Artificial Intelligence, Big Data, Media, and Health Literacy

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Abstract

This study outlines a comprehensive framework for analyzing the intersections among artificial intelligence, big data, and digital health literacy within modern information ecosystems. Artificial intelligence is conceptualized as a transformative technological layer that collects, analyzes, and classifies health data at scale, thereby reshaping institutional and individual practices. Big data infrastructures facilitate real-time health monitoring, epidemiological modelling, and population-level surveillance, while also raising concerns regarding privacy, algorithmic accuracy, and disparities in access. Digital health literacy is characterized as a multidimensional competency encompassing system awareness, critical judgment, and ethical evaluation, extending beyond basic information-seeking. Empirical evidence demonstrates that higher levels of digital health literacy are associated with improved health decision-making, enhanced patient autonomy, and greater resilience to misinformation. Nevertheless, national and global studies identify significant disparities across population groups, highlighting the need for targeted interventions. In the digital era, these domains increasingly converge as individuals depend on mobile platforms, wearable devices, and algorithmic recommendations. A framework emphasizing transparency, agency, critical inquiry, and equitable access is essential to ensure that emerging health technologies empower users and do not perpetuate structural inequities. This integrated perspective regards artificial intelligence and big data as socio-technical systems that require informed engagement.

Keywords: Media literacy; Health literacy; Digital health literacy; Critical media literacy; Media and health literacy

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1. Conceptual View Of Health Literacy: The Shift From Traditional Health Literacy To Digital Health Literacy

Contemporary perspectives on health literacy extend beyond the individual's capacity to comprehend and apply health-related information. Health literacy is now recognized as a critical determinant in reducing societal health disparities and facilitating effective use of healthcare services. The World Health Organisation (WHO) defines health literacy as "the ability of individuals to access, understand, and use health information," positioning it as a foundational element of public health (WHO, 2013). This definition underscores the necessity for individuals to act as active decision-makers, rather than passive recipients, in the healthcare process.

The concept of "health literacy" was first introduced by Simonds in 1974 in the article "Health Education as Social Policy." Since the 1990s, the concept has evolved to encompass a broader societal perspective (Parker & Ratzan, 2010; Simonds, 1974). Nutbeam identified three levels of health literacy: functional health literacy (basic reading, writing, and health knowledge), interactive health literacy (communication and decision-making skills), and critical health literacy (the ability to evaluate, interpret, and question information) (Nutbeam, 2000). This framework demonstrates that health literacy encompasses individual, social, and political dimensions.

Subsequent research has demonstrated that low health literacy has serious consequences at both the individual and societal levels. Inadequate health literacy results in challenges in managing chronic diseases, non-compliance with medication regimens, increased healthcare costs, and worsening health outcomes (Paasche-Orlow & Wolf, 2007; van der Gaag et al.,

2022). Moreover, disparities in health literacy levels have emerged as a significant determinant of broader health inequalities in society (Sörensen, 2019).

The global digital transformation has prompted a reassessment of health literacy. Individuals now obtain health information not only from physicians, healthcare institutions, or printed materials, but also through the internet, mobile applications, social media platforms, and artificial intelligence-powered digital assistants. This shift necessitates moving beyond traditional conceptions of health literacy. The COVID-19 pandemic exposed the "infodemic," characterised by the rapid dissemination of false or misleading health information, thereby underscoring the critical importance of digital health literacy (WHO, 2020).

At this juncture, digitalization—the most significant transformative force of the 21st century—has reshaped health literacy. The proliferation of the internet and mobile technologies has greatly diversified individuals' sources of health information. Health knowledge now extends beyond physicians' verbal explanations or printed brochures; online health portals (e.g., WebMD, Mayo Clinic), official institutional websites, digital health platforms, and social media have become primary sources of health information for individuals (LaValley et al., 2017; Milanti et al., 2025).

Digital health literacy lies at the centre of this transformation. Norman and Skinner (2006) defined digital health literacy as individuals' abilities to find, understand, evaluate, and use health information from digital sources (Norman & Skinner, 2006). This definition requires additional competencies beyond traditional health literacy: media literacy, information literacy, computer literacy, and critical thinking.

Digital transformation presents both opportunities and challenges for health literacy. The internet and mobile health applications offer continuous access to health information, empower patients in self-management, and democratise access to information (Levin-Zamir & Bertschi, 2018). Conversely, the vast and unregulated flow of information in digital environments heightens the risks of information pollution and disinformation. The COVID-19 pandemic, marked by the rapid spread of false and misleading information—referred to by WHO as an "infodemic"—highlighted the essential role of digital health literacy (WHO, 2020).

