Making time for brain health: recognising temporal inequity in dementia risk reduction

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Time is an under-recognised social determinant of brain health, and is potentially as important as education or income for dementia risk. Temporal inequity refers to the unequal distribution of discretionary time owing to structural conditions shaping daily life. Temporal inequity encompasses insufficient time for rest, misaligned biological rhythms, fragmented leisure, and the encroachment of work or digital demands into personal time. Time poverty is a measurable manifestation, denoting insufficient time for brain health, disproportionately affecting structurally disadvantaged populations and exacerbated by performance-driven cultures. Although evidence for modifiable risk factors of dementia, such as sleep, physical activity, nutrition, and social engagement, is strong, adopting healthy behaviours requires time. In this Personal View, we integrate insights from epidemiology, neuroscience, and time-use research to argue that addressing temporal inequity is essential for brain health and dementia risk reduction. We call for temporal justice through research and policies that recognise time as both a resource and a site of inequity in ageing and dementia. Accordingly, we outline future research directions, including the development of metrics for temporal inequity, longitudinal studies linking time-use patterns to brain health outcomes, and intervention research to evaluate policies that expand equitable access to time.

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Introduction

Major progress has been made over the past two decades in creating the evidence base for modifiable risk and protective factors for dementia. In 2024, the *Lancet* Commission on dementia prevention, intervention, and care recognised 14 factors across the life course associated with developing dementia: less education in early life; hearing loss, traumatic brain injury, hypertension, diabetes, high cholesterol, excessive alcohol consumption, physical inactivity, depression, smoking, and obesity in midlife; and social isolation, air pollution, and untreated vision loss in later life.[1] Elimination of these risk factors could prevent 45% of dementia cases worldwide—a potential that remains largely unrealised. Although these risk factors are well established, many share a common condition for change: the time required to act on them. For example, adequate, well-structured time is needed to pursue education, maintain physical activity, engage socially, or manage chronic health conditions. Yet temporal inequity—ie, the unequal distribution and control of time—undermines the feasibility of these actions. Despite intersecting with nearly all established dementia risk factors, temporal factors remain underexplored in brain-health research. Evidence-based risk reduction guidelines to delay or prevent cognitive decline and dementia focus on lifestyle behaviours and the management of physical and mental health conditions linked with dementia risk.[2] However, these guidelines do not consider the temporal conditions required to implement them. Recent intervention studies targeting lifestyle behaviours, mood, and cardiovascular management, whether addressing a single risk factor or multiple factors simultaneously, have shown mixed effectiveness; many studies reported no effects on cognitive functioning, whereas a few showed small to moderate benefits, with some evidence of reduced dementia risk but none for dementia prevention.[3–5] Numerous methodological reasons are cited for this low or no effectiveness: insufficient knowledge on optimal prevention windows in populations at risk, short intervention durations relative to long-term neuropathological processes, decreased adherence when interventions are too complex, and uncertainty over which outcome measures and scores yield clinically meaningful trial results.[3,6] By focusing primarily on behavioural change and personal choice, these interventions risk overlooking the real-life conditions that constrain people's capacity to engage in health-promoting activities, thus excluding population groups for whom constraints are large.[7] These constraints can encompass socioeconomic disadvantages, caregiving responsibilities, unstable housing or employment conditions, and health illiteracy—factors that represent established social determinants of health, ie, the structural, non-medical conditions that influence lifestyle behaviours rather than merely reflecting individual preferences.[8,9]

Importantly, these determinants are conditioned by temporal inequity. Time, as both a resource and a constraint, cuts across these social determinants, influencing the capacity to access services, maintain healthy routines, care for oneself, recover from illness, and participate fully in social and economic life.[10] Thus, temporal inequity amplifies existing structural barriers, further restricting the ability to engage in and sustain brain-healthy behaviours. Temporal inequity is quantifiable as time poverty, defined as a condition in which individuals have insufficient discretionary time to rest, care for their health, or participate in valued activities once paid and unpaid obligations are met. As such, time poverty might structurally undermine even the best-designed interventions. First conceptualised as a dimension of deprivation alongside income poverty,[11] time poverty entered the global health and disease discourse in the 1990s.[12] Since then, time poverty has been linked directly to adverse health outcomes, including high stress

levels; reduced physical activity; sleep deprivation; low social engagement; and poor cognitive, emotional, and health management outcomes.[13] Although time poverty is an acknowledged concept in health, and brain-healthy lifestyle components are well documented, less attention has been given to how temporal conditions enable or constrain these practices, particularly in contemporary societies where competing demands on time are pervasive.

