

PILOTING A BIBLICALLY BASED CURRICULUM TO
IMPROVE WORKING MEMORY AS A RESOURCE
FOR SPIRITUAL FORMATION OF OLDER ADULTS

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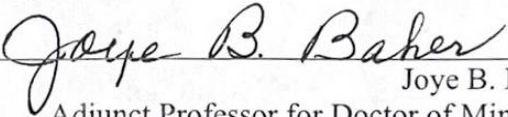
Donna A. Williams

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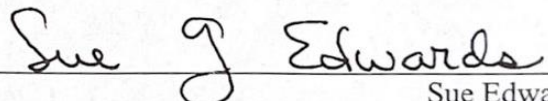
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ABSTRACT

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Donna A. Williams

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This study will present a biblically sound method for improving cognitive functions and enhancing quality of life as a resource for spiritual formation in older adults. Study group participants were between the ages of 57 and 68 and were evaluated using the *Kaufman Brief Intelligence Test-2* and an assessment included in the *Equipping Minds Cognitive Development Curriculum*. Participants applied the prescribed training for 6 weeks and upon reassessment were found to have made cognitive improvements. There were mixed findings related to gains in personal perspectives of quality of life and spiritual growth. Overall, consistency was shown in strengthening both cognitive functions and Christian community.

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CHAPTER 1

INTRODUCTION

Cognitive aging is not a disease but rather over time it represents the natural progression of the physical nature of the human brain. As Christians concerned about physical, mental, and spiritual health—coupled with appreciation for relatively new knowledge from neuroscience regarding the dynamic nature of the brain—this study examines a practical method for incorporating a biblically based cognitive development curriculum into Christian education for older adults to nurture spiritual growth.

Lifestyles and thought processes affect the body and its ability to age well.¹ This project comes from seeking to apply the connections between biblical instruction (for example Rom 12:2, “be transformed by the renewing of your mind”) and neuroscience which informs us how the brain functions.² With the focus to encourage older adults to strengthen the cognitive potential of their brains and the mind it houses,^{3,4} this study falls into the developing field of “neurotheology.”⁵

The cognitive potential, or intelligence, of the brain to effectively receive, process, and respond appropriately to information is essential for healthy functioning of

¹ Timothy R. Jennings, *The Aging Brain: Proven Steps to Prevent Dementia and Sharpen Your Mind* (Grand Rapids, MI: Baker Books, 2018), 20–22.

² Andrew Newberg and Mark Robert Waldman, *How God Changes Your Brain* (New York: Ballantine Books, 2009), 43–44.

³ Curt Thompson, *Anatomy of the Soul: Surprising Connections Between Neuroscience and Spiritual Practices that can Transform your Life and Relationships* (Carol Stream, IL: SaltRiver, 2010), 29.

⁴ Matthew S. Stanford, *The Biology of Sin: Grace, Hope, and Healing for Those Who Feel Trapped*. (Downers Grove, IL: InterVarsity Press, 2010), 17–19.

⁵ Mark A. Maddix and Dean G. Blevins, eds., *Neuroscience and Christian Formation* (Charlotte, NC: Information Age Publishing, 2016), 34.

the whole person. This potential is typically measured as “crystalized knowledge” and represented with an “IQ” score.⁶ However, no matter the age, the brain continues to change. This static score then underrepresents the dynamic nature of intelligence and its “flexibility.”⁷

Therefore, this research with older adults specifically focusses on strengthening the brain’s working memory (WM), an ability that is outcome based and evidenced by “what you can do with what you know.”⁸ This ability is located in, and the “primary function” of, the prefrontal cortex (PFC) as it “coordinates with other areas of the brain.”⁹ The significance of choosing to address WM in spiritual formation is that “truth enters the mind through the circuits of the prefrontal cortex.”¹⁰

In my ministry setting, the goal for older adults is to focus attention on exercising their working memory to age well to the best of their cognitive abilities. Realizing that a major fear of aging is forgetfulness and diminished thinking abilities commonly expressed as “losing your mind,”¹¹ research has shown that with a strong working memory it becomes possible to stave off the effects of brain damage from

⁶ Tracy Alloway and Ross Alloway, *The Working Memory Advantage: Train Your Brain to Function Stronger Smarter, Faster* (New York: Simon & Schuster, 2013), 15–16.

⁷ Damian P. Birney and Jens F. Beckmann, “Intelligence IS Cognitive Flexibility: Why Multilevel Models of Within-Individual Processes are Needed to Realise This,” *Journal of Intelligence* 10, no. 3 (2022): 49, accessed November 22, 2022, <https://dts.idm.oclc.org/login?url=https://www.proquest.com/scholarly-journals/intelligence-is-cognitive-flexibility-why/docview/2716553280/se-2>.

⁸ Alloway, *Working Memory Advantage*, 16.

⁹ Alloway, *Working Memory Advantage*, 6.

¹⁰ Timothy R. Jennings, *The God-Shaped Brain: How Changing Your View of God Transforms Your Life*, 2nd ed. (Downers Grove, IL: IVP Books, 2017), 83.

¹¹ Alloway, *Working Memory Advantage*, 159.

deterioration and conditions such as Alzheimer’s Disease.¹² Education and lifelong learning can change the brain and affect how well the brain ages.¹³

An example of the benefit of lifestyle, faith, and cognitive strength suppressing Alzheimer’s Disease is found in the “Nun Study” implemented by Dr. David Snowdon in 1986 and ongoing under Dr. Margaret Flanagan at Northwest University.¹⁴ This longitudinal study of 678 nuns aged 75 to 107 found that those who had strong verbal skills were protected against the development of Alzheimer’s disease (AD) later in life. Evidence from postmortem brain examination reveals that although AD was present in some nuns, due to cognitive strength, the disease was not expressed.¹⁵

Along with brain diseases, the ability to recall information is a major aging concern. Memory is more than simple recall of information and is significant for understanding how people relate to God and how God responds to us.¹⁶ From both the Old and New Testaments, an understanding of memory and remembering requires action.¹⁷ Addressing cognitive aging and decline in the church among older adults sets the tone for the church to focus on remembering and how God has created us as His image bearers. It honors and enables older adults to confidently fulfill their biblical role in the body of Christ (Ps 139:13–14; Deut 32:7; Ps 71; Titus 2:1–8, and others).

¹² Alloway, *Working Memory Advantage*, 161, 166.

¹³ Alloway, *Working Memory Advantage*, 159–66.

¹⁴ Elizabeth Eisenstadt Evans, “20 Years Later, Lessons on Aging from the ‘Nun Study’ Resonate Today,” *Global Sisters Report: A Project of the National Catholic Reporter*, accessed September 20, 2021, <https://www.globalsistersreport.org/news/20-years-later-lessons-aging-nun-study-resonate-today>.

¹⁵ David A. Snowdon, “Aging and Alzheimer’s Disease: Lessons from the Nun Study,” *The Gerontologist* 37, no. 2 (April 1997): 150–56. <https://doi.org/10.1093/geront/37.2.150>.

¹⁶ Spencer A. Jones, “Memory,” *Lexham Theological Wordbook*, ed. Douglas Mangum et al., Lexham Bible Reference Series (Bellingham, WA: Lexham Press, 2014). Logos Bible Software.

¹⁷ Jones, “Memory.” Logos Bible Software.

Research Concern

The effects of nonpathological aging on the brain can be observed when someone is not as sharp as they used to be. Noticeably diminished routine functioning is referred to as cognitive decline. However, cognitive difficulties or impairment fall on a spectrum from trouble remembering, learning, directing attention, and problem solving to a complete disruption of life. More people exhibit some form of cognitive impairment without dementia than those who are diagnosed.¹⁸

For ministry purposes we also need to be aware that not all cognitive decline is limited to the older adult population. Diminishing cognitive function can emerge for various reasons and appear in other age groups. Signs of decline can begin in twenty- and thirty-year-old adults and are “referred to as cohort effects, which include a variety of influences on cognitive functioning associated with changes in the social and cultural environment, such as quantity and quality of education, nature of health care, etc.”¹⁹ At any age, if intrinsic capacity (ability to function) is hindered or pathological (related to disease) issues arise, anyone concerned should always seek the advice of a physician.

Education programs are typically age-graded; however, no one definitively knows at what point age-related cognitive decline begins.²⁰ As it is with many human developmental stages with predictable patterns, people do not age at the same rate. While the “effects of aging on cognition” have been described, investigators struggle to uncover the “progressive changes that in all probability differ in rate and form from one cognitive function to another” because the “adult system” is dynamic.²¹ Because cognitive decline

¹⁸ Brenda L. Plassman, et al., “Prevalence of Cognitive Impairment without Dementia in the United States,” *Ann Intern Med* 148, no. 6 (2008): 427–34. doi: 10.7326/0003-4819-148-6-200803180-00005.

¹⁹ Timothy A. Salthouse, “When Does Age-Related Cognitive Decline Begin?” *Neurobiol Aging* 30, no. 4 (2009): 510. doi: 10.1016/j.neurobiolaging.

²⁰ Salthouse, “When Does Age-Related Cognitive Decline Begin?” 509.

²¹ John Duncan, Louise Phillips, and Peter McLeod, *Measuring the Mind: Speed, Control, and Age*, 1st ed. (Oxford: OUP Oxford, 2005), 294.

issues can appear across the adult age range, sensitivity to this factor is necessary in adult ministry to avoid a “strictly chronological categorization of elderly humans.”²² To the extent we are able, understanding how the brain processes as it ages is of value for teaching, building discipling relationships, and providing spiritual formation resources.

Genetics, coupled with life experiences of the brain, can influence the effects of aging on the brain.²³ To a certain extent genetic expressions of cognitive conditions related to declining functions are under the influence of these experiences which program the mind. Yet, brain wiring can be flexible allowing the brain to rewire and the mind to reorganize.²⁴ Various factors that influence the brain through these experiences, called “epigenetics,” may switch the expression of genes on or off for factors affecting decline.²⁵

Although cognitive decline may impact various age groups for various reasons, we live in a world with an ever-growing population of aging people.²⁶ This older group has garnered our attention because according to the World Health Organization, the growth rate is such that by 2050 the population of those over 60 is expected to double and the population of those over 80 is expected to triple.²⁷ Many in this group will notice a change in their own cognitive abilities before any condition is diagnosed. This

²² Marc Verny, Emmanuel Moyse, and Slavica Krantic, “Successful Cognitive Aging: Between Functional Decline and Failure of Compensatory Mechanisms,” *BioMed Research International* (2015): 2.

²³ Lawrence Whalley, *Understanding Brain Aging and Dementia: A Life Course Approach* (New York Chichester, West Sussex: Columbia University Press, 2015), 3.

²⁴ Bessel Van Der Kolk, *The Body Keeps the Score: Brain, Mind, and Boding in the Healing of Trauma* (New York: Penguin Books. 2015), 169.

²⁵ Thompson, *Anatomy of the Soul*, 46.

²⁶ United Nations, “Demographic Profiles,” 28, https://population.un.org/wpp/Publications/Files/WPP2019_Volume-II-Demographic-Profiles.pdf.

²⁷ World Health Organization, “WHO’s Work on the UN Decade of Healthy Ageing 2021–2030,” accessed March 11, 2020, <https://www.who.int/ageing/decade-of-healthy-ageing>.

awareness has become a public health concern.²⁸ In 2016 dementia was added as a quality-of-life indicator that is “overwhelmingly faced by older adults.”²⁹ Individual recognition of it is so prevalent that the concern over simply the possibility of developing dementia has been termed “dementia worry”—however, it appears participation in a religion may help with thoughts driven by negative cognitive age-related stereotyping.³⁰

As the church grows it will continue to experience an increase in people with cognitive issues with related perceptions and feelings. Improved healthcare and quality of life has increased human longevity and aging with dignity has grown to be a global concern. Losing “the ability to live independently” has been cited as “one of the greatest fears adults express when considering old age.”³¹ Continuing to live at home has shown to have it benefits due to close relationships.³² Most older adults do not live in institutional settings; they live among us and can at times become a vulnerable population.³³ This increasing population size with its inherent need for cognitive well-being reflects a clearly defined ministry group. As we seek to fulfill the Great

²⁸ Centers for Disease Control and Prevention, “Chronic Diseases and Cognitive Decline,” accessed February 2, 2020, <https://www.cdc.gov/aging/pdf/20-03-Chronic-Diseases-and-Cognitive-Decline-Pages-h.pdf>.

²⁹ Federal Interagency Forum on Aging-Related Statistics, “Older Americans 2016: Key Indicators of Well-Being,” *Federal Interagency Forum on Aging-Related Statistics* (Washington, DC: U.S. Government Printing Office, August 2016).

³⁰ Jennifer R. Roberts and Molly Maxfield, “Examining the Relationship Between Religious and Spiritual Motivation and Worry About Alzheimer’s Disease in Later Life,” *Journal of Religion and Health* 57, no. 6 (2018): 2500. doi: 10.1007/s10943-018-0635-x.

³¹ Denise C. Park, and Gerard N. Bischof, “The Aging Mind: Neuroplasticity in Response to Cognitive Training,” *Dialogues Clinical Neuroscience* 15, no. 1 (2013): 109. doi: 10.31887/DCNS.2013.15.1/ dpark.

³² Maria C. Norton, Kathleen W. Piercy, Peter V. Rabins, Robert C. Green, John C. S. Breitner, Truls Østbye, Christopher Corcoran, Kathleen A. Welsh-Bohmer, Constantine G. Lyketsos, and JoAnn T. Tschanz, “Caregiver–Recipient Closeness and Symptom Progression in Alzheimer Disease. The Cache County Dementia Progression Study,” *The Journals of Gerontology: Series B*, 64B, no. 5 (September 2009): 560–68. <https://doi.org/10.1093/geronb/gbp052>.

³³ Centers for Disease Control and Prevention, *Identifying Vulnerable Older Adults and Legal Options for Increasing Their Protection During All-Hazards Emergencies: A Cross-Sector Guide for States and Communities* (Atlanta: U.S. Department of Health and Human Services, 2012), 2–3.

Commandment (Mark 12:29–31) and Great Commission (Matt 28:19–20), the collective issue of brains aging well is significant to the church and Christian education especially.

Addressing cognitive health requires an awareness of the two types of intelligence housed in the brain—fluid and crystalized.³⁴ Aging takes its toll on fluid intelligence (processing speed, working memory, long-term memory, and reasoning) while crystalized intelligence (knowledge of facts and vocabulary) “remains invariant, or even increases with age.” From an understanding of “neuroplasticity,” the ability to change the brain by “increasing capacity in response to sustained experience,” it is possible to enhance cognitive functions (fluid intelligence) through cognitive training.³⁵

When observing the aging process, “psychomotor and cognitive performance are recognized as two major domains for successful aging, with a loss of motor coordination and working memory deficits two of the most characteristic features of elderly people.”³⁶ Outwardly then we observe both slower movement and slower cognitive processing speeds. Slower cognitive processing speed is indicative of cognitive decline, however, not necessarily dementia. To address processing speed is to address fluid intelligence. This is specifically the function of the brain called “working memory is [considered by neuroscience to be] the cognitive location of our consciousness. It’s where we give attention to our self, where we decide, and where we act.”³⁷ Working memory (WM) is involved when we face dilemmas and make moral choices.³⁸ In order to make

³⁴ Park and Bischof, “The Aging Mind,” 109–19.

³⁵ Park and Bischof, “The Aging Mind,” 109–19.

³⁶ Myrna Nalley Vázquez-Hernández, Nestor I. Martínez-Torres, and Ignacio González-Burgos, “Plastic Changes to Dendritic Spines in the Cerebellar and Prefrontal Cortices Underlie the Decline in Motor Coordination and Working Memory During Successful Aging,” *Behavioural Brain Research* 400 (2021): 113. doi: 10.1016/j.bbr.2020.113014.

³⁷ Alloway, *Working Memory Advantage*, 277.

³⁸ Miriam Boleyn-Fitzgerald, Introduction to *Pictures of the Mind: What the New Neuroscience Tells Us about Who We Are* (Upper Saddle River, NJ: Pearson Education, 2010), 72–73.

these decisions, WM allows us to hold multiple bits of information as we process them—it is described as the brain’s “conductor” which keeps order in our thought processes.³⁹

This project pilots the use of the biblically based Equipping Minds Cognitive Development Curriculum⁴⁰ in an older adult discipleship small group to apply what we know from neuroscience. The intention is to address the concerns and fears related to cognitive decline addressing fluid intelligence and specifically working memory. Strengthening the brain’s working memory will enhance cognitive skills. Enhanced cognitive skills will influence attitudes and enable older adults to thrive in relationships, discipleship, and spiritual formation as they live to fulfill God’s plan for their lives.

Introduction to Research Problem

There have been major scientific advances in understanding the nature of the brain and that the brain is changeable.⁴¹ Embracing these advances in understanding bolsters educational tools for developing an effective older adult educational and discipleship ministry. Despite aging, the brain has a lifelong ability to rewire itself (neuroplasticity) and form new neural pathways (neurogenesis) for continued learning as well as healing and recovery.⁴² In the past education theorists believed that intelligence was “fixed.”⁴³ It was also thought that “the physical structure of the adult brain was essentially immutable,” that in children “most neural networks were in place” at an early age and by the teenaged years the “baseline chemical state” was set.⁴⁴

³⁹ Alloway, *Working Memory Advantage*, 9.

⁴⁰ Carol T. Brown, *Equipping Minds Cognitive Development Curriculum* (Frankfort, KY: Self-published, 2018).

⁴¹ Boleyn-Fitzgerald, *Pictures of the Mind*, 22.

⁴² Boleyn-Fitzgerald, *Pictures of the Mind*, xi.

⁴³ Robert J. Sternberg, “How Can We Teach Intelligence?” *Educational Leadership* Sept 42, no.1 (1984): 38.

⁴⁴ Boleyn-Fitzgerald, *Pictures of the Mind*, xi.

However, we now know about the brain's neuroplasticity, the design at the cellular level (neurons) "to make new synapses (neuron connections) and to prune away those synapses that do not get much firing action."⁴⁵ The brain "has the capacity to heal, grow, and change itself in ways that before were thought impossible."⁴⁶ Through research, recovery, and rehabilitation of stroke patients, scientists and clinicians know that even with the decline that comes with aging, "the brain has the capacity to increase neural activity and develop neural scaffolding to regulate cognitive function."⁴⁷ Because the aging brain has plasticity it can reorganize itself. If it is damaged "new parts of the brain take over functions performed by areas that have been damaged," something "the aging brain is very capable of."⁴⁸ Older adults have the opportunity to continue to grow and learn for a lifetime.

A biblical view towards lifelong learning is supported by the brain's ability to generate new neurons (neurogenesis). New neurons continue to develop on a portion of the hippocampus called the dentate gyrus, the function of which is to store long term information.⁴⁹ Interestingly this process continues throughout all life stages. It "spans embryonic and postnatal stages and indeed continues seamlessly into adult neurogenesis."⁵⁰ Researchers speculate it occurs because "the generation of new nerve cells is critical to learning and memory."⁵¹ This "limited ability to generate new neurons though in a small area, is a major part of the brain involved in declarative

⁴⁵ Thompson, *Anatomy of the Soul*, 45.

⁴⁶ Boleyn-Fitzgerald, *Pictures of the Mind*, xi.

⁴⁷ Park and Bischof, "The Aging Mind," 109.

⁴⁸ Park and Bischof, "The Aging Mind," 113.

⁴⁹ Alloway, *Working Memory Advantage*, 6.

⁵⁰ Ancas B. Mihalas and Robert F. Hevner, "Control of Neuronal Development by T-Box Genes in the Brain," in *Current Topics in Developmental Biology*, ed. Manfred Frasch, vol. 22, 279–312 (Cambridge, MA: Academic Press, 2017), 279. <https://doi.org/10.1016/bs.ctdb.2016.08.001>

⁵¹ Boleyn-Fitzgerald, *Pictures of the Mind*, 97.

memory function.”⁵² Declarative memory function identifies “the memories of facts and events”⁵³ and “is highly responsive to genetic and environmental factors.”⁵⁴

Problem Statement

A philosophy of adult education and ministry will intentionally care for the whole person, including caring for the dynamic brain. It will specifically address working memory because it supports the brain’s cognitive abilities. Physical health and well-being for good stewardship of the “temple” Christians live in (1 Cor 6:19–20) has been taught and embraced for some time. Christians recognize the benefits of proper nutrition and physical exercise for a healthy lifestyle and brain; however, with increasing information available concerning the brain it can be a problem to address strengthening the brain and mind in the church context.

It is challenging to delve into topics relevant to the brain and matters of the mind, the physiological and psychological issues in a faith-based context. Yet, Scriptures frequently mention imperatives for the application of disciplined brain activities, for example, remembering, learning, knowing, and thinking. These are all functions requiring a strong working memory and make an impact on our brains. New findings in brain strengthening to enhance cognitive skills can be incorporated into Christian education, in this case education for older adults.

In addition to the concerns of aging with a healthy brain, Christian adult education and ministry faces an issue of an enlarging population of older adults, many presenting with potentially age-related cognitive decline and isolated from community by brain related diseases such as Parkinson’s Disease, Alzheimer’s Disease, and other

⁵² John H. Byrne, “Learning and Memory,” chapter 7 in *Department of Neurobiology and Anatomy* (Houston, TX: McGovern Medical School, 1997), open access online textbook, <https://nba.uth.tmc.edu/neuroscience/m/s4/chapter07.html>.

⁵³ Byrne, “Learning and Memory,” chapter 7.1.

⁵⁴ Mihalas and Hevner, “Control of Neuronal Development,” 279.

neurodegenerative conditions. These conditions are growing in the adult population as increasing numbers of people are projected to be diagnosed with early-onset conditions.⁵⁵

From my experience, the church is not prepared to reach and minister to those struggling with these conditions and this population will continue to grow. Members of the church are called and gifted to equip and build each other up in the Lord (Eph 2:8–10) and those who struggle cognitively are to be encouraged to fulfill their life purposes. In this time period we find ourselves, people living longer lives and the older generation expanding, the church is called to effectively engage, disciple, lead, and minister to these adults.

About Equipping Minds Cognitive Development Curriculum

Equipping Minds Cognitive Development Curriculum (*EMCDC*) was developed by education specialist and cognitive development therapist Dr. Carol Thompson Brown as an “intervention program” to help individuals reach their cognitive potential.⁵⁶ After decades of work and personal involvement her curriculum has developed into a biblically focused “holistic cognitive intervention program, based on the theory of Structural Cognitive Modifiability (SCM) and Mediated Learning Experience (MLE) of Reuven Feuerstein.”⁵⁷ His orthodox Jewish background and faith influenced his thinking and discoveries.⁵⁸ As a clinical and cognitive psychologist, he trained and was acquainted with Jean Piaget (known for developmental psychology and a constructivist)

⁵⁵ S. Hendriks, et al., “Global Incidence of Young-Onset Dementia: A Systematic Review and Meta-Analysis,” *Alzheimer’s and Dementia Journal* (2022): 17. doi: 10.1002/alz.12695.

