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Putting Prevention in People's Hands: Rethinking Healthcare Through Early Action

Lifestyle interventions are central to addressing noncommunicable diseases and sustaining healthcare systems. Despite investment, outcomes vary due to differences in funding, participation and behavioural barriers, with service availability not ensuring uptake. Personalised metrics such as biological age, alongside digital tools and AI-supported screening, can improve engagement. Early, data-driven and tailored interventions can reduce disease burden and support a shift towards proactive care.

key points

- Prevention in people's hands is essential for sustainable healthcare systems.
- Biological age insights motivate personalised prevention and behaviour change.
- Early interventions significantly improve long-term health outcomes.
- Digital tools enable scalable, predictive, preventive care models.
- Personalised data enhances engagement in lifestyle interventions.

Lifestyle Interventions Are Key to the Future of Healthcare Systems

The World Health Organization (WHO) has for several decades advocated the need to invest heavily in prevention¹. In its 2025 report, *Saving Lives, Spending Less: The Global Investment Case for Noncommunicable Diseases*, the WHO states: "By framing [non-communicable disease] NCD prevention and control as both a health and development priority, the report offers a roadmap for action that delivers benefits across populations, economies and generations. The evidence is clear: investing in massive prevention is not only possible – it is imperative."

European countries have developed targeted prevention priorities, mostly

focusing on vaccination, cancer, diabetes and, increasingly, mental health. Tobacco, alcohol and road safety have been high on their agendas for more than four decades. Funding for these priorities has been of considerable importance.

According to the European Commission, European countries have on average spent €202 per inhabitant per year on health prevention, but this statistic masks important differences between countries. Germany and Austria, for example, spend more than 7% of their health budgets on prevention, while Poland and Malta fall behind at 2%. A significant number of European Union countries are in the 2–3% range.

¹ See the 1978 Alma-Ata Declaration, which redefined health as more than just treating disease, with a focus on prevention, health promotion and community-based care.



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Primary care professionals, such as general practitioners, are usually considered the guardians of a global and holistic approach to health that emphasises prevention. However, when the results of even well-funded priorities such as cancer screening are analysed, the picture is mixed. For example, in 2025, 90% of eligible citizens were offered cancer screening, but only 60%, 30% and 14% of the target population were actually screened for breast, cervical and colorectal cancers respectively. Offering a service is therefore substantially different from ensuring its uptake. Here again, important differences between countries can be observed (OECD 2025). In Hungary, colorectal cancer screening depends on general practitioners' participation, and individuals must request or order tests themselves, resulting in a participation rate of around 9%.

“Investing in massive prevention is not only possible – it is imperative.”

Funding is, of course, one important issue. Yet cultural and personal attitudes to risk, as well as collective support for investing in the public good in fields such as public health, are also factors that may explain important differences between countries. Other significant issues include introducing new ways of intervening in conditions, such as screening,

choosing the appropriate timing of interventions and, from a behavioural perspective, encouraging changes in self-management through the use of quality data.

Reinventing Screening: Considerations for Interventions

Research in behavioural sciences has shown that, from an individual perspective, fear of receiving a positive screening result for specific diseases or conditions can lead to “information or behaviour avoidance” (Daehyun 2025; Baumeister et al. 2001). Alternatively, people may be affected by an optimism bias and downplay negative results. Prevention often involves perceived short-term inconvenience in exchange for long-term benefits. Some types of screening can also be associated with stigma or embarrassment. None of these observations, of course, denies the impact of practical barriers on individuals, such as the ability to travel to a screening centre or the need to take time off work or arrange childcare in order to attend a screening appointment.

Ageing is, of course, a life-course process that cannot be avoided. Not everyone ages at the same pace, however. Current evidence shows that multiple behavioural, clinical, social and environmental factors influence how people age and their risk of developing NCDs at an early age (Abud et al. 2022).

Dementia is one such NCD. In relation to dementia, a total of 14 modifiable risk factors have been identified across the life course (The Lancet 2024). Increasing people's knowledge of the risk factors for developing dementia is necessary, but far from sufficient.

