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Grow Old, but Do It Yourself

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Research Article

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Abstract

Ageing-related biological claims circulate through self-tracking platforms, commercial biomarkers, citizen-science projects and community laboratories. Access to information or instruments does not settle who can evaluate a claim, decide what it warrants or secure an institutional response. Ethical biohacking describes a conditional orientation towards self- and community-directed biological inquiry, assessed through evidential adequacy, proportionate safeguards, meaningful refusal and the social distribution of responsibility. Personal science, health literacy, capability theory and research on extra-institutional biology distinguish inquiry competence, epistemic control and situated health agency. The last concerns practical opportunities to question, use or reject health-related knowledge under specific material and institutional conditions. Published studies of community laboratories and collective biosafety governance, considered alongside publicly documented resource-intensive longevity practices, disclose unequal access to expertise, institutional authority and economic power. Optimisation drift names a defeasible risk when measurement generates recurring obligations while workable conditions for stopping weaken. Responsible participation requires answerable institutions alongside individual competence, particularly when ageing-related classifications influence care or valued opportunities. Whether these configurations improve health, or how prevalent they are, remains empirically undetermined.

1. Introduction

Ageing unfolds across a life course shaped by biological change, educational opportunities, material resources, care relations and institutional environments. Capacities to interpret and act on health-related knowledge therefore develop under historically unequal conditions. Research on cumulative advantage and disadvantage explains how inequalities can widen over time (Dannefer 2003), while the World Health Organization's life-course framework identifies transitions and accumulated exposures as determinants of health trajectories (World Health Organization 2025a). The implications may become particularly consequential in later life, when frailty classifications, functional limitations, care needs and longevity services can acquire greater practical significance.

The infrastructures through which ageing becomes knowable are also changing. Biological-age estimates, wearables, self-tracking platforms, microbiome reports and functional classifications circulate alongside public-health guidance, citizen-science projects and community laboratories. Digitalisation can intensify bodily self-evaluation in later life (Arzroomchilar 2024), while biohacking cultures have connected ageing to molecularisation, quantification and optimisation (Cozza et al. 2022). At the same time, do-it-yourself (DIY) biology has opened extra-institutional spaces in which biological techniques can be learned and practised, often by participants whose expertise ranges from novice to professionally trained scientist (Eireiner 2025a). Greater access, however, leaves open the more difficult question of what people can legitimately infer from biological signs and what they can actually do when institutions, platforms or material circumstances mediate their use.

DIY biology, citizen science and personal science provide overlapping but non-coextensive sites for examining this problem. Citizen science redistributes roles in organised knowledge production; DIY biology can redistribute material access to biological practice; personal science foregrounds self-directed empirical inquiry into personally salient questions (Hacking et al. 2024; Wolf and De Groot 2020). These forms of participation can expand epistemic agency without dissolving the need for expertise. They also expose a tension that cannot be resolved by choosing between professional authority and individual autonomy. Institutions can be unresponsive, dismiss experiential knowledge or make consequential classifications difficult to challenge. Conversely, access to instruments, data or a self-authored question does not guarantee sufficient competence, sound inference or social conditions that make knowledge usable.

Ethical biohacking names a conditional orientation towards self- or community-directed biological inquiry. It concerns how people pursue biologically informed questions, what evidence warrants their interpretations, and who remains responsible when findings are used by others. A practice can be epistemically competent yet ethically inadequate if participation entails excessive risk, unreviewable classifications, inaccessible support or a transfer of care work without resources. Conversely, safe and accountable forms of self-directed inquiry need not depend on professional credentials. The ethical assessment consequently concerns the configuration of inquiry, embodiment, institutions and material power, rather than a certified community or a catalogue of approved techniques.

Situated health agency refers to the effective opportunities to understand, question, decide, refuse and act on health-related knowledge, given a person's embodied circumstances, resources, relationships and institutional environment. Inquiry competence is the capacity to conduct and evaluate a bounded investigation; epistemic agency concerns control over its questions and interpretation. Neither ensures practical influence over a care decision, an opaque platform or the distribution of resources. Resource–health conversion, articulated by Ryan-Claytor and Daw (2026), supplies a wider account of this dependence. When biological information is the resource at issue, evidential status, interpretive authority and institutional answerability specify distinct conditions on its use. These are analytic distinctions, not independent causal mechanisms demonstrated by the present argument.