⁵⁶ Carol T. Brown, “Equipping Minds: Applying a Biblically Based Curriculum for Improving Working Memory” (Ed.D. Dissertation, Southern Baptist Theological Seminary, December 2016), 91.

⁵⁷ Carol T. Brown, “Equipping Minds Cognitive Development Training in Learners with Neurodevelopmental Disorders: Case studies,” *Journal of Alternative Medicine Research* 10, no. 2 (2018): 171–93.

⁵⁸ Reuven Feuerstein, Rafael S. Feuerstein, and Louis H. Falik, *Beyond Smarter: Mediated Learning and the Brains’ Capacity for Change* (New York: Teachers College Press, 2010), 6.

and Andre Rey (psychologist, known for alternative approaches to assessments).⁵⁹ In its holistic approach, Dr. Brown's *EMCDC* begins with the potential that exists because people are made in the image of God and incorporates mind and body health, along with neurological and sensory development as areas that support cognitive development and training.⁶⁰

Recommended physical exercises in *EMCDC* address developmental reflexes and are the work of Kathy Johnson in "Maintaining Brains Every Day" as part of the Pyramid of Potential model of brain development.⁶¹ The exercises target early developmental reflexes which may not have been properly integrated in the first year of life and are helpful for older adults who may be losing these neuromuscular pathways. According to Kathy Johnson, "trauma or age" may be causative agents and "after the age of 40 the reflexes integrated in the first year of life can become 'disintegrated' until by the time we reach old age, we look more like babies."⁶² Training these reflexes is significant because, as Dr. Brown references Sally Goddard (consultant in neuro-developmental education) in her *EMCDC*:

Most education and many remedial techniques are aimed at reaching higher centers in the brain. A neuro-developmental approach identifies the lowest level of dysfunction and aims therapy there. Once problems there have been remedied, it attempts to build links from lower to higher centers through the use of specific stimulation techniques.⁶³

As part of the holistic approach, mind and body well-being and cognitive training is supplemented with a healthy diet. Dr. Brown suggests the *Broken Brain* by Dr.

⁵⁹ Feuerstein, Feuerstein, and Falik, *Beyond Smarter*, xv.

⁶⁰ Brown, *Equipping Minds Cognitive Development Curriculum*, 6–8.

⁶¹ Kathy Johnson, "Brain Exercises from Maintaining Brains Every Day," accessed April 24, 2020, www.pyramidofpotential.com.

⁶² Johnson, "Brain Exercises," 3.

⁶³ Brown, *Equipping Minds Cognitive Development Curriculum*, 7.

Mark Hyman as a resource for body and brain health.⁶⁴ In addition to primitive reflex exercises, healthy practices of “aerobic exercise three times a week for thirty minutes is needed” and “8–12 hours of sleep a night.”⁶⁵

Auditory and visual processing therapies address sensory-motor development. Auditory therapy issues are addressed through “Sound Therapy” by Patricia and Rafael Joudry, developed from the work of French otolaryngologist Dr. Alfred Tomatis.⁶⁶ It captures the role of the ear, which among many things, energizes the brain through the “stimulation of sound” and when properly engineered “retrains the hearing pathways between the ear and the brain.”⁶⁷ In further addressing the role of the ear she utilizes the work of physician Dr. Harold Levinson whose work identifies the imbalance in the vestibular/inner ear. If this is not functioning properly it can send “blurred messages to the brain interfering with visual and auditory processing.”⁶⁸

Visual processing includes “visual tracking, visual localization and fixation, visual coordination, and visual cognitive problem-solving skills.”⁶⁹ These enable students to “find the words for objects”⁷⁰ they see and to improve the brain’s ability to process vision. She suggests “Eye Can Learn,” a free website (www.eyecanlearn.com) and the EyeQ Advantage website (www.eyeqadvantage.com) with visual processing and visual memory exercises.

⁶⁴ Brown, *Equipping Minds Cognitive Development Curriculum*, 6.

⁶⁵ Brown, *Equipping Minds Cognitive Development Curriculum*, 6.

⁶⁶ Patricia Joudry and Rafael Joudry, *Sound Therapy: Music to Recharge Your Brain*, 13th ed. (Sydney, Australia: Success Stream Books, 2020).

⁶⁷ Joudry, *Sound Therapy*, 30–31.

⁶⁸ Brown, *Equipping Minds Cognitive Development Curriculum*, 7.

⁶⁹ Brown, “Equipping Minds,” 93.

⁷⁰ Brown, “Equipping Minds,” 93.

The cognitive development therapy component of Equipping Minds Cognitive Development Curriculum addresses assessment and training of cognitive skills.⁷¹ The activities are designed to change the brain, “to strengthen working memory, processing speed, perceptual reasoning, and comprehension.”⁷² Through cognitive training (SCM) with a mediator (MLE) thinking skills are strengthened.⁷³

Need for this Study

This study is warranted to enable the church and its leadership to more effectively and accurately minister to the whole church and community by intentionally engaging older adults and addressing their cognitive abilities, specifically working memory. Recognizing older adult ministry as “by and to older adults”⁷⁴ who have become marginalized for various reasons in a growing population of aging people has been a helpful step forward for older adult ministry, especially as the older generations are transitioning.⁷⁵ Other ministries speak to this. The church is in danger when the elders are missing.

Yet, lack of proper understanding of cognitive aging issues and mental processes limits ministry effectiveness.⁷⁶ By ignoring brain science we choose to remain willfully ignorant of resources that are available to enable and potentially restore elder members to their theologically sound positions of leadership in the fellowship of the

⁷¹ Brown, *Equipping Minds Cognitive Development Curriculum*, 25–27.

⁷² Brown, “Equipping Minds,” 93.

⁷³ Brown, “Equipping Minds,” 93.

⁷⁴ James M. Houston and Michael Parker, *A Vision for the Aging Church* (Downers Grove, IL: IVP Academic, 2011), 32.

⁷⁵ Houston and Parker, *A Vision for the Aging Church*, 34.

⁷⁶ Houston and Parker, *A Vision for the Aging Church*, 115.

Christian community.⁷⁷ We need to address this now with fresh insights from modern neuroscience using curriculum that has proven to be effective in strengthening brains.⁷⁸

As the generations change there are those older adults who are motivated and able to gracefully continue to attend worship and to serve as they fulfill their roles as elders among believers. They can say like the Apostle Paul, “So we do not lose heart, though our outer self is wasting away, our inner self is being renewed day by day” (2 Cor 4:16). But then there are those, along with their families and friends, whose lot in life is solely fixed on living within the frustrations of cognitive decline, the fear of mild cognitive impairment, and the grief and devastation of strokes, Parkinson’s and Alzheimer’s Diseases, and other life-changing neurodegenerative disorders. But God knows this. These cognitive issues touch everyone involved and those with debilitating issues remain a part of our Christian fellowship, continue to need corporate worship and offer their full service to God. The difficult conditions they experience create an opportunity to focus on His plan for their lives as they suffer and age well. Stepping into the realm of cognitive strengthening will graciously minister hope and encouragement through brain strengthening. Rewiring of thought processes becomes essential in order to “rejoice in hope, be patient in tribulation, and be constant in prayer” (Rom 12:12).

From experience in older adult ministry some individuals come into this sphere, not because of chronological age, but rather because they have had rare early onsets of pathological neurodegenerative disorders—individuals in their late 40’s and early 50’s. This resonates with the reported increase in dementias in the younger population.⁷⁹ Presently, the average age of early onset of Alzheimer’s Disease is forty-

⁷⁷ Houston and Parker, *A Vision for the Aging Church*, 109.

⁷⁸ Brown, “Equipping Minds Cognitive Development Training in Learners,” 171.

⁷⁹ Alzheimer’s Association, “Young/Early Onset Alzheimer’s,” accessed January 23, 2021, <https://www.alz.org/alzheimers-dementia/what-is-alzheimers/younger-early-onset>.

nine.⁸⁰ While cognitive strengthening will not cure them, investigation continues to bring to light more of how these diseases operate and ways to slow the progression. According to researchers at UT Dallas in an article entitled “*The Aging Mind: Neuroplasticity in Response to Cognitive Training*,” we should consider focusing on “slowing cognitive aging” through “cognitive training and other interventions.”⁸¹ In this article they report that according to the Alzheimer’s Association a delay of 5 years would result in a 50% decrease in in Alzheimer’s diagnoses.”⁸² This is a way the church and Christian education can help.

The need for this topic goes beyond older adults; it is necessary to educate church leadership. Again, from experience, as an older adult group leader, church leadership sought to integrate into older adult ministry a younger person with advanced cognitive decline, which we did. However, none of the older adults, aged 63 to 92, had any pathological cognitive decline issues. Initially the group was uncomfortable, but this situation had an unforgettable impact as they adjusted to the presence of someone much younger than the group.

This experience raised awareness that leadership may presume a stereotypical level of cognitive decline among older adults. Coupled with this is the assumption the person shepherding older adults would be prepared to work with cognitive disabilities regardless of age. Sadly, most people simply accept some degree of cognitive decline as a normal part of aging when they have not been provided the opportunity in a Christian context to truly strengthen and rewire their brains.

⁸⁰ Blue Cross and Blue Shield, “Early-Onset Dementia and Alzheimer’s Rates Grow for Younger American Adults,” accessed January 23, 2021, <https://www.bcbs.com/the-health-of-america/reports/early-onset-dementia-alzheimers-disease-affecting-younger-american-adults#Three>.

⁸¹ Park and Bischof, “The Aging Mind,” 111.

⁸² Park and Bischof, “The Aging Mind,” 111.

As we love older adults well by encouraging and enabling them to serve through strengthened cognitive abilities, these experiences raise awareness to situations that develop in ministry with adults, their relationships, their cognitive and spiritual needs, and church leadership. Those with cognitive and neurodegenerative disorders are to be included and they need ministries and community attuned to their personal struggle as they fulfill their potential.

The issues of the aging brain, life experience, brokenness, and maintaining dignity impact our relationships as we make disciples and provide spiritual formation resources. Christian educators, in teaching and ministering to the older adult as a whole person, need to boldly delve into new topics relevant to brain aging and understanding matters of the mind in a faith-based context. Understanding these physical, physiological, and psychological issues through the lens of God's Word helps us better love and care for this population as this need is increasing.

Over the years there has been a "tumultuous history" between psychological science and the church.⁸³ In a recent study published in *Spirituality in Clinical Practice*, the attitudes of religious leaders toward integrating psychology and church ministry were examined revealing both positive and negative attitudes. Those in the categories of "conservative political orientation and intratextual fundamentalism were associated with negative attitudes towards integration, whereas religious intellectual humility and emotional intelligence were associated with positive attitudes."⁸⁴ The health and strength of the brain impacts us physically through our bodies, but also in our thought processes and our spiritual lives.

⁸³ Adam S. Hodge, Joshua N. Hook, Don E. Davis, and Mark R. McMinn, "Attitudes of Religious Leaders Toward Integrating Psychology and Church Ministry," *Spirituality in Clinical Practice*, 7 no. 1 (2020): 18–33. <https://doi.org/10.1037/scp0000200>.

⁸⁴ Hodge, et al., "Attitudes of Religious Leaders Toward Integrating Psychology and Church Ministry," 18–33.

By God's grace it will take courage to step into this realm of understanding aging and brain functioning. This remains a realm in which neuroscientists, Christian counselors and psychologists are more familiar, and one in which Christian educators need to grow and increase their theologically sound presence and practice. Science and faith meet in working with the brain and the mind. A proper view of attending to the brain and the mind is critical in ministry. Because the science of understanding cognitive processes is not well understood in some Christian realms it is important to be educated and understand the design of the brain and how it operates.

Benefit of this Study

Bringing information about the brain's dynamic abilities to full light in the church begins with knowledge of two actions, both at the cellular level, relative to how the brain functions (physiology). First, at the neuron level of functioning, the brain can rewire itself (neuroplasticity) meaning it can adjust neuron connections—it is, as Dr. Feuerstein believed, “modifiable.” This neuroplasticity is “enhanced and facilitated by intentional behavior.”⁸⁵ Second, within the brain there is also an ongoing process of neurogenesis generating new neurons (brain cells). This occurs in the hippocampal area for functions such as learning and establishing memory.⁸⁶ As neuroscience brings to light new understandings of how the brain and the mind were designed by God to function, it becomes essential to contribute to a scripturally sound view of this design. This can be done by educating church leadership as well as ministering directly to older adults in the church and community. As we do so we obediently grow in understanding more of the matchless work of God.

This effort can make a substantive difference in many areas of Christian education and ministry because it is applicable for all ages. In this case it is especially

⁸⁵ Thompson, *Anatomy of the Soul*, 46.

⁸⁶ Boleyn-Fitzgerald, *Pictures of the Mind*, 97.

helpful for church leaders to understand that ministry clearly includes a growing population of aging people with aging brains. However, in our American culture that evidences it does not value aging people,⁸⁷ as other world traditions might, nor values the process of aging in this life, this work highlights the biblical respect we are to show our elders and helps bring honor as we serve them by serving their cognitive needs. Specifically, this work is accomplished directly by improving those fluid cognitive skills like working memory. This generates many benefits for the corporate body of the church:

1. In discipleship, it can serve older adults in one-on-one situations, for brain training and strengthening.
2. In spiritual formation, with strengthened brains, older adults will be able to more effectively pursue accountability and spiritual development.
3. In Christian education group settings, it can be incorporated into the curriculum for Bible study much the same way it is incorporated into subjects taught in elementary and secondary classrooms. Examples of various ways to implement this in classroom settings are found in the *EMCDC*.
4. By equipping, it can enable ministry leaders who are advanced in years themselves to process, communicate, and remember much more efficiently as they pass on a living memory of what God is doing with His world and among His people.
5. In leadership training by raising awareness, it can inform younger ministry leaders regarding aging members and their needs.
6. In mentoring younger ministry leaders, it shows how to better care for their brains and cognitive skills as they plan to age well.
7. Evangelistically it reaches outward as the church models respect and aging well to the surrounding community.
8. This process enables us to respond obediently to better know God and how He communicates with us as we strengthen our brains making us available to our fullest potential for the work that He has for us.
9. As we infuse cognitive skills training into older adult Christian education we will be leading by example and influencing the younger generations to be lifelong learners, prayerfully motivating them to care for their brains and minds.

⁸⁷ Houston and Parker, *A Vision for the Aging Church*, 106.

10. In community, Equipping Minds Cognitive Development Curriculum (*EMCDC*) can be used effectively in a multigenerational setting bringing people of all ages together.

For further benefits of the *EMCDC* and the “implications for the church, Christian school practitioners, Christian higher education practitioners, Christian academicians and professionals, homeschool parents, adoption and foster care parents, and missionaries”⁸⁸ please see Dr. Brown’s dissertation.

Relationship Between Neuroscience and Scripture

From the information presented above, neuroscience informs us that at the cellular level the brain can grow in size, rewire itself, and to a limited extent, generate new neurons (nerve cells) for a lifetime. And among other things, no matter age, rewiring is affected by various activities, whether it is exercise or thinking, meditating, learning new information or restructuring after trauma and other brain injuries. Brain cells communicate, transfer information, and replicate based on information encoded in the neurons and response from internal and external stimuli. We can think and make choices.⁸⁹

From neuroscience and neural imagining we are also aware working memory is housed in the prefrontal cortex and works with the hippocampus (location of long-term memory), the amygdala (the center for emotions), the intraparietal sulcus (region for math functions), and Broca’s area (necessary for language comprehension and verbal fluency).⁹⁰ Working memory functions to bring order to all the input the brain receives, processes, and uses. It “helps us do something with the information, helps us recall from long-term memory and combined with new information, helps us transfer new

⁸⁸ Brown, “Equipping Minds,” 11.

⁸⁹ Alloway, *Working Memory Advantage*, 4.

⁹⁰ Alloway, *Working Memory Advantage*, 6–7.

information into longer-term memory.”⁹¹ This vast amount of information flowing within man makes the image bearer of God “undoubtedly the most complex information-processing system existing on earth.”⁹²

Towards a Biblical View of Man (Biblical Anthropology)

However, with all this information regarding design, locations in the brain, and the brain’s abilities, mankind lives in a fallen world, one in which all of creation, including human beings, is corrupted (Gen 3). People are physically alive and spiritually dead.

Scripture and neurological discoveries meet in anthropology by contributing to an understanding of the physical neurological design, a design that allows for functioning in a body with a “rational soul and spirit.”⁹³ From neuroscience we learn this design becomes “enhanced and facilitated by intentional behavior.”⁹⁴

Recognizing the mind “is housed in our physical self and depends on your body to function”⁹⁵ the need to present a biblical anthropology is due to the fact that anthropology “is approached from two widely different angles, namely, that of human philosophy and that of the Bible.”⁹⁶ Human philosophy is determined by people in the fallen world while the biblical view “is a revelation from God” we find throughout the Scriptures.⁹⁷ Without faith and biblical guidance new insights from neuroscience are

⁹¹ Alloway, *Working Memory Advantage*, 8–9.

⁹² Werner Gitt, *In the Beginning was Information* (Green Forest, AR: Master Books, 2014), 89.

⁹³ Lewis Sperry Chafer, *Systematic Theology*, vol.2 (Grand Rapids, MI: Kregel Publications, 1976), 144.

⁹⁴ Thompson, *Anatomy of the Soul*, 46.

⁹⁵ Thompson, *Anatomy of the Soul*, 29.

⁹⁶ Chafer, *Systematic Theology*, 125.

⁹⁷ Chafer, *Systematic Theology*, 125.

interpreted with “human philosophy” and darken the truth of God’s revelation of himself through his creation (Rom 1:18–20). Human philosophy holds in high value “the creature rather than the Creator” (Rom 1:25). New information regarding the design of the brain would be corrupted as we have experienced in the past, for example, with the concept of the origin of mankind—a product of evolution versus special creation in the image of God (Gen 1:26–27). People are not evolving into more superior beings.

Believers understand “the natural person (human philosophy) does not accept the things of the Spirit of God, for they are folly to him and he is not able to understand them because they are spiritually discerned” (2 Cor 2:14). The fact they are “not able to understand” speaks to a level of intellect or cognitive ability that is hindered in the unregenerated person. Scripture is very clear that with a spiritual birth the mind is being renewed and can think more accurately, “By this we know the Spirit of truth and the spirit of error” (1 John 4:5–6).

A biblical anthropology exhibits proper stewardship and understanding of the revealed information from neuroscience, information God progressively enables neuroscientists to discover. He is still revealing Himself in His creation (Rom 1:19–20).

Towards a Biblical View of the Mind

People are made in the image of God (Gen 1:26–27) with both material and immaterial natures. The material nature is formed from the material of the ground and the immaterial nature transmitted—God “breathed into his nostrils the breath of life,” as in Genesis 2:7, “and the man became a living creature.”⁹⁸ The image of God includes the whole person in structure and function.⁹⁹ The mind is only a part of the whole of mankind’s immaterial being. It is one of five “elements” of the immaterial nature (soul,

⁹⁸ Chafer, *Systematic Theology*, 160.

⁹⁹ Anthony A. Hoekema, *Created in God’s Image* (Grand Rapids: William B. Eerdmans, 1986), 26.

spirit, heart, flesh, mind)¹⁰⁰ used in Scripture to describe what man is. These “elements” are the “modes” of actively expressing the nature of mankind (intellect, sensibility, will, memory, conscience).¹⁰¹ From Dr. Chafer, “The mind may originate thoughts, the memory may retain thoughts, the spirit may discern the value of thoughts, and the soul respond to thoughts, but the conscience judges thoughts in respect to their moral worthiness.”¹⁰²

With the focus on the brain which houses the mind, we find in Ephesians 4:23–24, “be renewed in the spirit of your minds, and put on the new self, created after the likeness of God in true righteousness and holiness.” Of significance is the role of working memory in the “mind” for processing information with “conscious attention.”¹⁰³ Working memory serves to coordinate information and the body then responds or acts upon it. When working memory is strong and functioning properly it brings order, however, when working memory is overridden poor decisions are made.¹⁰⁴ Working memory is located in the prefrontal cortex, the region of the brain through which “truth enters the mind.”¹⁰⁵

Towards a View of Older Adults and a Renewed Mind

Long life is considered a blessing and, in the Lord, older adults must remain productive. “The righteous flourish like the palm tree and grow like a cedar in Lebanon. They are planted in the house of the Lord; they flourish in the courts of our God. They still bear fruit in old age; they are ever full of sap and green” (Ps 92:12–14). In contrast to

¹⁰⁰ Chafer, *Systematic Theology*, 180.

¹⁰¹ Chafer, *Systematic Theology*, 192–93.

¹⁰² Chafer, *Systematic Theology*, 197–98.

¹⁰³ Thompson, *Anatomy of the Soul*, 160.

¹⁰⁴ Alloway, *Working Memory Advantage*, 64.

¹⁰⁵ Jennings, *The God-Shaped Brain*, 83.

this psalm, Paul illustrates 2 Corinthians 4:7 the weakness of the human body describing it as “jars of clay”—the material part—yet affirms in verse 16 that “though our outer self is wasting away, our inner self is being renewed day by day.”

Bearing fruit in old age is intentional and requires attention to the well-being of the “inner self,” the part that can truly live. Jesus came to give life (John 10:10). In this lifetime, people can only truly live by coming to faith in Christ. Romans 8:13 states, “For if you live according to the flesh you will die, but if by the Spirit you put to death the deeds of the body, you will live.” And, from Romans 8:10, “But if Christ is in you, although the body is dead because of sin, the Spirit is life because of righteousness. If the Spirit of him who raised Jesus from the dead dwells in you, he who raised Christ Jesus from the dead will also give life to your mortal bodies through his Spirit who dwells in you.” When we come to faith, we are given a new life and it is transformational (Gal 2:20; Col 3:1–3; 2 Pet 1:3).