In this Personal View, we refer to temporal inequity as a broader construct, encompassing not only time poverty but also other temporal dimensions, such as circadian alignment and digital time (panel 1). To inform this perspective, we conducted a narrative literature search across PubMed and Google Scholar using a broad range of time-related and brain-health related terms, detailed in the appendix (p 1).

See Online for appendix

The emergence of time as a social determinant of health

Time exists as a fundamental dimension of the physical universe, enabling the sequencing of events and the unfolding of processes. Biologically, all living organisms are attuned to temporal patterns, such as circadian rhythms driven by light–dark cycles, infradian rhythms such as menstrual cycles or seasonal breeding, and the overarching lifecycle comprising birth, growth, ageing, and death. However, beyond natural dimensions, time is a human construct. Humans have developed ways to measure, organise, and attribute meaning to time through clocks, calendars, schedules, and metaphors that conceptualise time as money or a race, thereby shaping how time is lived and valued–creating a sociology of time.[14] Constructions of time influence everyday life, embedding expectations about productivity, leisure, ageing, and health. Although physical time operates independently of human perception, the lived experience of time—how it is structured, accelerated, fragmented, or privileged—is socially produced and varies across cultures and contexts.[15] Understanding time as both a natural condition and a social construct is fundamental for recognising its role as a determinant of brain health.

Before industrialisation, time was largely governed by natural cycles and task-oriented rhythms, with daily life attuned to ecological events.[16] With industrialisation, however, time became increasingly organised around metrics of productivity, efficiency, and output, reshaping social life around clock time.[17] The transition from natural to industrial and post-industrial temporal structures has substantially altered the tempo of daily life and introduced chronic misalignments between biological and social time, with increasing implications for health.[18] In many contemporary societies, time has become one of the most contested and unequally distributed resources. The acceleration of life in digitally mediated, productivity-driven cultures has created conditions in which time is relentlessly optimised, fragmented, and commodified.[19] Despite technological advances that promise efficiency and flexibility, many individuals experience a chronic sense of time poverty, with little discretionary space for rest, reflection, or care.[20] This paradox of progress has implications for brain health. The constant pressure to perform and always remain active contributes to cognitive overload, sleep disruption, emotional exhaustion, chronic stress, and reduced capacity for renewal.[19] Simultaneously, the distribution of time is structurally unequal: caregivers, low-wage workers, especially shift workers, and marginalised groups often face the greatest time constraints, deepening existing health inequities.[13]

Overall, time in contemporary societies is a layered construct in which biological rhythms, cultural norms, economic systems, and technological infrastructures intersect to shape temporal experiences. Misalignments between these layers, for example, when industrial or digital schedules override biological rhythms, or when cultural expectations and socioeconomic pressures limit temporal autonomy, create conditions of temporal inequity. These inequities, in turn, can constrain opportunities for brain health-promoting behaviours and widen dementia disparities.[10] Thus, a scientific understanding of how temporalities shape brain health and a rethinking of how societies allocate, value, and protect time—not only as a productivity metric but also as a prerequisite and resource for brain health—are required to recognise time as a social determinant of brain health; however, how much time does brain care require?

Time needed for brain care

Evidence-based lifestyle guidelines relevant to brain health provide time-based references for essential life domains, including sleep and rest, physical activity, nutrition, social engagement, and leisure. These requirements are often conceptualised in a 24-h time-use framework, emphasising the finite nature of daily time and the need to consider its distribution.[21,22]

Sleep

The National Sleep Foundation and American Academy of Sleep Medicine consensus recommends 7–9 h of sleep per night for adults aged 18–64 years, whereas older adults (>65 years) require 7–8 h.[23] Regularly sleeping less than 7 h per night has been associated with adverse health outcomes, including diabetes, depression, heart disease, hypertension, and stroke—all risk factors for dementia.[23] Evidence on the direct link between insufficient sleep and dementia has been inconsistent;[1] however, insufficient sleep has been associated with impaired immune function, increased susceptibility to inflammatory processes, and compromised neuroplasticity in animal studies, suggesting that these mechanisms lead to reduced cognitive performance, including memory and executive functioning problems.[24] The fundamental need for sufficient sleep to ensure brain health is often not met. A review of 19 population-based cohort studies from 11 countries found that the prevalence of subjective short sleep duration (<6 h) among adults ranged between 7·5% and 9·6% and that of objective short sleep duration (<6 h)was 22·1% to 53·3%.[25] Temporal inequity has concrete implications for sleep

Panel 1: **Key terms and definitions relevant to time and brain health**

Temporal inequity
The unequal distribution and control of time across individuals and groups, shaped by structural and social conditions, constraining opportunities for brain-health promoting activities.