The digital divide also represents a significant challenge. Differences in education, age, income level, and geography directly affect individuals' access to and use of digital health information. Elderly individuals or those from low socioeconomic backgrounds may be disadvantaged in accessing digital health services (van Deursen & van Dijk, 2014). In the Turkish context, this stratification is empirically observable: data from the Turkish Statistical Institute (TÜİK) Household Information Technologies Usage Survey (TÜİK, 2024) indicate that internet use among individuals aged 16–74 is markedly higher in metropolitan areas than in rural settings, and considerably lower among adults aged 65–74 than among younger groups. Educational attainment functions as a further structural variable, with higher-education graduates reporting substantially greater use of e-government and digital health services than primary-school graduates. These patterns suggest that age, geography, and education jointly produce a multi-layered digital health divide, risking the exacerbation of existing inequalities in healthcare access.

In the Turkish context, digital health literacy is becoming increasingly important. The e-Nabız system (Türkiye's national personal health record system), implemented by the Ministry of Health (e-Nabız, n.d.), enables individuals to access their personal health records online, thereby placing digital health literacy at the centre of daily health management. e-Nabız simultaneously functions as a large-scale big-data infrastructure: it consolidates laboratory results, imaging records, prescriptions, and immunisation histories of millions of users, enabling integrated epidemiological surveillance, pandemic monitoring, and population-level analytics. During the COVID-19 pandemic, the integration of e-Nabız with the HES code application offered a concrete example of how aggregated personal health records can be operationalised for real-time public-health decision-making. The effective use of such systems, however, depends not only on technological infrastructure but also on society's level of digital health literacy and on transparent governance of the underlying data flows (Maurud et al., 2025; Zhou et al., 2024).

In summary, the transition from traditional to digital health literacy has fundamentally altered the ways in which individuals access and utilise health-related information. While this transformation supports greater autonomy in health decision-making, it also introduces challenges, including increased exposure to misinformation, information overload, and digital inequalities.

2. Mobile Health (mhealth) and "Wearable Information"

Mobile health (mHealth) refers to the use of mobile devices, wireless technologies, and wearable sensors to support healthcare services and promote active individual participation in health management. The World Health Organization defines mHealth as "the provision of health applications and services through mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices" (WHO, 2011). This approach breaks the confinement of healthcare services to medical institutions alone, enabling individuals to continuously monitor, manage, and share their personal health data in real time.

Mobile health applications are used in many areas, including chronic disease management, supporting healthy behaviors, and strengthening patient-physician communication. For instance, mobile applications for patients with diabetes facilitate regular blood sugar monitoring and the sharing of this data with healthcare professionals (Lopes et al., 2024). Similarly, mobile applications in hypertension management improve medication adherence and support lifestyle changes (Mena et al., 2020). Additionally, smartphone-based reminder systems are increasingly being used to improve medication compliance.

Mobile health plays an important role not only for patients but also in lifestyle management for healthy individuals. Hundreds of applications encourage physical activity, track nutritional habits, record sleep patterns, or provide guidance for stress management, supporting individuals' health-related behaviours (Duncan et al., 2018; Lee Ventola, 2014). This situation redefines health literacy not merely as accessing and

understanding information, but also as the capacity to interpret personal health data and translate it into behavioural changes.

A significant component of mobile health is wearable technology, which consists of devices that continuously measure and record individuals' health data. Smartwatches (Apple Watch, Samsung Galaxy Watch), fitness bands (Fitbit, Xiaomi Band), heart rate sensors, EKG recorders, and continuous glucose monitors enable individuals to monitor their health status 24 hours a day (Liang et al., 2018; Piwek et al., 2016).

Wearable devices not only collect data but also provide users with feedback by interpreting that data. For example, smartwatches can detect irregularities in heart rhythm and alert users about the risk of atrial fibrillation; glucose sensors provide diabetic patients with real-time glucose values, reducing the risk of hypoglycaemia or hyperglycaemia (Steinhubl et al., 2015; Vashist et al., 2014). These features introduce the concept of "wearable information": the transformation of continuously generated data from individuals' bodies into real-time health knowledge.

Mobile health applications and wearable devices provide substantial benefits for both individuals and healthcare professionals. However, uncertainties persist regarding the interpretation of mobile health data in clinical decision-making, the reliability of various data sources, and strategies for managing data overload.

Mobile health and wearable technologies reveal a new dimension of health literacy: individuals must not only understand health information but also read, interpret, and derive meaningful insights from their own biological data. The concept of "wearable information" transforms health literacy into

a data-driven process, empowering individuals to be more active in their health management. Nevertheless, data security, ethical responsibilities, and digital inequalities remain significant barriers to the adoption of mHealth applications and wearable technologies.