With respect to the aging older adult, in stark contrast to what culture offers with death, no matter how old an adult is, there exists the wise choice to come to know truth, for the beginning of eternal life now and to finish well. The redemptive truth is that through Jesus there exists eternal life now (John 3:16; John 10:10). With that then comes reconciliation to God (2 Cor 5:19) and the ability, as God’s image bearers, to “be renewed in the spirit of your mind” (Eph 4:23) and age well with grace and wisdom (Ps 1; Eph 5:15). The Apostle Paul brings together the unity of material and immaterial part of mankind in Romans 12:1 when he states, “I appeal to you therefore, brothers and sisters, by the mercies of God, to present your bodies as a living sacrifice, holy and acceptable to God, which is your spiritual worship.” Then in verse 2 he adds, “Do not be conformed to this world, but be transformed by the renewal of your mind,” which is for a reason. This reason is “that by testing you may discern what is the will of God, what is good and acceptable and perfect.” He continues by addressing the thought process in verse 3. “For by the grace given to me I say to everyone among you not to think of

himself more highly than he out to think, but to think with sober judgment, each according to the measure of faith that God has assigned.” Neuroscience informs us that of all the ways to exercise the brain, the top one is “faith.”¹⁰⁶

From 1 Peter 1:13–14, “Therefore, preparing your minds for action, and being sober-minded, set your hope fully on the grace that will be brought to you at the revelation of Jesus Christ.” A lack of knowledge is mentioned in verse 14, “As obedient children, do not be conformed to the passions of your former ignorance.” Regardless of age, believers are directed to prepare their minds for action. With aging brains that slow in processing, older adults can care for the mind so that it is sober and ready for action.

Towards a Biblical View of Memory

Scripture also meets neuroscience through application in the field of educational neuroscience, that is, directly applying research findings in an educational setting.¹⁰⁷ Education involves the storing and sharing of memory. We are relational beings and it is through education, formal or informal, that individuals grow as information is transmitted from one generation to the next.

We strengthen our brains by strengthening working memory to remember what God compassionately has done for us. From Ephesians 2:12–13, the Apostle Paul states, “Remember that you were at that time separated from Christ, alienated from the commonwealth of Israel and strangers to the covenants of promise having no hope and without God in the world. But now in Christ Jesus you who once were far off have been brought near by the blood of Christ.”

The practice of remembrance strengthens the brain and is part of our worship. Paul, in 1 Corinthians 11:23–26, directs the believers how they are to participate in the Lord’s Supper, and Jesus’ directions for the bread, “This is my body which is for you. Do

¹⁰⁶ Newberg and Waldman, *How God Changes Your Brain*, 163–165.

¹⁰⁷ David A. Sousa, *How the Brain Learns* (Thousand Oaks, CA: Corwin Press, 2017), 6.

this in remembrance of me” and the cup, “This is the cup of the new covenant in my blood. Do this, as often as you drink it, in remembrance of me.”

Believers are to remember God’s past faithfulness. From Psalm 77:11–12, “I will remember the deeds of the Lord; yes, I will remember your wonders of old. I will ponder all your work and meditate on your mighty deeds.” From Psalm 143:5, “I remember the days of old; I meditate on all that you have done; I ponder the work of your hands.” Repetition builds neural connections and strengthens the brain.

Memory teaches us. From Hebrews 13:8 we learn, “Remember your leaders, those who spoke to you the word of God. Consider the outcome of their way of life and imitate their faith. Jesus Christ is the same yesterday and today, and forever.” Memory is increased when we practice, recall, reflect, and meditate. These are activities that are known to help the brain in its structural scaffolding and modifiability.

Psalm 9:1 states, “I will give thanks to the Lord with my whole heart; I will recount all of your wonderful deeds.” And from Deuteronomy 7:18, “You shall remember what the Lord your God did to Pharaoh and to all Egypt.” Working memory is strengthened when we continue to practice remembering. Other examples of practicing remembrance includes remembering others in prayer; from Philippians 1:3–6, “I thank my God in all my remembrance of you” and Ephesians 1:16–18, “I do not cease to give thanks for you, remembering you in my prayers, that the God of our Lord Jesus Christ, the Father of glory, may give you a spirit of wisdom and of revelation in the knowledge of him having the eyes of your hearts enlightened, that you may know what is the hope to which he has called you.”

Painful memories affect our brain structures but a healthy working memory helps us to decide in truth how to act on them. Paul sets an example in Philippians 3:13–14: “Brothers and sisters, I do not consider that I have made it my own. But one thing I do; forgetting what lies behind and straining forward to what lies ahead, I press on toward the goal for the prize of the upward call of God in Christ Jesus.”

The application of neuroscience information regarding our brains gives us hope to persevere in this life and leave behind a godly legacy. Proverbs 10:7 says, “The memory of the righteous is a blessing, but the name of the wicked will rot.” And Psalm 112:6 declares, “For the righteous will never be moved; he will be remembered forever.”

Purpose Statement

The purpose of my research is theologically sound and significant to help senior adults retain greater cognitive ability so that they can continue to grow in their relationship with God and be used by Him. It is to pilot the use of the biblically based *Equipping Minds Cognitive Development Curriculum (EMCDC)* with older adults in my ministry setting by assessing and then addressing cognitive abilities, specifically working memory. The relational aspect of this process requires a mediator, someone trained to guide and assist with strengthening the modifiable brain structures.¹⁰⁸ I will specifically pilot *EMCDC* as a resource for enhanced working memory and then evaluate the influence on spiritual growth and development for older adults. To my knowledge, the use of this curriculum outside of the classroom setting is limited to clinicians working with patients with cognitive decline. This will be primary, foundational, research for the church and Christian Education.

Research Question

Will the use of Equipping Minds Cognitive Development Curriculum (*EMCDC*) in an older adult ministry as a resource for enhance working memory of the group participants improve working memory? And will improvement in working memory impact spiritual development? If so, how?

¹⁰⁸ Brown, “Equipping Minds,” 13.

Hypotheses

Quantitatively, the use of the biblically based Equipping Minds Cognitive Development Curriculum by my local church older adult discipleship group will enhance working memory and is measurable by direct test scores. Qualitatively, there will be discernable changes reported by the participants themselves. The use of the biblically based Equipping Minds Cognitive Development Curriculum by a local church adult ministry focus group will report personal positive changes in spiritual growth.

Research Method

Participants for this research were invited from my discipleship small group to be the pilot study group for evaluating *EMCDC* in our church's context. The participants were tested and received 30 hours of *EMCDC* over 6 weeks.

A baseline was established by testing the participants' working memory using *EMCDC* pre-test for working memory. Baseline verbal and non-verbal abilities were measured using the Kaufman Brief Intelligence Test (KBIT-2). Participants in the group then completed 30 hours of *EMCDC* cognitive development skills training with me as the mediator. Following the 30 hours of training participants completed an *EMCDC* working memory post-test as well as the KBIT-2 post-test. All data was compiled, analyzed, and reported by this author.

Definition of Terms

The following are terms related to this topic and are helpful for clarification and a fuller understanding of the issues facing older adults as the church begins to help in communities.

Agism (Ageism)

Agism is the prolific stereotyping and discrimination toward older people occurring in global society, including the church. According to Houston and Parker,

“Ageism is a self-defeating societal ill that has many forms of expression.” Further, agism “is the presence of negative stereotypes, incorrect assumptions and distorted characterizations about older people and their capacities.”¹⁰⁹

Alzheimer’s Disease (AD)

This is the most common form of dementia, and more prevalent in women than men.¹¹⁰ Miriam Boleyn-Fitzgerald, in her work *Pictures of the Mind: What the New Neuroscience Tells Us About Who We Are* explains that AD is not a normal part of aging but rather, “The devastating illness is characterized by the formation of abnormal clumps of protein (amyloid “plaques”) and twisted bundles of fibers (“tangles”) in the brain, and by the resulting loss of healthy neurons – anatomical changes that can take hold 10 to 20 years before symptoms emerge and eventually lead to memory loss, mental and social impairment, personality changes, and ultimately death.”¹¹¹

Behavioral Variant Frontotemporal Dementia (bvFTD).

There are many categories of dementia and this one affects the frontal and temporal lobes of the brain.

Behavior variant frontotemporal dementia (bvFTD), according to the Alzheimer’s Association, “is characterized by prominent changes in personality and behavior that often occur in people in their 50s and 60s but can develop as early as their 20s or as late as their 80s. In behavior variant frontotemporal dementia, nerve cell loss is

¹⁰⁹ Houston and Parker, *A Vision for the Aging Church*, 30.

¹¹⁰ Daniel Muñoz-Mayorga, et al. “Tau Phosphorylation in Female Neurodegeneration: Role of Estrogens, Progesterone, and Prolactin,” *Frontiers in Endocrinology* 9, no. 133 (2018). doi:10.3389/fendo.2018.00133 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5882780/>

¹¹¹ Boleyn-Fitzgerald, *Pictures of the Mind*, 91.

most prominent in areas that control conduct, judgment, empathy and foresight, among other abilities.”¹¹²

Boomer Generation

This influential generation was born after World War II between the years 1946–1964. Data from the U.S. Census shows that 10,000 a day are turning 65 and by 2030 they will all be over 65. This large population of boomers “have changed the face of the U.S. population for more than 70 years and continue to do so as more enter their senior years, a demographic shift often referred to as a “gray tsunami.”¹¹³

Brown Six N-back

Central to cognitive training is Dr. Carol Brown’s “adaptive n-back.” It uses up to six tasks in which individuals associate in various ways vowels, numbers, pictures, sounds, directions, and colors. “If the learners succeeded at a particular level of (n), the task was made incrementally more difficult by increasing the size of (n) to six.”¹¹⁴

Central Executive

One of the original components of the working memory (WM) model was proposed by Dr. Alan Baddeley and Dr. Graham Hitch in 1974. This component oversees the other components of working memory, the visuospatial sketch pad, phonological loop, and episodic buffer.¹¹⁵

¹¹² Alzheimer’s Disease and Dementia, “Frontotemporal Dementia,” accessed March 18, 2021, <https://alz.org/alzheimers-dementia/what-is-dementia/types-of-dementia/frontotemporal-dementia>.

¹¹³ U.S. Census, “By 2030, All Baby Boomers Will Be Age 65 or Older.” United States Census Bureau, accessed February 18, 2021, <https://www.census.gov/library/stories/2019/12/by-2030-all-baby-boomers-will-be-age-65-or-older.html>.

¹¹⁴ Brown, *Equipping Minds Cognitive Development Curriculum*, 36.

¹¹⁵ Alan Baddeley, “Working Memory: Theories, Models, and Controversies,” *Annual Review of Psychology* 63, no. 1 (2012): 1–29, accessed February 18, 2021, <https://doi.org/10.1146/annurev-psych-120710-100422>.

Crystalized Intelligence

This intelligence is the type of knowledge stored in the brain and “remains invariant, or even increases with age.”¹¹⁶ Whether or not the information is useful at the moment, it is described as the amount of information stored in long-term memory and can be measured by tests that are designed to assess a person’s depth and breadth of knowledge of topics, such as general knowledge, vocabulary, and mathematics.”¹¹⁷

Dementia

Dementia is not a specific disease but rather a syndrome with a range of symptoms from mild to severe. According to the National Institute on Aging, it is a group of symptoms that include the loss of cognitive functions and can affect behavior, emotions, and personality.¹¹⁸

Episodic Buffer

The original working memory model published by Baddeley and Hitch in 1974 included the visuospatial sketchpad and phonological loop overseen by the central executive. Baddeley added the episodic buffer in 2000. “It is assumed to hold integrated episodes or chunks in a multidimensional code. In doing so, it acts as a buffer store, not only between the components of WM, but also linking WM to perception and LTM (long-term memory). It is able to do this because it can hold multidimensional representations, but like most buffer stores it has a limited capacity.”¹¹⁹

¹¹⁶ Alan Baddeley, “Working Memory,” 11.

¹¹⁷ Tracy Packiam Alloway and Ross Alloway, *Working Memory: The Connected Intelligence* (New York: Psychology Press, 2013), 17.

¹¹⁸ National Institute on Aging, “What Is Dementia? Symptoms, Types, and Diagnosis,” accessed January 15, 2021, <http://www.nia.nih.gov/health/what-dementia-symptoms-types-and-diagnosis>.

¹¹⁹ Baddeley, “Working Memory,” 15.

Equipping Minds Cognitive Development Curriculum (*EMCDC*).

Developed by Dr. Carol Brown and defined in her dissertation, this curriculum is a “method of cognitive skill development based on the theory of Structural Cognitive Modifiability (SCM), Mediated Learning Experience (MLE) and a biblical worldview of human development.”¹²⁰

Feuerstein’s Instrumental Enrichment Program (FIE)

Israeli psychologist Dr. Reuven Feuerstein believed that intelligence is dynamic, not fixed. This belief in the ability of the brain to change, structural cognitive modifiability (SCM), and belief in learning through a mediated learning experience (MLE) forms the core of the program which equips children to learn.¹²¹

Fluid Intelligence

While intelligence is related to brain structure and function, fluid intelligence is related to its use. Fluid intelligence “is associated with one’s ability to analyze complex relationships, to infer and deduce, and to use knowledge and skills to solve novel problems.”¹²²

Frontotemporal Dementia (FTD)

Frontotemporal dementia or frontotemporal degeneration refers to a group of disorders caused by progressive nerve cell loss in the brain’s frontal lobes (the areas behind your forehead) or its temporal lobes (the regions behind your ears).¹²³

¹²⁰ Brown, “Equipping Minds,” 8.

¹²¹ Feuerstein, Feuerstein, and Falik, *Beyond Smarter*, 25.

¹²² Sousa, *How the Brain Learns*, 122.

¹²³ National Institute of Health, “What Are Frontotemporal Disorders? Causes, Symptoms, and Treatment,” accessed February 17, 2021, <https://www.nia.nih.gov/health/types-frontotemporal-disorders>.

Hippocampus

This region of the brain “checks working memory information and compares it to stored experiences.” It is responsible for “consolidating learning and converting information from working memory via electrical signals to the long-term storage regions.”¹²⁴ This brain structure is a “seahorse-shaped structure deep in the forebrain with major responsibilities for processing memories and emotions.”¹²⁵

Intrinsic Capacity (IC)

According to the World Health Organization, healthy aging includes an individual’s functional abilities. In order to arrive at a measurement of an individual’s functional ability one component is the IC or “the composite of all the physical and mental capacities of an individual.”¹²⁶

Lewy Body Dementia

“Lewy body dementia, also known as dementia with Lewy bodies, is the second most common type of progressive dementia after Alzheimer’s disease dementia. Protein deposits, called Lewy bodies, develop in nerve cells in the brain regions involved in thinking, memory and movement (motor control).”¹²⁷

Mediated Learning Experience (MLE)

In considering sources for human development, the mediated learning experience is proposed by Feuerstein as the third part of “the triple ontology of

¹²⁴ Sousa, *How the Brain Learns*, 19.

¹²⁵ Boleyn-Fitzgerald, *Pictures of the Mind*, 92.

¹²⁶ Matteo Cesari, et al., “Evidence for the Domains Supporting the Construct of Intrinsic Capacity,” *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences* 73, no. 12 (2018): 1653–60. <https://doi.org/10.1093/gerona/gly011>.

¹²⁷ Mayo Clinic, “Lewy Body Dementia - Symptoms and Causes,” accessed February 16, 2021, <https://www.mayoclinic.org/diseases-conditions/lewy-body-dementia/symptoms-causes/syc-20352025>.

development” following biological and social development. Human development is not complete without a mediator, the one who conveys “knowledge and experience that would not be accessible to the learner but for the mediator providing it and creating in the learner forms of thinking and cognitive abilities that do not exist except by virtue of the mediation.”¹²⁸

Millennial Generation

Individuals born between the years 1981–1996, will turn 40 in 2021, and are less likely to live in a traditional home with a spouse and child than any of the previous generations.¹²⁹ A higher percentage of them live with their parents or other family members and they are less likely to hold to religious practices. They are the largest generation in the work force.¹³⁰

Neurogenesis

Within the hippocampus is the dentate gyrus. This region has the lifelong ability to “generate new neurons.” It is hypothesized that the new neurons are generated in the hippocampus for learning and memory.¹³¹

Neurotheology

A relatively new term with recent studies in neuroscience attention has focused on the “mind/religion question.”¹³² It “explores the relationship between the brain

¹²⁸ Feuerstein, Feuerstein, and Falik, *Beyond Smarter*, 19–20, 64.

¹²⁹ “For Millennials, Generational Shifts Hit Home,” accessed March 12, 2021, <https://www.livingfacts.org/en/articles/2021/for-millennials-generational-shifts-hit-home>.

¹³⁰ “Millennials Overtake Baby Boomers as America’s Largest Generation,” *Pew Research Center* (blog), accessed March 12, 2021, <https://www.pewresearch.org/fact-tank/2020/04/28/millennials-overtake-baby-boomers-as-americas-largest-generation/>.

¹³¹ Boleyn-Fitzgerald, *Pictures of the Mind*, 97.

¹³² Mark A. Maddix, *Neuroscience and Christian Formation* (Charlotte, NC: Information Age Publishing, 2016), 33–34.

and religious and spiritual phenomena, rather than focusing only on the neuroscientific aspects associated with theology itself . . . typically has been expanded more broadly to include religious and spiritual practices, beliefs, attitudes, and experiences . . . on the “neuro” side it typically expanded beyond just neuroscience to include other aspects of mental and physical health, psychology (at least as it pertains to the brain), and even sociology and anthropology. Thus, we define the field of neurotheology broadly and use the term here as a multidisciplinary approach that could have important clinical and neuroscientific implications deriving from an analysis of the aging brain.”¹³³

Neuroplasticity

The plastic nature of the brain indicates the lifelong process of change within the brain. It involves all the types of cells within the brain and affects changes both intracellularly and intercellularly. There are different time periods for certain types of changes such as age-dependent development. Gender is known to play a role in the brain’s ability to change (see Literature Review, page 48 for further details). And plasticity is influenced by both normal development “and as an adaptive mechanism to maximize functional abilities (or to make use of the remaining intact brain) in the presence of brain injury.”¹³⁴

Older Americans Act of 1965

Legislation providing grants to States “for community planning and social services, research and development projects, and personnel training in the field of aging”

¹³³ Saachi Datta and Andrew Newberg, “The Relationship Between the Brain and Spirituality with Respect to Aging and Neurodegenerative Diseases: Clinical and Research Implications,” *Journal of Religion, Spirituality & Aging* 32, no. 4 (2020). DOI: 10.1080/15528030.2020.1773372.

¹³⁴ Linda Campbell, Dee Dickson, D. Drubach, and J. E. Ormrod, *Learning and The Brain* (Boston, MA: Pearson Custom Publishing, 2004), 47–48.

and forming “the Administration on Aging (AoA) to administer the newly created grant programs and to serve as the federal focal point on matters concerning older persons.”¹³⁵

Parkinson’s Disease (PD)

Parkinson’s disease is initially a movement disorder brought on by the loss of the neurotransmitter dopamine by certain neurons located in a brain region called the striatum. Initial treatment is to prescribe dopamine but as the disease progresses further complications arise including cognitive problems such as memory loss.¹³⁶

Phonological Loop

A component of the model for working memory, it represents the portion responsible for the temporary storage of speech-like information, including all types of verbal communication such as sign language and lip reading.¹³⁷

Plaques

The shortened term for the beta-amyloid protein, known to come from a larger amyloid precursor protein as it is broken down in the brain. Although it is a naturally occurring brain protein, “beta-amyloid 42” appears “more toxic” and “in the Alzheimer’s brain, abnormal levels of this naturally occurring protein clump together to form plaques that collect between neurons and disrupt cell function.”¹³⁸

¹³⁵ Administration for Community Living, “Older Americans Act | ACL Administration for Community Living,” accessed December 5, 2020, <https://acl.gov/about-acl/authorizing-statutes/older-americans-act>.

¹³⁶ “Parkinson’s Disease and Dementia,” accessed February 19, 2021, <https://www.hopkinsmedicine.org/health/conditions-and-diseases/parkinsons-disease/parkinsons-disease-and-dementia>; Shenyu Zhai, Asami Tanimura, Steven M Graves, Weixing Shen, and D James Surmeier, “Striatal Synapses, Circuits, and Parkinson’s Disease,” *Current Opinion in Neurobiology* 48 (February 1, 2018): 9–16. <https://doi.org/10.1016/j.conb.2017.08.004>.

¹³⁷ Baddeley, “Working Memory,” 11–12.

¹³⁸ National Institute on Aging, “What Happens to the Brain in Alzheimer’s Disease?” accessed April 18, 2021, <http://www.nia.nih.gov/health/what-happens-brain-alzheimers-disease>.

Primary Progressive Aphasia (PPA)

PPA is one of three types of frontotemporal degeneration and presents before age 65. It affects “language skills, speaking, writing and comprehension.” There are variations of this condition. If “individuals lose the ability to understand or formulate words in a spoken sentence” it is referred to as a “semantic variant.” If an individual’s speech is not fluent but “very hesitant, labored or ungrammatical” it is a “nonfluent/agrammatic variant.”¹³⁹

ROSES

ROSES stands for Recorded Online Session Equipping Students. Dr. Carol Thompson Brown, the founder of Equipping Minds Cognitive Development Curriculum, provides video training as “you watch Dr. Carol Brown work with a student” through the curriculum. Then you will be able to implement the program with your students.”¹⁴⁰

Structural Cognitive Modifiability

In 1950 Reuven Feuerstein proposed the human brain can change which stood in contrast to the accepted fixist view of Piaget. Feuerstein studied with Piaget in 1947. Piaget’s view of human development is more biological in that development occurs in predictable stages and that each stage is to be mastered before moving on to the next level. There are three fundamental ideas that constitute Feuerstein’s theory of human development. First, human beings are shaped by the environment, biology, and mediation. Second, behavior is a temporary state and intelligence is adaptable. And third,

¹³⁹ National Institute on Aging, “What Happens to the Brain in Alzheimer’s Disease?”

¹⁴⁰ Carol T. Brown, “ROSES 2.0: Recorded Online Sessions Equipping Students,” *Equipping Minds*, accessed October 5, 2020, <https://equippingminds.com/product/roses-2-0-recorded-online-sessions-equipping-students/>.

the brain is plastic; it can generate new structures based on cumulative factors both internal and external.¹⁴¹

Tangles

This term refers to neurofibrillary tangles of tau protein which abnormally form in the neuron cytoplasm. These proteins normally support transport microtubules which assist in movement of nutrients and molecules from the cell body to the axon and dendrites. Clumped together they form threads that inhibit the transport system and the synapsis with other neurons.¹⁴² Additionally, the recent development of a “tau-based PET (positron emission tomography) brain imaging technology to accelerate Alzheimer’s clinical trials and improve individualized patient care” has shown that “tau is concentrated precisely where brain atrophy is most severe” leading scientists to believe that tau protein may “drive brain degeneration in Alzheimer’s disease more directly than amyloid protein.”¹⁴³

Verbal Working Memory

The system that allows us to store and manipulate verbal information. Verbal information may enter the system both aurally and visually. Visual information will have to be transferred into the phonologic loop code.¹⁴⁴

¹⁴¹ Reuven Feuerstein and Ann Lewin-Benham, *What Learning Looks like: Mediated Learning in Theory and Practice, K–6* (New York: Teachers College Press, 2012), 27–29.