Time poverty
A form of deprivation in which individuals have insufficient discretionary time to rest, engage in valued activities, and take care of their brain health after fulfilling their necessary obligations.

Temporal plurality
The coexistence of multiple ways of experiencing, measuring, and organising time within and across societies, which may be shaped by biology, cultures, technology, and subjective experience.

Temporal autonomy
The capacity of individuals or groups to decide how they allocate and organise their time across daily activities, according to their needs, values, and preferences but within the structural constraints of daily life.

Temporal sovereignty
The collective right of a community, culture, or nation to live by its own temporal rhythms, calendars, and time-related governance systems.

Temporal justice
The principle that equitable access to time, as a resource, is essential for fair brain health and wellbeing.

Digital time
The structuring and experience of time mediated by digital technologies, including connectivity, algorithmic rhythms, and self-quantification.

Circadian alignment
Synchronisation of behavioural, environmental, and biological rhythms with the body's internal clock to support cognitive and physiological functioning.

Temporal alignment
The degree to which an individual's allocation and experience of time harmonise with personal needs, social roles, environmental conditions, and biological rhythms.

duration and quality. For example, individuals with low income experience high rates of insufficient sleep, which is linked to temporal inequity: disproportionate employment in shift work, long and irregular hours, and fewer resources for paid domestic help compress the time for sleep[26] and introduce social jetlag, a chronic misalignment between biological and social clocks.[27] Caregiving, especially among women, reduces and fragments rest time through continuous care demands and night-time interruptions, leading to short and poor-quality sleep.[28]

Physical activity

Temporal inequity also constrains opportunities for movement: long working hours, shift work, multiple jobs, and caregiving responsibilities reduce the discretionary time needed to meet recommended physical activity levels. WHO 2020 guidelines on physical activity and sedentary behaviour state that adults should complete at least 150–300 min of moderate-intensity aerobic physical activity; or at least 75–150 min of vigorous-intensity aerobic activity; or an equivalent combination of moderate-intensity and vigorous-intensity activities for health maintenance per week.[29] A dose–response relationship has been reported between physical activity and brain health in older adults, suggesting that approximately 45–60 min of moderate-to-vigorous physical activity per day over prolonged periods is associated with improvements in cognitive performance.[30] Conversely, excessive sedentary behaviour was detrimental to cardiovascular health and associated with increased all-cause-mortality[29] and reduced cognitive performance.[31] However, studies have yielded mixed findings on the direct association of sedentary behaviour with cognitive functioning and incident dementia.[32,33] Notably, sedentary behaviour is highly prevalent in many high-income countries; for example, adults in the USA spend an average 9·5 h in a day sitting during work and in their leisure time, with leisure accounting for 47% of these hours.[34] Regarding dose–response, Raichlen and colleagues[32] reported a non-linear association between sedentary behaviour and incident dementia, with risks increasing after about 10 h per day. Relevant to those with limited time, studies suggest that even short bouts of activity ($\leq$10 min) can yield measurable improvements in autonomic regulation and attentional control.[35] Such daily activities might include mindfulness, stretching or yoga, and breathing exercises; these activities are thought to support brain health by contributing to stress and emotional regulation.[35,36]

Nutrition

In terms of time spent on nutrition, Organisation for Economic Co-operation and Development Time Use Database 2024 data showed that adults spend 1·5 h eating and drinking each day. However, this duration varies among countries. People living in countries with strong food cultures (eg, Italy, France, and Greece) devoted over 2 h, whereas countries with a strong fast-food culture (eg, the USA and Canada), only spend half of that time (roughly 1 h) on meals.[37] In addition, low-income and time-poor groups often report spending less than 1 h per day for eating and drinking.[38] Although no universal standard is recommended, allocating adequate, unhurried time to meals, ideally at least 20–30 min per meal, supports metabolic health, satiety, and dietary quality.[39] Moreover, the timing and frequency of meals and snacks mattered.[39] Over recent decades, the proportion of adults consistently consuming three standard meals daily has declined markedly, reflecting shifts in eating patterns rather than overall eating frequency.[40] In healthy, non-shift-working adults in the USA, eating occasions ranged from approximately four to ten times per day, with food consumption occurring almost throughout the entire 24-h period.[41] Dinner also coincides with fragmented eating patterns in families, reflecting less time for shared meals, carrying implications for social wellbeing.[42] Evidence indicates that the trend of near-continuous eating disrupts circadian alignment and has been associated with increased risk for physical (eg, cardiovascular disease, diabetes, obesity, and cancer) and psychiatric (eg, depression, bipolar disorder, schizophrenia, and attention deficit) conditions.[43] Moreover, temporal inequity, especially time poverty owing to irregular and long working hours, is a strong and consistent perceived barrier to healthy eating practices.[38] Among time-poor individuals, the cumulative time costs of shopping, meal preparation, and clean-up impede healthy eating. This often leads to greater use of convenience or ready-prepared foods, which typically have higher energy density and greater saturated fat and salt content.[38] Together, these findings underscore how both biological rhythms and the social organisation of time shape dietary behaviours and influence long-term brain health.