Beyond individual health tracking, the aggregation of mobile health data into large-scale datasets opens a distinct analytical frontier. Epidemiological modelling increasingly relies on anonymised wearable and electronic health record (EHR) data to detect disease clusters, forecast seasonal influenza peaks, and allocate scarce healthcare resources in real time. During the COVID-19 pandemic, for example, aggregated smartwatch heart-rate and activity data enabled researchers to identify pre-symptomatic infection signals days before conventional testing confirmed cases, demonstrating the predictive value of population-level biometric streams. Patient record analysis powered by machine-learning algorithms can stratify chronic-disease risk across demographic groups, informing preventive-care policies at the population level. However, the epidemiological promise of big data must be weighed against privacy risks, algorithmic opacity, and the potential for surveillance creep—concerns that connect directly to the critical health literacy competencies discussed in the following section (Yuan & Singh, 2025; Zhou et al., 2024).

3. Critical Health Literacy

3.1. Trusting Algorithms Over Information

Among the most debated areas in the evolving structure of health literacy in recent years is "critical health literacy." This approach encompasses not only individuals' understanding of health information but also their ability to question its

source, reliability, and ideological or commercial orientations (Nutbeam et al., 2018; Sörensen et al., 2012). In the digital age, the diversification of information sources and the growing role of algorithms in everyday decision-making processes have made critical health literacy increasingly important.

Search engines, social media platforms, and mobile applications have become central sources for health-related information. However, this information flow is not neutral—it is filtered and organised by algorithms. This situation directly affects the information individuals are exposed to, the health recommendations they see, and even the treatment options they consider (R. J. Chen et al., 2023). For instance, health information appearing at the top of Google search results is often determined by algorithms that prioritise commercial interests, advertising investments, or popularity metrics. Consequently, individuals may encounter algorithm-prioritised information rather than objective, evidence-based health knowledge. At this point, critical health literacy teaches individuals to ask, "Why am I encountering this content?"

3.2. Risks of Trusting Algorithms Over Information

The filtering of health information through algorithms brings numerous risks (Vosoughi et al., 2018), such as misinformation and disinformation, where a significant portion of health news shared on social media consists of false or distorted information. Additionally, it leads to unequal access, as algorithms create "information bubbles" by presenting content based on users' previous searches, preventing exposure to diverse perspectives. Another risk involves commercial interests, since mHealth applications and search engines often provide sponsorship and advertisement-based

recommendations, intertwining health information with commercial interests. Critical health literacy extends beyond the ability to read and understand information. This approach emphasizes competencies that include questioning the reliability of sources, analysing the political, economic, and cultural context of information, recognizing algorithmic biases, seeking alternative information sources, and balancing expert opinions with digital information in decision-making processes. Within this framework, critical health literacy seeks to shift individuals from the role of "passive information consumers" to that of "active and questioning information users."

3.3. Looking Ahead: Algorithmic Transparency and Health Literacy

As algorithm-based information flow becomes increasingly inevitable, a new paradigm in health education is required to help individuals become resilient and conscious in the face of these systems. Demands for algorithmic transparency, strengthened regulations, and the incorporation of critical literacy modules into digital health education can be counted among the important steps to protect public health in the future.

The conceptual development of health literacy should be examined across a spectrum extending from traditional approaches to digital transformation and critical dimensions. The shift from traditional to digital approaches, along with mHealth and wearable technologies, offers new opportunities, while algorithms shaping health information necessitate a critical perspective. For future health literacy, it is essential not only that individuals access health information but also that

they question it, contextualise it, and use it consciously in decision-making processes.

In this context, future health literacy will require individuals to develop both information access and critical evaluation capacities, analyse algorithmic outputs, and communicate effectively with healthcare professionals. Educational programs, policymakers, and healthcare systems must develop strategies to strengthen digital and critical health literacy.

In conclusion, health literacy should be regarded not only as an individual competency but also as a foundational component of public health and digital justice. As technological advancements reshape the production and consumption of health information, fostering conscious and critical individuals is essential for the sustainability of public health.

4. Digital Health Applications And Artificial Intelligence: Between Clinical Reality And Algorithmic Expectations

The rise of AI-based digital health applications is redefining individuals' relationships with health, not only at the informational level but also in decision-making. Mobile applications, wearable devices, and symptom checkers have transformed into systems capable of continuously monitoring, classifying, and providing feedback on the user's health status. While this development enables healthcare services to become partially independent of time and space constraints, it also creates a hybrid plane in which information authority is redistributed between medical institutions and algorithmic systems (Topol, 2019, pp. 112–114).

In this context, individuals engage in decision-making processes that alternate between the expert assessments of health professionals and algorithm-generated results. This dynamic requires digital health literacy to encompass not only comprehension of information but also the capacity to critically evaluate the systems that generate it.

4.1. AI-Supported Wearable Technologies and the Limit of Clinical Accuracy

Wearable devices can continuously monitor a wide range of biometric data, including heart rhythm variability, oxygen saturation, sleep patterns, and stress indicators. These devices have become powerful tracking systems that allow users to monitor their own health status, regulate their behaviours, and respond to early warning signals. Large-sample studies show that wearable technologies can make clinically significant contributions, particularly in chronic disease management, atrial fibrillation screening, and behavioural health monitoring (Torous et al., 2021, p. 320). These data support the potential of algorithms as an auxiliary layer for healthcare providers.