¹⁴² National Institute on Aging, “What Happens to the Brain in Alzheimer’s Disease?” accessed April 18, 2021, <http://www.nia.nih.gov/health/what-happens-brain-alzheimers-disease>.

¹⁴³ “Prospective Longitudinal Atrophy in Alzheimer’s Disease Correlates with the Intensity and Topography of Baseline Tau-PET | Science Translational Medicine,” accessed March 8, 2021, <https://stm.sciencemag.org/content/12/524/eaau5732/tab-pdf>.

¹⁴⁴ Baddeley, “Working Memory,” 7.

Visual-Spatial Working Memory

From Alloway and Alloway's *Working Memory Advantage*, "It is used to remember sequences of events, patterns, images, and math skills."¹⁴⁵ It can also be described as a "mental blackboard."¹⁴⁶

Visuospatial Sketchpad

A component of the model for working memory proposed by Baddeley and Hitch representing the portion of the system responsible for the temporary storage of visual information.¹⁴⁷

Working Memory

This type of memory is a "conscious information processing" type "modeled as a worktable, a place of limited capacity where we can build, take apart, or rework ideas for eventual storage somewhere else."¹⁴⁸ According to Dr. Carol Brown, working memory is "the ability to hold two or more pieces of information in the mind while performing a mental operation or manipulating the information such as listening and taking notes, reading, spelling, writing, and mathematics."¹⁴⁹

Limitations

This study is limited to a single small pilot group. The group is in a small rural church. One older adult in the study has a diagnosis of dyslexia, the others have no prior learning disorders or cognitive issues.

¹⁴⁵ Alloway, *Working Memory Advantage*, 9.

¹⁴⁶ Tracy Packiam Alloway, "Education," accessed January 6, 2021, <https://www.tracyalloway.com/education>.

¹⁴⁷ Baddeley, "Working Memory," 12.

¹⁴⁸ Sousa, *How the Brain Learns*, 51.

¹⁴⁹ Brown, *Equipping Minds Cognitive Development Curriculum*, 9.

Additionally, the timeframe for the study was shorter than desired. Dr. Brown recommends 60 hours of Equipping Minds Cognitive Development Curriculum training for optimal results. Only six weeks were available for this study in the Fall semester and this replicates Dr. Brown's original study with Equipping Minds Cognitive Development Curriculum for six weeks also.

Preview of Remaining Chapters

Chapter 2 contains a review of literature relevant to the role of working memory in cognitive abilities and applied to learning and the aging brain. It also examines literature addressing the needs of a growing church population of older adults.

Chapter 3 explains the research procedures. It presents the parameters of the pilot group, the research methodology and tables of data. Chapter 4 discusses the findings of the data analysis. Chapter 5 contains reflections, conclusions, and implications for further research.

CHAPTER 2

LITERATURE REVIEW

This literature review is a synthesis of research and publications with an aim to develop a biblically sound perspective of ministry to the growing population of older adults, specifically with a biblically based method focused on improving working memory.

It begins with a review of the literature which reports the global demographics of this population and world responses to needs and challenges. This is followed by insight into ongoing research on cognitive aging and related dementias which are linked to working memory. Next is a review of works published relevant to a proper understanding of a biblical perspective of the brain and mind. This review closes with the current response of the church to the growing population of older adults and the recognition of care for cognitive health.

Why this Focus on Older Adults?

Older adults are the fastest growing population worldwide and will eventually outnumber all the younger living generations.¹ This means that the entire human population of the world is a progressively aging population of people. This trend towards a global society of older people is the result of decreasing birth rates and increasing lifespans. There are over one billion people in the world over the age of 60.²

¹ United Nations, “Demographic Profiles,” 28, accessed February 13, 2020, https://population.un.org/wpp/Publications/Files/WPP2019_Volume-II-Demographic-Profiles.pdf.

² World Health Organization, “Decade of Healthy Aging,” accessed March 10, 2021, <https://www.who.int/ageing/decade-of-healthy-ageing>.

This trend, enmeshed in other global trends discussed later, is expected to continue at least through 2050 with 1 in 6 people being over the age of 65.³

By 2030, the generation in the United States referred to as the Boomers (born between 1946 to 1964)⁴ will be 65 and older and constitute a significant 20 percent of the United States population.⁵ Adding to the significant growth of the aging world population is the larger Millennial Generation, born between 1981 to 1996.⁶ In 2019 they became the largest living generation in the United States. The increasing growth factor in this generation not only includes those who are natural born citizens but also includes an inflation by the age of the incoming migrant population into the United States.⁷

Who Are the Older Adults?

Around the world there is no clear definition of what is meant by older, elderly, or senior adults. Chronologically this population generally tends to be accepted around the age of 60. There is marked concern for the lack of clarity on identifying individuals in this category. Diseases and disabilities typically associated with aging do affect people much younger, blurring the age line. Defining this population impacts many

³ United Nations, “Ageing: Trends in Population Ageing,” accessed July 12, 2019, <https://www.un.org/en/global-issues/ageing>.

⁴ Lauren D. Medina, Shannon Sabo, and Jonathan Vespa, “Living Longer: Historical and Projected Life Expectancy in the United States, 1960 to 2060,” *Current Population Reports* (Washington, DC, U.S. Census Bureau, 2020), 25–1145, <https://www.census.gov/content/dam/Census/library/publications/2020/demo/p25-1145.pdf>.

⁵ “2020 Census Will Help Policymakers Prepare for the Incoming Wave of Aging Boomers,” accessed April 18, 2021, <https://www.census.gov/library/stories/2019/12/by-2030-all-baby-boomers-will-be-age-65-or-older.html>.

⁶ Pew Research Center, “Millennials Overtake Baby Boomers as America’s Largest Generation,” Pew Research Center (blog), accessed March 12, 2021, <https://www.pewresearch.org/fact-tank/2020/04/28/millennials-overtake-baby-boomers-as-americas-largest-generation/>.

⁷ Pew Research Center, “Where Millennials End and Generation Z Begins,” accessed March 12, 2021, <https://www.pewresearch.org/fact-tank/2019/01/17/where-millennials-end-and-generation-z-begins/>.

criteria that range from collecting accurate data to unique services to be provided to them such as medical care and even the proper prescriptions of pharmaceuticals.^{8, 9, 10}

For data collection around the world the United Nations uses the age of 60 to define a senior adult.¹¹ The World Health Organization uses 60 and older.¹² The United States government and its agencies use the retirement age at 65, or for benefits, eligible individuals the earlier age of 60. The benefits eligible age was created under the Older Americans Act which was put in place in 1965. The Older Americans Act was reauthorized in 2020 through fiscal year 2024 and called “The Supporting Older Americans Act of 2020” which “includes provisions that aim to remove barriers to the aging network increasing business acumen and capacity building, provide states and localities with the flexibility of deciding the allocation of National Family Caregiver Services between the populations served, and extends authorization of the RAISE Family Caregiver Act and the Supporting Grandparents Raising Grandchildren Act by one additional year.”¹³

The growing retirement population represents a significant factor affecting communities. The group identified as older adults is reflected by those who are no longer

⁸ Population Reference Bureau, “Countries with the Oldest Populations,” accessed March 24, 2021, <https://www.prb.org/countries-with-the-oldest-populations/>.

⁹ Hajime Orimo, Hideki Ito, Takao Suzuki, Atsushi Araki, Takayuki Hosoi, and Motoji Sawabe. “Reviewing the Definition of ‘Elderly,’” *Geriatrics and Gerontology International* 6 (2006). 10.1111/j.1447-0594.2006.00341.x.

¹⁰ S. Singh and B. Bajorek. “Defining ‘Elderly’ in Clinical Practice Guidelines for Pharmacotherapy,” *Pharmacy Practice* 12, no. 4 (2014): 489. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4282767/Singh>.

¹¹ United Nations, “Global Population Growth and Sustainable Development,” accessed November 12, 2019, https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/unpd_egm_2_01902_sl_sergeischerbov.pdf.

¹² World Health Organization, “Active Ageing: A Policy Framework,” accessed March 10, 2021, <https://extranet.who.int/agefriendlyworld/wp-content/uploads/2014/06/WHO-Active-Ageing-Framework.pdf>.

¹³ Centers for Disease Control and Prevention, “Aging,” accessed August 17, 2019, <https://www.cdc.gov/cpr/documents/aging.pdf>.

actively engaged in the workforce. The effect of Covid-19 at this time has significantly increased the rate of retirement of the Boomer population.¹⁴

World Attention on Health, Wellbeing, and Aging

In 1982 the World Health Organization, endorsed by the United Nations General Assembly, formed the World Assembly on Ageing.¹⁵ The Vienna International Plan of Action on Ageing (IPAA) produced 62 recommendations for topics to address regarding the global welfare of this age group. This was the first policy document on aging to be adopted by an international community. Its purpose was two-fold: to strengthen the countries and communities' abilities to respond to the needs of aging people and to encourage older adults to be vital members of society.

In the United States, former president Ronald Reagan proclaimed August 21, 1988 as "Senior Citizens Day" to recognize this age group as important members of society.¹⁶ Historically some have celebrated Senior Citizens Day as August 14th, the day former president Franklin Roosevelt signed the Social Security Act in 1935.¹⁷ In 1991 the United Nations established the International Day of Older Persons to be celebrated on October 1st.¹⁸ The point of elevating a day for remembering senior citizens or older persons has two purposes: It honors the positive contributions they have made and it

¹⁴ Pew Research Center, "The Pace of Boomer Retirements has Accelerated in the Past Year," accessed March 12, 2021, <https://www.pewresearch.org/fact-tank/2020/11/09/the-pace-of-boomer-retirements-has-accelerated-in-the-past-year/>.

¹⁵ United Nations, "Aging: Trends in Population Aging," accessed July 12, 2019, <https://www.un.org/en/development/devagenda/ageing.shtml>.

¹⁶ American Presidency Project, "Proclamation 5847: National Senior Citizens Day," accessed September 23, 2019, <https://www.presidency.ucsb.edu/documents/proclamation-5847-national-senior-citizens-day-1988?>

¹⁷ Time and Date, "Senior Citizens Day," accessed July 10, 2019, <https://www.timeanddate.com/holidays/us/senior-citizens-day>.

¹⁸ United Nations, "Older Persons Day," accessed July 10, 2019, <https://www.un.org/en/observances/older-persons-day>.

educates the public regarding the specific needs and challenges of this population. It is a means to raise awareness of issues this age group faces in society.¹⁹

Where are the Older Adults?

Though there may be a global consensus on the increasing size of the older adult population, the dispersal of older adults around the world is not homogenous. According to the World Health Organization in 2019, “37 percent of older people live in eastern and south-eastern Asia, 26 percent in Europe and North America, 18 percent in Central and South Asia, 8 percent in Latin America and the Caribbean, 5 percent in sub-Saharan Africa, 4 percent in North and West Africa and 0.7 percent in Oceania.”²⁰ Specifically, by nation, Japan leads the world with 28.2 percent of its population being 65 and older. Italy is second with 22.8 percent followed by Finland with 21.9 percent. The United States is 36th with 16 percent.²¹

This clustering of older people is also reflected within the United States. According to the Administration for Community Living which includes the Administration on Aging, a division of the U.S. Department of Health and Human Services, half of those 65 and older live in 9 of our 50 States. Those states, beginning with the largest population over 65, are California (5,669,025) Florida (4,358,071) Texas (3,602,320), New York (3,213,534), Pennsylvania (2,335, 630), Ohio (1,995,022), Illinois (1,992,961), Michigan (1,716,604), and North Carolina (1,689,265).²² Other states

¹⁹ United Nations, “Older Persons Day,” accessed July 10, 2019, <https://www.un.org/en/observances/older-persons-day>.

²⁰ Population Reference Bureau, “Countries with the Oldest Populations,” accessed September 24, 2019, <https://www.prb.org/countries-with-the-oldest-populations/>.

²¹ Population Reference Bureau, “Countries with the Oldest Populations,” accessed September 24, 2019, <https://www.prb.org/countries-with-the-oldest-populations/>.

²² Administration on Aging (AoA), Administration for Community Living, U.S. Department of Health and Human Services, “Profile Older Americans,” 11–12, accessed December 5, 2020, <https://acl.gov/sites/default/files/Aging%20and%20Disability%20in%20America/2019ProfileOlderAmericans508.pdf>.

with over one-million people over 65 include Georgia, New Jersey, Virginia, Arizona, Washington, Massachusetts, Tennessee, Indiana, and Missouri.

Genders and Needs

Adding to the complexity of identifying and working with older people are the challenges unique to this age cohort. Their needs are not homogeneous. The World Health Organization articulates it well in pointing out that there is “no ‘typical’ older person.”²³

This concept is further complicated by recognizing that needs differ between genders. Men and women age differently and the disparaging differences in the aging process for both are such that back in 1999 the World Health Organization published a paper specifically addressing the aging male.²⁴ Women in developed countries tend to live seven to nine years longer than men. “While women experience greater burdens of morbidity and disability, men die earlier, yet the reasons for such premature mortality are not fully understood. The rapidity with which the world-wide population is aging will require a sharp focus on gender issues if meaningful policies are to be developed.”²⁵

The difficulty of determining a chronological age for the old or elderly person joined with other mitigating factors such as the culture and resources available for a healthy lifespan, coupled with the understanding that the genders do age differently, can make identifying this population difficult. The United Nations view the need for expectancy of rate of aging include “alternative measures of population aging that offer a

²³ World Health Organization, “Aging and Health,” accessed September 20, 2020, <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>.

²⁴ Alexandre Kalache and Bruno Lunenfeld, “Health and the Aging Male,” *The Aging Male* 3, no. 1 (2000): 1–2, accessed July 1, 2021, <https://www.tandfonline.com/doi/abs/10.3109/13685530009167820?journalCode=itam20>.

²⁵ Bruno Lunenfeld and Pamela Stratton, “The Clinical Consequences of an Ageing World and Preventive Strategies,” *Best Practice and Research Clinical Obstetrics and Gynecology* 27, no. 5 (2013): 643–59. 10.1016/j.bpobgyn.2013.02.005.

more nuanced view of changes over time in the population age structure.”²⁶ In an effort to better identify this population and their needs, in the past, chronological age, joined with the factor of dependency, has been used for identification. However, with increasing longevity and productivity there is interest in “an alternative ‘prospective’ measure that adjusts the threshold of old age based on years of remaining life expectancy; and an economic measure that incorporates information about age patterns of consumption and production.”²⁷

Risk factors for Alzheimer’s Disease include age, genetics, family history, and other modifiable factors.²⁸ Genetics with the “strongest impact on risk of late-onset Alzheimer’s” involves the function of the gene known as “APOE-e4.”²⁹ This gene is related to higher “risk in women than men between ages 55 to 70” and it is not clear if this is related to the decrease in estrogen in women at this age.³⁰

Stereotyping and Agism

Agism, a negative view of stereotyping and discrimination of older people, occurs around the world. In response, the World Health Organization reports and periodically updates a global report on agism along with tools to help other institutions

²⁶ United Nations, Department of Economic and Social Affairs, Population Division, “World Population Ageing,” 2019, 3 accessed July 12, 2019, <https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf>.

²⁷ World Health Organization, “Social Determinants of Health: Demographic Change and Healthy Ageing,” accessed September 20, 2020, <https://www.who.int/teams/social-determinants-of-health/demographic-change-and-healthy-ageing/combating-ageism/global-report-on-ageism>; Cesari Matteo, et al., “Evidence for the Domains Supporting the Construct of Intrinsic Capacity.” *The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences* 73, no. 12 (2018): 1653–60. <https://dash.harvard.edu/handle/1/37365383>.

²⁸ Alzheimer’s Association, “Alzheimers Facts and Figures,” 13–14, accessed January 23, 2021, <https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf>.

²⁹ Alzheimer’s Association, “Alzheimers Facts and Figures,” accessed January 23, 2021, <https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf>.

³⁰ Alzheimer’s Association, “Alzheimers Facts and Figures,” 24, accessed January 23, 2021, <https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf>.

identify and combat agism.³¹ Agism is not something solely expressed by the younger generations. Within the elderly population itself agism is manifested when negativity affects the elderly in their own responses to being older, specifically their response to increased dependency or off-handedly joking about “senior moments.”³² The elderly can themselves perpetuate the negative stereotype of aging.³³

Skills and Abilities

Skills and abilities of older adults have increased as advancing technology has created a change in global culture, especially with the advent of the internet. A statistic tracking website reports that 88 percent of older adults aged 50–64 use the internet while 73 percent of those 65 and older have internet skills.³⁴ Coupled with this includes the data that shows advanced education levels have increase with 25 percent of the Boomer Generation holding bachelor’s degrees and nearly 40 percent of the Millennial Generation having the same educational degrees.³⁵

In understanding what we might perceive as normal cognitive aging, it appears that some people are more resilient when facing the effects of aging on the brain. In a 2015 special editorial published in BioMed Research International, the authors wrestle with the concept of “successful brain aging” and overview several studies and modes for arriving at the conclusion. “It appears that cognitive aging consists likely much

³¹ World Health Organization, “Ageism,” accessed September 20, 2020, <https://www.who.int/ageing/ageism/campaign/en/>.

³² American Association of Retired Persons, “Age Discrimination Still Thrives in America,” 5, accessed October 12, 2018, aarp.org.

³³ Geneviève Coudin and Theodore Alexopoulos, “Help Me! I’m Old!’ How Negative Aging Stereotypes Create Dependency Among Older Adults,” *Aging & Mental Health* 14, no. 5 (2010): 516–23. <https://www.tandfonline.com/doi/abs/10.1080/13607861003713182>.

³⁴ Statista, “Percentage of Internet Users by Age Groups in the US,” accessed August 20, 2021, <https://www.statista.com/statistics/266587/percentage-of-internet-users-by-age-groups-in-the-us/>.

³⁵ Pew Research Center, “Millennial Life: How Young Adulthood Today Compares with Prior Generations,” accessed March 12, 2021, <https://www.pewresearch.org/social-trends/2019/02/14/millennial-life-how-young-adulthood-today-compares-with-prior-generations-2/>.

more in a decrease of cognitive reserve than in functional losses.”³⁶ Having skills is helpful, as cited in a 1995 article in which it states that “the practice of leisure activities demanding planification, such as gardening, traveling, odd jobs, and knitting, decreases the risk of dementia.”³⁷ But new research is hopeful in looking at ways to reduce the risk of developing dementia.³⁸

Decline of Cognitive Abilities

Cognitive abilities can decline with aging and this decline falls into several categories based on the cause or the source of the issue. Mild cognitive impairment, Alzheimer’s Disease and related conditions, and other forms of dementia, represent an aspect of aging that many individuals either inherit or develop with aging presumably based on lifestyle or environmental exposure. Regardless of the cause, the significance of the impact of some amount of loss of cognition, especially in this expanding older adult population, is receiving growing attention.³⁹

According to the National Institute on Aging, “Dementia is the loss of cognitive functioning—thinking, remembering, and reasoning—and behavioral abilities to such an extent that it interferes with a person’s daily life and activities.”⁴⁰ Dementias fall into categories based on the cause of the onset of the condition. These conditions can

³⁶ Marc Verny, Emmanuel Moyse, and Slavica Krantic, “Successful Cognitive Aging: Between Functional Decline and Failure of Compensatory Mechanisms,” *BioMed Research International* (2015): 2. <https://doi.org/10.1155/2015/367407>.

³⁷ Verny, Moyse, and Krantic, “Successful Cognitive Aging,” 3.

³⁸ Annie Rhodes, Jenny Inker, Jennifer Richardson and Faika Zanjani, “Alzheimer’s Disease Prevention Health Coaching,” *Journal of Prevention of Alzheimer’s Disease* 9, no. 2 (2022): 277–85. doi: 10.14283/jpad.2022.33.

³⁹ Miriam Boleyn-Fitzgerald, *Pictures of the Mind: What the New Neuroscience Tells Us about Who We Are* (Upper Saddle River, NJ: Pearson Education, 2010), 91.

⁴⁰ National Institute on Aging, “What Is Dementia? Symptoms, Types, and Diagnosis,” accessed January 15, 2021, <http://www.nai.nih.gov/health/what-dementia-symptoms-types-and-diagnosis>.

range from neurodegenerative disorders which are progressive and irreversible to other conditions that may present as dementia and are treatable.⁴¹

Normal age-related decline is not dementia, but affects brain function as neurons shrink, dendritic ends which receive impulses withdraw and the protective outer covering that speeds the rate of transmission of an impulse degrades. However, research also shows evidence of a population of older adults termed “Super Agers” who have not experienced the same shrinking and degradation of the brain as their peers and this population exhibits better overall health.⁴² Research is pursuing what they have done differently to inhibit or reverse cognitive decline.

The literature regarding the benefits of cognitive training and rehabilitation remains mixed in results. Results show that “cognitive rehabilitation can yield greater benefits in rehabilitating patients when associated with other forms of intervention. The latest studies demonstrating greater scientific evidence concluded that results remain limited and that further studies on the topic are needed.”⁴³ It does seem that a background of strong education in the younger years can be helpful and provides some “resiliency” against cognitive decline.⁴⁴

Working Memory Decline

Research has examined the reporting of working memory decline in normal aging, mild cognitive impairment (MCI) and Alzheimer’s dementia. The purpose of a

⁴¹ “What Is Dementia? Symptoms, Types, and Diagnosis,” accessed January 15, 2021, <http://www.nai.nih.gov/health/what-dementia-symptoms-types-and-diagnosis>.

⁴² Amanda Cook, et al., “Rates of Cortical Atrophy in Adults 80 Years and Older with Superior vs Average Episodic Memory,” *JAMA* 317, no. 13 (2017): 1373–75. doi:10.1001/jama.2017.0627.

⁴³ Patricia R. Manzine and Sofia Christina I. Pavarini, “Cognitive Rehabilitation: Literature Review Based on Levels of Evidence,” *Dementia & Neuropsychologia* 3, no. 3 (2009): 248–55. <https://doi.org/10.1590/S1980-57642009DN30300012>.