Published research documents the material organisation of extra-institutional biology and the changing roles of participants in personal and citizen science. The resulting conceptual distinctions specify questions about evidence, material access and institutional responsibility. Their application to ageing-related technologies remains conditional: the available studies do not establish population frequencies, clinical benefits or a general causal relation between participation and health outcomes.

2. Ageing knowledge across institutional, digital and civic infrastructures

A community biology laboratory is recognisable as a laboratory and different in the ways that matter sociologically. Benches, pipettes, incubators, protocols and safety procedures remain familiar, while

access, ownership and organisational control move outside the usual settings of academic, industrial or government science. DIY biology consolidated in the early 2000s as a loose movement associated with hacker and maker cultures, open-source commitments and attempts to lower material barriers to biological practice. Landrain et al. (2013) described it as an open science and technology movement oriented towards wider access to molecular and synthetic biology. Meyer (2013) located its democratic promise in material practices: equipment can be made cheaper, more adaptable and shareable, while homes and community spaces can become sites of learning and experimentation.

Access to a laboratory rests on sustained material and organisational work. Eireiner's comparative study of DIY biology spaces in Great Britain, Germany and Canada shows communities assembling laboratories through donations, second-hand markets, repair, university connections and extensive volunteer labour (Eireiner 2025b). Stable participation depends on rent, consumables, organisational continuity and mentoring; some projects operate through permanent laboratories, others through temporary spaces, gardens, online forums or distributed arrangements. "DIY" therefore describes a practical and organisational capacity to make biology possible under different institutional conditions. It does not identify an absence of expertise.

Community laboratories also complicate the identification of DIY biology with amateur science. Eireiner (2025a) documents participants with formal scientific training and professional connections alongside newcomers to laboratory work. University relationships, donated instruments and experienced mentors can sustain activities located outside conventional academic, industrial or government institutions. The distribution of competence therefore depends on organisational relationships as well as access to a physical laboratory.

Citizen science overlaps with this ecology but is not its taxonomic container. Hacking et al. (2024) show that citizen and community science cover heterogeneous modes of participation whose meaning varies across epistemic cultures, from contributory projects with tightly specified roles to arrangements in which participants influence questions, design and interpretation. DIY biology intersects with citizen science when biological practice becomes part of collaborative knowledge production, but material access to laboratories can exist outside a formal citizen-science project. Conversely, a citizen scientist can exercise substantial epistemic agency without handling biological materials or controlling laboratory infrastructure. Guerrini et al. (2022) make the overlap visible in genomic citizen science, where participation can range from data contribution and co-research to home- or community-laboratory work and participant-designed self-experimentation.

Collective governance already exists in some DIY biology communities. In their ethnographic and interview study of the OpenCovid19 initiative, Wexler et al. (2024) describe the creation of a Biosafety Advisory Board, formal guidance and debate over whether oversight should remain advisory or acquire enforceable force. This case documents an actual distribution of ethical work: community participants sought openness while confronting responsibility for material risk and third-party consequences. Murray and Santos (2022) place such experiments in the wider field of community bioethics, where collective

vulnerabilities cannot be settled by individual consent alone. The case shows an institutional design problem inside participatory science; it does not establish that all community laboratories adopt equivalent safeguards.

The life-course consequences of these arrangements depend on how people acquire skills and how institutions treat their interpretations. Scientific familiarity, digital access and resources for sustained participation accumulate unevenly; their practical value may change as individuals encounter care needs or consequential classifications (Dannefer 2003; World Health Organization 2025a). Thus, an ageing-related score, a laboratory opportunity and a citizen-science invitation create different possibilities for inquiry, interpretation and action.

Institutional arrangements also distribute control unevenly. Laboratory users may gain access to instruments yet depend on the labour and financial resources required to maintain them (Eireiner 2025a, b). Citizen-science participants may collect data without controlling study design or interpretation (Hacking et al. 2024). Commercial users can purchase health measurements while model specifications and downstream uses remain under provider control. Autonomy in one part of inquiry consequently does not guarantee authority over its subsequent interpretation or consequences.

3. DIY biology, personal science and situated health agency

The most demanding form of participation begins when a person does more than receive data. Wolf and De Groot (2020) define personal science as the use of empirical methods to investigate personally salient health questions through questioning, designing, observing, reasoning and discovering. Heyen's study of Quantified Self practitioners similarly shows how methodical self-tracking can produce a form of non-certified self-expertise when people use scientific sources, methods and quality criteria to generate and test self-related knowledge (Heyen 2020). The distinction matters because a wearable trace, microbiome report or laboratory value does not become research merely by being numerical. A person may consume a score exactly as a recommendation system presents it; personal science requires enough ownership of the inquiry for the result to remain open to comparison, revision and rejection.

