analyze health data of older people, predict potential future health issues, and send early warnings.

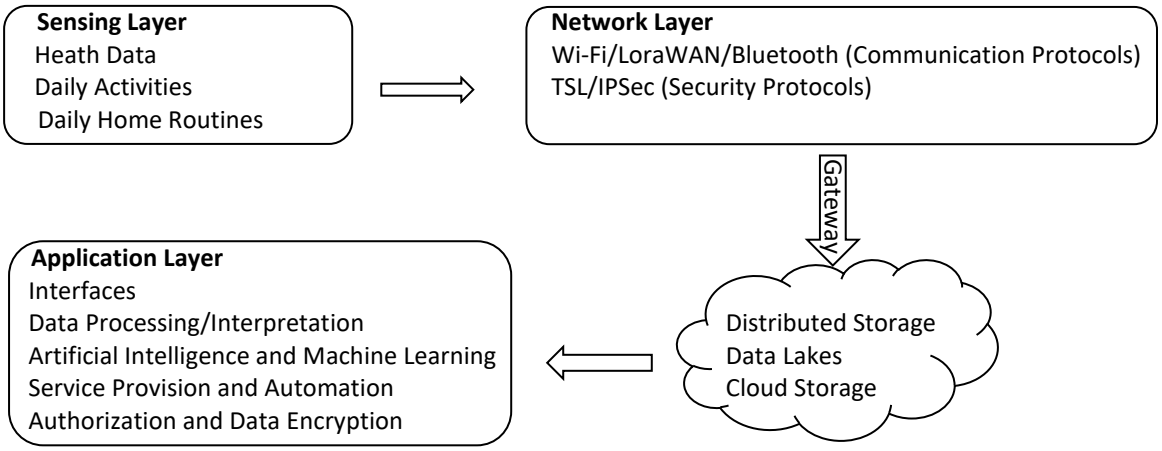

Figure 2. Functional Layers of IoT Systems

Artificial intelligence, in the field of elderly care, analyzes real-time data collected by IoT systems from the user and the environment; it can diagnose, enable early detection, learn health trends to predict potential risks, and provide immediate intervention in living spaces in case of any risk (Wang et al., 2018). For instance, by analyzing the data collected by IoT systems, it can detect health threats such as the risk of falling in older people in advance and enable prompt intervention.

Systems Used in Elderly Care and Opportunities from a Social Work Perspective

IoT systems used in elderly care can be structurally categorized into their sensors, communication-network infrastructures, and data processing-analysis layers (Zanella et al., 2020). However, from a social work perspective, it was considered more beneficial to classify these systems based on the advantages they provide to users.

Systems for Health Monitoring and Early Diagnosis

Health monitoring systems are used for providing real-time data both in home care services for older adults (Nath & Thapliyal, 2021) and in hospital care (Creswell et al., 2020) within imaging, monitoring, diagnosis, and decision-making systems. These technologies, by enabling real-time data sharing, can integrate individuals' health needs into social work plans and contribute to the development of personalized care plans. Additionally, monitoring the health status of the individual increases their active participation in their own care process, supporting their autonomy and self-confidence. This strengthens the individual's right to make decisions regarding their care, upholding the principle of self-determination, and aligns with the goal of preserving the independence of older people.