However, significant debates continue over the accuracy and clinical reliability of measurements from wearable technologies. Measurement discrepancies, device software updates, sensor sensitivity, and user characteristics can affect data reliability. Although the discourse of early diagnosis is increasingly emphasised, the potential for devices to produce false-positive or false-negative results can create unnecessary anxiety or a false sense of security in the individual (Smith & Magnani, 2019, pp. 281–282).

A critical regulatory distinction frames these reliability concerns: most consumer wearables (Apple Watch, Fitbit, Samsung Galaxy Watch) are marketed primarily as wellness or general-fitness devices, while only specific functionalities—such as the Apple Watch ECG and irregular-rhythm notification features—operate within defined medical-device regulatory pathways in particular jurisdictions (Apple Inc., 2025a, 2025b; European Union, 2017; U.S. Food and Drug Administration [FDA], 2022). This means that a single device can carry both regulated medical-device features and unregulated wellness features, a layered status that is rarely transparent to end users. The implications for patient safety and clinical decision-making are substantial: a notification generated by a cleared or regulated feature is governed by formal evidentiary thresholds, whereas a sleep-quality or stress-level reading on the same wrist may rest on proprietary algorithms with no comparable validation. Platforms such as Apple HealthKit and Google Fit/Fitbit further aggregate these heterogeneous data streams, presenting clinically uneven signals through visually uniform dashboards. For public-health purposes, the consumer-electronics versus regulated-medical-device boundary is therefore a fundamental axis of digital health literacy: users must learn to recognise which readings carry regulatory weight and which do not.

Therefore, while wearable technologies are a promising field, the tension between algorithmic outputs and clinical accuracy constitutes a fundamental boundary that must be considered within the scope of digital health literacy.

The regulatory landscape underscores this tension. Devices that undergo FDA 510(k) clearance or De Novo classification—such as the Apple Watch ECG feature (FDA Class II) or

certain continuous glucose monitors—must demonstrate analytical and clinical validity through controlled trials. In contrast, the vast majority of consumer fitness trackers and wellness applications are marketed under the FDA's general wellness exemption and are not required to meet the same evidentiary standards. Users who conflate regulatory categories risk making clinical decisions—adjusting medication, skipping medical visits—on the basis of measurements whose margin of error has never been formally established. Digital health literacy must therefore include an understanding of regulatory tiers, enabling users to distinguish between clinically validated outputs and algorithmically generated wellness estimates (FDA, 2022; Steinhubl et al., 2015).

4.2. AI-Based Chat Systems and the Challenges of Algorithmic Decision Support

Symptom checkers and AI-based health chat systems can become the first point of contact when individuals experience uncertainty about their health. Studies based on clinical-scenario analyses reveal that symptom-checker algorithms exhibit significant differences in triage accuracy. While some algorithms may offer high accuracy in certain situations, others may overlook serious medical conditions or provide misleading guidance (Semigran et al., 2015, pp. 374–376). These findings demonstrate that AI systems providing decision support cannot be accepted as reliable clinical authorities; they emphasize that they do not eliminate the need for professional evaluation, especially in emergencies.

A similar tension applies to health information provided by large language models. Evaluations show that responses from AI-based chat systems are highly readable but carry

distinct limitations in clinical accuracy and contextual appropriateness (Xue et al., 2024). In this case, the individual's ability to correctly evaluate AI-generated information becomes a fundamental skill that determines the extent to which they will rely on algorithms in health-related decisions. In this context, digital health literacy is a broad competency area that encompasses not only acquiring information but also developing awareness of information sources.

4.3. Algorithmic Guidance, Behavioural Architecture, and the Autonomy Debate

AI-based health applications may not directly manage an individual's behaviours; however, the design of user interfaces, feedback forms, and data display logics can indirectly guide daily decisions. This process, termed "choice architecture" in the behavioural economics literature, shows that how specific options are presented to the user can influence decision-making behaviour (Yeung, 2017, pp. 119–121). Health applications that routinely send reminders, evaluate progress through scoring systems, or encourage goal setting can create invisible lines of influence that shape individual behaviour within a framework of self-discipline.

These mechanisms can shift the individual's relationship with health from one grounded in free choice to a performance-oriented framework. Such guidance may inadvertently diminish individual autonomy. Users may come to perceive regular monitoring and data sharing as obligatory, transforming digital health practices from voluntary participation into tacit compliance (Lupton, 2016, pp. 45–47). The performative aspects of digital surveillance infrastructures and competitive design features can generate psychological

pressure, framing health as a project to be completed rather than a state of well-being.