Social engagement and leisure activities

Among different elements, such as quality, reciprocity, and cognitive demand, time spent in social interaction is one criterion that determines influence on brain health.[44] Daily social contact is consistently associated with better survival.[45] More social engagement is linked to better global cognition in later life; for example, frequent social activity was associated with a 70% reduction in the rate of cognitive decline compared to infrequent social activity.[46] Although the complex nature of social interactions might not justify an optimal daily time requirement for social engagement, evidence suggests that frequent, high-quality interactions are better. However, this suggestion stands in contrast to a trend towards reduced in-person time because of increased screen time and social media use.[47] By contrast, leisure, which refers to discretionary time spent outside of obligatory roles, has a U-shaped relationship with wellbeing. Although having too little leisure time is linked to lower subjective wellbeing caused by stress, having an abundance of leisure time does not necessarily enhance wellbeing. Excess leisure time was even associated with low levels of wellbeing because of a perceived lack of productivity.[48] A field study investigating work–life balance among Chinese manufactory workers revealed that an average leisure time threshold of 4·7 h per day was associated with the best job performance, moderated by better physical health and happiness outcomes.[49] In addition to the prerequisite of having a discrete amount of daily leisure time available, how this time is filled is key. The 2023 American Time Use Survey suggested that Americans aged 15–64 years spend 5·15 h on leisure activities on average every day. Of this total time, 19 min were spent on physical activity, 22 min on playing games, and 34 min on socialising and communicating, which stood against 2·7 h of watching television.[50] Notably, playing games taps into the category of cognitive-stimulating leisure activities. Other examples are playing an instrument, doing puzzles, or learning a new language. Such activities are associated with reduced risk of cognitive impairment and dementia.[51] According to the American Time Use Survey data, although adults have a reasonable quantity of leisure time available each day, a large share is spent in passive activities. For those experiencing time poverty, the problem is not only fewer total hours of leisure but also greater barriers to using these hours in ways beneficial to brain health: unpredictable schedules, fatigue from long work hours, and caregiving duties might push time-poor individuals towards low-effort or passive activities.

Minimum threshold for essential daily brain care

Taken together, essential daily lifestyle aspects occupy at least a 10-h period (minimum 7 h of sleep, 45–60 min of physical activity, 20–30 min spent per meal, and assuming 1 h of social engagement; this period does not include other leisure activities for which time recommendations are not generally available) at the bare minimum, not indicating an optimal range for brain health maintenance or promotion. The above results suggest that more time might be required per day for brain-health related activities, while excluding the time needed for work, commuting, caregiving, and other essential tasks such as personal care and household routines. Temporal inequity cuts across all these domains: time-poor individuals might need to compromise on sleep, skip physical activity, shorten meals, or forgo social contact. Such trade-offs impact brain health over time.

Variability in time needs

Although lifestyle recommendations provide some guidelines on time requirements for brain health, the actual time needed varies among individuals and populations. These differences arise from various factors, including age, sex,

neurodivergence and disability, socioeconomic conditions, regional time-use patterns, and sociocultural norms (figure). For example, older adults often require longer sleep and more recovery time following physical exertion.[52] Individuals with neurodivergent conditions such as autism spectrum disorder or attention-deficit hyperactivity disorder might require additional time for self-regulation, rest, and structured activities to support cognitive functioning.[53] Such variation reflects human diversity and does not constitute inequity by itself. Temporal inequity arises when systemic or structural factors prevent some groups from meeting their time needs for brain health, even when those needs are equal to or greater than others' needs.[54] For example, women, particularly those balancing paid and unpaid caregiving roles,[55] frequently face compounded time demands and might experience greater disruptions in sleep, nutrition, social, leisure, and physical activity patterns than men (panel 2).[56]

Socioeconomic status also plays a crucial role in temporal inequity. Individuals with low incomes often face unpredictable and long work hours, hold multiple jobs, and endure longer commutes, while also juggling caregiving responsibilities. As described above, these factors markedly reduce the time available for brain health-promoting activities.[13,38]