Table 1. Systems for health monitoring and early diagnosis

Device Type	Functions	Ethical Considerations	Contribution to Social Work	Method	Source
Smart Adult Diapers	Detects moisture and wetness levels; provides real-time data (sensor is reusable).	Not Mentioned	Mentioned	Quantitative	Lin et al., 2025
Smart Watches, Bracelets	ECG, heart rate, sleep, stress monitoring; fall sensor; emergency call.	Accessibility, Privacy, Technology Acceptance	Mentioned	Mixed	Chung et al., 2023
Smart Rings	Sleep, physical activity, heart rate, body temperature monitoring.	Not Mentioned	Not Mentioned	Quantitative	Browne et al., 2021
Smart Shoes and Insoles	Tracks walking speed and steps; fall sensor reduces accident risk.	Technology Acceptance, Health Literacy	Not Mentioned	Quantitative	Piau et al., 2021
Wearable ECG Devices	ECG measurement with chest strap/band/textiles; real-time data transmission.	Data Security, Privacy, User Consent	Mentioned	Scoping Systematic Review	Dahiya et al., 2024
Smart Textile Products (T-shirt/Fabric)	Integrated ECG/ECG measurement within fabric; mobile transfer via Bluetooth.	Data Privacy, User Consent, Data Ownership and Use	Not Mentioned	Quantitative	Li et al., 2023
Smart Beds	Sleep, position, respiration, heart rate monitoring; repositioning; fall alerts.	Data Errors, False Alarms	Not Mentioned	Mixed	Tak et al., 2023
Voice Assistant-Based Systems	Medication, blood pressure, and activity reminders; support via voice commands.	Accessibility, User Consent, Data Security, Privacy	Not Mentioned	Quantitative	Valera Román et al., 2021

Systems Providing Safety and Emergency Response

Systems that offer early warning and intervention opportunities in situations such as falls, fires, and gas leaks; smart homes.

Smart smoke detectors and IoT-based gas sensors ensure safety by providing loud alerts even if older people are asleep or have hearing impairments during fire or natural gas leak situations, facilitating early intervention (He et al., 2022). AI-based behavior monitoring systems and behavior analysis systems with machine learning infer risky behavioral patterns from the collected data, making early diagnosis and treatment easier (Huang et al., 2024).

These systems support older people in safely remaining at home and can reduce the need for institutional care. This contributes to the social work approach that protects the right to age in place. Additionally, anomalies detected through behavior analyses can reveal early changes in the psychosocial condition of older people; this accelerates advocacy and intervention processes against issues such as neglect, abuse, or depression. In this way, not only is physical safety ensured, but a strong data infrastructure is also provided to social workers for holistic care planning.

Systems Aimed at Reducing Social Isolation

Loneliness and social isolation are precursors to poor cardiovascular health, depression, anxiety, suicidal ideation, high stress levels, low self-esteem, sleep and stress problems, and low physical activity in older adults. Care robots, wearable devices, voice command systems, and smart home technologies have potential value in reducing social isolation (Latikka et al., 2021).

These technologies used in combating social isolation and loneliness strongly align with the objectives of social work, which include psychosocial support, empowerment, and promoting social participation. Social robots, voice command devices, and VR-based applications enhance social interactions among older people, contributing to the prevention of mental health issues such as depression, anxiety, and loneliness.

Social interaction opportunities provided through technology support a sense of belonging, reduce social exclusion, and improve quality of life. These tools offer significant opportunities for social workers in providing remote psychosocial support, integrating social activities into individualized care plans through technology, and systematically monitoring social isolation. Thus, in social work practices, not only physical care but also the psychosocial well-being of the individual is strengthened with technological support.

Table 2. Systems providing safety and emergency response

Device Type	Functions	Ethical Considerations	Contribution to Social Work	Method	Source	Device Type
Fire and Smoke Detection	Smart smoke detectors	Detects smoke, heat, or carbon monoxide levels and provides audible alerts.	Accessibility, Safety, Privacy, Data Confidentiality	Mentioned	Literature Review	He et al., 2022
Gas Leak Detection	IoT-based gas sensors	Detects natural gas and carbon monoxide buildup, sends audible and digital alerts.	Accessibility, Safety, Privacy, Data Confidentiality	Mentioned	Literature Review	He et al., 2022
AI-Supported Behavior Monitoring	Wearable devices (bracelets, watches, rings), camera systems, passive sensors, voice command systems, smart carpets	Tracks behavioral patterns, identifies emergencies through anomaly detection.	Autonomy, User Consent, Technological Exclusion, Sense of Surveillance, Privacy	Mentioned	Scoping Systematic Review	Zhu et al., 2022
Behavior Analysis with Machine Learning	Wearable devices (bracelets, watches, rings), camera systems, motion, glass/door and pressure sensors (chairs, carpets), voice command systems	Monitors daily movements, detects routines and anomalies, controls home entrances/exits for safety, tracks sitting/lying activities on furniture, monitors room temperature and humidity to support a healthy living environment.	Continuous Monitoring, Privacy, False Alarms, Restriction of Freedom of Movement, Data Security	Mentioned	Quantitative	Sridevi et al., 2020