5. Media, Mobile Culture, And Social Representations of Health

In the digital age, media environments have become not just a channel for the dissemination of health information but a productive field of power that redefines the meaning, boundaries, and norms of health. Content disseminated through mobile applications, wearable devices, and social platforms shapes individuals' perceptions of their health; it creates new cultural frameworks that evaluate biological well-being along axes of performance, efficiency, and visibility.

From a communication-studies perspective, the cultural construction of health in the digital age can be productively read through the lenses of agenda-setting and framing. Classical media-effects research has long argued that media do not tell audiences what to think but rather what to think about (McCombs & Shaw, 1972) and shape interpretive schemes through the selection and salience of particular attributes (Entman, 1993). In digital ecosystems, these agenda-setting and framing functions are increasingly performed by algorithmic curation systems that determine which health stories trend on social platforms, which symptoms surface as "search interest" peaks, and which technologies appear in feeds as innovations worth attention. The popular framing of artificial intelligence as a "promising technology"—a redemptive force capable of solving entrenched problems of access, accuracy, and cost in healthcare—travels through this circuit of algorithmically amplified visibility. Such "promise narratives" tend to foreground individual empowerment, miraculous early

detection, and seamless personalisation while backgrounding questions of regulatory uncertainty, data extraction, and algorithmic failure. The result is a discursive environment in which public perception of AI in health is shaped less by clinical evidence than by curated representational regimes.

This process leads to the fragmentation of information authority in the health field among medical professionals, government institutions, media organisations, and user communities; it increasingly heightens the importance of questions regarding why and how information is produced, alongside its accuracy (Lupton, 2016, pp. 32–35). Thus, the media becomes not a passive carrier of health culture, but an active constructor of it.

Entman's (1993, p. 52) canonical definition of framing—"to select some aspects of a perceived reality and make them more salient"—acquires new dimensions in algorithmic media environments. When health-related content is surfaced by recommendation algorithms, the frame is no longer set solely by journalists or editors but is co-produced by engagement metrics, user profiles, and platform affordances. Similarly, McCombs and Shaw's (1972) agenda-setting function is amplified: trending health hashtags, viral symptom videos, and algorithmically boosted wellness brands can set a public health agenda that diverges sharply from epidemiological priorities. The result is a media environment in which the salience of a health topic correlates less with its clinical significance than with its shareability, creating a structural challenge for evidence-based health communication.

5.1. Advertisements, Data-Centric Health Ideology, and the Marketing of "Wellness."

The mobile health industry repositions health within market dynamics through advertising strategies. Messages on digital platforms frame health as an individual project that requires constant improvement and define it in terms of measurable metrics. The motto "be the best version of yourself," frequently encountered in the discourses of wearable technology manufacturers, transforms the individual's biological reality into a data-centric logic of performance (Lupton, 2016, pp. 32–35).

Behind these advertising surfaces lies a political-economic infrastructure that warrants systematic attention. Within the framework of platform capitalism (Srnicek, 2017), health data functions as a commodity form: continuously generated, easily aggregated, and structurally valuable for predictive modelling. Couldry and Mejias (2019) describe this configuration as "data colonialism," a regime in which the everyday flows of bodily and behavioural data are appropriated as the raw material of a new accumulation process. Health platforms occupy a privileged position in this regime because biometric data carries unusually high predictive value for advertisers, insurers, and pharmaceutical actors. Concrete cases illustrate the dynamic: Apple HealthKit and ResearchKit, Google Fit/Fitbit, and Google's acquisition of Fitbit in 2021 exemplify how dominant platforms have moved to consolidate health-data flows within proprietary ecosystems (Apple Inc., n.d.; Google LLC, 2021). The beneficiaries of this circulation are not only device manufacturers but also the broader advertising ecosystem that integrates health-adjacent signals into behavioural targeting (Zuboff, 2019). Recognising these articulations is

essential to understanding why "free" health-tracking services are economically sustainable in the first place.

This perspective reframes health from a direct bodily state to an ideal attainable through consumption, in which downloading applications, purchasing devices, or subscribing to services are depicted as necessary to enhance health capacity. Such processes can provide emotional and behavioural guidance under the appearance of objective information. Advertising frequently employs risk narratives about unhealthy lifestyles, while ideals of the perfect body and high performance impose normative pressures on users. Individuals are thus encouraged to generate data not only for personal health but also for visibility and social acceptance. This commodified view of health redefines digital health literacy as an awareness that involves critically analysing the ideological influence of media discourses.

