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### **Battling Boredom – Preventing Cognitive Decline**

Between the years 2012 and 2050, the US population of men and women over the age of 65 is projected to double from 43.1 million to 83.7 million people.<sup>1</sup> This equates to 20% of the US population being over age 65 in 2050.<sup>1</sup> Additionally, current CDC statistics found that one in eight adults 60 years and older experience more frequent or worsening confusion or memory loss.<sup>2</sup> If this trend of cognitive decline continues with the projected increase in the elderly population, roughly 10.5 million older Americans will struggle with mental decline in 2050. Mental decline has many implications on the lives of older generations, particularly relating to their ability to live independently. In order to provide support to aging Americans, there will be significant financial, medical, and social costs. Not only would maintaining cognitive function and preserving independence in our older population relieve a financial and social burden, it would allow these individuals to sustain a higher quality of life. With proper mental acuity, this population would continue the lives they are accustomed to by maintaining relationships, completing daily tasks without assistance, and contributing to society with the wealth of knowledge that comes with age. Because of this, there is a clear public health need to focus on preserving the cognitive function of our elderly population.

To address this public health need, the Community Preventive Services Task Force in Healthy People 2020 made it a goal to combat physical and cognitive decline in elderly adults by prioritizing leisure-time physical activities.<sup>3</sup> With increased physical activity, Healthy People

2020 aims to prevent progression of disease and injury in the population, and maintain their health and independence.

Cognitive decline, and how to combat it, is on the minds of the public, and many express concern and fear around how it may affect their lives. According to a 2012 public opinion poll by Marist, Americans fear Alzheimer's disease and dementia more than any other life-threatening disease, including cancer.<sup>4</sup> This fear highlights a clear stigma and anxiety surrounding the possibility of losing one's cognitive ability and independence. Even those with diagnosed mild dementia avoid telling others about the diagnosis due to the fear of losing friends, loved ones, resources, and respect.<sup>5</sup>

Because of this clear concern, it is important for clinicians to be aware of the screening tools to identify cognitive decline. Current Medicare guidelines recommend a provider assess a patient's cognitive function by direct observation, and discussion with family members at each annual physical exam.<sup>6</sup> If there is concern, the American Academy of Family Physicians recommends a two-visit approach.<sup>7</sup> The first visit, when the patient or family presents with concerning symptoms, includes a one minute screening test for dementia such as the verbal fluency test where the patient lists all the animals they can think of in 60 seconds, the Mini-Cognitive Assessment Instrument, or the Sweet 16, both of which are scored tests.<sup>7</sup> If this brief screen suggests cognitive decline, a further work up including laboratory tests and imaging can be ordered and the patient can come back for a second comprehensive visit that includes further review and work up. This two-step approach gives a clinician a full office visit to thoroughly assess the patient, and address any concerns they may have.

The topic of cognitive decline within the older population is not an unfamiliar one in the Pacific Northwest. The population of older adults living in residential care facilities in

Washington and Oregon is more than double the national rate.<sup>8</sup> Additionally, according to regional statistics, the Northwest population sees death due to Alzheimer's and dementia more than the typical American: Oregon and Washington have the 10<sup>th</sup> and 3<sup>rd</sup> highest Alzheimer's death rates in the US respectively.<sup>9</sup> These statistics highlight the prevalence of mental decline in our community, and the need to educate the aging population on how to better understand and prevent cognitive decline. One example of a target audience for this educational outreach is the population of retired individuals age 65 and older living in senior care facilities in the Northwest. Combining regional statistics and the fact memory loss begins at, or before, age 60,<sup>2</sup> it is very likely these individuals have seen friends, loved ones, or neighbors battle cognitive decline, and will have the motivation to make changes to prevent initial or further decline in themselves.

In order to determine the best way to channel this motivation, one must first understand the pathophysiologic process of cognitive decline to better appreciate how preventative action can be effective. The process of age related cognitive decline is multifactorial, involving the reduction of executive function, processing speed, verbal fluency, visuospatial skills, and both working and episodic memory.<sup>10</sup> These different factors of decline are caused by neurophysiological degenerative changes which begin in midlife, but rapidly accelerate after age 50.<sup>10</sup> The changes that contribute to age related decline occur in various areas of the brain including the frontal, parietal, and temporal lobes including the hippocampus.<sup>10</sup> One marker of tracking these degenerative changes is a patient's white matter. White matter is made up of axons and myelin, and plays a key role in our cognitive speed and maintaining memory.<sup>11</sup> A major cause of age-related cognitive decline is specifically the decrease in cerebral white matter, causing degeneration in processing speed.<sup>11</sup> Particularly with a sedentary lifestyle, this degeneration builds, causing a decline in cognitive function, memory, and the ability to live independently.<sup>11</sup>

