

Brain capital is crucial for global sustainable development

As your Editorial¹ noted, sustainable development demands brain health. However, this Editorial also showed that brain health is primarily relevant for only one of the existing

goals of the current UN agenda, namely the *Sustainable Development Goal (SDG) 3: improving health and wellbeing*. Given that brain health and skills are crucial to the economy and society, we seek a more comprehensive approach. Furthermore, the UN's SDG progress is in peril; therefore, a transformative approach seems to be a necessity.

Brain capital offers a broader framework than that of the current SDG agenda, and can orchestrate a socioeconomic transformation.² It brings together several policy fields with the objective of focusing on cognitive and emotional skills, as well as brain and mental health. Brain capital connects and fuses disciplines (ie, it is transdisciplinary) and, hence,



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	Influence of SDG on brain capital	Influence of brain capital on SDG
SDG 1: no poverty	Enhances brain capital by optimising brain development and hence educational abilities, workforce engagement, health status, and quality of life.	Improves education and brain function, increases earning potential, and aids in poverty eradication.
SDG 2: zero hunger	Enhances brain capital by optimising brain development and hence educational abilities, workforce engagement, health status, and quality of life.	Improves education and brain function, increases earning potential, and aids in poverty eradication.
SDG 3: good health and wellbeing	Improves the quality of and access to mental health services and neurological care, and to preventive strategies.	Improves health and wellbeing by optimising key skills, such as resilience, adaptability, and psychological flexibility.
SDG 4: quality education	Cultivates cognitive skills and the capacity for learning. There are new opportunities to leverage personalised education and educational neuroscience.	Brain capital provides a new lens for dealing with economic strain, productivity slow down, sustainability, gender equity, creativity shortcomings, and mental health, thereby affecting education.
SDG 5: gender equality	Improves our understanding of, research in, and treatment for brain health conditions that disproportionately affect women.	Promotes gender equity and empowerment of women and girls through brain health and skills.
SDG 6: clean water and sanitation	Reduction of waterborne diseases is crucial to reduce the incidence of brain health disorders that cause cognitive impairment. Reduction of microplastic and nanoplastic consumption via the water supply will reduce neurotoxic effects.	Brain capital subserves creativity and green skills, which fuel new approaches to water management, sanitation, and hygiene practices.
SDG 7: affordable and clean energy	Reducing air pollution is important to improving brain health.	The green-skill development of current young generations will lead to new sustainable and clean energy solutions.
SDG 8: decent work and economic growth	Engagement in meaningful work with equitable access to brain-health care is key to the brain capital of individual workers and to corporations.	A brain-healthy, creative, robust workforce is crucial to economic security. Many jobs of the future might be in the development of a brain-capital industrial innovation system.
SDG 9: industry, innovation, and infrastructure	Developing industrial innovation strategies for brain health and brain skills are key to the creation of startups and disruptive technologies to diagnose, prevent, and treat disorders, and personalise education.	Entrepreneurship is a key brain skill that is essential to optimise industrial innovation output. Therefore, caring for the brain health of entrepreneurs is linked to successful industrial innovation.
SDG 10: reduced inequalities	The current brain-capital gap is set to worsen with offshoring, robotisation of jobs, and automation by use of artificial intelligence.	A brain-capital lens is key to reduce the brain-capital gap over time.
SDG 11: sustainable cities and communities	Well designed cities and buildings can build brain capital via optimised exercise, healthy nutrition, creative spaces, green spaces, and reduced air pollution.	Brain-health-inspired architecture and urban design would be key new fields for developing sustainable cities and communities.
SDG 12: responsible consumption and production	Technology-focused initiatives are starting to target food insecurity, consumption, and production with a holistic approach, alleviating hunger (SDG 2) and poverty (SDG 1) while reducing food waste (SDG 12). All of these initiatives can build brain capital.	Ecological intelligence and green skills are crucial to tackle adaptation to climate extremes and excessive consumption.
SDG 13: climate action	Climate is a key environmental determinant of brain capital. Extreme weather, natural disasters, and air pollution must be effectively mitigated to optimise brain health.	Green brain capital is crucial to driving a sustainable future by optimising green skills and ecological intelligence.
SDG 14: life below water	Reduction of microplastic and nanoplastic consumption via the water supply will reduce neurotoxic effects.	Brain capital subserves creativity and green skills, which can lead to new approaches to sustainable land use and agriculture.
SDG 15: life on land	Reduction of microplastic and nanoplastic consumption via the water supply will reduce neurotoxic effects.	Brain capital subserves creativity and green skills, which can lead to new approaches to sustainable land use and agriculture.
SDG 16: peace, justice, and strong institutions	A peaceful and inclusive society with access to justice for all and strong institutions can substantially contribute to the enhancement of brain capital. In such societies, individuals are more likely to have access to quality education, health care, and other resources that are crucial for brain health and development.	Brain capital drives pro-social and pro-democratic mindsets and behaviours. It is associated with algorithmic literacy, which reduces susceptibility to misinformation and disinformation.
SDG 17: partnerships for the goals	Partnerships substantially influence brain capital by fostering global cooperation in research, technology development, and policy making related to brain health.	Collaborations, knowledge sharing, and capacity building—driven by brain capital and prosociality—are essential for achieving all SDGs, emphasising the interconnectedness and interdependence of global efforts towards sustainable development.

SDG=Sustainable Development Goal.

Table: Bidirectional links between brain capital and the United Nations 17 Sustainable Development Goals

offers them a unique common goal for collaboration.

The skills component of brain capital aligns well with the Inner Development Goals, which outline science-based skills and qualities to help people live purposeful, sustainable, and productive lives. There are five dimensions encompassing 23 skills and qualities of inner growth and development. Dimensions include being, thinking, relating, collaborating, and acting.

We believe that a reason why the SDGs are not making sufficient progress is that an economic transition to a brain-health economy is needed.³ Such an economy would leverage insights from neuroscience to provide novel contributions to the economy, and can help describing how economy shapes our lives. The brain-health economy also integrates other crucial social, technological, and policy dynamics that all interrelate. The bidirectional links between brain capital and each SDG⁴ are listed in the table.

On Sept 19, 2023, we discussed the effect of brain capital on the international agenda at a UN Science Summit event in New York, NY, USA, in which experts from various disciplines, from brain and mental health, education, economic security, and resilience, to the built environment came together. The event concluded that comprehensive regional, national, and global brain deals are needed to

link related policy fields together and create transformational agendas. The Summit report⁵ captures the main ideas that were raised and videos of the full-day programme are available on YouTube.

As the UN Summit of the Future is being prepared for September, 2024, the most impactful contribution of the neuroscience and brain health communities would be to provide the keys that can unlock transformative change. Brain capital has all it takes to make that change.

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