The commodification of health data operates through multiple extraction mechanisms. At the primary level, users exchange biometric information for personalised feedback—a transaction that appears equitable but obscures the asymmetric value generated when aggregated datasets are licensed to pharmaceutical firms, insurers, and advertising networks (Couldry & Mejias, 2019, pp. 110–115). At the secondary level, behavioural metadata—when the user opens the application, how long they engage with each screen, which notifications prompt action—fuels the refinement of persuasive design patterns whose purpose is to maximise engagement rather than health outcomes. Zuboff's (2019, pp. 96–97) concept of "behavioural surplus" captures this dynamic: data generated as a by-product of health self-management is repurposed for prediction products that serve market rather than clinical

interests. A critically literate user must therefore read not only the health information presented by the application but also the economic architecture that shapes which information is presented and how.

5.2. Influencer Medicine, Self-Discipline, and Visible Bodies

Health representations visible on digital platforms are produced not only by institutions but also by users. Social media influencers have become new information actors who model and normalise health behaviours without claiming expert status. By sharing exercise routines, nutrition programs, and sleep tracking graphs, these users influence audiences at both the informational and normative levels.

In digital environments where the female body is constantly open to evaluation, beauty and health discourses intertwine; visibility reinforces bodily discipline processes (Elias & Gill, 2018, pp. 61–63). Within this framework, influencer content is not merely the sharing of individual experiences but cultural tools that shape perceptions of health and the body. Even private spaces like home and family can become part of digital health culture. Sharing wearable device data among family members, comparing daily step counts, or discussing sleep graphs prepares the ground for surveillance practices to settle into intimate spaces (Hardey, 2022, pp. 4–6).

Such sharing can trigger voluntary self-control mechanisms, leading the individual to rearrange their behaviour in line with goals determined by the system. This culture, which appears capital-free and horizontal, may open new spaces questioning the institutional distribution of health

information, but it also invisibly reinforces the ideology of individualized responsibility. The rise of influencer medicine also contributes to the redefinition of expertise. While clinical knowledge in the traditional model relies on professional education and competence, visibility and audience trust create a new type of authority domain in the digital environment. This situation complicates the question of which sources individuals will trust in their search for health information and moves digital health literacy beyond the question "who is speaking?" to "within what interest relationship are they speaking?" Thus, the media is not merely a space for transmitting information, but a powerful cultural intermediary that can support or undermine the individual's autonomy regarding health (Lupton, 2016, pp. 32–35; Elias & Gill, 2018, pp. 61–63; Hardey, 2022, pp. 4–6).

6. New Forms of Health Literacy: Ethics, Autonomy, And User Power In The Digital Age

The expansion of the digital health ecosystem has rendered classical approaches to defining health literacy, which define it solely in terms of the capacity to access and use information, insufficient. With the penetration of artificial intelligence, big data, and mobile health applications into everyday life, a new health subject is emerging where the individual is no longer just a consumer of information but also a producer, distributor, and interpreter of data.

This new subject position points to a multidimensional area of competence that goes beyond information literacy and requires grasping the functioning of systems, data flows, and algorithmic mechanisms (Ban et al., 2024, pp. 3–4). Digital health literacy, therefore, represents much more than

technical skills: it is a form of awareness in which the individual understands under what structural conditions their health information is produced and how it is instrumentalised.

6.1. Transition from Information Consumption to Digital Subjectification

Data production on digital platforms creates an invisible form of participation in which every step shared, every heartbeat measured, and every sleep cycle recorded contributes to the functioning of systems. Biometric data recorded via wearable technologies go beyond individual health tracking and become raw material for algorithmic learning (Lupton, 2016, pp. 42–45). This transformation positions the individual not only as a measured body but as a productive actor of the data-driven health economy. The digital environment also alters how individuals interpret their own behaviours: converting health data into personal objectives can establish normative progress metrics that encourage individuals to manage their health as a project. These dynamics blur the distinction between cognitive autonomy and the directive influence of digital systems in decision-making, and viewing data production as voluntary normalises participation in digital platforms in ways that potentially obscure the underlying interests of these systems (Ajana, 2017, pp. 8–9). Health literacy therefore extends beyond information consumption to encompass critical thinking about the data flows shaping individual experiences.

Translating this awareness into concrete public-health practice involves several pragmatic capacities. At the level of individual decision-making, it means reading a wearable's notification with an awareness of its regulatory status before

adjusting medication; at the level of intervention design, it means building consent and data-portability options into mHealth applications so that critical literacy can be enacted rather than merely conceptualised. The theoretical framework of digital subjectification thus connects directly with operational questions in health communication and behaviour change.

6.2. Human-Centric Design, Ethical Sustainability, and User Autonomy

The effects of digital health technologies on the individual are not limited to usage practices; assumptions, values, and goals embedded in application and system designs constitute the infrastructure that determines the individual's options. User interfaces, feedback mechanisms, and goal-setting tools may appear to offer freedom of choice but can create behavioural architectures triggering self-discipline and compliance processes (Yeung, 2017, pp. 119–121).