Table 3. Systems aimed at reducing social isolation

Device Type	Functions	Ethical Considerations	Contribution to Social Work	Method	Source
Social Robots	Daily conversation, games, reminders, psychosocial support	Deception, Over-Attachment, Trust, Ethical Design	Mentioned	Literature Review	Mahmoudi et al., 2022
Therapy Robots	Personalized therapy and conversation, reducing feelings of loneliness	Protection of Human Dignity, Human-Centered Approach	Mentioned	Literature Review	Pfeifer-Chomiczewska, 2023
Mobility Support Robots	Musculoskeletal support, mobility enhancement, blood pressure monitoring, conversation	Autonomy, Safety, Privacy, Technology Acceptance	Mentioned	Literature Review	Costanzo et al., 2024
Service Robots	Object transport, medication delivery, household tasks, low technological maturity	Emotional Attachment, Risk of Loneliness	Mentioned	Review	Santhanaraj & MM, 2021
Voice Command Devices	Conversation, reminders, games, video calls	Privacy, Data Security, Over-Attachment, Risk of Loneliness	Mentioned	Quantitative	Jones et al., 2024
VR and Augmented Reality Glasses	Virtual travel, social interaction, memory games, meditation, exercise	Ethical Design	Mentioned	Quantitative	Abeele et al., 2021

Systems That Reduce the Burden on Caregivers

Difficulties in moving the patient, musculoskeletal problems caused by the caregiver standing or moving constantly during care, disrupted sleep patterns, and resulting chronic fatigue can negatively affect the caregiver's overall health in elderly care (Choi et al., 2024). The physical challenges experienced by caregivers can also impair their caregiving abilities, reducing the quality of care received by older people (Turner et al., 2024). These systems can reduce the physical and cognitive burden on caregivers and enhance the social support network. In doing so, they help prevent psychosocial issues that negatively affect both the caregiver and the care process, such as depression, anxiety, social isolation, and feelings of inadequacy (Choi et al., 2024).

Technologies that reduce the caregiver's physical and cognitive burden align directly with social workers' objectives of providing caregiver support, preventing burnout, and promoting psychosocial empowerment. Systems that reduce physical strain and the need for constant

supervision allow caregivers to devote more time to their own health and well-being, thereby improving care quality and enabling more effective planning of psychosocial support for caregivers.

Additionally, digital task planners and remote monitoring systems help organize the care process more effectively, reducing caregiver stress levels and the risk of burnout. This contributes to strengthening family support systems in social work interventions and enhancing caregivers' sense of self-efficacy. These technologies prevent caregiver isolation, facilitate the planning of social support mechanisms, and enable the implementation of a human-centered, sustainable approach in the care process.