Beyond individual factors, sociopolitical and cultural exposures shape brain-healthy behaviours.[57] People living in countries with robust social and family support systems often allocate more time to shared meals, leisure, and socialising,[58] whereas those living in fast-paced, productivity-driven societies might prioritise work hours over rest and social engagement. Cultural norms also dictate acceptable sleep durations, meal timing, and the value placed on physical activity and social interaction.[59,60] Low-income and middle-income countries (LMICs), where the number of people living with dementia is projected to increase most rapidly in the coming decades, bear a disproportionate burden of temporal inequity (panel 3).[61]

These intersecting factors underpin variability in time for brain care and create temporal inequities in who can adopt and benefit from lifestyle-based dementia risk reduction. Accordingly, interventions should be equity-oriented and tailored to the temporal realities of different groups.

Digital time and the quantified self

Over the past two decades, the quantification of self has become a feature of everyday life. Digital devices enable individuals to monitor sleep, heart rate variability, metabolism, number of steps walked, and even levels of cognitive performance, with unprecedented granularity.[62] These self-tracking technologies promise empowerment, enabling users to take control of their health and the ability to detect early signs of dysfunction.[63] In the context of brain health, such technologies hold potential for encouraging positive lifestyle changes and promoting awareness of cognitive wellbeing.

However, this promise is entangled with emerging concerns about health anxiety, digital perfectionism, and compulsive self-surveillance. Constant tracking can heighten stress and diminish intuitive bodily awareness.[64] This shift reflects a cultural tension prevalent in 24/7 societies that are always active; the drive for efficiency and optimisation eclipses the value of embodied presence and lived experience.[65] Digital biohacking, ie, the use of technology-based tools and digital platforms to monitor and optimise health for longevity, exemplifies this ethos.[66] Although biohacking is often presented as a frontier innovation in personal health management, it can reinforce technocratic ideals that decouple self from natural rhythms. By focusing on performance metrics—many of them linked to time—and biological data, individuals might prioritise measurable outcomes over subjective wellbeing, feeding into the temporal demands of neoliberal values that focus on being constantly busy and productive.[67] The challenge is to differentiate when digital self-monitoring supports brain care from when it becomes an instrument of stress or potential harm. Therefore, such pressures must not be reinforced when using digital time as a measurable factor in brain health. When implemented thoughtfully, measuring time in digital contexts can help to identify temporal inequities and be used to tailor recommendations for diverse needs, which includes ensuring voluntary participation, promoting contextual interpretation, safeguarding data privacy, and explicitly protecting against the use of time metrics to intensify workload or enable surveillance.

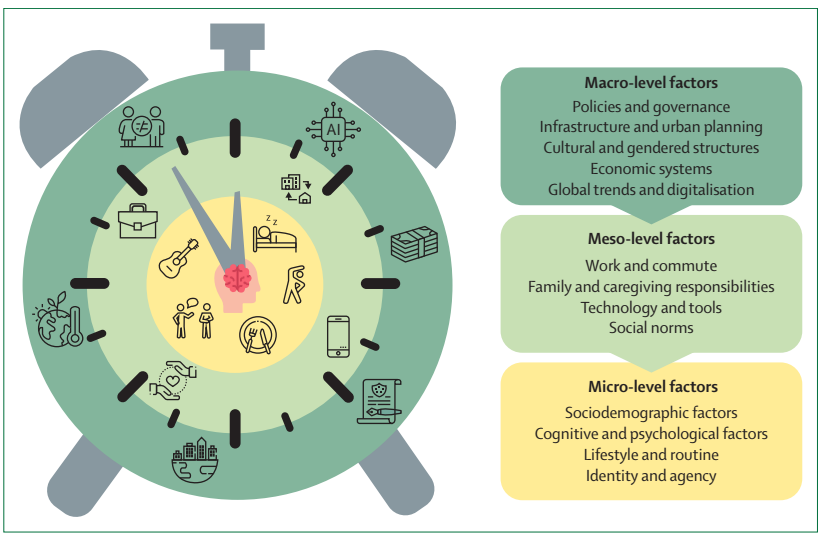

Figure: **Integrative illustration of micro (individual)-level, meso (relational and organisational)-level, and macro (systemic)-level factors that shape people's experience, use, and availability of time relevant to brain health. AI=artificial intelligence.**

Temporal inequity and temporal sovereignty

Structural conditions, including economic precarity, socially ascribed roles, inadequate care infrastructure and restricted service access, long commutes or poor transport, unsafe or overcrowded housing, digital divides, environmental disruptions, and restrictive cultural norms, reinforce temporal inequities. Moreover, the colonisation

Panel 2: Gendered temporal inequity: spotlight on women

Throughout their lives, women perform a disproportionate share of unpaid caregiving and domestic work alongside paid employment (also known as the second shift), often with low schedule control and high exposure to precarious or part-time roles.[56] Inadequate access to affordable childcare, elder care, or paid help further reduces discretionary time in many countries.