Therefore, for digital health platforms to be ethically sustainable, design must be regulated not only in terms of functionality and accessibility but also in terms of individual autonomy and privacy rights. Applying human-centric design principles to digital health systems means designing technology that adapts to users. This approach advocates that the individual's needs, capabilities, and limitations should be the starting point of design. Systems that do not offer the user control over their own data not only establish an instrumentalising relationship but can also transform health technologies into tracking and guidance mechanisms.

Consequently, for digital health tools to empower individuals, transparency of data flows, algorithmic accountability,

and the user's active participation in decision-making processes are required (Ruotsalainen & Blobel, 2025, p. e68661). In this framework, ethical governance becomes a foundational necessity for the future of digital health culture. Meaningful user consent, limiting third-party access to data, and the questionability of algorithm outputs are elements that must be included in the scope of digital health literacy. Health literacy thus becomes not only an individual skill but a societal capacity for the sustainability of rights, autonomy, and ethical consciousness in the digital society.

6.3. User Agency, Negotiated Use, and Digital Resistance

A perspective that frames users solely as objects of algorithmic guidance risks reproducing the very passivity it seeks to critique. Communication and STS research has consistently documented that users of digital health platforms also engage in negotiated, oppositional, and creatively appropriative practices. Reception studies of self-tracking communities show that users frequently disable notifications they experience as intrusive, selectively share data with clinicians while withholding it from platforms, and repurpose menstrual or sleep trackers for goals unanticipated by designers (Pink et al., 2017; Lupton, 2017). Forms of "obfuscation," workaround configurations, and outright abandonment of devices have been documented as everyday tactics of digital resistance (Brunton & Nissenbaum, 2015). Similarly, patient communities online frequently challenge dominant medical framings by sharing alternative interpretations of biometric data and crowdsourcing experiential knowledge. Incorporating this evidence of user agency does not weaken the critical argument advanced

in this chapter; rather, it grounds it more realistically. Digital health literacy, on this reading, is not only the capacity to recognise asymmetries of power but also the practical competence to act within them—through negotiated use, selective disclosure, and creative reinterpretation of platform affordances.

Concrete resistance practices are already observable. Some users engage in "data obfuscation"—deliberately introducing noise into their tracked metrics to disrupt profiling algorithms (Brunton & Nissenbaum, 2015, pp. 44–46). Others practise selective disclosure, sharing step counts but withholding sleep or menstrual-cycle data from applications whose privacy policies permit third-party data sharing. At the collective level, patient advocacy groups have mobilised around data portability rights, demanding that health platforms allow users to export and delete their records—a demand that echoes the "right to be forgotten" enshrined in European data-protection law. These practices demonstrate that digital literacy is not merely a cognitive competency but an enacted, socially situated form of agency that reshapes the very platforms it engages with.

7. Health in the Pocket, Ethics on the Wrist: A New Horizon of Literacy

The expansion of the digital health ecosystem is fundamentally altering individuals' experiences of their bodies and health. Health is now conceptualized as a multi-layered construct, influenced not only by biological information but also by data-driven self-regulation, behavioural guidance mechanisms, and economic interests. Data-driven health technologies render the body both observable and regulated, while

simultaneously positioning individuals as active contributors within these systems (Lupton, 2016, pp. 43–45). Consequently, health literacy in the digital era encompasses not only information acquisition and decision-making, but also an understanding of the structural operations, control mechanisms, and ethical boundaries of the information ecosystem.

7.1. From Biopolitical Voluntarism to the Digital Self

Digital health applications are built on the assumption that individuals internalize data production as a voluntary behaviour. Systems that record the number of steps taken, heart rate, or sleep cycles do not merely provide feedback on health status; they frame health as a performance domain requiring constant improvement. This self-directed regulation can lead the individual to view sharing their data as a natural, even necessary practice. This situation can transform the individual's participation in systems into an obligation based not only on consent but on cultural and social norms (Ajana, 2017, pp. 8–9).

Thus, the individual is redefined as a subject who manages and changes their own behaviours through digital tools. To explain this process, the concept of biopolitics gains a new interpretation. Although steps taken to protect health imply that individuals assume responsibility for regulating their own lives, these regulations occur within the framework of criteria set by systems. Consequently, the idea that the individual is the manager of their own health also points to an identity-production process shaped by the values, goals, and norms of digital systems. The integration of measured data into every aspect of daily life indicates that individuals are subject to a new type of self-control regime (Lupton, 2016, pp. 43–45).

Digital health culture thus presents a sphere of norms in which voluntary compliance is accepted as natural rather than an expansion of individual freedom. In this context, digital health literacy is the capacity to grasp how the individual is shaped through their own data, not just knowing how to use devices. Understanding data production processes and questioning whether health recommendations are objective scientific necessities or outputs of algorithmic preferences becomes critical for the individual to maintain self-consciousness in the digital age.