⁴⁴ Selam Negash, et al., “Resilient Brain Aging: Characterization of Discordance Between Alzheimer’s Disease Pathology and Cognition,” *Current Alzheimer Research* 10, no. 8 (2013): 844–51. doi: 10.2174/15672050113109990157.

work published in 2015 was “to highlight the behavioral and neurological differences that distinguish these three stages in an effort to guide future research on MCI diagnosis, cognitive therapy, and AD prevention.”⁴⁵

When considering working memory and executive function that declines with normal aging, mild cognitive impairment, and Alzheimer’s disease, there remains a period of time during the mild cognitive impairment phase when “cognitive restructuring and neuroplasticity such as compensation still occur; therefore, cognitive therapies could have a beneficial effect on decreasing the likelihood of AD progression during MCI.”⁴⁶

Dementia and Working Memory

There are several models to illustrate and communicate what working memory is and how it functions. Though not completely understood, it is recognized as the brain’s ability to hold on to visual and auditory information while manipulating and processing information for reading, writing, and problem solving. People with hearing and vision problems can appear to have dementia.⁴⁷

It appears that most research regarding dementia and working memory has focused on mild cognitive impairment (MCI), Alzheimer’s disease dementia and Parkinson’s disease dementia. In 2003, it was specifically reported that “Alzheimer’s disease (AD) and Parkinson’s disease (PD) impair working memory (WM).”⁴⁸ Given that the sources of the two diseases are different, research has shown there is also a

⁴⁵ Anna-Mariya Kirova, Rebecca B. Bays, and Sarita Lagalwar, “Working Memory and Executive Function Decline across Normal Aging, Mild Cognitive Impairment, and Alzheimer’s Disease,” *BioMed Research International* (2015). doi: 10.1155/2015/748212.

⁴⁶ National Institute of Health, “How the Aging Brain Affects Thinking,” accessed February 17, 2021, <https://www.nia.nih.gov/health/how-aging-brain-affects-thinking>.

⁴⁷ Alzheimer’s Society, “Symptom of Sight and Hearing Loss,” accessed January 6, 2019, <https://www.alzheimers.org.uk/about-dementia/symptoms-and-diagnosis/sight-hearing-loss>.

⁴⁸ Elizabeth A. Kensinger, Deirdre K. Shearer, Joseph J. Locascio, John H. Growdon, and Suzanne Corkin, “Working Memory in Mild Alzheimer’s Disease and Early Parkinson’s Disease,” *Neuropsychology* 17, no. 2 (2003): 230–39. <https://doi.org/10.1037/0894-4105.17.2.230>.

differentiation between the modes of impairment with the two types of dementia. Research presented in 2005 reported that “AD patients manifested extensive memory disorder; patients with PD manifested difficulties in working memory and strategy memory; there were significant differences in memory disorder between AD and PD patients”⁴⁹

An electroencephalogram (EEG) can be used to measure electrical brain wave activity and can be diagnostically helpful, especially if there are cases where “cognitive, psychiatric and behavioral features can sufficiently overlap such that neurophysiologic testing may be of help.”⁵⁰ In 2006 a study focused attention on the brain circuits handling “directed attention” used in working memory related to mild cognitive impairment and found “that a decrease in the early phasic theta ERS (event related synchronization) power during working memory activation may predict cognitive decline in MCI. This phenomenon is not related to working memory load but may reflect the presence of early deficits in directed attention-related neural circuits in MCI.”⁵¹

A paper published in 2011 in the *Annals of Neurology* found that “estimates of incident dementia, and cognitive impairment not dementia (CIND) (or the related mild cognitive impairment) are important for public health and clinical care policy.”⁵² The report further states that the cognitive impairment not dementia (CIND) category showed a “high risk of progressing to dementia” which indicates those with cognitive

⁴⁹ Li Wang and Zao Huo Cheng, “A Comparative Study of Memory Disorders in Patients with Alzheimer’s Disease and Parkinson’s Disease,” *Chinese Journal of Clinical Psychology* 13, no. 1 (2005): 80–82.

⁵⁰ Mayo Clinic, “EEG (electroencephalogram),” accessed February 16, 2021, mayoclinic.org/tests-procedures/eeg/about/pac-20393875.

⁵¹ Pascal Missonnier, et al., “Decreased Theta Event-Related Synchronization During Working Memory Activation is Associated with Progressive Mild Cognitive Impairment,” *Dementia and Geriatric Cognitive Disorders* 22, no. 3 (2006): 250–9. doi:10.1159/000094974/.

⁵² Brenda L. Plassma, et al., “Incidence of Dementia and Cognitive Impairment, Not Dementia in the United States,” *Annals of Neurology* 70, no. 3 (2011):418–26. doi: 10.1002/ana.22362.

impairment, but not dementia, would potentially benefit from “treatments aimed at slowing cognitive decline.”⁵³

The phonological loop is the component of working memory responsible for “temporary storage of speech-like information.”⁵⁴ Given the projections of the increasing growth rate of cases of dementia and Alzheimer’s with the growth of this population and age-related hearing loss, “epidemiologic approaches have focused on the identification of putative risk factors that could be targeted for prevention based on the assumption that dementia is easier to prevent than to reverse” and 2011 research was conducted “to determine whether hearing loss is associated with incident all-cause dementia and Alzheimer disease (AD).” The study found that “hearing loss is independently associated with incident all-cause dementia. Whether hearing loss is a marker for early-stage dementia or is actually a modifiable risk factor for dementia deserves further study.”⁵⁵

Other studies related to hearing have found the role of working memory to be important for older adults with normal hearing. A 2016 study reported,

The results indicate that older adults with high working memory capacity are able to capitalize on contextual cues and perform as well as young listeners with high working memory capacity for sentence recognition. The data also suggest that listeners with normal hearing and low working memory capacity are less able to adapt to distortion of speech signals caused by background noise, which requires the allocation of more processing resources to earlier processing stages. These results indicate that both younger and older adults with low working memory capacity and normal hearing are at a disadvantage for recognizing speech in noise.⁵⁶

⁵³ Plassma, et al., “Incidence of Dementia and Cognitive Impairment,” 418–26.

⁵⁴ Alan Baddeley, “Working Memory: Theories, Models, and Controversies,” *Annual Review of Psychology* 63, no. 1 (2012): 11–12. <https://doi.org/10.1146/annurev-psych-120710-100422>.

⁵⁵ Katrien Vermeire, Allart Knoop, Marleen De Sloovere, Peggy Bosch, and Maurits van den Noort, “Relationship Between Working Memory and Speech-in-Noise Recognition in Young and Older Adult Listeners with Age-Appropriate Hearing,” *Journal of Speech, Language, and Hearing Research* 62, no. 9 (2019): 3545–53. doi: 10.1044/2019_JSLHR-H-18-0307.

⁵⁶ Sandra Gordon-Salant and Stacey S. Cole, “Effects of Age and Working Memory Capacity on Speech Recognition Performance in Noise Among Listeners with Normal Hearing,” *Ear and Hearing* 37, no. 5 (2016): 593–602. doi: 10.1097/AUD.0000000000000316.

There is concern that with low working memory the allocation of cognitive resources with hearing issues could lead to dementia.

Aside from hearing issues, strengthening working memory can have benefits as research shows that “deficits in divided attention may be one of the first signs of WM decline in the preclinical stages of AD.”⁵⁷

Neurodegenerative Disorders

Alzheimer’s Disease is the most common type of dementia and described as a neurodegenerative disorder. The condition is known by the appearance of “plaques and tangles” that form and destroy the neurons. It tends to affect more women than men and according to the 2021 report from the American Alzheimer’s Association, “6.2 million Americans aged 65 and older are living with Alzheimer’s dementia.”⁵⁸ This report breaks down the 6.2 million Americans into age subcategories. Of the 6.2 million total, the 65–74-year-old category have 1.72 million (27.6%), 75–84 years have 2.25 million (36.1%), and 85 and older have 2.27 million (36.4%).⁵⁹

In perspective with the American population, also from this report, “more than 1 in 9 people (11.3%) age 65 and older” have Alzheimer’s. By 2050 it is estimated the number living with this type of dementia will be close to 13 million. During the Covid-19 pandemic “deaths from Alzheimer’s is up 16 percent” and “1 in 3 seniors dies with Alzheimer’s or another dementia – more than breast and prostate cancer combined.”⁶⁰

⁵⁷ Anna-Mariya Kirova, Rebecca B. Bays and Sarita Lagalwar, “Working Memory and Executive Function Decline across Normal Aging, Mild Cognitive Impairment, and Alzheimer’s Disease,” *BioMed Research International* (2015). <https://doi.org/10.1155/2015/748212>.

⁵⁸ Alzheimer’s Association, “Alheimers Facts and Figures,” accessed January 23, 2021, <https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf>.

⁵⁹ Alzheimer’s Association, “Alheimers Facts and Figures,” accessed January 23, 2021, <https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf>.

⁶⁰ Alzheimer’s Association, “Alheimers Facts and Figures,” accessed January 23, 2021, <https://www.alz.org/media/Documents/alzheimers-facts-and-figures.pdf>.

The second type of neurodegenerative disorders are frontotemporal disorders – degenerative changes in brain tissue that affect the frontal and temporal lobes of the brain. The National Institute on Aging identifies three types of frontotemporal disorders, “behavioral variant frontotemporal dementia (bvFTD), primary progressive aphasia (PPA), and movement disorders” and significantly these “can affect middle-aged and older adults.”⁶¹

Behavior variant frontotemporal dementia (bvFTD) does not present with memory loss but rather changes in personality and an inability to control behavior.⁶² This change in behavior occurs as proteins build up within the neurons and results in the death of the tissue. It begins in the frontal lobe and involves the temporal lobe affecting communication abilities.⁶³

Primary progressive aphasia (PPA) affects an individual’s ability to communicate. People will have difficulty with speech and have trouble finding the right words. According to the Mayo Clinic it may begin “gradually” before the age of 65 and progress to a loss of “the ability to speak and write and, eventually, to understand written or spoken language.”⁶⁴

Lewy body dementia is the second most common type of progressive dementia after Alzheimer’s disease and tends to affect more men than women. Protein deposits, called Lewy bodies, “develop in nerve cells in the brain regions involved in

⁶¹ National Institute of Health, “What Are Frontotemporal Disorders? Causes, Symptoms, and Treatment,” accessed February 17, 2021, <https://www.nia.nih.gov/health/types-frontotemporal-disorders>.

⁶² University of California San Francisco, “Behavioral Variant Frontotemporal Dementia,” accessed February 19, 2021, <https://memory.ucsf.edu/dementia/ftd/behavioral-variant-frontotemporal-dementia>.

⁶³ Rachel Despres, “Types of Dementia That aren’t Dementia,” accessed August 17, 2021, <https://www.activebeat.com/your-health/9-types-of-dementia-that-arent-alzheimers>.

⁶⁴ Mayo Clinic, “Primary Progressive Aphasia,” accessed February 16, 2021, <https://www.mayoclinic.org/diseases-conditions/primary-progressive-aphasia/symptoms-causes/syc-20350499>.

thinking, memory and movement (motor control).” Dementia with Lewy bodies and Parkinson’s disease dementia are both caused by the development of these bodies of proteins which inhibit the neuron’s abilities to chemically communicate with each other and cause neuron death. Dementia with Lewy bodies is seen in people as early as 50 while Parkinson’s disease dementia is most often seen in people over 60.^{65, 66}

Checking Working Memory: N-Back Task and Chunking

The n-back task is used to check working memory and, in an article published in *Frontiers in Psychology* in 2018, comparison studies were done to look at what the n-back measured in different age groups. Their findings revealed that “in older age, mainly attentional, verbal memory, updating, and to a lesser extent executive processes seem to play a crucial role in the n-back task, suggesting a shift of processing strategies across the lifespan.”⁶⁷

Tracy and Ross Alloways’ work published in 2013 describes “chunking” as a strategy the working memory uses to break down large bits of information with the goal to store it in long-term memory. This helps “prioritize and manage data more efficiently.”⁶⁸

With limited information available on older adults and working memory, most of the work is focused on those cases with Alzheimer’s Disease. In a work published in

⁶⁵ Cleveland Clinic, “Lewy Body Dementia,” accessed August 8, 2022, <https://my.clevelandclinic.org/health/diseases/17815-lewy-body-dementia>.

⁶⁶ Mayo Clinic, “Lewy Body Dementia - Symptoms and Causes,” accessed February 16, 2021, <https://www.mayoclinic.org/diseases-conditions/lewy-body-dementia/symptoms-causes/syc-20352025>.

⁶⁷ Patrick D. Gajewski, Eva Hanisch, Michael Falkenstein, Sven Thönes, and Edmund Wascher, “What Does the *n*-Back Task Measure as We Get Older? Relations Between Working-Memory Measures and Other Cognitive Functions Across the Lifespan,” *Frontiers in Psychology* 26, no. 9 (2018): 2208. doi: 10.3389/fpsyg.2018.02208.

⁶⁸ Tracy Alloway and Ross Alloway, *The Working Memory Advantage: Train Your Brain to Function Stronger, Smarter, Faster* (New York: Simon & Schuster, 2013), 183.

2011 in *British Journal of Psychiatry*, researchers show that the ability of the brain with mild stage of Alzheimer's Disease can use chunking as "an encoding strategy to improve verbal working memory." However, it does not help with spatial working memory. "Simple training in the use of chunking might be a beneficial therapeutic strategy to prolong working memory functioning in patients at the earliest stage of Alzheimer's disease."⁶⁹

Practical Help: The Role of Diet and Exercise

Diet and exercise significantly help the brain and improve working memory and in Tracy Alloway's book, *The Working Memory Advantage: Training Your Brain to Function Stronger, Smarter, Faster*, she lists the three groups of foods which help. They are "sustainers" which prevent the deterioration of working memory, foods like dairy and red meat which supply carnitine and B-12; "boosters and protectors" which encourage neuron growth, blood flow and protect against neuron inflammation and oxidative stress, foods like berries, herbs, dark chocolate, green leafy vegetables, plums, black-eyed peas, and green or black tea; and "sparkers", which make it easier for electrons to pass between neurons, foods like omega-3 fatty acids, DHA, and EPA.⁷⁰

Simple things to incorporate into living to care for the working memory are getting good quality sleep, decluttering living space (it's distracting), exercise, and be creative because creativity engages working memory. Believe it or not, checking on friends on Facebook helps update your working memory – deleting old information and updating it. And being outdoors has been shown to improve mood and increase working memory scores.⁷¹

⁶⁹ Jonathan Huntley, Daniel Bor, Adam Hampshire, Adrian Owen, and Robert Howard, "Working Memory Task Performance and Chunking in Early Alzheimer's Disease," *British Journal of Psychiatry* 198, no. 5 (2011): 398. doi:10.1192/bjp.bp.110.083857.

⁷⁰ Alloway, *Working Memory Advantage*, 207.

⁷¹ Alloway, *Working Memory Advantage*, 237–38.

The brain continues to grow and change throughout life. According to Dr. Curt Thompson, the neuroplasticity of the adult brain is known to be enhanced by “aerobic activity at least 45 minutes per day, at least five days per week,” “focused attention exercises”, and “novel learning experiences.”⁷²

Emotional Wellness and Positive Attitude

The American Psychological Association shared an overview of research in 2019. It states, “Current theories predict that the positivity effect seen in older adults depends on either controlled attentional processes as described in the socioemotional selectivity theory (SST), meaning that the relative importance of goals for an older adult becomes more significant as their perception of their future time left shrinks, or on an automatic gating selection mechanism as outlined in the dynamic integration theory (DIT), whereby automatic processes in attention ‘gate’ out negative emotional stimuli.”⁷³

Music is also known to have a positive effect on those struggling with Alzheimer’s Disease. Music can help with negative thinking and assist with some levels of recall.⁷⁴

Focusing on a Biblical Worldview: What is the Church Doing?

We get a picture from global demographic studies coupled with cognitive and dementia research that the cohort of longer-lived people around the world is ever growing

⁷² Curt Thompson, *Anatomy of the Soul: Surprising Connections Between Neuroscience and Spiritual Practices that can Transform your Life and Relationships* (Carol Stream, IL: SaltRiver, 2010), 46–47.e

⁷³ American Psychological Association, “Research Roundup: Healthy Aging and the Positivity Effect: Identifying the Regulatory Mechanisms Behind Positivity Bias in Older Adults,” accessed November 23, 2020, <https://www.apaservices.org/practice/ce/expert/healthy-aging?>

⁷⁴ Stephane Guetin, et al., “Intérêts de la musicothérapie sur l’anxiété, la dépression des patients atteints de la maladie d’Alzheimer et sur la charge ressentie par l’accompagnant principal (étude de faisabilité) [Impact of music therapy on anxiety and depression for patients with Alzheimer’s disease and on the burden felt by the main caregiver (feasibility study)],” *Encephale* 35, no. 1 (2009): 57–65. French. doi: 10.1016/j.encep.2007.10.009.

and with that comes the increased population of people struggling with cognitive issues. Regardless of worldview, all people groups are affected. We also have seen that brain related disorders are appearing in people middle age and younger. This means that the church, living redemptively and missionally, is called to reach these people and their caregivers (Matt 22:37–40; 28:18–20). I believe God is allowing this as an opportunity to witness to the world, to serve Him by serving humanity.

As the reviews showed previously, other organizations are intentional in planning with action to build up communities to be able to respond to the needs of aging people. They also are intentional to communicate that older adults are important to society. Others have created special days for remembering the positive contributions of older adults and to intentionally raise awareness of the issues relevant to this age group. But agism is present in the church and cognitive decline has been a contributing factor in the negative view towards aging. Churches must be more proactive in reaching the older generation as well as providing formats in which they can serve with their gifts.⁷⁵

Emotional Wellness and Positive Attitude in the Church

In a 2016 article by the National Alliance on Mental Illness, religion and spirituality have a strong supportive role in the overall health and wellbeing of individuals with a faith background. Religion and spirituality are different in that religion provides the community and connections while it is the spirituality that provides a “sense of empowerment and mindfulness” and incorporation of healthy practices for mind and body.⁷⁶

⁷⁵ James Houston and Michael Parker, *A Vision for The Aging Church* (Downers Grove, IL: IVP Academic, 2011), 45.

⁷⁶ National Alliance on Mental Illness, “The Mental Health Benefits of Religion,” accessed February 21, 2021, <https://www.nami.org/Blogs/NAMI-Blog/December-2016/The-Mental-Health-Benefits-of-Religion-Spiritual>.

Yet churches struggle in this area. Realizing that Christianity is different from all the other world religions, it can be difficult for those who do practice a flesh-centered mindfulness, to translate the benefits of being aware of a thought-life if we muddle the unregenerate ways of thinking with that of a person who has been “born again.” Being “born again” will not necessarily “fix” the broken nature of the fallen physical brain, yet Scripture is clear on how we are to think (Phil 4:13). In line with this concept, a study from Harvard in 2019 reveals that “conservatives are less likely to seek professional mental health care.”⁷⁷

Lifeway Research reports, “Pastors are more likely to broach the subject [mental health] in a large group setting today than in 2014, when 49% said they rarely or never spoke about it. Eight years ago, 33% mentioned the issue several times a year or more compared to 43% today.”⁷⁸ However, in this Lifeway follow-on study, they found, “It appears more pastors are talking about mental health issues with the church—it is now up to 60 percent” who do talk about it and “9 in 10 U.S. Protestant pastors (89%) say local churches have a responsibility to provide resources and support for individuals with mental illness and their families.”⁷⁹

In 2018, Stephen Groevich published *Mental Health and the Church: A Ministry Handbook for Including Children and Adults with ADHA, Anxiety, Mood Disorders, and Other Common Mental Health Conditions*. He states, “While the church is making progress in addressing the needs of persons with physical disabilities, many

⁷⁷ Irena Matanovic, “Influence of Religiosity and Fundamentalism on Attitudes Toward Psychotherapy: Religion Related Barriers to Mental Health Services Utilization,” Master’s thesis, Harvard Extension School, 2019), accessed August 13, 2022, <https://dash.harvard.edu/handle/1/37365383>.

⁷⁸ Aaron Earls, “Pastors Have Congregational and, for Some, Personal Experience with Mental Illness,” Lifeway Research, accessed November 12, 2022, <https://research.lifeway.com/2022/08/02/pastors-have-congregational-and-for-some-personal-experience-with-mental-illness>.

⁷⁹ Earls, “Pastors Have Congregational and, for Some, Personal Experience with Mental Illness,” <https://research.lifeway.com/2022/08/02/pastors-have-congregational-and-for-some-personal-experience-with-mental-illness>.

pastors and leaders in the church struggle to fully integrate mental illness into their theology and praxis.”⁸⁰ Although dementias are not mental illness per se, as cognitive abilities decline with aging it might appear otherwise if there are untreated hearing, vision, or other issues.

Dementia is not a Sin

Fundamental to Christian doctrine is the knowledge that people are image bearers of God (Gen 1:26–28), born with a purpose, and born into this world in a sinful state known as “original sin” (Romans 5:12). Matthew Stanford explains well the difference between “original sin” and “actual sin” in *The Biology of Sin: Grace, Hope, and Healing for Those Who Feel Trapped*.⁸¹ This work represents an excellent source to equip the church to address “a lack of knowledge, both of basic brain function and of scriptural teaching.”⁸² Understanding this is important to realize the source of the symptoms. Dementia is not a sin, but rather the result of living in a fallen world.

There is No Shame in Dementia

Dementia, understandably, will be interpreted as something bad that has happened to someone. To have anyone afflicted with cognitive decline, or those who care for them, experience shame with a brain failing them that is corrupted with a disease they cannot control and seen as “less than” or a “burden.” Curt Thompson’s work *The Soul of Shame: Retelling the Stories We Believe About Ourselves*, clearly points out the role that shame plays in destroying people and relationships. He says we live in a world where good and evil happen to us, but they are “not just events that happen to us but rather

⁸⁰ Stephen Groevich, *Mental Health and the Church: A Ministry Handbook for Including Children and Adults with ADHD, Anxiety, Mood Disorders, and Other Common Mental Health Conditions* (Grand Rapids: Zondervan, 2018), 26.

⁸¹ Matthew S Stanford, *The Biology of Sin: Grace, Hope, and Healing for Those Who Feel Trapped* (Downers Grove, IL: InterVarsity Press, 2010), 7–8.

⁸² Stanford, *The Biology of Sin*, 11.

expressions of something or someone whose intention is for good or for evil. And I will suggest that shame is used with this intention to dismantle us as individuals and communities and destroy all of God's creation."⁸³ There is a great need for proper teaching and discipleship to eliminate the negative responses to a dementia diagnosis.

Biblical View of the Mind and Brain

In the realm of psychiatric research and medicine the duality of the brain and mind are acknowledged with the evidence of "directed neuroplasticity."⁸⁴ This means that "directed willed mental activity can clearly alter and systemically alter brain function; that the exertion of willful effort generates a physical force that has the power to change how the brain works and even its physical structure."⁸⁵ This force is potentially behind the directed attention that reshapes the brain in its neuroplasticity and can improve working memory.