Compressed and unpredictable schedules translate into sleep restriction and fragmentation (eg, night-time caregiving), reduced opportunities for physical activity, rushed meals and poor diet quality, curtailed social and leisure time, and chronic stress. All these mechanisms are in turn linked to poor brain health. Time poverty is amplified for single mothers, women with low income, migrant and Indigenous women, women with disability, and women in low-income and middle-income countries, where informal labour, long commutes, and scarcity of time-saving infrastructure are common. These disadvantages accumulate from early parenthood through midlife (often with dual caregiving roles) into older age. System-level measures can expand women's temporal autonomy and enable routines to promote brain health. These measures include equitable paid parental and caregiver leave, universal affordable childcare and elder care, predictable and flexible scheduling, rights to disconnect (ie, the right of workers to ignore work communications outside of working hours without penalty), pay equity and scheduling rights (ie, giving workers more control and predictability over their work hours), community respite services, and proximity-focused urban design (ie, ensuring daily needs are accessible by a short walk or bike ride).

Note: Men can face distinct temporal inequities (eg, long paid work hours, restricted support for caregiving), and gender-diverse people might encounter discrimination and safety concerns that further restrict time; these require tailored approaches.

Panel 3: Regional temporal inequity: spotlight on LMICs

In the coming decades, low-income and middle-income countries (LMICs) are projected to experience the largest increase in people living with dementia.[61] Temporal inequities are shaped by structural conditions—political, economic, infrastructural, and cultural—that restrict control over time across the life course.[13] In LMICs, time and income are tightly coupled; low income raises the time cost of daily life (eg, long commutes, queuing for services, and self-provisioning), whereas time poverty limits opportunities for education, secure work, and care access, slowing wealth accumulation and reinforcing inequity. Across many LMIC settings, gendered temporal inequities are exacerbated with women spending disproportionate time in unpaid domestic and caregiving roles, often alongside informal or low-paid work. Older adults, especially in rural areas, frequently continue manual or subsistence labour and shoulder family obligations, leaving less time for structured social or cognitively stimulating activities. Truncated schooling, early entry into informal work, and transitions to older age without pensions or social protection denote a different layer of life course temporal inequities. Urban contexts can add different time pressures such as congested travel, extended commutes, and household crowding. Digital divides remove time-saving options and force in-person visits, which consume scarce discretionary time. Time-use research is underdeveloped in LMICs. Because temporal inequities intersect with structural and social determinants of brain health in LMICs, recognising and measuring time poverty in these settings are urgent to inform equitable dementia risk reduction.

of time, as described by postcolonial and indigenous scholars, highlights how colonial powers imposed rigid, clock-based temporalities that disrupted traditional, cyclical, ritual-based and relational modes of experiencing time.[68] These enforced time structures aligned with capitalist and industrial demands, marginalising indigenous and non-dominant cultural temporalities and contributing to ongoing inequities in the organisation of daily life.[68] Ultimately, the commodification of time use entails a detachment from natural rhythms, and this detachment has implications for both planetary and human health, as circadian misalignment, loss of ritual, and perpetual acceleration contribute to chronic stress, sleep disruption, and reduced opportunities for collective meaning-making.[59] Reintegrating planetary temporalities such as light–dark cycles, lunar calendars, or seasonal harvesting rituals might offer restorative pathways, for example for better sleep.[16]

Emerging research on temporal sovereignty reclaims time as a site of cultural, political, and epistemic autonomy. It affirms that the right to identify temporal alignment through ritual, ceremony, or collective pauses is integral to identity, resilience, and health.[68] For example, indigenous concepts of time often enact non-linear and intergenerational time, creating spaces for restoration, continuity, and healing.[69,70]

Reclaiming time for all

Modern societies have increasingly recognised time as a public good. In many high-income countries, policies aimed at reducing time poverty with an equity focus include flexible work arrangements such as four-day work weeks rather than traditional five-to-six-day work weeks; universal, affordable childcare systems; or paid leave to support family members in caregiving roles. To reduce the time spent on commuting, cities are investing in efficient public transport and integrated mobility systems. Digital services such as telehealth, e-government, and online grocery delivery can help to save time on everyday tasks. Countries such as