In practical terms, this biopolitical reframing means that a health communication campaign promoting wearable adoption must simultaneously equip users with the critical vocabulary to interrogate whose norms the device encodes and what behaviours it rewards—transforming passive data subjects into reflexive participants in their own health governance.

7.2. Posthuman Thought and Post-Human Ethical Sensitivity

The rise of digital health technologies has triggered new theoretical debates, moving the human relationship with technology beyond an anthropocentric perspective. Braidotti (2013, pp. 89–91) defines the post-human subject within a network woven by interactions among humans, technology, and the environment. From this perspective, wearable devices are not merely measurement tools; they are extensions that expand cognitive capacity and add new dimensions to perception. The individual's health experience is now shaped not only within the boundaries of the body but through algorithmic environments where data circulates.

Read at the level of intervention, this perspective has tangible implications. If the body is understood as networked with algorithmic environments, then designing for digital health literacy becomes a matter of shaping these networked relations rather than instructing isolated individuals. Concretely, this means moving educational programmes beyond "how to use the app" tutorials toward curricula that explain data flows, regulatory categories, and platform business models; embedding interpretability features into clinical decision-support tools; and creating institutional channels through which patients can contest algorithmic decisions. The post-human framing, in this sense, does not float free of practice but reorients where in the socio-technical system intervention is located.

This transformation also gives rise to new ethical tasks. Grasping how the invisible infrastructures of digital health systems affect user subjectivity requires a sensitivity far beyond classical health literacy. Not only the transactional value of data but also its capacity to reproduce social inequalities must be considered. Ruotsalainen and Blobel (2025, p. e68661) mention three fundamental principles of ethical sustainability: transparency, accountability, and user control. Digital health systems can genuinely empower users only by embedding these principles into their technological infrastructure; an external ethical control mechanism cannot achieve this transformation.

Posthuman ethical sensitivity situates individuals not only as managers of their own health outcomes but also as participants in a broader data ecosystem. Sharing health data carries both personal and societal implications, making questions about data collection, sharing practices, and underlying

interests increasingly important. Digital health literacy, therefore, represents a new form of consciousness: individuals who critically examine the systems through which data circulates and who remain aware of the technological infrastructure shaping their health experiences. The future of digital health literacy will be characterized not only by proficiency in using digital tools, but also by critical awareness of the digital environment. While "health in the pocket" offers accessibility, speed, and autonomy, "ethics on the wrist" demands a deeper understanding of the conditions enabling such autonomy. In the digital era, genuine empowerment derives from understanding how information is produced and whose interests it serves, rather than from access alone.

8. General Evaluation and Conclusion

The digital age health ecosystem is fundamentally reshaping individuals' bodies, behaviours, and relationships with knowledge. Artificial intelligence (AI), big data, wearable technologies, and media platforms have shifted health information from passive content to an actively produced and user-shaped process. This transformation necessitates moving beyond traditional definitions of health literacy to include an understanding of how information systems operate, their underlying motivations, and the ways in which individuals' data are utilized.

Therefore, digital health literacy has become a multi-layered competency area, including critical awareness, ethical evaluation, and the capacity to understand the socio-technical context beyond technical skills (Levin-Zamir & Bertschi, 2018; Norman & Skinner, 2006; Ban et al., 2024, pp. 3–4). Wearable devices, mobile applications, and algorithmic

recommendation systems carry the potential to transform the individual into a subject who is constantly measured, monitored, and guided, while integrating health information with personal experience. This process feeds a new regime of self-control, defined as biopolitical voluntarism: the individual not only tracks data but also reconstructs their bodily experience in line with data logic (Ajana, 2017, pp. 8–9). At the same time, as documented in Section 6.3, this self-control is never total; user agency, negotiated use, and resistance remain operative throughout.

In this context, the sustainability of health can be measured not only by the individual's access to technology but by their ability to notice how technology guides them. At the same time, the economic and political dimensions of digital health systems raise significant questions regarding data ownership, privacy, inequality, and power relations. Big data infrastructures, while transforming individual data into economic value, turn users into both providers of information and invisible laborers in this economy (Couldry & Mejias, 2019, pp. 49–50; Zuboff, 2019, pp. 8–14). Therefore, understanding the digital health ecosystem means not only following technological innovations but also questioning their societal consequences. This study demonstrates that digital health literacy needs to be redefined. Health literacy is no longer solely an individual activity of acquiring information; it has become a critical practice that requires analysing how AI systems work, how data is collected, and what purposes it serves. In this context, real power lies in the capacity to evaluate the epistemic universe established by these tools, to renegotiate it when necessary, and to use digital tools. In conclusion, the benefits of speed, accessibility, and autonomy provided by

portable health technologies are significant only when accompanied by ethical awareness. In the digital era, health literacy evolves individuals from passive consumers of information to active participants in data production, information dissemination, and technological governance. This transformation is poised to play a crucial role in shaping the future of health at both individual and societal levels.

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