This type of directed focus would be a "growth mindset" as described by Sousa in *How the Brain Learns*.⁸⁶ We are designed with cognitive abilities that are dynamic, with a working memory that can be strengthened, and with proper attitude and motivation progress can be made. For Christians, Scripture is clear about our growth, to renew our minds, how to fix our thoughts, remembering, growth in knowledge and in grace (Rom 12:2; 1 Cor 2:16; Phil 4:8; 2 Pet 3:18; and others). And God's Word addresses development of our thoughts apart from the aging body: "Though our outer self is decaying, yet our inner self is being renewed day by day" (2 Cor 4:16).

⁸³ Curt Thompson, *The Soul of Shame: Retelling the Stories We Believe About Ourselves* (Downers Grove, IL: InterVarsity Press, 2015), 12.

⁸⁴ Jefferey M. Schwartz and Sharon Begley, *The Mind and The Brain: Neuroplasticity and the Power of Mental Force* (New York: Regan Books, Harper Collins, 2002), 18.

⁸⁵ Schwartz and Begley, *The Mind and The Brain*, 18.

⁸⁶ David Sousa, *How the Brain Learns* (Thousand Oaks, CA: Corwin, 2017), 60, 67.

The brain is an organ with neurons that communicate with each other, is structured with regions for specific functions, and is connected to the body through peripheral nerves which bring sensory information to the brain. Curt Thompson in *Anatomy of the Soul: Surprising connections between neuroscience and spiritual practices that can transform our life and relationships* describes the mind with three points. First, it is “embodied, which means it is housed in your physical self and depends on your body to function.” Second, it is “relational”, meaning “your sense of your mind is dependent on and shaped by your interactions with other people.” And third, “It is a process that regulates, or helps shape, the flow of energy and information. The mind is flowing, not static.”⁸⁷

Evidence that the brain can change and that intelligence is not fixed for life is found in work accomplished by a Jewish cognitive and clinical psychologist, Reuven Feuerstein (1921–2014), who studied with Piaget (1896–1980) but had different experiences working with children who survived the Holocaust. His experience shows that the brain can change, and he referred to this change as cognitive structural modifiability (CSM). This was accomplished in children in a mediated learning experience (MLE).⁸⁸ Feuerstein’s perspective states that we have the need to mediate because we have an awareness of death and our “finite existence” – we are “conscious of the physical limitations of biological life” and “continue our personal existence beyond our physical limitations by transmitting culture, spiritual aspirations, and experiences to the generations that come after” us.⁸⁹

The encouraging ability of the brain to change is presented in *How God Changes Your Brain: Breakthrough Findings from a Leading Neuroscientist* written by

⁸⁷ Thompson, *Anatomy of the Soul*, 29–31.

⁸⁸ Reuven Feuerstein and Ann Lewin-Benham, *What Learning Looks like: Mediated Learning in Theory and Practice, K-6* (New York: Teachers College Press, 2012), 19, 21.

⁸⁹ Feuerstein and Lewin-Benham, *Mediated Learning in Theory and Practice*, 20.

neuroscientist Andrew Newberg, M.D. and therapist Mark Robert Waldman. Published in 2009, they define “The ‘God’ Circuits in Your Brain” describing how the lobes of the brain perceive God, process spiritual concepts, and ways to exercise the brain.”⁹⁰

Two other works address a godly perspective of the brain, both from the same author, Timothy R. Jennings, M.D. *The God-Shaped Brain: How Changing Your View of God Transforms Your Life*, published in 2013 with a second edition in 2017, strongly and clearly addresses the theological and practical implications of science and Scripture with our belief in God. We must have science and Scripture together, for if we do not “we risk falling into the ditch of atheistic evolutionism; on the other hand, the study of Scripture separated from God’s laws in nature risks theologies that misrepresent God and distort his character.”⁹¹ *The Aging Brain: Proven Steps to Prevent Dementia and Sharpen Your Mind* is more focused towards aging. It was published in 2018 and presents four parts: “The History of Aging,” “Oxidative Stress and Aging,” “Lifestyle and Aging,” and concludes with “Pathological Aging.” The purpose of this book is to provide “lifestyle interventions to improve health, slow aging, and reduce the risk of late-onset Alzheimer’s Disease (AD).”⁹²

In 2016 a Christian Education text, *Neuroscience and Christian Formation*, was published. Christian scholars representing the Religious Education Association (REA) and the Society of Professors of Christian Education (SPCE) determined there was a need for a text due to the volume of neurological research increasing and influencing “our understanding of the person, memory, learning, development, communal interaction

⁹⁰ Andrew Newberg and Mark Robert Waldman, *How God Changes Your Brain* (New York: Ballantine Books, 2009), 43, 149.

⁹¹ Timothy R. Jennings, *The God-Shaped Brain: How Changing Your View of God Transforms Your Life* (Downers Grove, IL: IVP Books, 2017), 11–12.

⁹² Timothy R. Jennings, *The Aging Brain: Proven Steps to Prevent Dementia and Sharpen Your Mind* (Grand Rapids, MI: Baker Books, 2018), 9.

and practice of education.”⁹³ The text editors are Mark A. Maddix, from Point Loma Nazarene University, and Dean G. Blevins, from Nazarene University.

Chapter 12 in this text, written by Dr. Carol T. Brown and entitled “Equipping Minds for Christian Education or Learning from Neuroscience for Christian Educators,” includes her report of the four-year case study (2010–2015) using *Equipping Minds Cognitive Development Curriculum* with a Down syndrome student. In her research she concluded, “Marie’s success may be attributed not only to supportive teachers, but undeniably to specific cognitive training exercises in *EMCDC* that are targets to her areas of weakness...working more on logic, reasoning, and abstract thinking which is impacting her cognitive, social, and spiritual development.”⁹⁴

Equipping Minds Cognitive Development Curriculum

Dr. Carol T. Brown’s *Equipping Minds Cognitive Development Curriculum* (*EMCDC*) was developed to help children improve cognition by “equipping their minds to reach the full potential God has for them.”⁹⁵ Her effort builds on the foundational understanding, expressed by educator John Amos Comenius, that all people are made in the image of God and have the capacity to learn.⁹⁶ Also, this curriculum embraces the learning theories of Structural Cognitive Modifiability (SCM) and the Mediated Learning Experience (MLE) as defined by Feuerstein.⁹⁷ Belief that the brain can change (modifiability) and MLE are essential components of *EMCDC*. The emphasis on the

⁹³ Mark A. Maddix and Dean G. Blevins, eds., *Neuroscience and Christian Formation* (Charlotte, NC: Information Age Publishing, 2016), vii.

⁹⁴ Mark A. Maddix and Dean G. Blevins, “Equipping Minds for Christian Education or Learning from Neuroscience for Christian Educators,” in *Neuroscience and Christian Formation*, 153–70 (Charlotte, NC: Information Age Publishing, 2016), 163.

⁹⁵ Carol Thompson Brown, “Equipping Minds: Applying a Biblically Based Curriculum for Improving Working Memory” (D.Ed. Dissertation for Southern Baptist Theological Seminary, 2016), 1.

⁹⁶ Maddix and Blevins, “Equipping Minds for Christian Education,” 167–68.

⁹⁷ Maddix and Blevins, “Equipping Minds for Christian Education,” 156–60.

necessity of human mediation, in order for learning to progress, takes this theory beyond the simple Piaget model of “stimulus-organism-response (S-O-R)” to the Feuerstein model of “stimulus-human-organism-human-response (S-H-O-H-R).”⁹⁸ Evaluating the concern over computer based training compared with human intervention, Dr. Brown cites a meta-analysis study in her dissertation which found computer training programs that addressed working memory only provided near-transfer effects and questioned the durability of those effects.⁹⁹

EMCDC has been found to be helpful for people of all ages as it uses a set of exercises, along with a human mediator, to strengthen cognitive abilities.¹⁰⁰ A significant component of this cognitive training therapy is the adaptive n-back task developed by Dr. Brown. In the past N-back tasks have been used in research as a method to train working memory and yield near transfer effects.¹⁰¹ N-back tasks for training working memory have shown to have potential in working with older adults for near and far transfer.¹⁰² *EMCDC* is significant in that training with the “Brown Six N Back” uses six tasks and has far transfer effects to strengthen other cognitive abilities.¹⁰³ In other words, near transfer training only has effects in the skill that is trained whereas far transfer effects are durable and go beyond the training task to impact other abilities.

⁹⁸ Maddix and Blevins, “Equipping Minds for Christian Education,” 158.

⁹⁹ Brown, *Equipping Minds*, 133.

¹⁰⁰ Carol T. Brown, *Equipping Minds Cognitive Development Curriculum* (Frankfort, KY: Self-published, 2018), 8.

¹⁰¹ Carol T. Brown, “Equipping Minds Cognitive Development Training in Learners with Neurodevelopmental Disorders: Case Studies,” *Journal of Alternative Medicine Research* 10, no. 2 (2018): 175.

¹⁰² Valentina Pergher, et al., “N-Back Training and Transfer Effects Revealed by Behavioral Responses and EEG,” *Brain and Behavior* 8, no. 11 (2018). doi: 10.1002/brb3.1136.

¹⁰³ Brown, “Equipping Minds Cognitive Development Training,” 175–76.

Helpful Publications in Ministry Focused on Older Adults

Listed below are examples of helpful works addressing the needs of older adults. However, there is a clear lack of published material relevant to protecting older adult cognitive health with aging and a lack of material to address preventative steps to take to avoid cognitive decline in the latter years.

You Only Die Once: Preparing for the End of Life with Grace and Gusto, written by Margie Jenkins, was published in 2002. It contains all the relevant step-by-step items for dealing with end-of-life matters and is informative about sharing and visiting with the dying. It has a workbook that can be used in a group setting. She encourages older adults to write their own biography. “Writing your life’s story is a good place to begin because it is a reminder of your own importance, remembering who you are, what you have enjoyed, and what you have achieved in life.”¹⁰⁴ The end of the book lists several other helpful resources.

In 2011, James Houston and Michael Parker published *A Vision for the Aging Church: Renewing Ministry for and by Seniors* which highlights needs and areas of improvement for care of older people and support for families.¹⁰⁵ Some of this work focuses on contributing to the “Parent Care Readiness Program” which was developed for “military personnel and their families and is based on the premise of a soldier’s ‘family care plan’ that is constructed before he ships out.”¹⁰⁶ The overarching intent of the book includes “celebrating” the longer lives of people and “proposes the idea that longer lives can be more fulfilled lives.”¹⁰⁷

¹⁰⁴ Margie Jenkins, *You Only Die Once: Preparing for the End of Life with Grace and Gusto* (Georgetown, TX: Balcony Publishing, 2002), 63.

¹⁰⁵ Houston and Parker, *A Vision for The Aging Church*, 127.

¹⁰⁶ Houston and Parker, *Vision for The Aging Church*, appendix C.

¹⁰⁷ Houston and Parker, *Vision for The Aging Church*, 23.

Benjamin Mast's book *Second Forgetting: Remembering the Power of the Gospel During Alzheimer's Disease* powerfully opens our eyes to see "there is hope in Alzheimer's disease." The reason he wrote this book for people with Alzheimer's and their families was "so they might reconnect with the power and hope of the gospel."¹⁰⁸ In the chapter on Remembering and Forgetting he makes this powerful point, "We live in the already and not-yet, leaning on the unshakeable truth that we are already redeemed in Christ, but have not yet been fully restored."¹⁰⁹

An Age of Opportunity: Intentional Ministry By, With and For Older Adults by Richard Gentzler, Jr, was published in 2018. The author is affiliated with the Tennessee Conference of The United Methodist Church and his work outlines how to begin a ministry for older adults and constructive ways of involving and ministering to them. The only practical reference to struggles with cognitive issues is in implementing an "Adult Day-Care Ministry" to provide respite for caregivers and activities for "social, physical, and emotional well-being of older adults" and initially would require a "one-to-one" ratio of volunteers to participants."¹¹⁰

Senior Adult Discipleship: Essentials for Effective Church Ministry to Senior Adults was published in 2020, edited by Bernard M. Spooner from the Texas Baptist Convention. In the introduction Spooner states the reason for the book. "There was no book that focused on Christian Education for senior adults."¹¹¹ He presents nine essentials for ministry to senior adults and includes features for educational space, room diagrams, and lesson plans.

¹⁰⁸ Benjamin Mast, *Second Forgetting: Remembering the Power of the Gospel During Alzheimer's Disease* (Grand Rapids, MI: Zondervan, 2014), 13.

¹⁰⁹ Mast, *Second Forgetting*, 54.

¹¹⁰ Richard H. Gentzler, Jr., *An Age of Opportunity: Intentional Ministry By, With, and for Older Adults* (Nashville, TN: Discipleship Resources, 2018), 145–47.

¹¹¹ Bernard M. Spooner, *Senior Adult Discipleship: Essentials for Effective Church Ministry to Senior Adults* (Coppell, TX: Christian Leadership Publishing, 2020), ix.

Conclusion

There is work to be done. At this point we see the population aging, more people retiring during the pandemic, and cognitive issues can begin in people well before the older and senior adult years. People in leadership and caring for others need to become more aware of the subtle changes of those affected with cognitive decline and dementia as they address spiritual growth. The research shows that there is potential to interrupt progressive forms of dementia by strengthening working memory. And n-back tasks such as used in Equipping Minds Cognitive Development Curriculum do work. Within Christian Education, little to no work has been done to address strengthen working memory with older adults.

CHAPTER 3

PROCEDURE AND RESEARCH METHOD

This chapter describes the procedure and methods used in this research study. The purpose of this study was to implement and then observe the effects of the *Equipping Minds Cognitive Development Curriculum (EMCDC)* on working memory in an older adult discipleship small group and evaluate whether an increase in working memory skills transferred into a measurable increase in cognitive abilities. Additionally, this study surveyed cognitive aging perspectives and the potential influence on quality of life and spiritual growth. Presented in this chapter are the research questions and hypotheses, research method, instruments developed and applied, procedures for collecting the data, and analyzing the data.

Research Questions and Hypotheses

Research Questions

1. What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on working memory?
2. What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on verbal and nonverbal abilities?
3. What, if any, will be the influence of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on perspectives of cognitive aging and quality of life?
4. What, if any, will be the impact of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on spiritual growth?

Hypothesis for Quantitative Research

The use of the biblically based *Equipping Minds Cognitive Development Curriculum* by an older adult discipleship small group will enhance working memory and yield improved post-test scores of verbal and nonverbal abilities.

Hypothesis for Qualitative Research

The use of the biblically based *Equipping Minds Cognitive Development Curriculum* by an older adult discipleship small group will report positive perspective changes towards cognitive aging, quality of life, and spiritual growth.

Research Method

This research method represents a “mixed methods experimental design.”¹ It includes both a quantitative and a qualitative study of the use of a biblically based cognitive development curriculum in an older adult discipleship small group. It was designed as a “mixed method”² study with quantitative cognitive assessments and qualitative surveys of the participants’ perspectives before and after the six-week pilot of the curriculum including interviews during the pilot. The *Equipping Minds Cognitive Development Curriculum* was the material experienced by the older adult discipleship small group. The qualitative survey before the pilot was necessary to compile baseline information about the older adults backgrounds, interviews during the six-week study helped provide insight into their experiences of the curriculum, and the follow-up survey provided an opportunity for feedback from the participants regarding their perspectives of cognitive aging, quality of life, and spiritual growth.

¹ John W. Creswell and J. David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed. (Los Angeles: SAGE, 2018), 228–29.

² Creswell and Creswell, *Research Design*, 216–17.

Instrument Development and Description

Participant Checklist

The purpose, nature, and expectations of the research were verbally explained and group members were provided a “Participant Checklist”³ to ensure these were well communicated and that all forms, assessments and exercises were clear and the schedule was available.

Informed Consent

Prior to testing, participants completed an “Informed Consent Form”.⁴ All gathered information was strictly confidential. The form was necessary due to the personal nature of the *EMCDC* assessment, the cognitive testing, and the survey prompts.

Anticipated risks and discomfort of the participants were addressed. Participants were informed that the information gathered spanned several decades which could bring to mind uncomfortable memories or unresolved conflicts or issues. Also, for those who may not have had positive academic experiences, participation in training and thoughts of any evaluation might create stress. The researcher emphasized the program was completely voluntary and that pastoral care and counseling were available. Participants could leave the study at any time.

Participant Survey

Participants completed a survey so the researcher could collect information to form a holistic view of each individual’s development as well as their academic, work, and church experiences.⁵ The survey was designed and test piloted six months in advance in order to evaluate clarity of the survey for this age group. Survey categories included

³ Appendix A: Participant Checklist.

⁴ Appendix B: Informed Consent Form

⁵ Appendix C: Participant Survey.

the following demographic information: family life and history, educational and early development history, education, work and volunteer history, church attendance and service history, and quality of life. This helped establish a collective baseline of personal information relevant to understanding the point of view of older adults in this study. It helped gather facts, as well as they could recall gaining insights into their formative life experiences and stories. In addition, it informed how the participants have developed in life by highlighting factors that may have influenced the formation of perspectives and expectations as they became older adults and impacted their ability to age well as Christians.

The survey was designed to dig deep and mine out clues from an individual's history; yet, when the information was pooled it collectively presents a snapshot of the present day older adult population within this congregation. Although each participant is different and entirely unique in life experiences there are some commonalities that help form a model of older adults in this church. This model may then be used to inform and point the direction to strengthen this church ministry. Through understanding the participants' development and cognitive health, and their church experience as a whole within this community, this survey will help meet older adults where they are with their gifts, abilities, perceptions, and expectations in order to encourage them to renew and strengthen their minds. Addressing cognitive health will open a lane for the church to offer hope for older adults to continue to strive to be all God has enabled them to be.

The world experienced the advent of Covid-19 in 2020; it has been divisive, isolated people, and claimed lives. Yet, it imposed a time to pause and reflect on the sanctity of life and God's purposes for aging, suffering, dying, and death, something on which the older adult population already meditates. My mission is to encourage older adults and build them up (1 Thess 5:11). This study will be a step to help renew (Rom 12:1–2) and strengthen minds (1 Thess 5:14), as we become accountable for the days we

have (Ps 90:12) and gain wisdom (Prov 2:1–6) to share with the younger generation for God’s glory (Ps 71:17–18).

Equipping Minds Cognitive Development Curriculum Assessment

A baseline for each participant was established by evaluating reflexes, sensory-motor, and cognitive abilities using the *EMCDC* assessment.⁶ The assessment takes about 15–30 minutes and briefly examines primitive reflexes (primitive reflex quiz), vision screening (concentration, peripheral vision, tracking, convergence), balance screening, dominance screening (hand, leg, eye, and ear) and cognitive skills (visual memory, working memory, visual processing, spatial reasoning, auditory processing, logic, and reasoning, attention, long-term memory, and reading comprehension).

Kaufman Brief Intelligence Test (KBIT-2)

Baseline verbal and non-verbal abilities were measured using the Kaufman Brief Intelligence Test (KBIT-2) which provides a “reliable, well-normed assessment of intelligence.”⁷ It measures both crystalized and fluid intelligences and has been normed for ages 4 to 90.⁸ It takes 15–30 minutes to administer and provides three scores: verbal, non-verbal, and a composite IQ. Verbal abilities are measured with two subtests. First, verbal knowledge is measured by assessing receptive vocabulary and general information. Then, riddles are used to measure comprehension, reasoning, and vocabulary knowledge. Non-verbal abilities are measured with a matrices subtest. The

⁶ Dr. Brown’s EMCDC includes a teacher workbook, student workbook, instructional USB’s for classroom use, church, or home by teachers, therapists, and parents.

⁷ Alan Kaufman and Nadeen Kaufman, *Kaufman Brief Intelligence Test*, 2nd ed. (Bloomington, MN: PsychCorp, 2004), 2.

⁸ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 1.

matrices evaluate the ability to problem solve through accessing the ability to complete visual analogies and understand relationships.⁹

Equipping Minds Cognitive Development Curriculum

Developed by Dr. Carol T. Brown, the *Equipping Minds Cognitive Development Curriculum*, based on the theory of Structural Cognitive Modifiability (SCM), Mediated Learning Experience (MLE), and a biblical worldview is “designed to strengthen existing neural connections and...to create missing neural pathways that may inhibit ones’ ability to learn.”¹⁰ The curriculum is a “holistic approach to cognitive training through primitive reflex exercises, sensory-motor development exercises, and cognitive development exercises.”¹¹ As an intervention program, Dr. Brown recommends the exercises be done “30–60 minutes per day, 5 days a week for 12–24 weeks. . . . Individuals over 40 years of age and those with neurodevelopmental disorders may benefit from doing these exercises daily to keep memory, processing, and critical-thinking abilities strong.”¹²

Post-Participation Survey

The post-participation survey is an open-end survey inviting participants to share perspectives on the influence of implementing *EMCDC* on their physical, mental, and spiritual lives.¹³ The survey addresses daily habits known to affect physical and cognitive health such as exercise, sleep, and diet. The participants have the opportunity to

⁹ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 1–4.

¹⁰ Carol T. Brown, “Equipping Minds: Applying a Biblically Based Curriculum for Improving Working Memory” (D.Ed. Dissertation, Southern Baptist Theological Seminary, December 2016), 92.

¹¹ Brown. “Equipping Minds,” 92.

¹² Carol T. Brown, *Equipping Minds Cognitive Development Curriculum* (Frankfort, KY: Self-published, 2018), 5.

¹³ Appendix D: Post-Participation Survey.

express how the training may have influenced their thinking, processing, and cognitive abilities as well as how they now view their brain and aging. The survey also invites them to share how the study influenced their spiritual life and ways to implement this program for the church family.

Procedures for Collecting Data

Older adults from my rural church in Kentucky were invited to form a discipleship small group to participate in the use of *EMCDC*. The discipleship group was comprised of the four adults available to participate, three women and one man, aged 58, 59, 62, and 68.

Initially I met with the group to describe the purpose, nature, and expectations of the research. Group members were provided a “Participant Checklist” to ensure details were well communicated and they received the initial participant survey. The week prior to piloting the *Equipping Minds Cognitive Development Curriculum*, I scheduled appointments and met with participants individually for completion of the informed consent form, *EMCDC* assessment, and pretesting with the KBIT-2. At this appointment they returned the initial survey.

Participants completed over 48 hours of *EMCDC* cognitive skills training by meeting five days per week for six weeks. The training times available for the group were one hour on Sunday mornings at 10:00 a.m. and two hours Mondays to Thursdays at 4:00 p.m. The two hours on Tuesdays were divided into one hour of *EMCDC* training and one hour of Bible study. In addition to *EMCDC* training, the discipleship group was concurrently engaged in the study of the book of Ephesians. The training plan followed the curriculum schedule as used by Dr. Carol Brown in her research.¹⁴

¹⁴ Brown, “Equipping Minds,” 152.