	Rationale and approaches	Possible topics and questions
Comprehensive time-use assessment and time measurement	Current assessments of many lifestyle behaviours rely heavily on retrospective self-reports, which rarely capture the temporal quality, structure, or fragmentation of routines. Comprehensive time-use methods ideally capture quantitative and qualitative aspects as well as contextual factors. Although tools such as ecological momentary assessment, wearable technologies, and digital phenotyping are promising,[74] they might need to be refined to account for variability among individuals, cultures, and health statuses.	Investigate more granular temporal patterns (good for some lifestyle factors such as sleep and physical activity but not so much for other factors such as social engagement or leisure activities eg, timing, sequence, and duration of activities) Explore time quality (eg, rushed *vs* mindful eating, solitary *vs* socially embedded movement) and time constraints and choice (eg, caregiving, employment precarity, and commuting burden) Continue studies on temporal misalignments (eg, circadian disruption, shift work, and mealtimes) Consider simultaneity and context (eg, who the activity is done with and where) Adapt and develop measures for culturally diverse settings and LMICs
Population-based time mapping	Large-scale, representative time use surveys are valuable but rarely linked to cognitive, biological, or neurological outcomes. In-depth studies of social patterns, including a gender lens of time-use can identify and characterise the time-poor population groups.	Link time-use datasets with cognitive, biological, and neurological measures Harmonise time-use datasets across countries to explore geopolitical differences and similarities in relation to cognitive outcomes Examine time allocation across age, gender, ethnicity, socioeconomic status, and neurodiversity strata in relation to cognitive outcomes
Temporal ecology of interventions	Most lifestyle trials against cognitive decline do not comprehensively consider the temporal ecology of participants' lives. Moreover, time-related intervention outcomes such as improved temporal agency, rhythm restoration, or reduction in time-related stress could be developed as measurable endpoints in dementia risk reduction research.	Address temporal feasibility: how much time does the intervention require and how does it displace or integrate with an individual's daily life? Account for temporal equity: who has access to unhurried time and who bears the burden of multitasking, time fragmentation, or scheduling rigidity? Tailor to individual chronotypes and time affordances to maximise adherence and effectiveness Include temporal measures as secondary intervention outcomes Test time-friendly interventions in relation to cognitive outcomes (eg, 10–15 min of walking, breathing, or exposure to nature)
Cultural and indigenous time frameworks	The field has largely been shaped by culturally dominant, industrialised approaches. Collaborative, consumer-led, and community-based methods can illuminate these culturally embedded temporalities.	Investigate collectivistic versus individualistic time constructs and their influence on shared lifestyle behaviours and cognitive outcomes Integrate indigenous knowledge systems that prioritise ecological, seasonal, and relational learning Explore how rituals and temporal sovereignty support brain health
Digital temporalities and psychosocial risk	The new-found dominance of digital time marked by constant connectivity, performance metrics, and round-the-clock self-surveillance might present risks for mental and cognitive health. Research on cognitive and mental health consequences of the quantified self, especially in younger populations, is particularly needed.	Investigate the psycho-cognitive load of tracking and optimisation behaviours Temporal compressions experienced by digitally tethered workers Trade-offs between digital convenience and embodied temporal awareness
Policy and structural interventions	Beyond individual behaviour change, systems-level research (eg, at organisational and societal levels) is needed on how time can be restructured to support brain health. Approaches are especially necessary in LMICs. The emerging concept of temporal justice, ensuring equitable access to restorative and meaningful time, could be central to brain-health policy frameworks.	What are the effects of four-day work weeks, flexible scheduling, or universal basic time policies on cognitive outcomes? Can urban design, public transport access, delivery services, and community infrastructure reduce time burdens and enhance access to brain health-promoting activities? How might health systems measure and support time equity as part of brain-health promotion and dementia risk reduction? How can co-locating life activities (eg, those related to home, work, caregiving, education, and leisure) and services (eg, primary care, mental health support, financial advice, and housing services) save time for brain care?

LMICs=low-income and middle-income countries.

