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EDITORIAL

Toward a Brain Capital Living Lab model: multi-scale opportunities

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Brain capital is a conceptual framework incorporating brain health and brain skills in the knowledge economy.[1] This is based on the understanding that our brains are our greatest asset. It provides an approach for defining, quantifying, and tracking brain issues. Brain capital can be driven into policies and investments.

Brain capital activities have been advancing quickly given the many brain challenges humanity faces, and the fact that these challenges require intellectual capital for resolution – from rising rates of depression and anxiety, to the effects of long COVID-19, to rising rates of Alzheimer's disease, to concerns over susceptibility to fake news and educational losses during COVID. Moreover, brain capital goes beyond medicalization by bringing a truly transdisciplinary approach to understanding the links between health, economy, well-being, and equity.

Multiple factors affect brain capital across several scales: individual, family, community, environment, and society. At the individual level, age, genetics, race, ethnicity, gender, sexual orientation, disability, beliefs, knowledge, attitudes, lifestyle, personality, and coping skills are operative factors. At the family level, there are relationships with siblings, parents and caregivers, family mental health, financial stability, domestic violence, and trauma. At the community level, there are relationships with friends and colleagues, faith communities, schools, universities, workplaces and levels of community support and resources. At the environment level, there is neighborhood safety, access to green and blue spaces, healthy food, housing, health care, pollution, natural disasters, and climate change. At the societal level, there are social and economic inequalities, discrimination, racism, migration, media and technology, popular culture, and government policies.

According to the European Network of Living Labs (https://enoll.org/), Living Labs are "a user-centered, open innovation ecosystem based on a systematic user co-creation approach, integrating research and innovation processes in real life communities and settings". Living Labs are both clinical practice-based and real-life environments (such as the home) where new solutions are developed via human-centered innovations. Through this unique design, Living Labs facilitate and foster open innovation and provide a vehicle for design thinking and deep collaboration. These living labs create templates for expansion and dissemination. This enables joint value co-creation, rapid prototyping, and validation for scale innovation and businesses by bringing together patients, families, research organizations, cities, and regions.

We have previously suggested that the brain health field can benefit from the living lab model.[2] Given the novelty of the brain capital model, there is an urgent need to robustly and empirically assess approaches to enhancing it. Thus, we suggest the development and refinement of a Brain Capital Living Lab model. These Labs may be relevant across regions, countries and multiple scales. Indeed, it will be essential to develop a Brain Capital Living Lab that is multi-scale and can integrate and span clinics, health systems, businesses, and schools at a national and international level. A series of models are outlined in Box 1.

Like many other Latin American countries, Brazil is facing the negative synergistic impact of an aging population, growing inequalities, negative social determinants of health, one of the largest caregiver burdens in the world, an unprecedented rise in mental health issues, a fragile and fragmented health system, and many post-COVID consequences.[3,4] Traditional solutions from standard policy makers are not enough to assure the country's

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Box 1 Instructive models towards Brain Capital Living Labs

European Network of Living Labs (https://enoll.org/): a user-centered, open innovation ecosystem based on a systematic user co-creation approach, integrating research and innovation processes in real-life communities and settings.

Policy Labs: a forum for open, honest conversation about a policy topic that creates new networks, collaborations, and partnerships between academics and policymakers, synthesizes available evidence on a policy topic in a robust and accessible format, and provides timely access to evidence relevant to a policy issue.

Digital Foundry: a disciplined approach, methodology, and set of services for continuous innovation. Digital foundries provide organizations with the opportunity for continuous innovation and were designed to overcome barriers to innovation unique to each enterprise. This approach is based on four key disciplines that enable organizations to create value and look beyond just applying technology to business use cases (i.e., ''committing random acts of digital'') to instead create a scalable, disciplined approach that enhances its ecosystem, leadership, and culture, all elements without which the capability for continuous innovation cannot develop.

Learning Health System: a health system in which internal data and experience are systematically integrated with external evidence and knowledge is put into practice. A rapid-learning health system has seven characteristics: engaged patients; digital capture, linkage, and timely sharing of relevant data; timely production of research evidence; appropriate decision supports; aligned governance, financial, and delivery arrangements; a culture of rapid learning and improvement; and competencies for rapid learning and improvement. Rapid learning and improvement can take place at all levels of a health system: self-management, clinical encounters, programs, organization, local and provincial health authorities, and government.

brain capital. An open innovation ecosystem, based on the co-creation of citizen and policy labs with scalable digital healthcare solutions, a rapid-learning culture, change implementation, and co-creation are unique tools provided by brain capital initiatives.[5] These innovative approaches may not only impact health but represent a holistic investment in the future of the country's brain capital. We strongly encourage the development of these models across multiple scales in Brazil and Latin America.

Disclosure

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