The week following completion of the training I scheduled appointments to meet with each participant individually to complete the post *EMCDC* assessment and post testing with the KBIT-2. Each person was provided the open-ended post participation surveys. The surveys were completed by the participants in their homes and returned to me at church.

Procedure for Data Analysis

As a mixed method study, data was compiled from the initial surveys and post surveys, the *EMCDC* pre-assessments and post-assessments, and the KBIT-2 pre-tests and post-tests. Responses from the surveys were given numerical value for comparison purposes, as were the responses on the *EMCDC* assessments.

Information gathered from the initial surveys will help inform the model of an older adult small group member in our context. Tallies from the Equipping Minds post assessments were subtracted from the pre-assessments to determine gains. And scores from the KBIT-2 allowed for direct comparisons. To determine improvement in cognitive development training, pre-test KBIT-2 scores were subtracted from the post test scores. Values above 0 indicate improvement. To answer Questions 1 and 2, a statistical analysis of the data collected required paired *t*-tests to determine the significance of pre-test and post-test scores. Survey data will answer Questions 3 and 4.

CHAPTER 4

ANALYSIS OF FINDINGS

Introduction

This research examined the effects of piloting *Equipping Minds Cognitive Development Curriculum (EMCDC)* in an older adult discipleship small group located in a small rural church. The investigation involved an inquiry into the potential effects of *EMCDC* on cognitive abilities of senior adults as well as the curriculum's effect on the participants' perspectives of quality of life with cognitive aging and their spiritual growth. The quantitative research data was compiled using pre- and post-tests. The qualitative data was collected through pre- and post-surveys. This chapter presents the data with an analysis of the findings.

Data Gathering

From a Christian discipleship perspective focused on caring for the aging brain, this study began as a non-scientific project. The simple inquiry intended to determine if piloting *EMCDC* in a group of older adults would be feasible and produce any gains analogous to those discovered with the use of *EMCDC* in younger individuals and classroom settings.¹ Participants were enlisted from the same church, participated in pretesting and pre-surveying, engaged in training with *EMCDC*, and then completed

¹ Dr. Carol Brown has multiple publications noting the improved cognitive abilities of individuals in case studies and in classroom research using her *Equipping Minds Cognitive Development Curriculum*. In addition to her website www.equippingminds.com, her work is published in the *Journal of Alternative Medicine Research*, the textbook *Neuroscience and Christian Formation*, and her dissertation *Equipping Minds: Applying a Biblically Based Curriculum for Improving Working Memory* in 2016 for Southern Baptist Theological Seminary.

post-testing and post-surveying. A statistical analysis of the data was done and independently verified.

Participants

The study was completed with a small group of four individuals from the same church. Covid-19 was a factor contributing to the size of the study group due to isolation effects and declining church attendance. Given the rural location it was necessary for participants to reside closer to the church and it was limited to those who could make a commitment to this study. Given the health concerns from Covid-19, and although there are older church members in their 80's and 90's, it was not feasible to include them at the time of this study. The group was composed of three women aged 57, 62, and 68 and one man aged 59.

Pre-Testing and Evaluation

I am a qualified *Kaufman Brief Intelligence Test (KBIT-2)* administrator and a qualified *EMCDC* mediator. The participants were individually administered the *KBIT-2* one week prior to beginning the program. This test measures verbal and nonverbal intelligence of individuals aged 4 to 90 and takes approximately 15-30 minutes to administer. It yields three scores: verbal, nonverbal and an IQ composite. The verbal score is derived from two subtests: Verbal Knowledge (measures receptive vocabulary and general information about the world) and Riddles (measures verbal comprehension, reasoning, and verbal knowledge). The nonverbal portion is a single subtest of matrices. Matrices incorporate visual information that is “meaningful [people and objects] and abstract [designs and symbols].”² Additionally, one week prior to beginning the program, the participants were evaluated individually with an initial *EMCDC* assessment. The

² Alan Kaufman and Nadeen Kaufman, *Kaufman Brief Intelligence Test*, 2nd ed. (Bloomington, MN: PsychCorp, 2004), 1–4.

assessment is part of mediator training. It addresses primitive reflexes, vestibular screening, and reading comprehension as well as initial abilities of the *EMCDC* training developed by Dr. Brown. Cognitively, the assessment focusses on visual processing, visual memory, working memory, spatial reasoning, auditory processing, auditory memory logic, attention, and long-term memory.

The individuals tested and evaluated formed a small discipleship group that met five times a week over six weeks of *EMCDC* training. *EMCDC* is a holistic method of cognitive development training which incorporates primitive reflexes,³ sensory-motor development exercises which use sound therapy⁴, and cognitive development exercises in Dr. Brown's *EMCDC*. Six primitive reflex exercises were introduced and instructions given for completion by participants for 15 minutes a day at home. Sound therapy for sensory-motor development was pursued and found to be cost prohibitive for the group. Our small church did not have the funding to support this component. This is a notable deviation from the method pursued by Dr. Brown in her dissertation research.⁵ After discussion with Dr. Brown, and to not completely lose the sound component, the option taken was to suggest participants practice meditation with instrumental worship music.

Over the course of six weeks the training occurred on Sundays through Thursdays. On Sundays, training occurred for one hour, followed by two hours on Monday. Tuesday was split between one hour of training followed by one hour of Bible study. On the remaining days, Wednesday and Thursday, there were two hours of training each day. For the six weeks, this totaled 54 hours of contact time with 48 hours of training and 6 hours of Bible study.

³ Kathy Johnson, *Maintaining Brains Every Day*, DVD, accessed April 24, 2018, www.pyramidofpotential.com.

⁴ Sound therapy is a specially filtered therapeutic music designed to aid auditory processing. More information is available at <https://mysoundtherapy.com/us/what-is-sound-therapy>.

⁵ Carol T. Brown, "Equipping Minds: Applying a Biblically Based Curriculum for Improving Working Memory" (D.Ed. Dissertation, Southern Baptist Theological Seminary, December 2016).

Post testing was completed at individual appointments the following week. After testing, the participants were asked to complete a post survey and return it to the researcher the following Sunday. In all, the project required a period of eight weeks from beginning to final completion of data collection.

The *KBIT-2* pre-test and post-test scores were compiled in an Excel spreadsheet as were the *EMCDC* pre-assessments and post-assessments. The Excel statistical function was applied to generate paired *t*-tests to determine if any statistical significance existed between pre-test and post-test scores. This process was repeated with the *EMCDC* assessments. The pre- and post-survey responses were self-reported and anecdotal.

Research Question 1

Research Question 1 asked, “What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on working memory?”

Table 1. Study Group *KBIT-2* Pre- and Post-Test Scores

<i>Measures</i>	Pre-test Mean	Post-test Mean	Difference	Pre-to-Post (p)*
Verbal	103.75	110.00	+6.25	0.309504
Nonverbal	115.25	119.00	+3.75	0.065015
IQ Composite	110.00	115.50	+5.50	0.216476

*P-value less than the significance level of 0.05 is statistically significant.

Working memory ability is a significant factor for verbal and nonverbal abilities. The findings in Table 1 show the *KBIT-2* mean pre-test and post-test scores. The Nonverbal score is derived from the Matrices subtest raw score. Completion of Matrices is not timed and requires the use of both *Fluid Reasoning (Gf)* and *Visual Processing (Gv)*. Working memory involves the ability to hold on to information and to do

something with it. To solve Matrices requires “‘simultaneous processing’ as well as ‘planning ability’ (executive functioning).”⁶ Participants were allowed time to verbalize what they were “seeing” as they processed their responses. The ability to plan includes “hypothesis generation, flexibility, impulse control, and efficient use of one’s working memory.”⁷ This portion of the *KBIT-2* took approximately 45 minutes.

In attempting to answer the first question with regard to the effect of *EMCDC* on this group’s working memory, though statistically not significant based on analysis with the paired *t*-test, the use of *EMCDC* with this group did show a positive result with increased mean Matrices subtest scores. The results in Table 1 show the *p*-value was 0.065015 slightly above the standard significance level of 0.05.

Table 2. *KBIT-2* Age Adjusted Expectation with Standard Deviation and Confidence Intervals.

<i>Nonverbal</i> (Matrices)	M (S.E.) (S.D)
<i>KBIT-2</i> Age 56-65	32.5 (4.6) (6.8)
<i>KBIT-2</i> Age 66-75	29.8 (3.9) (6.9)
Small Group Pretest Age (M) 61.5	38.25 (3.8) (7.6)
Small Group Post Test Age (M) 61.5	39.7 (3.5) (7.0)

The sample size for this research is too small to be statistically significant. However, the research results are consistent with the published expectations for the age ranges for the *KBIT-2*.⁸ Table 2 reports mean (M) Nonverbal raw scores with standard deviations (S.D.) and confidence intervals (S.E) for the *KBIT-2* test normed for the

⁶ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 30.

⁷ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 30.

⁸ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 54, 56.

appropriate age range of this study and the study group results. The mean age for the study group was 61.5 years.

Table 3. Standardized Nonverbal Comparisons

Nonverbal Standard Score	Study Group (M)(S.E.)	EMCDC Training Group (M)(S.E.)
Pre-Test M	115.25 (9.78)	100.81 (10.17)
Post-Test M	119.00 (9.15)	116.00 (10.77)

In Table 3, standardized Nonverbal scores for the study group are compared to the training group from Dr. Brown's initial research with the standard error (S.E.).⁹ The study group results are similar to increases Dr. Brown reported with her research.

Table 4. Equipping Minds Cognitive Development Pre- and Post-Assessment

<i>Modified Games</i>	Pre-Assessment Mean	Post-Assessment Mean	Ability Increase	Pre- to Post (p)*
Xtreme Memory	10.25	25.50	15.25	0.001004**
Tic-Tac-Toe	4.00	34.00	30.00	0.0000016764***
Make-a-List	17.75	22.75	5.00	0.026548**
Digit Span	6.75	7.75	1.00	0.03002***

Note: *P-value < 0.05 statistically significant. ** Paired *t*-Test: Two Sample for Means; ***Paired *t*-Test: Two-Sample Assuming Equal Variances.

The effect of strengthening working memory through training with *EMCDC* can also be seen in the pre- and post- training assessment results in Table 4. There is a learning curve to knowing the games and, after teaching them, the performances

⁹ Brown, "Equipping Minds," 151.

ultimately yielded a progression in ability. Xtreme Memory is a workout for visual memory, visual processing, working memory, and spatial reasoning. Tic-Tac-Toe challenges visual memory, auditory processing, working memory, logic, and reasoning. Make-a-List exercises working memory, attention, and long-term memory. Digit Span challenges auditory memory with a series of digits dictated and later recalled. For Digit Span, the amount of time from dictation to recall was gradually stretched from a few minutes to an hour.

Research Question 2

Research Question 2 asked, “What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on verbal abilities?”

Table 5. *KBIT-2* Verbal Subtest Scores with Age Adjusted Expectations and Standard Deviations

	Verbal Knowledge M (S.D)	Riddles M (S.D.)	Verbal Sum M (S.D)
Study Group Pretest Age 61.5	51 (5.71)	45.25 (1.2)	96.25 (6.1)
Study Group Post Test Age 61.5	52 (4.16)	46.25 (1.2)	98.5 (5.2)
KBIT-2 Age 56-65	51.3 (6.7)	40.3 (5.6)	91 (11.6)
KBIT-2 Age 66-75	49.1 (8.6)	38.5 (6.4)	87.6 (14.3)

Table 5 reports the study group’s mean subtests for the verbal portion of the test compared with the scores normed for the age range. The study group met this expectation. The Verbal score “measures the Broad Ability known as *Crystallized Ability (Gc)*”¹⁰ and is comprised of two components, the Verbal Knowledge portion and Riddles.

¹⁰ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 29.

Verbal Knowledge accesses long-term storage of information.¹¹ This portion of the test progressed more quickly because participants were required to simply point to a picture or say the letter of the picture in response to the word given, something stored in their crystalized knowledge. It took approximately 20 minutes to complete.

The Riddles component measures “*Language Development...and General Sequential (Deductive) Reasoning...associated with Fluid Reasoning (Gf).*”¹² Sequential deductive reasoning measures the ability to begin with information and progress through steps to solve a problem.¹³ This subtest alone took on average 30 minutes. Verbal Knowledge and Riddle raw scores are combined for the verbal score which can then be translated into the standardized *KBIT-2* score.

Table 6 reports the study group’s pre-test and post-test means for the Verbal standard score. The mean of the pre-test scores was 103.75. The mean of the post-test scores was 110.00. Although this data reflected an increase in the standardized score by 6.25 points, based on the paired *t*-test score this was not a significant finding. The paired *t*-test score was at 0.309504, well above the 0.05 required for statistical significance. The data was compared to Dr. Brown’s initial findings with the training group. It does appear the *EMCDC* worked in a school setting to significantly improve verbal scores for the younger age group.¹⁴ Overall, the process of administering the *KBIT-2* took significantly longer than the suggested 15-30 minutes.¹⁵ The slower processing speed for these older individuals required over 95 minutes to administer the test.

¹¹ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 4.

¹² Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 29.

¹³ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 29.

¹⁴ Brown, “Equipping Minds,” 150.

¹⁵ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 3.

Table 6. Comparison of Verbal Standard Scores with Confidence Intervals

	Pre-test M	Post-test M	Increase	Pre-to-Post (p)*
Study Group	103.75 (4.33)	110.00 (7.93)	6.25	0.309504
Training Group	94.56 (10.51)	108.00 (15.99)	13.44	0.000112

*P-value < 0.05 statistically significant.

Research Question 3

Research Question 3 asked, “What, if any, will be the influence of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on perspectives of quality of life with cognitive aging?”

From the pre-survey, participants in the study were asked to share if they were personally concerned about their own cognitive health, if they had a family history of dementia, and if training to improve their cognitive health was available, would they participate? Open-ended responses record that all participants had given thought to the status of their present cognitive abilities and were concerned about their cognitive health as they age. Two participants have a strong family history of dementia and are concerned about its potential to manifest as they age. All four study participants recognize signs of slowing cognitive functions in themselves (searching for a word, lack of attention, speed of recall). And all replied that if cognitive training were available, they would participate. However, one said at first, “I was intimidating because I didn’t want to do poorly.” A slightly older participant was initially reluctant and expressed intimidation at the thought of someone in church discovering their cognitive ability—or lack thereof. However, after realizing scores were kept strictly confidential they overcame their fears and joined in.

Following the study, participants completed a post-survey with open-ended questions. They were asked if the study influenced how they thought about their brain and aging; one responded to a new awareness of brain functioning and noted, “The brain

exercises are wonderful to keep your brain alert.” Another shared, “It opened my eyes to be concerned,” and another, “I realized how exercises help strengthen recall and speed.”

When asked in another question if they noted any changes in their thinking and cognitive abilities throughout the training the reported benefits included the ability to be more focused with daily cognitive tasks and an improved ability to recall both short-term and long-term information. One participant, discouraged with a family history of Alzheimer’s Disease expressed, “At first, I felt like a first grader...as time went on I realized just how important this study is...I really improved my focus, reading, and memory.” Another commented on speed of recall, “I was able to recall items faster and also things from the past more readily,” and another, “I could think clearer and remember dates and phone numbers better!”

Lifestyle and quality of life may affect the aging brain and cognitive abilities.¹⁶ Before participating in training with *Equipping Minds Cognitive Development Curriculum*, study participants were asked open-ended questions about exercise, diet, and sleep habits. All had exercise habits that included, at a minimum, regular walking; however, diet and sleep habits were not as consistent. Three of the four had adjusted their diets over the years to improve their health. Regarding sleep, all had regular bedtimes, but not bedtime routines. Three of the four do not sleep through the night and achieved an estimated 5 to 6 hours of sleep per night. They reported a lack of restorative sleep.

While participating in *Equipping Minds Cognitive Development Curriculum* training, participants were challenged to include primitive reflex exercises in addition to regular walking, asked to consider their nutritional requirements for a healthy brain, and were encouraged to practice good sleep hygiene. The surveys indicated that quality-of-life issues of exercise, diet, and sleep were positively influenced. Incorporating primitive reflex exercises was difficult; one participant completed the six exercises three days per

¹⁶ Presented earlier in this paper is the “Nun Study” which found it possible to suppress the expression of dementia.

week, one incorporated three of the six exercises, and two added only one exercise. One participant reported that changing exercise to address balance “helps with dyslexia” and another reported that exercises positively influenced “sleep habits.”

Making dietary changes in this short time period of the study was difficult. With regard to diet, only one reported making any dietary change. The change had to be with “normal foods in the grocery store.” They were able to incorporate more foods for brain health like, “salmon, flax, walnuts, and blueberries.”

In addressing sleep issues, three of the four participants anecdotally reported better sleep quality by falling asleep easier and staying asleep longer. One reported that exercise did influence sleep habits. They “went to bed earlier and had no trouble falling asleep.” Another reported often when falling asleep “recalling the Stroop Animals training.” One participant reported that exercises influenced sleep habits, “I did notice I slept through the night peacefully!”

Research Question 4

Research Question 4 asked, “What, if any, will be the impact of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on personal perception of spiritual growth?”

Realizing it is God who is at work spiritually forming believers through various modes in lives, the pre-survey findings for this study recorded responses participants made related to regular spiritual disciplines over the years in their faith life.¹⁷ These survey prompts focused on a personal history of coming to faith, baptism, church attendance, prayer life, practice of scripture memory, Bible study or regular reading, and whether or not they had been discipled, if they felt they were using their gifts, were participating in outreach, and actively discipling others. In response to these ten practices,

¹⁷ Paul Pettit, ed., *Foundations of Spiritual Formation: A Community Approach to Becoming Like Christ* (Grand Rapids MI: Kregel, 2008), 44.

two of the four participants responded positively to only five or fewer practices. All enjoyed attending church as children, but not all attended consistently nor did everyone participate in scripture memory at a young age. And further, in their backgrounds, half struggled to find their place in church as youth and young adults. However, from the pre-survey responses, all the participants have been active in church and have in common, coming to faith (one as an adult, the others as children), having been baptized, maintaining a regular prayer life and Bible reading or study plan. Two responded positively to nine of the ten items and for all there was a weakness in scripture memory.

Following participation in the *EMCDC* training there was an increase in the group's personal perception of spiritual growth. One responded that they were "able to recall scripture easier and remember more things that I've studied." Another commented on "slowing down to focus and find the books of the Bible easier...to self-reflect on issues, and to pull from memory verses when needed." One participant articulated, "We are members of the church, so it brought us closer together spiritually" and that resonated with the group as another stated, "I feel more connected in community and with God, too, seeing how He made us to care for our minds."

Spiritual growth can be further acknowledged in the ways by which participants responded to the piloting of *EMCDC* in the church. In response to the survey question, "If we were to implement this program in our church, what suggestions do you have?" The majority suggested the training games be incorporated into Bible studies. Noting that "Make-a-List" is one of the training exercises that pulls from memory, participants began to see how many biblical topics could be easily used for this. One suggested lists of "books, kings, and animals of the Bible." Scripture memory was recognized as very important for brain strengthening as well as the significance of music and the songs recalled. Realizing the time commitment, it was suggested that we "reach out to more people that have extra time on their hands, that want to socialize" and include refreshments.

The group as a whole, though individually stressed and tested by creating time in their schedules to meet three additional times per week (the five meeting times included Sunday morning and Tuesday afternoon Bible study that were already in place), collectively expressed they missed the frequency with which they were able to gather and participate in this project together. They had grown closer by being more involved in community life together. With the absence of the increased time invested together in this research when it was completed, they expressed a desire to continue in some fashion. One unsolicited response stated, “This program would work well in schools (elementary, high school, college) as well as the churches. It’s very educational, and really works your brain!”

Evaluation of the Research Design

This research design was based on a mixed method of research with both quantitative and qualitative hypotheses. The quantitative method allowed for measuring and statistically analyzing *KBIT-2* test score results as well as quantifying the *EMCDC* pre- and post-assessments. The qualitative hypothesis allowed for open-ended surveys with prompts to better understand individuals’ developmental backgrounds, and from the respondents’ perspectives, the effects of this curriculum’s use on both quality of life with cognitive aging and spiritual growth.

Strengths of the Research Design

This research was not a scientific study yet one strength of the study included that the testing tool, *KBIT-2*, was normed for ages 4 to 90. Statistical comparisons with the age range norms as well as with Dr. Brown’s previous research help substantiate the test results. Standard error (or confidence intervals) support how close the study mean is to the population mean, although in this case the sample size is too small. Standard

deviations further support this study in comparison with the *KBIT-2* norms and previous research.

Another strength of this research design is represented by the potential for relational intimacy in a small group. In the modern church small groups are a means through which spiritual growth may occur as people “share life together and maintain accountability.”¹⁸ While a much larger study group with a corresponding control group would have represented a more scientific study, the use of *Equipping Minds Cognitive Development Curriculum* with older adults in a church small group challenged the participants to a deeper level of vulnerability and connectivity. In this small rural community, the four participants have known each other the majority of their adult lives. Through this experience they shared walking through something new and challenging together. By participating in the *EMCDC* activities as a group, and at times working in pairs, the participants’ cognitive functioning abilities were exposed to each other. This endeavor modeled a Christian community with accountability, discipline, and especially encouragement as participants were present for each other week after week, maintained training with *EMCDC*, and challenged each other to focus and work to the best of their individual abilities.

Another strength of the design was that *EMCDC* was implemented in a group that already existed as a Bible study discipleship group. The Bible study expectation provided a more academic learning context, as Dr. Brown’s work was accomplished in an educational environment. With the focus on cognitive abilities and the learning process, study participants began to be aware of the strengthening of their brains and that churches and the community could be blessed by incorporating this training into learning programs.

¹⁸ Pettit, *Foundations of Spiritual Formation*, 268.

Weaknesses of the Research Design

For the church setting, this was not a true scientific study. Although it began with the intension of a larger population paired with a control group, it was completed with a small group of four individuals. The group size was limited due to Covid-19, decreasing church attendance, and those who were able make a commitment to this study. Also, it would be difficult to determine if the perceived growth reported by the participants on the surveys was a result of participating in the curriculum alone. This research was not designed to filter other factors which may influence the gains reported by positive comments on the post surveys and increased *KBIT-2* scores. The participants were already part of an older adult discipleship small group. However, the group previously met only twice a week as compared to the increase to five times per week for the pilot. This research cannot ascertain if the reported positive post survey comments and increases in the *KBIT-2* scores were solely due to the cognitive training exercises. This research cannot conclusively report the gains were based on applying *EMCDC* alone or if somehow results were influenced by simply being more intentional about cognitive health habits. Nor can this research determine if collectively spending more time together as church family in community contributed to the positive survey results and increased *KBIT-2* test scores.