Table 4. Systems that reduce the burden on caregivers

Device/System Type	Functions	Ethical Considerations	Contribution to Social Work	Method	Source
Automatic Medication Dispensing Systems	Automatically dispenses and reminds based on dose, time, and day. Prevents medication errors, reduces monitoring workload.	Medication Dosage Control and Safety, Autonomy, Privacy and Access Control	Mentioned	Quantitative	Roumaissa & Rachid, 2022
Patient Transfer Robots	Facilitates transfer between surfaces like bed, chair, toilet. Reduces physical strain.	Safety, Autonomy	Mentioned	Literature Review	Sivakanthan et al., 2020
Remote Monitoring and Alert Systems	Provides real-time data; does not require constant caregiver presence.	Data Security, Privacy	Mentioned	Literature Review	Abdulmalek et al., 2022
Smart Beds	Prevents bedsores (pressure ulcers), contactless infection control, sleep tracking, fall risk monitoring. Reduces caregiver's physical workload, increases efficiency.	Safety, False Alarms	Mentioned	Quantitative	Tak et al., 2023
Smart Home Systems (lighting, curtains, temperature control)	Enhances comfort via voice commands or automatic programming. Reduces the need for caregiver intervention in every detail.	Technology Acceptance, Digital Literacy, Privacy	Mentioned	Literature Review	Oyibo et al., 2023
Digital Task Planners (mobile apps)	Organizes the care process by planning daily tasks. Reduces forgetfulness.	Data Security, Accessibility, Health Literacy	Mentioned	Quantitative	Göransson et al., 2020

Ethical Issues in Light of the Freedom-Control Dilemma

Thompson (2009) uses the freedom-control dilemma to describe the tension between ensuring an individual's autonomy and ensuring their safety, particularly in care services. In this dilemma, every controlling intervention made for the individual's well-being serves a protective function on the one hand but carries the risk of restricting the individual's freedom of decision-making on the other. In this context, Thompson argues that the ethical responsibility of caregivers requires a constant search for balance between these two poles.

Deception and Manipulation

Artificial intelligence systems used in elderly care can apply algorithmic manipulations. For example, voice command systems or social robots may conceal bad news to calm the elderly, provide false information, or expose the person to continuous misinformation. Certain social media or communication robots designed for older people may repeatedly direct users to interact with the same content or people, thereby trapping them in a narrow social environment lacking diversity (Sharkey & Sharkey, 2012). Similarly, a care robot may provide consistently overly positive feedback to maintain the morale of an elderly person, which could delay necessary medical consultations.

In the context of Thompson's freedom-control dilemma, the manipulation of individuals through information by AI systems and care robots used in elderly care can be considered a violation of the right to autonomy and thus an ethical issue. According to this dilemma, every controlling intervention made for protection limits the individual's capacity for free decision-making (Thompson, 2009); however, directing individuals through incomplete or incorrect information disguises this limitation in a covert and manipulative way, deepening the violation of autonomy.

Another serious debate regarding deception and manipulation concerns care robots and social robots. Sparrow and Sparrow (2006) argued that robots cannot meet the social and emotional needs of older people. Robots do not understand human vulnerabilities and therefore cannot genuinely provide care to vulnerable persons. Additionally, the use of care robots may reduce the amount of human interaction experienced by older people, which can have a negative impact on their well-being. According to this view, attempting to replace real social interaction with robotic imitation is unethical (Sparrow & Sparrow, 2006).

The issue of care robots' inability to provide genuine care involves both intrinsic and extrinsic aspects. The intrinsic aspect concerns the fact that care robots do not possess human consciousness or experience human emotions. Therefore, it is impossible for a robot to truly understand what it means to provide care to a person. Ironically, the robot's inability to feel pain, distress, or vulnerability like a human makes them inherently lacking in empathy and insufficient in providing care (Sparrow & Sparrow, 2006).

The extrinsic aspect relates to the robots' design. The appearance of robots has a significant impact on how people perceive them. If a robot has a highly human-like (anthropomorphic) design, an older people may eventually humanize the robot or attribute human emotions and thoughts to it. This can lead to confusion about whether the person is communicating with a real human or a machine (Yew, 2021). Of course, this deception can sometimes be well-intentioned. Coeckelbergh et al. (2012) suggested that if the purpose of the robot's design is to increase the elderly person's motivation, reduce stress, and shorten the adaptation process to care, then such

deception could be considered acceptable—but is it truly acceptable?