Table: **Research directions and associated themes to investigate temporal inequity and time poverty in relation to brain health and dementia risk**

France, Belgium, and Ireland have introduced right-to-disconnect laws, which enable workers to switch off contact outside of work hours.[71] Urban planning approaches, such as 20-min neighbourhoods (ie, where everything needed for daily life is within a 20-min walk, bike ride, or public transit trip from a home) adopted in Portland (USA), Paris (France), and Melbourne (Australia), for example, aim to co-locate daily services within walking or cycling distance, further reducing time burdens.[72]

Despite these advancements, many people remain time-poor, particularly those from structurally disadvantaged populations or LMICs, and the implications for brain health and dementia are not well understood. Recognising temporal inequity invites a reorientation of brain-health frameworks away from either neglecting time or simple prescriptive time-use norms towards temporally diverse, ecologically grounded, and culturally respectful approaches. Brain health thrives not merely on performance metrics but on restorative practices, including unstructured time in nature, creative absorption, and slow embodied movement.[73–75] These practices allow for recuperation from cognitive load and reconnection with intrinsic motivation and sensory experience. Rituals, pauses, and propitious moments enable individuals to inhabit time meaningfully rather than merely efficiently, for example through meditation, storytelling, gardening, or communal meals.

From an equity perspective, individual practices alone cannot address systemic temporal constraints; reclaiming time for brain health requires structural change. The policies above are promising but unevenly implemented. Achieving equitable time distribution requires coordinated

action across multiple levels; governments can legislate for flexible work and caregiving leave, workplaces can embed rights-to-disconnect policy and output-based performance metrics, communities can invest in mixed-use design and safe walking or cycling networks, and health systems can integrate time-use assessment into brain-health tools. International collaboration, especially with LMICs, can extend these benefits through co-developed, culturally grounded solutions and support for time-saving infrastructures.

Research directions

Despite the increasing recognition of opportunities for dementia risk reduction and prevention, temporal inequity and time poverty remain undertheorised and undermeasured in brain-health research. Future research should examine how temporal structures, shaped by work, caregiving, political and socioeconomic conditions, gender norms, cultural frameworks, and digital environments, affect brain health across all phases of life.

Priorities include developing culturally adaptable tools to capture both quantity and quality of time use; linking representative time-use datasets to cognitive and biological measures to identify groups most affected by time poverty; evaluating temporal equity and feasibility of interventions, including micro-time strategies and chronotype tailoring; exploring cultural and indigenous temporalities as buffers to cognitive decline and pathways to temporal sovereignty; assessing the cognitive impacts of digital temporal compression; and evaluating policy changes, such as reduced working hours, co-located services, and transport or urban design innovations, for their potential to reduce temporal inequities and benefit brain health (table).

These directions centre time as a social determinant of brain health and call for multilevel, context-sensitive approaches that ensure equitable access to unhurried, restorative, and self-directed time.

Limitations

In this Personal View, we adopted a narrative rather than a systematic review approach, which, while enabling interdisciplinary synthesis, is linked to selection bias and omissions. The conceptual framing of time as a social determinant of brain health remains emergent, and empirical evidence directly linking time-use patterns and temporal needs to cognitive outcomes is still scarce. Much of the data referenced stem from high-income settings, with little generalisability to diverse cultural or socioeconomic contexts. Time-use surveys vary in methodology, constraining cross-national comparisons. Although the article touches on indigenous and alternative temporalities, it does not fully capture their depth or diversity. Specific temporal thresholds for brain-health behaviours remain largely unclear, underscoring the need for context-sensitive research. Lastly, most of this article focuses on time poverty, and only briefly mentions the other end of the spectrum, ie, having too much time, which might also contribute to adverse brain-health outcomes.[48]

Conclusions

As brain-health research advances, the question is no longer whether lifestyle matters, but whose time counts and how it is structured. Time is not a backdrop; it is an active social determinant: biologically encoded, socially organised, culturally mediated, and increasingly technologically governed. Yet current frameworks largely ignore the temporal conditions that enable or impede engagement with brain health, by assuming that time is abundant, flexible, and personally controllable. These assumptions, however, do not hold for many people. From shift workers and caregivers to those working in gig economies and exposed to digital optimisation, many live with time poverty and temporal misalignment—forms of temporal inequity that undermine brain health. Recognising temporal inequity invites a paradigm linking neurobiology with lived temporality, epidemiology with ecology, and public health with temporal justice. Research should move beyond counting minutes to examine when, how, and under what conditions time unfolds and how interventions redistribute temporal resources. Policies to restore agency over time and protect time for brain care should be established to honour diverse temporalities across cultures and contexts. Reducing dementia risk is not only about promoting healthy behaviours but also ensuring the provision of sufficient time and opportunity to adopt and sustain such behaviours.

Contributors

SRö conceptualised the paper, conducted the literature search, and wrote the original draft. SRe, AM, SS, and PSS provided intellectual input and reviewed and edited the manuscript. All authors approved the final version of the manuscript.

Declaration of interests

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