Distribution of agreement in impact assessment

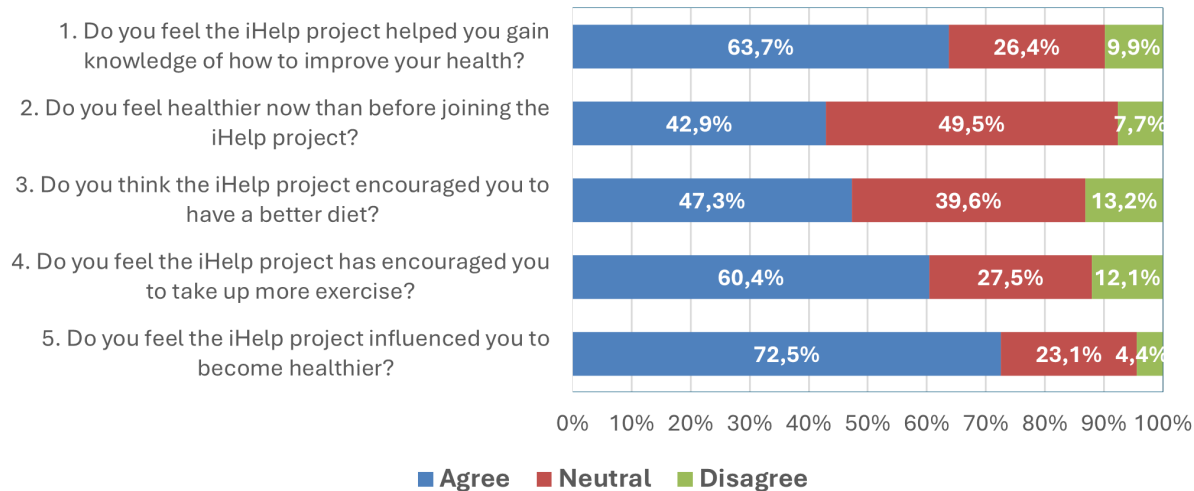


Figure 1. Distribution of agreement in impact assessment

Following the iHelp intervention, the majority of iHelp participants reported positive impacts, including improvements in health behaviour, knowledge and perceived wellbeing. These findings indicate that personalised epigenetic feedback may support behavioural and cognitive engagement when brought together with lifestyle change.

Today, maturing technologies supported by artificial intelligence (AI), along with new, increasingly efficient and accessible biomarkers, can provide individuals with a snapshot of their biological age and, at the same time, a prediction of their expected lifespan. Even when the news received by the person undergoing screening is not that hopeful — that is, when the person is informed that their biological age is higher than their chronological age — it still comes with the proviso that biological age may change in the future if priority risk factors are addressed appropriately.

Findings from the iHelp lifestyle impact model (iHelp 2024), focused on pancreatic cancer, provided a compelling, evidence-backed narrative for why early and sustained behavioural interventions should become central to healthcare strategies. In iHelp, a Horizon 2020 project, the distinction between biological and chronological age also emerged as a powerful communication tool. A significant proportion of iHelp participants were found to have a biological age higher than their actual age. For some participants, the result reinforced awareness of risk, while others received positive reinforcement

about their health when age-related results were favourable.

For healthcare professionals, these findings suggest that using personalised and easy-to-interpret measures can make it easier for patients to remain engaged, particularly in preventive care where the benefits are not immediately visible or felt. Reinventing screening and reducing people's fears are therefore crucial: learning about biological age, in contrast to chronological age, can act as a key motivational driver for self-management of health.

Going Beyond Theory: Prevention that Works

The data furnished by iHelp reinforces what public health has long suggested, but has often struggled to operationalise: combined lifestyle interventions, specifically diet and physical activity, can significantly reduce the incidence of major chronic conditions, including cardiovascular disease, type 2 diabetes, cancer and dementia.

What distinguishes the biological age model is its ability to quantify impact at scale. Even with a modest 25% uptake across a population cohort, measurable gains can emerge in life expectancy, disease prevention and reduced healthcare burden. This level of uptake moves prevention from an aspirational goal to a calculable investment.

The benefits of early prevention have a range of useful strategic implications for different players, including healthcare actors, policymakers, providers and system-level actors.

One of the most critical insights from the iHelp project, for healthcare actors, is the importance of the **timing** of when interventions should begin. The model clearly demonstrates a gradient of benefit.