The establishment of deceptive social relationships by robots through human-like designs or their concealment of bad news to influence decision-making exemplifies situations in which control takes on an oppressive rather than a protective nature, as defined by Thompson. In this context, directing or filtering the flow of information to older people narrows their range of choices; while it may appear that freedom is being preserved, in reality, it undermines the individual's cognitive independence. As a result, the control pole in the freedom-control balance loses its ethical legitimacy.

Privacy and Data Security Violations

Supportive IoT systems deal with users' personal data, making privacy and security critically important. The security of an IoT framework relies on the concepts of privacy, authentication, and authorization. Fully complying with these principles can be highly challenging, as the IoT paradigm inherently allows access to system information from multiple points (Zanella et al., 2020). Network attacks, cloud-based data security threats, and web-based attacks are among the main security concerns for IoT systems (Ahmed & Jabarullah, 2020).

To ensure data security, artificial neural network-based intrusion detection systems and cloud security policies offer significant solutions. By analyzing network traffic, artificial neural networks can detect potential cyberattacks and unauthorized access, thereby providing prioritized defense in protecting health data (Alam & Sethi, 2013). Furthermore, Alam and Sethi (2013) emphasized the necessity of implementing security policies such as encryption, access control, and anonymization to protect sensitive data stored in the cloud within government-supported healthcare systems. These approaches are considered not only to strengthen data privacy but also as an ethical obligation to safeguard older people against information security breaches.

Anonymization is defined as the process of removing or modifying personally identifiable information from data collected by IoT systems so that individuals cannot be identified. This process is implemented to protect user privacy (Neves et al., 2023). However, anonymization does not always guarantee complete privacy. When anonymized data is combined with other datasets, there is a risk that individuals' identities can be re-identified (Neves et al., 2023).

Anonymized IoT data poses not only cybersecurity risks but also strategic and reputational risks. The IoT Risks from an Insurance Perspective report published by CRO serves as a guide on how insurance companies can use anonymized IoT data. The report explains how IoT data can be integrated into companies' risk assessment and pricing processes. According to the report, companies can analyze risks in specific regions and reassess policy coverage, potentially implementing excessive pricing based on regional risk profiles (CRO, 2022). For example, if anonymized data collected from IoT-based health devices in a certain region indicates a high risk of heart disease, the insurance company might increase health insurance premiums in that region or exclude heart attack treatment from policy coverage.

The use of anonymized IoT data by insurance companies reflects a digital-age version of the freedom-control dilemma. The CRO report (2022) illustrates how IoT systems, which theoretically promise better service delivery and personalized protection by collecting individuals' health, behavioral, and environmental data can be manipulated for commercial purposes. In this scenario, data-driven control mechanisms serve

to restrict the freedom space. Because individuals are classified based on risk assessments without knowing how their data is being used, they must endure the consequences of this classification. While the individual cannot freely make decisions regarding their health, they are confined to a risk category defined by the system.

On the other hand, monitoring systems used can violate individuals' privacy rights by subjecting them to continuous surveillance; the collection of information about a person's movements, health data, and daily life without consent or in a non-transparent manner creates an ethical issue by blurring the boundaries of their private space. The use of wearable and non-wearable sensors may be perceived as intrusive or uncomfortable by some older people (Boaziz et al., 2022).

As Thompson points out, control measures applied for the protection of individuals, if implemented without respecting the principles of informed consent, transparency, and minimal intervention, result in the unethical restriction of freedom. In this context, the security and monitoring functions of IoT and AI-based care technologies should be structured in a way that supports individuals' decision-making rights. Otherwise, despite their protective intent, these systems can turn into ethically oppressive control tools.

Autonomy

The IoT and AI-based care technologies examined in this study have the potential to monitor the health conditions of older people and support care processes; however, the question of how they affect individual autonomy emerges as a critical area of debate. In 38 of the 53 articles we reviewed, autonomy was cited as one of the ethical concerns of IoT and AI systems. Autonomy refers to the right of individuals to make decisions about their own lives freely, to exercise choice, and to assert their will (Beauchamp, 2003). However, the widespread use of data-driven monitoring systems can blur the boundaries of this right and overshadow the individual's capacity to make decisions regarding their own care process through technology (Boch et al., 2023).