Riggare et al. (2026) distinguish degrees of epistemic agency in self-tracking according to participants' control of the knowledge-making process. A professional researcher may contribute data without choosing a project's questions; a non-professional participant may design and interpret a bounded investigation. Agency over the inquiry can thus vary independently of formal scientific credentials, although control alone does not ensure inferential adequacy.

Credentials, inquiry competence and epistemic agency distinguish different relations to biological knowledge. Credentials establish recognised training or institutional standing; competence concerns the adequacy of a specific investigation, including measurement error, confounding, limitations and justified inference; epistemic agency concerns who controls its aims, design and interpretation. Competence may be acquired beyond professional settings, as Eireiner's (2025a) account of DIY biology participants helps

illustrate. These distinctions do not create an independent hierarchy of persons. They clarify why highly autonomous inquiry may still be scientifically weak, while a technically proficient participant may have little say over what a platform or institution does with the resulting data.

A commercial biological-age estimate offers a bounded conceptual example. A user can purchase a score while remaining unable to inspect the model, reference population, uncertainty or the significance of a change across repeated tests. Even an informed interpretation may have no recognised standing in clinical decision-making. Friedman (2025) shows how wearables can redistribute epistemic labour across patients, clinicians and algorithmic systems without removing conflicts over who has diagnostic authority. The contrast is between access to a number, control over its interpretation and the institutional capacity to act on a contestable classification. It is illustrative rather than an observed outcome of any specified biological-age service.

Scientific adequacy and material risk require separate assessments. Recording a low-stakes behavioural variable can involve unreliable inference, while carefully designed self-inquiry may still require safeguards because a proposed action is invasive or has consequences for others. The relevant differences concern the evidence supporting each claim, the intervention's stakes and the resources available for competent scrutiny.

Safeguards for self-directed biological inquiry should be proportionate to its epistemic and material stakes. Uncertain inference, invasiveness, irreversibility, third-party effects and possible clinical action may require stronger training, independent review or professional support. This principle allows extra-institutional competence to count while preserving justified oversight. Its application requires assessment of particular practices and does not yield a universal clinical threshold.

Competence does not determine a person's available choices. An individual may interpret a measurement accurately yet lack affordable care, accessible explanations, transport, time or an institution willing to reconsider a consequential classification. Situated health agency designates this relation between epistemic capacities and opportunities to act. Kapeller and Loosman (2023) have already argued that empowerment through self-testing apps is processual rather than secured by access alone. Their account makes the distinct question sharper: what happens when inquiry ownership and competence are present but the power to alter a decision, refuse data reuse or obtain support remains elsewhere? Situated agency is useful only insofar as it makes that institutional asymmetry explicit.

Ethical biohacking designates a configuration in which self- or community-directed biological inquiry is evidence-bounded, proportionate to its risks, open to revision and refusal, and supported by appropriate institutional accountability. The assessment covers the relation among inquiry, embodied circumstances and social infrastructure. Two methodologically competent investigators may therefore occupy ethically different positions if one can contest downstream data uses and obtain care while the other cannot. Similarly, openness within a community laboratory is ethically significant only alongside adequate mentoring, governance and biosafety arrangements.

Personal science identifies self-directed empirical inquiry; citizen-science ethics addresses participation in collective research; and community bioethics examines responsibilities within extra-institutional practice (Wolf and De Groot 2020; Murray and Santos 2022). Ethical biohacking is most informative when these concerns intersect with health technologies and institutions that shape practical opportunities. Its distinct utility depends on identifying an accountability failure that would remain obscured by evaluating inquiry competence or individual consent alone. Where established concepts already capture the case adequately, the additional label carries no explanatory advantage.

Anti-paternalism imposes a corresponding constraint. Institutional expertise may be inaccessible, dismiss experiential knowledge or make classifications difficult to contest. Guerrini et al. (2022) document autonomy, openness, safety and solidarity among the values articulated by genomic citizen-science participants. Critical engagement with professional authority can therefore be consistent with responsible inquiry. The relevant test concerns evidence, proportionate protections and continuing institutional duties, rather than professional approval as an independent ethical criterion.

