

Short Communication

Could Research into Certain STEM Fields Stem the Rise in Dementia Prevalence?

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Abstract

As the population ages, the need to find ways to stem the increase in the prevalence of dementia becomes more urgent. Diverse STEM (science, technology, engineering, and math) fields can play roles in finding solutions. For example, developments that lower the costs of living for low income elders while providing enhanced support will help elders to live healthier lives. Advances in bioscience will reveal more information about the health science, healthcare, and medical treatment aspects of dementia. The public health field will play a role in implementing some of the wisdom gained from STEM research into gerontology and gerontechnology.

Introduction

Palliative care for individuals with dementia is resource and labor intensive [1]. The costs for dementia care consume one percent of the aggregated world gross domestic product (GDP) [1]. As the population ages, dementia is expected to increase in prevalence putting an even greater strain on the economy [2]. This makes dementia the leading public health problem we face. Expertise in STEM fields, (science, technology, engineering, and math), have been essential in overcoming many challenges that we have faced in the past and will continue to be essential for current and future challenges [3,4,5]. Various STEM fields can play public health roles in stemming the prevalence of dementia.

Solar Energy

The future is bright for solar energy. Vital research is being done to increase the efficiency of solar power for homes while also making it more affordable [6,7,8,9]. In contrast to residential solar panels, fossil fuels are vulnerable to possible future geo-political instability [10,11]. Such events could drive up the cost of conventional energy. Since one in seven US seniors lives in poverty, an increase in energy costs would impact them the most [12]. Widowed or single elderly women face even greater financial difficulties [13]. Research has shown that many seniors already cannot afford to sufficiently heat their homes in the winter [13,14,15]. If there are more disruptions in the economy or geo-political tensions escalate and cause fuel prices to rise, more seniors will face fuel poverty. Cold homes are particularly a concern for the elderly due to their thermoregulatory deficits – they have greater difficulty keeping warm [16]. This factor is believed to have health consequences, including dementia risk.

There are hints in the literature that the combination of cold housing and age-related thermoregulatory deficits might contribute to the tau pathology found in Alzheimer's disease [17,18,19]. Cold homes may also aggravate high blood pressure which could increase

the risk of stroke and vascular dementia [20,21,22]. In addition, research indicates that a move toward more clean energy, resulting in a reduction in particulate matter pollution, would have brain health benefits for the population [23,24,25].

Gerontechnology

Often seniors who have vision difficulties or other health issues lose their driving privileges causing them to be home-bound and lonely [26,27,28,29]. Loneliness has adverse effects on brain health [26,27]. Pleasant social interactions and other forms of cognitive enrichment can reduce the risk of developing dementia [30,31,32,33,34]. Gerontechnology may be part of the answer [35]. Senior-focused modifications in affordable videoconferencing technology hold the promise of helping the elderly to stay more socially connected [36,35,37]. Self-driving cars would enable elders to participate in community activities more often [38,39]. However, automakers should consider making these cars easy to enter and exit since many elders have arthritis. Life-long learning programs, whether in person or online through computer-supported collaborative learning, can provide wide-ranging learning experiences in a social atmosphere [40,41]. Future innovations, such as targeting online classrooms to the aging population, would provide greater environmental enrichment for home-bound seniors.

Bioscience

There are diverse lines of research in the biological and health sciences that are pertinent to the prevention of dementia – including nutritional, epidemiological, physiological, and biochemical. One example is the role that epigenetics (the regulation of gene expression) plays in the development of cognitive decline and the environmental factors that impact the epigenome [42,43,44,45,46,47,48,49].

Public Health

If the average age of onset of Alzheimer's disease could be delayed

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by just five years, it would substantially stem the trajectory of Alzheimer's disease prevalence [50]. At the Delaware Gerontology Institute, LLC, we are looking at public health strategies that could realize this delay.

Summary

With the aging population, dementia is expected to increase in prevalence [2]. However, a vast array of STEM fields could play roles in stemming this trend.

Conflict of Interest Statement

Dr. Celia M. Ross is the founder of the Delaware Gerontology Institute, LLC which seeks to find answers for the dementia epidemic. (For updates check: www.DEGerontology.com)

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