In particular, the recommendation and guidance capacities of AI-supported systems bring with them the potential to make decisions in place of the individual during the decision-making process (Calvo et al., 2020). This situation carries the risk of reducing the older person to a passive object of care. However, social work ethics prioritize that the individual remains an active subject in processes concerning their own life, has a say in their own care planning, and that their right to self-determination is protected (Banks, 2020).

The autonomy issue refers to the delicate balance that must be established between the caregiver's intervention and the individual's own decisions, yet in technology-supported systems, this balance is often disrupted in favor of algorithmic guidance. At this point, when ethical principles such as informed consent, transparency, the provision of options, and the right to withdraw are not fundamentally incorporated into the design and implementation of technology, autonomy becomes merely a technical term, functionally rendered ineffective. As Thompson emphasizes, control mechanisms applied for the purpose of protecting individuals, if not supported by ethical principles such as transparency, informed consent, and minimal intervention, can turn into tools that suppress freedom. In this context, unless technology-based care systems are structured not only to ensure the safety of individuals but also to support their autonomy, the control pole in the freedom-control dilemma may lose its ethical legitimacy. Therefore, strengthening the individual's decision-making capacity in the design and implementation processes of care

technologies is essential for the technology to be considered an ethically legitimate support element.

Transparency and Accountability

If an artificial intelligence system fails to perform a specific task and leads to poor outcomes, who should be held responsible? The undesirable result can arise from many factors, such as programming codes, input data, improper operations, or other variables. Although these technologies hold the potential to assist in the field of elderly care, the question of accountability when an error occurs is a critical issue. Therefore, accountability is an ethical concern related to the human factors involved in the design, implementation, deployment, and use of artificial intelligence (Huang et al., 2022; Presman et al., 2024).

When the decision-making processes of IoT and AI systems are carried out by algorithms, it is crucial to answer questions such as how these algorithms work, what data they are fed with, and how decisions are produced. In this context, the question "Who is the decision-maker?" relates not only to human actors but also to the operation of technological systems. To ensure accountability, algorithmic decision-making processes must be understandable, traceable, auditable, and transparent.

Thus, ensuring accountability requires that IoT systems and AI-based technologies conduct their data collection and analysis processes transparently. These systems generate large amounts of data about users' health information, daily activities, and environmental conditions. However, failing to ensure transparency regarding who collects this data, for what purpose, how it is stored, and with whom it is shared can lead to serious ethical problems (Banks, 2020).

In the framework of Thompson's freedom-control dilemma, transparency is essential for the individual to cease being merely the controlled party and instead become an active subject of the process. In the absence of transparency, the individual cannot gain knowledge about the decision-making mechanisms of technological systems and thus cannot fully exercise their right to make informed decisions about their care process (Thompson, 2009).

Access Issues and Technology Acceptance

Access to technological devices by older people is a determining factor in their ability to benefit from the opportunities provided by these devices. However, particularly for older people in low-income groups, accessing these devices can be difficult due to financial barriers and a lack of digital literacy (Oyibo et al., 2023). In addition to financial difficulties, designs must be user-friendly (for different demographics, cultural and linguistic groups, and especially for people with disabilities), meaning that one-size-fits-all solutions are inadequate (Kazim & Koshiyama, 2021). These inequalities in access to technology can undermine the principle of justice in care processes.

Technology acceptance refers to the process by which older people adopt the technology and integrate it into their daily lives. This process depends not only on the technical adequacy of the devices but also on individuals' perceptions of technology, their motivation to use it, and their sense of trust (Tan, 2024). Older people who experience technology as a mandatory monitoring and control mechanism may resist or reject these systems. This can limit their participation in the care process, weaken their right to autonomy, and reduce the effectiveness of the systems.

