Healthy Active Aging Can Help Urban Populations Be More Resilient to Changing Environments

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The world’s population is aging, and the number of people living with dementia and mild cognitive impairment is increasing, having doubled from 1990 to 2016. Encouraging behavior change, such as regular physical activity, and the provision of supportive urban environments (encompassing built, natural, and social environmental factors) can prevent or delay the progress of cognitive decline and dementia and promote healthy aging.

Cognitive health promotion aims to maintain cognitive function in healthy individuals and minimize cognitive decline among those with mild cognitive impairment by targeting modifiable risk factors, reducing neurodegeneration risk, and increasing cognitive resilience. The lack of physical activity has been suggested as one of the main modifiable risk factors of dementia. The environment is one of the main determinants of physical activity levels in the population. Urban environments with a high density, land use mix, street connectivity, access to different services and facilities, and good pedestrian and bicycle infrastructure can increase physical activity levels in the population. High-density urban environments are also associated with potentially harmful levels of traffic air pollution (another important dementia modifiable risk factor), and noise. Paradoxically, these same environments might increase scope for social connections, interactions, and behaviors, which are good for cognitive health. Meanwhile, many attributes of the social environment (such as crime and safety, social disadvantage, social capital, disorder, and civic participation) encompass social relationships, which impact cognitive aging by influencing loneliness, social support, social networks, and social interactions.

Evidence-informed, health-oriented urban design is increasingly recognized as a key strategy to improve health. However, the role of physical activity and urban environments in relation to brain and cognitive health has received comparatively little attention. Preliminary evidence suggests that mixed land use and access to public transport are predictive of better cognitive health and brain health. Residential neighborhoods also influence physical activity, cardiovascular health, and obesity, which are established determinants of cognitive health. Although there is strong evidence that urban design can promote active transport and physical activity in older adults, its influence on other health behaviors is unclear. This is important as it determines the level of exposure to the negative by-products of urban design and their effects on biomarkers and cognitive health, for example, the association between residential proximity to major roads and dementia risk.

Age-friendly urban design principles can promote physical activity, safety, accessibility, and mobility, increasing social connection and, thus, positively impacting cognitive trajectories. Quantifying the numerous direct and behavior-mediated impacts of the urban environment on cognitive health is critical. Furthermore, molecular biomarkers and individual characteristics, including personality traits and chronic diseases, are fundamental determinants of cognitive health over the lifecourse. DNA methylation is a key epigenetic feature associated with health behaviors (such as physical activity), environmental context, healthy aging, and cognitive health. DNA methylation may provide a dynamic link mediating causal influences of lifestyle behaviors (such as physical activity) and urban environments on cognitive function, demonstrating the need for further sociobiological insights.

Furthermore, storms, droughts, floods, and heat waves are direct effects of climate change, which create changes in environmental exposures, like water quality, air pollution, and ecological change. Such changes interact with individual and social characteristics, like age, socioeconomic position, health status, and mobility, having health impacts on climate-vulnerable populations. Therefore, climate change is a context that exacerbates existing weather conditions and creates unprecedented situations of more extreme scenarios of patterns that already exist.

The absence of climate stability will not affect everybody equally, older adults being one of the most vulnerable populations. There is evidence that older adults face more severe impacts as a result of climate change effects, like flooding and heat waves, due to their tendency to be more biophysically susceptible. Older adults may be more likely to experience detrimental physical impacts, such as dehydration, and the exacerbation of existing health problems, such as respiratory illness and heart disease, during a heatwave. Older adults may be less able to prepare for and cope during flood events, finding it particularly hard to recover from the effects of flooding, like the stress of disruption. Their physical and mental vulnerability can also be increased due to social factors, like being isolated, in ill-health, having lower personal mobility, living in certain types of housing, or being on a low income. Previous studies have shown an increased risk of cognitive decline and dementia as well as poorer quality of life and mental well-being among older people after natural disasters.

Building Resilience

We argue that promoting healthy aging via physical activity in climate-vulnerable populations requires a complex systems approach. Numerous political, economic, environmental, interpersonal, and individual factors dynamically interact to shape and
sustain healthy aging in climate-vulnerable populations. They usually work through complex causal pathways, leading to a range of potential intended and unintended outcomes, and their full effects may take a long time to emerge and change. However, policy making has relied on or defaulted to dominant linear models, which are suboptimal to deal with complex dynamics. Indeed, multilevel dynamic interactions and emergent phenomena within complex causal pathways can generate multiple divergent outcomes from a single system perturbation or intervention. By applying a complex system approach, we can develop a suite of systems-oriented interventions that account for and leverage interactions across multiple levels and sectors for positive change. Furthermore, the sociotechnical transitions framework takes into account complexity, ambiguity, contestation and uncertainty, and the need to incorporate multiple stakeholder perspectives and different knowledge bases and disciplines upon which to base policy, including innovative and “disruptive” solutions. This framework sees the complex system being “reordered” via transitions processes.

The Global Observatory for Ageing and Dementia Care highlighted the need for evidence-based, multilevel, multisectoral (urban planning/design, transportation, and health) strategies to yield significant, large-scale, sustainable reductions in dementia incidence. Environmental, interpersonal, and individual factors dynamically interact to influence cognitive health, usually through complex causal pathways, and their full effects may take time to emerge. Systems thinking methods can assist stakeholders and researchers to create a shared understanding of the problem and codevise optimum, coordinated strategies and interventions to improve cognitive health across the lifecourse in a complex landscape.

References