4. Knowledge access and health capability

Resource conversion is affected by who controls the epistemic and institutional terms under which a result acquires force. Ryan-Claytor and Daw (2026) explain resource–health conversion through endowments, histories, gatekeeping and agency; Sørensen et al. (2012) analyse the abilities needed to access, understand, appraise and apply health information. Their accounts already rule out the idea that distributing information suffices to improve health. The additional focus here is on participation in producing and contesting biological claims: identical access can coexist with unequal capacity to challenge model assumptions, obtain independent interpretation or induce a response from the actor applying the classification.

Organisational health literacy includes responsibilities for making health information accessible and usable (World Health Organization 2025b). The form of support depends on a claim's consequences. Self-education may require an intelligible account of measurement limits; eligibility decisions may require review and correction; treatment decisions may require clinical interpretation. Information access, inquiry control and effective health opportunities remain analytically distinct, without forming a compulsory sequence of empowerment.

Capability theory helps locate the distinction. Resources do not map uniformly onto substantive opportunities because conversion factors differ across persons and environments (Sen 1999; Nussbaum 2011). WHO’s healthy-ageing framework adopts a compatible practical orientation: functional ability depends on intrinsic capacity and the environments through which people are able to be and do what they value (World Health Organization 2015). A competent interpretation of a metric is therefore an intermediate achievement rather than evidence of improved functional ability. The same person may understand an ageing-related claim and still lack time, money, care, accessible services or an institution willing to consider the interpretation.

Interpretive competence and practical opportunity also interact over time. Participation can increase understanding; institutional exclusion can make that competence ineffective; social support can restore access to useful expertise. Conversely, a person may understand a metric and judge it irrelevant to a valued aim. These possibilities undermine any fixed sequence in which information necessarily produces literacy, agency and capability.

Frailty provides a consequential example of classificatory authority. Khan and Moreira (2025) trace scientific discourses around deficit-accumulation and phenotype approaches, including shifts associated with the Covid-19 pandemic. How a frailty category is applied depends on instruments, uncertainty, clinical context and institutional judgement. The study does not show that particular scores cause inequity; it demonstrates that frailty classifications have histories and organisational uses. People may therefore understand a category without controlling how decision-makers apply it.

Institutional answerability concerns the effective opportunity to challenge consequential interpretations, beyond the individual's ability to understand them. Because a classification can affect access to services or impose burdens, fairness and respect for affected persons provide reasons to require an accessible route to explanation, review and correction. Where applicable, the ability to contest secondary data uses and identify an accountable decision-maker is equally relevant. These are normative conditions whose fulfilment depends on actual institutional arrangements, rather than competences conferred by self-tracking. Individuals with equivalent interpretive skills may consequently face unequal opportunities if only one can obtain reconsideration of an opaque score.

Empowerment can consequently be assessed at several sites. An explanatory dashboard may improve comprehension without changing who controls a classification. A citizen-led investigation may increase epistemic agency without affecting institutional eligibility rules. An accessible avenue for review may benefit people who have no interest in conducting their own inquiries. Situated health agency captures how these capacities and institutional responses jointly determine a person's feasible choices.

Educational opportunity, familiarity with science, financial resources, digital access and trust in care institutions accumulate unevenly across the life course (Dannefer 2003; World Health Organization 2025a). These conditions make identical technologies socially non-equivalent. Accessible test results can coexist with scarce interpretation, the inability to afford follow-up care or a refusal of institutional reconsideration. Expansion of citizen competence can therefore be valuable without functioning as a substitute for health services, care or public accountability.

5. Ageing under optimisation pressure

Extended self-tracking can sustain a chosen health project without undermining autonomy. A person may monitor sleep, activity or recovery over many years while revising goals and retaining the option to stop. Sharon (2017) shows why such practices can express authenticity and self-direction as well as expose users to disciplinary pressures. Their ethical assessment depends on whether monitoring remains justified, revisable and compatible with meaningful alternatives.

Optimisation drift is a provisional description of an organisational change: measurement initially undertaken for a question begins to generate recurrent targets for correction, while completion, suspension and refusal become progressively less available. Its ingredients appear in studies of ageing and quantification (Cozza et al. 2022), health datafication (Ruckenstein and Schüll 2017) and the digitalisation of later-life self-evaluation (Arzroomchilar 2024). The relevant issue is not tracking frequency, technological sophistication or a person's wish to improve. Drift would require evidence that incentives, design or social expectations systematically privilege continued correction over reasonable closure. The literature supports the possibility of such a configuration, not its general prevalence.