With some risk factors being unpreventable, such as genetics and age itself, intervention must focus on controllable variables that contribute to these pathophysiological changes. Factors such as smoking cigarettes, eating a poor diet, and following a sedentary lifestyle can accelerate these changes, whereas eating well, sleeping through the night, staying social, and keeping your mind engaged can be protective.<sup>12,13</sup> As mentioned previously, and supported by multiple studies in a 2017 JAAPA article, aerobic physical activity interventions and prevention of sedentary lifestyles are practical ways to slow cognitive decline.<sup>10</sup> However, in 2012 less than 12% of adults age 65 and older participated in the recommended aerobic and muscle strengthening exercises.<sup>14</sup> Although it is easy to assume this lack of physical activity is simply due to decreased ability in older age, it is our duty as healthcare providers to educate our patients on the importance of modified activities, find resources to make this activity realistic, and encourage them to incorporate small amounts of physical activity into their lives, rather than allowing a sedentary lifestyle.

In addition to physical activity, research has demonstrated that social interaction and cognitive stimulation play synergistic roles in preventing cognitive decline. A 2017 study examined cerebral white matter in healthy older adults aged 60-79 with low activity level (defined as less than two moderate times of exercise per week). It compared changes over six months using MRI in four groups: dance, walking, walking + nutrition, and “active control” which involved stretching and toning. The study found the white matter integrity decreased in all groups except the dance group, which they attributed to the physical, cognitive, and socially engaging aspects of the activity.<sup>11</sup> Another randomized control trial suggested that the physical activity aspect might not be required at all. The study found that combined physical and cognitive training did not produce a synergistic effect; however, the cognitive intervention did

improve function on the cognitive performance.<sup>15</sup> This emphasizes that physical activity is not a requirement to see an improvement in cognitive performance, suggesting that even if an older individual is unable to be physically active, there is still the opportunity to preserve or enhance cognitive ability.

In addition to reviewing studies that highlight the effective ways to prevent cognitive decline, it is also critical to review the interventions that have been proven ineffective in maintaining brain health. One example of this is working memory puzzles, such as Sudoku. Although many people associate these activities with brain health, a 2014 trial found these activities might not be as effective as most think. The study aimed to determine the long-term effects of cognitive training on instrumental activities of daily living and cognitive function ten years after the initial cognitive training. The initial study was a randomized controlled trial consisting of 2,822 participants with three intervention groups including training for memory, reasoning and speed of processing, and an untrained group. The study found the reasoning and speed training, but not memory training, resulted in increased cognitive abilities after 10 years.<sup>16</sup> Additionally, a 2013 meta-analysis of 23 trials also concluded that although working memory performance improved on the specific game within the training, this improvement did not generalize to improvement in working memory overall.<sup>17</sup> These two studies highlight that memory training, although popular in the media, may not be the strongest cognitive training tool.

In order to synthesize these findings to an interventional plan for patients concerned with cognitive decline, a clinician can organize the discussion to three parts: an introduction of the importance of brain health, a review of what makes certain activities cognitively stimulating, and recommendations of what activities are best for brain health. To introduce the importance of maintaining brain health, the National Institute of Aging has an excellent handout that establishes

the importance of keeping your brain active to learn new things, remember important ideas, and preserve memories.<sup>18</sup> This introduction will construct a better understanding of the personal reasons to support optimal brain health such as maintaining independence, completing daily tasks, and sustaining relationships.

Utilizing this background information as motivation, a clinician can transition to what makes certain activities better for brain health than others. There are three essential aspects of brain healthy activities, as supported by the Burzynska et al. trial: social interaction, cognitive stimulation, and physical activity.<sup>11</sup> Both the National Institute of Health and the Alzheimer's Association have many recommendations of specific activities such as golfing, hiking, dancing, traveling, walking in groups, or joining an exercise group that merge these recommendations.<sup>19,20</sup> In addition to highlighting activities good for brain health, it is also important to discuss activities such as Sudoku which have not been shown to prevent cognitive decline.<sup>16,17</sup> This will improve a patient's understanding of what makes an activity beneficial for the brain and increase their confidence in choosing activities that will have long lasting and cross-contextual effects.

I was inspired to research this topic after discussing the project with my boyfriend's 93-year-old grandfather, Mr. H. He lives at the senior living facility where I will be presenting this information, and he was thrilled to hear I was interested in incorporating his community with my graduate school studies. Knowing this was the community I was interested in researching, I discussed the project with a friend who worked as a nursing assistant in a senior living facility. She recommended I present on ways to fill the many hours of boredom residents face on a daily basis. This was when I thought of my presentation topic: Battling Boredom. I cannot imagine what it would feel like to live in a facility alone day after day without work or a regimented schedule, all while seeing many of your friends and loved ones struggle with dementia and

Alzheimer's disease. Additionally, both my grandfather and Mr. H's late wife had dementia, and both our families have seen how difficult the disease can be for both the individual and their community. There are countless recommendations from the media on the "do's and don'ts" of optimal cognitive health, but I wanted to know which activities were evidence based. With that, I formulated this paper and my presentation on ways for older adults to battle boredom, and prevent cognitive decline while doing it!

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