Within Thompson's dilemma framework, technology acceptance means that individuals

choose to use technology voluntarily, without being controlled. If acceptance turns into compulsion, the dominance of the control pole increases, and the freedom pole weakens. Therefore, policies on technology acceptance must be supported by principles of voluntariness, informed consent, and user-centered design as an ethical imperative.

Environmental-Level Ethical Issues

The environmental impacts arising from the production, use, and disposal processes of IoT and AI systems are often overlooked but are critical ethical concerns. The energy consumption of these devices, the production of electronic waste, and the use of toxic materials in their components pose challenges in terms of environmental sustainability (He et al., 2022).

In particular, the rapid consumption of short-lived electronic devices in the care sector increases the volume of e-waste, and the inadequacy of recycling processes leads to environmental injustices. The health risks faced by workers in low-income countries during the disposal of e-waste must be addressed from a global ethical responsibility perspective (Neves et al., 2023).

Although Thompson's freedom-control dilemma typically offers an individual-focused framework, the extension of control to production and consumption processes at the environmental level demonstrates that this dilemma is also valid on a macro scale. If technological systems are designed not only to ensure individual safety but also to maximize corporate profits and production speed through short-lived, high-waste-generating structures, then control mechanisms become ethically problematic on both societal and environmental levels. Therefore, environmental sustainability is not just an ecological issue but also a freedom-control matter that must be considered within the context of social work ethics.

CONCLUSION

The use of AI and IoT-based systems in elderly care presents significant opportunities to improve the quality of care processes and reduce dependence on human labor in the face of a growing elderly population. These technologies provide effective solutions in areas such as health monitoring, early diagnosis, safety, reduction of social isolation, and alleviation of caregiver burden. However, it is evident that these opportunities also bring serious ethical concerns.

The findings from the 53 articles analyzed in this study highlight prominent ethical concerns, particularly regarding privacy, data security, autonomy, access to and acceptance of technology, deception and manipulation, transparency, and accountability. Within the framework of Thompson's freedom-control dilemma, these systems, while serving a protective function to enhance the safety of older people, can also limit their freedom. This dilemma emerges as the fundamental ethical challenge in the search for balance in technology use.

Especially the decision-making capacity of AI-based recommendation and guidance systems carries the risk of reducing older people from active subjects to passive objects of care. This poses a potential threat to the right to self-determination from a social work ethics perspective. Additionally, the inadequacy of data anonymization processes and the manipulation of data for commercial interests can pave the way for injustices in insurance policies, deepening control mechanisms that individuals are unknowingly subjected to.

Therefore, in the development and implementation of IoT and AI systems in elderly care, not only technical adequacy but also ethical design principles must be observed. Informed consent, transparency, the provision of options,

the right to withdraw, and the principle of minimal intervention should be indispensable elements of technology use. From a social work perspective, it is crucial that these technologies are designed to strengthen individual independence and participation, structuring them in a way that transforms the individual from a controlled object into an active subject of decision-making processes.

In conclusion, the ethical use of AI and IoT technologies in elderly care, in harmony with social work values, will not only enhance the quality of life for individuals but also lay the foundation for a care model that ensures ethical legitimacy in the freedom-control balance. This balance is indispensable for integrating technology into care processes in a manner that upholds human dignity.

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Based on the findings of this study, the following recommendations are proposed to ensure ethically responsible and socially inclusive implementation of AI and IoT systems in elderly care:

- Social workers should play an active role not only at the level of individual intervention but also in the ethical development, implementation, and policymaking processes related to these technologies.
- Integrating modules on the ethical use of AI and digital technologies into undergraduate and graduate social work education programs would enhance professionals' capacity to adapt to digital transformation.
- The design of technological systems should incorporate the direct participation of older people and caregivers to create ethically sound and functionally comprehensive care models.
- Further research within the social work discipline on the applications of IoT and AI is essential to provide critical and ethical perspectives on the digitalization of care.
- The environmental impact of these technologies should be considered, and both hardware and software must be developed in alignment with sustainability principles.

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