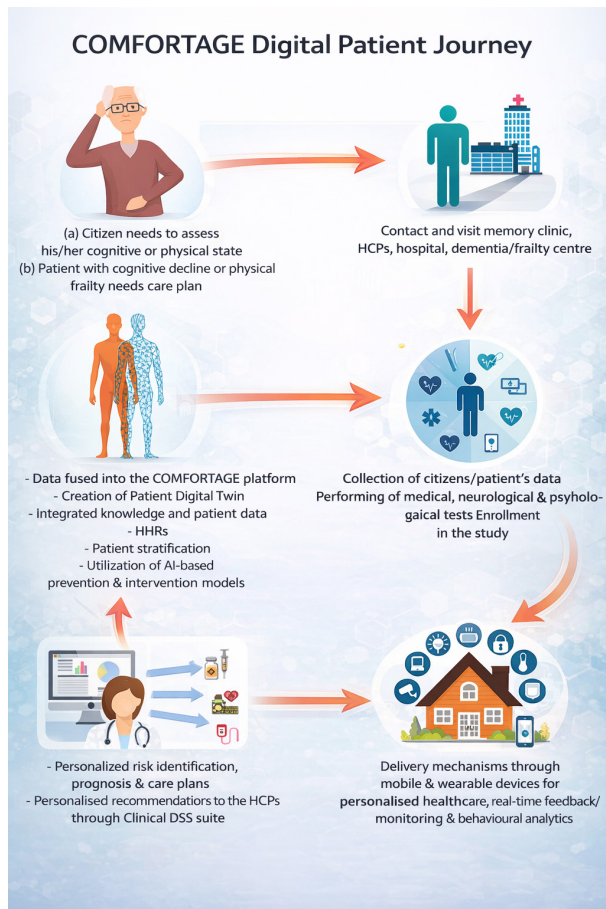


Figure 2. Distribution of agreement in impact assessment

Essentially, the COMFORTage PDT is used for dementia prediction analysis, patient stratification and targeted interventions.

Starting lifestyle changes at the age of 50 yields significantly greater gains than doing so at 60 or 70: earlier adoption can double or even triple the number of years people live independently.

Delaying intervention still provides benefits, but with a substantially reduced effect.

For policymakers and providers, this reframing of prevention as a **time-sensitive** intervention brings it closer in importance to a vaccination strategy, rather than to the simple provision of generic health advice.

“Offering a service is substantially different from ensuring its uptake.”

Perhaps the most system-relevant outcome of the timing of interventions is the compression of morbidity. Constructive lifestyle changes do not simply extend life — they shift the balance in the quality of those years. They lead to **more years** lived independently and in good health, and fewer years lived with disability or high care dependency. Delaying the onset of disability, for example, reduces pressure across acute care, social care and informal caregiving networks.

Overall, these various effects can have profoundly favourable implications for healthcare financing, long-term care infrastructure, workforce planning and community care.

Using Behavioural Awareness as a Catalyst

An often underappreciated finding in the field of prevention is the role of engagement. Feedback

from iHelp study participants highlights that simple participation in monitoring, through surveys, feedback or wearable devices, triggered meaningful behavioural change. Examples include increased awareness of diet and nutrition, greater adherence to physical activity and the adoption of preventive measures such as the use of nutritional supplements.

These findings suggest that digital health tools and feedback loops are not just measurement instruments — they are active intervention mechanisms. They are also critical for measuring the precise impact of different interventions and for improving the weighting of risk factors. As a result, anticipated lifespan, when contrasted with biological age, can become a synthetic indicator for measuring the impact of interventions in efforts to improve data quality.

Prevention as the Foundation of Health Systems

The key takeaway of these findings for healthcare actors is clear: lifestyle intervention is not merely a public health message — it is a scalable, evidence-based lever capable of reshaping population health trajectories.

The earlier an intervention is deployed, the greater its impact, not just on lifespan, but on healthspan, independence and system sustainability. In a context of ageing populations and rising chronic disease costs, prevention is no longer simply upstream — it becomes foundational.

This insight means that prevention should be in everybody’s hands, not only in those of healthcare

professionals. During the Radical Health Festival in Helsinki in 2025, a former President of the European Society of Cardiology stated that he was confident that advanced screening and assessment tools, including those supported by AI after validation, should be used mainly by citizens directly, without the need to involve cardiologists. As demonstrated by pilots led by the University of Manchester (Yang et al. 2026), when the community is involved in promoting these tools, the impact is multiplied.

Access to validated screening tools based on objective and validated data, particularly biomarkers, can thus become the entry point to a healthy ageing trajectory, while access to personalised services and digital tools can support individuals in addressing the main identified risks and their impact.

Multimodal Data Integration and the Digital Twin

The COMFORTage project, a Horizon Europe project conducting large-scale pilots, aims to connect screening, clustering and interventions, maximise the use of data and thereby enable the continuous consolidation of evidence while supporting personalised prevention and care. One element of the project's work relates to digital twins, which are virtual replicas of real-life people or products.

The COMFORTage Patient Digital Twin (PDT) represents a promising step towards this vision of data as infrastructure by offering a predictive, data-driven approach to prevention grounded in personalised health modelling.

At its core, the COMFORTage PDT is conceived as a “living”, continuously updated digital representation

of an individual that integrates diverse data sources, such as clinical records, biomarkers, images, lifestyle factors and real-world monitoring data, into a single unified model. Hence, it is multimodal.