The difference becomes clearer in a well-documented, exceptional setting. Bryan Johnson has publicly presented a highly monitored longevity programme supported by exceptional private wealth, specialist involvement and a commercial brand, Blueprint; a contemporary interview describes the programme and its reported annual expenditure (Simonpillai 2025). The public record illustrates resource asymmetry and the proximity of self-experimentation, publicity and commercialisation, but does not independently establish the efficacy of its interventions or prove that Johnson cannot stop. Intensive monitoring remains compatible with deliberate and revisable choice. The analytic question is whether high-cost access and control over public representations can make one actor's experience unusually influential as a model for others with radically different resources and care obligations.

Continuous improvement can itself be a considered life project. Its practical freedom depends partly on the ability to revise aims, refuse further measurement and pursue other valued activities. Extensive resources can preserve flexibility for a wealthy participant, whereas similar expectations may impose unaffordable demands on others. Low-cost self-tracking can nonetheless support genuine agency when its questions are bounded and exit is practicable. Optimisation drift should therefore be attributed only where the organisation of goals, incentives and choice supports that diagnosis.

Ageing adds a particular pressure because measurable independence and performance can acquire normative force. Critical work on successful ageing has shown how ideals of control, independence and productivity can marginalise dependence, decline and mortality (Lamb 2014). Functional measures can support communication, planning and care, while the same measurable dimensions can become problematic when they are allowed to stand for the value of the person or for the whole meaning of ageing well. WHO’s healthy-ageing model offers a useful counterweight because functional ability is relational and environmentally supported; it does not define health as maximal intrinsic capacity or permanent independence (World Health Organization 2015).

Repeated measurement may also remain warranted when an inquiry develops in response to evidence or when continuing clinical risks require monitoring. A shift towards optimisation drift would require more specific evidence: newly identified deviations recurrently generate obligations to correct, while defined stopping conditions lose practical force. Duration or frequency alone does not establish that change.

Commercial incentives can intersect with the organisation of ongoing self-measurement. Biomedicalisation and datafication scholarship documents how repeated monitoring can create new

markets, risk categories and data streams (Brantly 2025; Ruckenstein and Schüll 2017). The Blueprint example illustrates an important contrast: the person undertaking an experimental regimen may also shape its public presentation and benefit commercially from the audience it acquires (Simonpillai 2025). It would be unwarranted to conclude that any particular participant's motivation is commercially determined, or that commercial participation necessarily invalidates an inquiry. The question is how evidence, promotion, platform governance and incentives are separated and made answerable.

The ethical importance of stopping is therefore relational. A demanding monitoring practice may remain defensible when goals are revisable, its evidence is proportionate to the stakes and refusal does not jeopardise access to care or recognition. Where exit becomes penalised or inadequately supported, the distribution of power and responsibility requires scrutiny.

6. Social failures and accountability

The OpenCovid19 initiative shows why a community may need mechanisms for collective oversight even when participants are competent and acting in good faith. Its Biosafety Advisory Board and guidelines addressed risks extending beyond the individual experimenter (Wexler et al. 2024). A finding also changes evidential status when it travels beyond its original question, population and conditions: personal observations cannot automatically support general health recommendations. Murray and Santos (2022) emphasise the structural and group-level dimensions of community ethics. A defensible participatory practice must therefore identify who can contest a claim, who reviews its downstream use and who carries responsibility for foreseeable third-party effects.

A personal finding acquires additional responsibilities when circulated as general advice or reused in a collective dataset. Its original evidential warrant may be limited to a particular participant, setting or time, while secondary uses can expose others to consequences they did not accept. Governance must consequently address the transfer between audiences and purposes, including who reviews claims before they are generalised.

Participation costs also constrain scientific power. Eireiner (2025a, b) documents how laboratory activity depends on space, donated equipment, maintenance, volunteer work and ties with established institutions. Publicised private longevity programmes offer a different distribution of resources: access to specialist expertise, repeated testing and prominent dissemination may depend on substantial wealth (Simonpillai 2025). These are analytically juxtaposed settings, not matched cases capable of identifying a common causal effect. They nevertheless expose why an invitation to participate cannot itself establish equal opportunity.