The PDT has many benefits, some of which are outlined here: data integration, predictive capability, simulation options, scalability, individual targeting, explainability and transferability, and ethics and trustworthiness.

“Learning about biological age, in contrast to chronological age, can act as a key motivational driver for self-management of health.”

This holistic integration of data addresses one of the fundamental limitations of current healthcare systems: the fragmentation of patient data across multiple, often disconnected, sources.

What distinguishes the PDT from conventional digital health tools is its predictive capability. By leveraging longitudinal, multimodal data, the system enables risk stratification and the early identification of conditions such as dementia and frailty — domains in which early intervention is particularly critical. Instead of reacting to clinically evident disease after the fact, healthcare providers

can identify subtle deviations in patient trajectories and intervene before irreversible decline occurs.

This predictive capacity is further strengthened by simulation capabilities. The COMFORTage PDT enables clinicians and care teams to explore “what-if” scenarios, assessing the potential impact of different interventions on an individual's projected health trajectory. This functionality transforms prevention from a simple, generalised recommendation into a personalised, evidence-based strategy. For example, lifestyle modifications, pharmacological treatments or care pathway adjustments can be tested virtually before implementation, enabling more targeted and efficient interventions.

Importantly, this approach is closely aligned with emerging evidence on lifestyle-driven prevention, such as that demonstrated by the iHelp model, in which early behavioural interventions significantly improve health outcomes and delay disease onset. By embedding predictive analytics and simulation into clinical workflows, the PDT provides the operational means to act on such evidence at scale.

Beyond individual patient care, the PDT has implications at the system level. Its ability to support population-wide risk stratification enables healthcare organisations to prioritise high-risk individuals and allocate resources more effectively. People with a lower predicted risk can be followed and monitored at longer intervals without specific intervention by healthcare providers, while those at higher risk can be monitored more closely and more frequently. This possibility is particularly relevant in the context of preventive programmes, where targeting the appropriate population segments is key to maximising impact and cost-effectiveness.

Another critical contribution lies in the explainability and transparency of the PDT's outputs. Unlike many "black-box" AI systems, the COMFORTage approach emphasises explainable recommendations, thereby supporting clinician trust and facilitating shared decision-making with patients. This is essential for the adoption of predictive tools in sensitive areas such as cognitive decline, where uncertainty is common and ethical considerations are significant.

Furthermore, the PDT is designed with ethics by design in mind to ensure compliance with European data governance frameworks, including the General Data Protection Regulation and the emerging European Health Data Space. This commitment helps ensure that predictive prevention is not only effective but also trustworthy and aligned with societal expectations regarding data use and patient autonomy.

By combining data integration, predictive modelling and simulation in a personalised framework, the PDT enables a shift from reactive to proactive care. For healthcare systems seeking to enhance prevention, the PDT offers not only a technological innovation but also a new paradigm, in which anticipating disease becomes as central as treating it.

Will Prevention Save Our Systems?

Ultimately, the question is the extent to which prevention can help save Europe's healthcare systems. Its benefits are evident for citizens, policymakers, providers, payers and innovators.

Citizens. Supported by adequate communication channels, the added value of broadly promoted prevention supported by prediction is expected to be highly significant.

Policymakers. Incentivising early adoption, for example through screening, workplace health programmes or digital tools, may deliver highly beneficial returns.

“In a context of ageing populations and rising chronic disease costs, prevention is no longer simply upstream — it becomes foundational.”

Providers. Integrating structured lifestyle programmes into routine care pathways, particularly in midlife, can yield long-term clinical and operational benefits.

Payers. Prevention should be viewed as a cost-offset strategy rather than a cost centre, given its impact on delaying high-cost chronic conditions and dependency.

Innovators. There is a clear role for scalable digital platforms that combine monitoring, feedback and behavioural nudging.

Conclusions

Prevention must evolve from a policy aspiration into a foundational pillar of healthcare systems. Evidence shows that early, sustained lifestyle interventions not

only extend lifespan but also improve healthspan and reduce system pressures by delaying morbidity. Advances in personalised data, AI and digital twins enable scalable, predictive and targeted prevention strategies, empowering both individuals and healthcare providers. However, success depends on widespread engagement, equitable access and trust in these tools. By reframing prevention as a shared responsibility supported by technology and behavioural insights, healthcare systems can achieve more efficient resource use, better population health outcomes and long-term financial sustainability when faced with the challenges of ageing populations and rising chronic disease burdens.

Additional Information

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Conflict of interest

None.



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