Commercial and digital infrastructures introduce a related question of control. Brantly’s (2025) account of diabetes biomedicalisation shows how risk categories, self-surveillance, self-management and commercial expansion can develop together without reducing participants to passive consumers. Pronzato (2025) demonstrates that eHealth co-design can remain structured by knowledge and power asymmetries even when participation is formally invited. Dario’s (2026) review of continuous glucose

monitoring and mHealth adds a concrete data-governance problem: ownership can remain legally ambiguous, consumer-facing systems can fall outside conventional protections in some jurisdictions, and secondary use can blur boundaries between care, research and commercial objectives. None of these findings makes markets a failure condition by themselves. Failure arises when participation produces data, classifications or recurring engagement under terms that are opaque, difficult to exit or weakly answerable to those supplying the data.

The distribution of care work creates another limit to empowerment narratives. Smyth et al.'s (2025) review of burden-of-treatment theory describes health-related work delegated to people living with chronic conditions and their support networks, with burden emerging when workload exceeds available capacity and resources. Peterie and Broom (2024) similarly analyse informal care as unequally distributed and frequently marginalised within wider arrangements of provision. WHO's organisational account of health literacy reinforces the institutional implication: people can be supported to build knowledge and competence, but information providers and services retain responsibilities for making information and services accessible and usable (World Health Organization 2025b). The evidence supports a narrow claim about care displacement. Greater citizen competence cannot by itself justify transferring additional monitoring, interpretation or coordination work without adequate support. It does not establish that DIY biology causes care withdrawal or that access to treatment is routinely conditioned on self-tracking.

Institutional answerability remains necessary even where an individual's inquiry is sound. Kapeller and Loosman (2023) identify the relational conditions missing from some promises of empowerment through self-testing apps; Friedman (2025) examines how wearables complicate the concept and authority of diagnosis. Platforms and healthcare institutions can determine how evidence is recognised, how thresholds are applied and whether users can challenge consequential outputs. Responsible arrangements therefore require practical routes to explanation, correction, appropriate support and refusal of downstream uses where available.

Three recurrent vulnerabilities merit distinct examination: the extension of evidence beyond its warranted domain, unequal material access to participation, and the displacement of interpretation or care work without corresponding authority or support. They may arise independently. Their practical implication is to specify which actors must communicate uncertainty, review consequential classifications and maintain accessible pathways to care or disengagement. Whether a particular programme meets these requirements remains an empirical question.

7. Conclusion

Participatory biology can widen access to instruments and expertise while leaving authority over clinical decisions, platform classifications and data uses unchanged. Inquiry competence concerns the quality of an investigation; epistemic agency concerns control of its questions and interpretation; situated

health agency concerns the opportunities to act with that knowledge. Their differences matter when a person can generate or understand a result but lacks the resources or institutional standing to use it.

The examples disclose different limits to participation. Community-led biosafety oversight addresses risks extending beyond individual consent (Wexler et al. 2024). Sustaining extra-institutional laboratories requires shared material and organisational resources (Eireiner 2025a, b). Public accounts of the Blueprint programme illustrate exceptional financial capacity and the visibility of privately organised longevity practices (Simonpillai 2025). None establishes the clinical efficacy of an intervention or a general causal pattern. Together they identify the distinct forms of power against which claims of autonomous inquiry require evaluation.

Ageing connects these asymmetries over time. Unequal opportunities to learn, maintain resources, obtain care and contest classifications accumulate before older age, while medical and functional judgements may become increasingly consequential later in life. Public and institutional responsibilities do not diminish because an individual can measure more. Health-related participation matters when it expands feasible choices rather than merely assigning new tasks.

Optimisation drift remains a testable possibility where measurement repeatedly creates fresh demands for correction and meaningful exit becomes less available. Sustained monitoring pursued on revisable terms is a counterexample to diagnosis by intensity alone. Attribution would require evidence about goals, incentives, alternatives and the consequences of refusing further measurement.

The central normative requirement is proportionate and answerable participation: people with unequal resources must have practicable ways to evaluate consequential claims, seek appropriate support, contest classifications and disengage without unjustifiable disadvantage. Research organisations, technology providers and health services retain obligations relating to safety, evidence, care and data use. Empirical assessment should distinguish the costs of participation, control of interpretation and actual institutional responses rather than infer improved health from increased access alone.

Declarations

Author Contribution

I.H.C. conceptualised the article, developed its philosophical framework and central arguments, selected and critically evaluated the relevant literature, and reviewed and revised the manuscript. I.H.C. approved the final version and accepts full responsibility for the integrity and accuracy of the work.

Use of generative AI

Generative AI tools were used to assist with structural revision and bibliographic checking. Responsibility for the final arguments, evidence, citations and accuracy rests with the author.

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