Conclusion

In this mixed method research study, the quantitative questions asked were, “What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on working memory?” and “What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on verbal abilities?” Next, the qualitative research questions asked, “What, if any, will be the influence of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on perspectives of quality of life

with cognitive aging?” and “What, if any, will be the impact of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on personal perception of spiritual growth?”

Recognizing that working memory ability is a significant factor for nonverbal and verbal functioning, the two quantitative questions addressed effects of *EMCDC* on these abilities. Nonverbal and verbal abilities were evaluated using the *KBIT-2* which is normed for ages 4 to 90. The test has three subcomponents, Nonverbal (Matrices), and then Verbal Knowledge and Riddles both of these are combined for a Verbal sum score. Nonverbal abilities indicate *Fluid Reasoning (Gf)* and *Visual Processing (Gv)*. Verbal abilities represent long-term stored knowledge, a “*Crystallized Ability (Gc)*.”¹⁹ Solving Riddles also requires “*Fluid Reasoning (Gf)*.”²⁰ A stronger working memory can be reflected in the increased posttest subtest scores of nonverbal Matrices and Riddles.

The two qualitative questions asked, “What, if any, will be the influence of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on perspectives of quality of life with cognitive aging?” and “What, if any, will be the impact of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on personal perception of spiritual growth?” In addressing quality of life, all the participants anecdotally recognized signs of slowing cognitive functions in themselves (searching for a word, lack of attention or focus). The participants reported improvements in quality-of-life benefits from this training. Specifically, the improvements were in the ability to be more focused with daily cognitive tasks and to recall both short-term and long-term information. Changes in diet and exercise were not significantly impacted. However, in addressing sleep issues, three

¹⁹ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 29.

²⁰ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 29.

of the four participants anecdotally reported better sleep quality by falling asleep easier and staying asleep longer.

Qualitatively, addressing spiritual growth in the short six-week period, individually there was a slight increase in the personal perception of spiritual growth. Three of the four identified scripture memory or recall as an area in which they had improved, two identified reaching out to others as a main focus, and one spent more time in reflection. However, corporately, all the group members missed community life when the study was completed because of their increased time invested together.

Chapter 4 presented an analysis of the quantitative data from the *KBTI-2* test results as well as the *EMCDC* assessments. It also presented an analysis of the qualitative data from the participant surveys. Chapter 5 is a discussion of the data in response to each research question, provides a conclusion, suggestions for further research and implications of the study.

CHAPTER 5

CONCLUSIONS AND IMPLICATIONS FOR FURTHER STUDY

Through modern science, advanced research, and neurological studies, God has allowed us to learn more about the brain—its anatomy, physiology, health, and pathology. This information can improve our lives and bring glory to God. This study applied the biblically based *Equipping Minds Cognitive Development Curriculum*, developed by Dr. Carol T. Brown, to investigate a method for using a portion of this curriculum in the local church. The core curriculum principles are derived from the foundational work of Reuven Feuerstein—his theories of Structural Cognitive Modifiability (SCM), Mediated Learning Experience (MLE) and the recognition that people are image bearers of God with the capacity to change no matter the age. MLE training with a human mediator (as opposed to computer-based training) is necessary to help people “reach their full cognitive potential, as well as to increase their internal motivation and personal confidence.”¹

Previously, Dr. Brown’s research with *EMCDC* demonstrated that, “Training in working memory, processing, comprehension and reasoning with *EMCDC* does provide convincing evidence to the generalization of verbal abilities, nonverbal abilities, and IQ composite...similarly, far transfer effects to academic abilities in science were substantiated...”² This study was a pilot of *EMCDC* in a small discipleship group of older adults, with a trained mediator, and examined the curriculum’s effects on both cognitive

¹ Carol T. Brown, “Equipping Minds: Applying a Biblically Based Curriculum for Improving Working Memory” (D.Ed. Dissertation, Southern Baptist Theological Seminary, 2016), 142.

² Brown, “Equipping Minds,” 142.

abilities and on perceptions of aging cognitive health and spiritual growth. As nearly as possible, the study sought to follow the protocol described in Dr. Brown's initial research.³ As a nonscientific study it was limited to the small population that was available and relied on the *Kaufman Brief Intelligence Test-2*, a broader test, rather than isolating working memory function alone. Also, this study was conducted for 48 hours, more than the 30 hours of Dr. Brown's initial study, yet not the recommended 60 hours for optimal results.⁴

Research Purpose

To investigate the effects on both cognitive abilities and spiritual growth, with a trained mediator, *EMCDC* was piloted in a small discipleship group of older adults.

This aging demographic of the population is expected to continue to grow in number. In addition, lifestyles and cognitive interventions may significantly decrease the incidence rate of dementia—specifically Alzheimer's Disease. The intent of this study was to discover if *EMCDC* had any effect on cognitive abilities of older adults. For discipleship purposes, the intent was to subsequently detect any spiritual growth. Quantitative cognitive changes were measured using the *Kaufman Brief Intelligence Test-2* (KBIT-2), normed for ages 4 to 90, and by an *EMCDC* assessment. Qualitative changes were noted through open-ended survey prompts before and after piloting the curriculum.

Research Questions Answered

The first quantitative question asked, "What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on working memory?" The results of the *KBIT-2* revealed increased mean subtest scores for Matrices. This was notable because exercising inductive ability requires fluid

³ Brown, "Equipping Minds," Appendix 3, 152.

⁴ This study drew upon Brown's initial study of 30 hours of cognitive training. It is recommended for optimal results, 60 hours of training.

intelligence (*Gf*) and the use of working memory (*WM*).⁵ The design of the *KBIT-2* is not to specifically assess a working memory ability alone and the results were not statistically significant based on analysis with the paired *t*-test. However, results would indicate working memory is functioning in order to solve matrices. It requires the ability to hold on to multiple bits of information and process a response. Evaluation with the *EMCDC* assessment revealed significant gains in the abilities of the older adults' in this study to perform with *EMCDC* working memory related tasks.

The second quantitative question posed was, "What, if any, will be the effects of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on verbal abilities?" The results from the *KBIT-2* for verbal abilities predominantly addressed crystalized knowledge (*Gc*) and were not statistically significant based on the analysis of the data with the paired *t*-test. However, there was a slight increase in the Riddles test scores. To solve riddles requires the ability to hold on to three clues and develop a response. This is an ability connected to fluid reasoning (*Gf*) and indicative of a level of working memory function.⁶ Post *KBIT-2* verbal scores did increase and were found to be comparable to the age group for normed scores.

The third question was a qualitative question, "What, if any, will be the influence of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on perspectives of quality of life with cognitive aging?" To varying degrees, all the study participants were concerned about their brains aging and aware of lifestyle factors that influence quality of life.⁷ In this small group the rate of representative families clinically diagnosed with dementia was 50 percent. All the

⁵ Alan Kaufman and Nadeen Kaufman, *Kaufman Brief Intelligence Test*, 2nd ed. (Bloomington, MN: PsychCorp, 2004), 30.

⁶ Kaufman and Kaufman, *Kaufman Brief Intelligence Test*, 29.

⁷ Timothy R. Jennings, *The Aging Brain: Proven Steps to Prevent Dementia and Sharpen Your Mind* (Grand Rapids, MI: Baker Books, 2018), 224.

participants anecdotally reported an awareness of changes in their cognitive functions as they have aged. Surveys indicated a belief that accomplishing the *EMCDC* training provided hope for improvement of cognitive aging concerns. However, actually changing habits for adjusted lifestyle factors of diet and exercise were difficult and had minimal response. Qualitatively, other than an increased hope for the possibility of healthy cognitive aging, improved sleep was the most influenced quality of life factor.

The fourth question qualitatively asked, “What, if any, will be the impact of *Equipping Minds Cognitive Development Curriculum* in an older adult discipleship small group on personal perception of spiritual growth?” Survey responses after completion of the six weeks of *EMCDC* training indicated participation in the training positively influenced the group’s overall individual perception of spiritual growth. Collectively the group experienced positive behavior changes focusing on spiritual disciplines. More specifically, the changes were in personal reflection, scripture memory, and an increased desire to reach out to the community. Additionally, church members felt they had grown closer to each other by sharing their individual cognitive vulnerabilities and through increased time spent together in community.

Research Conclusions

In conclusion, by training with *Equipping Minds Cognitive Development Curriculum*, study group participants’ verbal and nonverbal scores revealed fluid intelligence (Gf) was strengthened, reported through Riddles and Matrices, and working memory (WM) was strengthened through the *Equipping Minds Cognitive Development Curriculum* training tasks. They also experienced an increase in hope with positive steps to be taken regarding the cognitive functioning of their aging brains. Some participants experienced improved quality of life, specifically related to sleep. Finally, there was an improved personal perception of intentional spiritual growth including a strengthened spiritual community.

Recommendations for Further Research

Further study could be done on the following:

1. The focus of this study was on normal cognition in aging adults and evaluated the curriculum with this older age group. Following a similar protocol, a quantitative follow up study could use *Equipping Minds Cognitive Development Curriculum* in a case-study for a person medically diagnosed with cognitive decline such as Parkinson's Disease.
2. A stronger, more scientific study could be accomplished with a larger church study group, using the standard 60 hours recommended for *Equipping Minds Cognitive Development Curriculum*, following the same training protocol, paired with a control group.
3. A quantitative follow up study could investigate using the same protocol, include Sound Therapy, and more specifically track diet, exercise, and sleep habits.
4. Further research could be done using the same protocol to investigate cognitive abilities adding music from specially filtered instrumental hymns rather than the instrumental classical music of "Sound Therapy."
5. Further research could be applied to modify *EMCDC* training games and strategies with a biblically focused content (for example, Make a List would include books of the Bible).

Implications of These Findings

Research has revealed that the aging demographic of the global human population will continue to grow and that lifestyles, health, and education backgrounds influence rates of aging and cognitive abilities. With this we have learned that the brain is capable of neuroplasticity and neurogenesis, and if working memory is strong, it is not necessary for aging neurons to die.⁸ And, we have also learned that working memory, located in the prefrontal cortex, is the cognitive function that helps us do something with incoming information and the information we know.⁹

1. The implications of the findings of this study specifically contribute more to understanding how aging Christians can improve cognitive function and a method

⁸ Alloway, *The Working Memory Advantage*, 163–66.

⁹ Tracy Packiam Alloway and Ross Alloway, *The Working Memory Advantage: Train Your Brain to Function Stronger, Smarter, Faster* (New York: Simon & Schuster, 2013), 6.

by which working memory may be trained—using *Equipping Minds Cognitive Development Curriculum*. Strengthening the mind does improve cognitive health and well-being.

2. Implications from this study support the findings of the use of a human mediator for strengthening the brain. Mediation was a key element of this study (MLE). The research of Dr. Carol T. Brown and the learning theories of Israeli psychologist Reuven Feuerstein indicate the brain is able to change and intelligence is able to improve through the model of “stimulus-human-organism-human-response (S-H-O-H-R)” with a human mediator.¹⁰ For a person to reach their full potential it requires another person (mediator) who possesses knowledge and meaning in order for the one learning to be able to apply this information elsewhere.¹¹
3. Implications from this study support strengthening cognitive functions as a necessary component for aging well and a significant issue for healthy discipleship of Christ’s followers. Working memory operates in the prefrontal cortex as does the reception of truth.¹² Our culture is full of destructive risk factors and habits that accompany people into the church body.¹³ A failure of the working memory system plays a role in addictive habits that threaten health.¹⁴ Working memory is involved with human will and the ability to make moral decisions.¹⁵ Therefore, as *Equipping Minds Cognitive Development Curriculum* is incorporated into classroom subjects, it would be beneficial to model this training in Christian education material. Since it would specifically strengthen working memory, it would be part of holistically ministering to people. In the process the church would be involved in helping reduce the incidence or delay the onset of brain diseases.
4. Implications from this study of addressing cognitive aging and decline among older adults in the church provides a resource for discipleship and sets the tone for the church to focus on how God loves people and has created them as His image bearers. People are strengthened in community. This training supports older adults by reinforcing a practical method of “being renewed day by day” (2 Cor 4:16) and

¹⁰ Mark A. Maddix and Dean G. Blevins, “Equipping Minds for Christian Education or Learning from Neuroscience for Christian Educators,” chapter 12 of *Neuroscience and Christian Formation* (Charlotte, NC: Information Age Publishing, 2016), 158.

¹¹ Maddix and Blevins, “Equipping Minds for Christian Education or Learning from Neuroscience for Christian Educators,” 158.

¹² Timothy R. Jennings, *The God-Shaped Brain: How Changing Your View of God Transforms Your Life*, 2nd ed. (Downers Grove, IL: IVP Books, 2017), 83.

¹³ Jennings, *The Aging Brain*, 61–174.

¹⁴ Alloway, *The Working Memory Advantage*, 72.

¹⁵ Alloway, *The Working Memory Advantage*, 30.

is a step in “renewing the mind” (Rom 12:2). Helpful brain exercises include recall and memory work.

5. Another implication from this study is that it relates to the supportive role of the church to inform the younger generation of many things, preeminently the truth of who God is and what He has done for us. Communicating with the younger generation helps overcome isolation. Assisting older adults to strengthen their minds honors and enables them to confidently fulfill their biblical roles as disciplined Christ followers. From Deuteronomy 32:7, “Remember the days of old; consider the years of many generations; ask your father and he will show you, your elders and they will tell you.” And from Psalm 71:18, “So even to old age and gray hair, O God, do not forsake me, until I proclaim your might to another generation, your power to all those to come.” Our elders are both men and women evidenced by two gender examples of notable older adults found in Luke 2: Simeon and Anna of the tribe of Asher. These two older people were prepared and waiting for their roles in a pivotal moment of history for the identification and announcement of Jesus as the son of God. Simeon is described as “righteous and devout, waiting for the consolation of Israel, and the Holy Spirit was upon him” (2:25). Before his death, he was not too old to be used by God to declare what he saw, “For my eyes have seen your salvation that you have prepared in the presence of all peoples, a light for revelation to the Gentiles, and for glory to your people Israel” (2:30-32). And the elderly Anna spoke—she was a prophetess (2:36) and shared about Jesus “to all who were waiting for the redemption of Jerusalem” (2:38). As a widow, her existence was tied to temple life with worshipping, fasting, and prayer (2:37). They are excellent models of older adults with powerful information to share!
6. A further implication from this research, with improved test scores and survey results, includes the use of *EMCDC* to help improve recall. With loss of memory a prevalent concern among the aging, and cited as a public health concern, memory involves more than simple recall of information. It is significant for understanding how people relate to God and how God responds to us.¹⁶ All generations are to be cognizant of the health of their minds and avoid destructive factors that accelerate aging¹⁷ (compromise physical and mental health) and degrade the ability of the mind to function. I would suggest, cognitively, aging well in the church does not begin in the older years with the “retired” or older generation. Rather, good cognitive health and habits begin in the earlier years of life to be practiced throughout a lifetime. This research has shown that cognitive training does have a positive effect on older brains. With good health, there is no reason for neurons to die and as “new creations” (2 Cor 5:17) minds need “renewal” (Rom 12:1–2). The brain produces thoughts in our minds and we have the ability to control these thoughts. Working memory and the health of the

¹⁶ Spencer A. Jones, “Memory,” ed. Douglas Mangum et al., *Lexham Theological Wordbook*, Lexham Bible Reference Series (Bellingham, WA: Lexham Press, 2014).

¹⁷ Jennings. *The Aging Brain*, 20–30.

prefrontal cortex play a significant role in this process, no matter the age. It is possible to provide an opportunity for people to strengthen and rewire their brains and do so in an intergenerational context.

7. And finally, an implication from this study may be the necessity to change church culture and teach the church directly the risk factors for dementia and how to reduce them. Christian educators could be trained EMCDC mediators and incorporate brain strengthening into Christian education curriculum or write curriculum that embraces training techniques. The church can raise awareness that cognitive decline is not normal aging and offer hope for those who struggle.

Conclusion

This study intended to provide new brain training information through piloting the biblically based *Equipping Minds Cognitive Development Curriculum*. It is directly applicable to the development of older adult educational ministry as a resource for spiritual formation. Positive outcomes from testing and surveys provide hope as the world population ages and the incident rates of cognitive decline and various dementias continue to grow. Cognitive strength can significantly decrease these rates and in some cases, diminish the expression of dementia completely. This work is offered as a means by which aging adults, created in God's image, may experience inner renewal (2 Cor 4:16), transformation (Rom 12:1–2), and growth in spiritual community for His glory.

APPENDIX A

EQUIPPING MINDS

You are invited to help me with an investigative research project as part of my degree interest and requirements for Dallas Theological Seminary. It is a project that requires a small group of people to invest time – 30 hours minimum – meaning one hour a day, five days a week, for six brief weeks.

I am using a biblically based curriculum for strengthening working memory. The strength of the brain's working memory has been shown to play a role in the functioning of our brains as we age. This program, in various forms, is being used in public and private schools and well as research and medical clinics. It has not officially been used in a church setting.

To my knowledge, this is the *only* study of its kind. We are focusing on the brain's ability to change (neuroplasticity) and grow (neurogenesis) in the area of working memory. Working memory effects cognitive abilities and recent research shows that neuroplasticity and neurogenesis continue for a lifetime. As Christians "renewing our minds" this has implications for how we think of caring for and using our brains and what we view as age-related cognitive decline.

The curriculum is called *Equipping Minds Cognitive Development Curriculum* and will be tailored to meet the needs of older adults. It has three components, exercise, music, and games which are used together with a learning process (Bible Study). In this case, the objective is to use it in conjunction with weekly discipleship and Bible study in our church.

For participants – everything will be provided. And, again, it is an investigative study that does require time. It can be done one-on-one or with a group! If you are interested, please let me know!

Name _____

Date _____

Participant Checklist

_____ Participant Consent Form

_____ Participant Survey

_____ KBIT-2 Pretest

_____ Equipping Minds Pre-assessment

_____ Kathy Johnson's Maintaining Brains Exercises: Pyramid of Potential (Done at home)

_____ Starfish: Integrates the Moro Reflex, *1 minute*; May help with:

- Visual problems—fixation (unable to keep eyes on object for 10+seconds), excessive blinking, doesn't maintain eye contact
- Light or auditory hypersensitivity (hears better than others)
- Anxiety (test, separation), mood swings, difficulty accepting criticism, dislike of change, emotionally sensitive

_____ Astronaut: To integrate the Tonic Labyrinthine Reflex, *3 minutes*; May help with:

- Poor posture
- Weak muscle tone
- Visual problems with refocusing near to far and far to near
- Spatial problems (bumping into furniture)
- Poor sequencing and organization skills
- Poor sense of time

_____ Snow/Slow Angel: Integrate the Spinal Galant Reflex, *3 minutes*; May help with:

- Bladder control
- Poor Concentration
- Poor Short-term memory
- Sensory integration problems
- Auditory processing difficulties
- Near Focusing problems
- Difficulty with reading

_____ Lizard: Integrate the Asymmetrical Tonic Neck Reflex, *1 minute*; May help with:

- Poor handwriting
- Convergence problems (near to far refocusing)
- Right-left confusion
- Visual-perceptual difficulties – reversals of b/d, u/n, saw/was
- Poor expression of ideas on paper

_____ Tiger/Cat Stretch: Integrate the Symmetrical Tonic Neck Reflex, *1 minute*; May help with:

- Poor Posture
- Poor eye-hand coordination
- Tracking problems—following a moving object smoothly
- Convergence problems – near to far refocusing
- Near focusing problems
- Slow with copying tasks
- Attention difficulties

_____ Finger Exercises: Integrate the Grasp (Palmar) Reflex, *1 minute*; May help with:

- Poor handwriting
- Poor manual dexterity
- Speech and articulation issues

_____ “Sound Therapy”: specially filtered instrumental classical music (optional)

_____ Equipping Minds Cognitive Development Curriculum (5 times per week for 1 hour)

_____ Xtreme Memory

_____ Tic Tac Toe

_____ Stroop Animal

_____ Blink

_____ Spot It

_____ Set

_____ Qwitch

_____ Arrows

_____ Stare Card

_____ Number Hunt 1-5

_____ Number Hunt 1-9

_____ Presidents

_____ Make a List

_____ Equipping Minds Post-Assessment

_____ KBIT-2 Post-test

_____ Program Schedule: 6 Weeks, 5 days/week for a minimum of 30 hours of training
Weekly Schedule: Sunday 10:00-11:00, Monday-Thursday 4:00-6:00

APPENDIX B
INFORMED CONSENT FORM

Informed Consent Form

“Piloting a biblically based curriculum to improve working memory in a discipleship plan for older adults.”

Donna Williams is piloting this study. Her contact information:
Cell phone: 210-882-6315
Email: donnawilliams@dallasseminary.edu

I am piloting a biblically based curriculum for strengthening working memory as an integral part of the discipleship plan in our church. Participants will complete a confidential survey as well as cognitive skills assessments with the KBIT-2 (the second edition of the Kaufman Brief Intelligence Test) and the Equipping Minds Cognitive Development Curriculum (developed by Dr. Carol Brown). I am a trained test administrator.

Confidential survey topics include demographic information as well as family life and history, educational and early development history, education, work, and volunteer history, church attendance and service history, and finally, quality of life. This information helps provide a holistic view of individuals' development and are free to omit any portion of the survey or offer any information they believe is relevant. All information will be kept confidential. No names will be used in this dissertation.

Participants' cognitive skills will be assessed both before and after completion of 30 hours of the Equipping Minds Cognitive Development Curriculum and the weekly discipleship class. All test results are kept confidential. Participants have complete access to their scores.

RISKS AND DISCOMFORT

Survey information spans several decades and may bring to mind uncomfortable memories or unresolved conflicts or issues. Also, for those who may not have had a positive academic experience thoughts of any evaluation may create stress. Participation is completely voluntary and pastoral care/counseling is available if needed. Participants may leave the study at any time.

BENEFITS AND USES OF DATA

This study provides an opportunity for churches and Christian Education departments to learn about a cognitive development training program that enhances individual's learning abilities. Donna Williams will use this information in preparing for her doctoral dissertation at Dallas Theological Seminary. Her work is under the direction of Dr. Joye

Baker and the Doctor of Educational Ministry program. The contact number for study related concerns is (800) 387-9673.

CONSENT

I understand participation in this research is voluntary and I may withdraw at any time. I have had a chance to have my questions and concerns answered.

Signature/Date

APPENDIX C

DEMOGRAPHIC INFORMATION

Participant Survey Introduction/Rationale

This survey is an instrument to establish a collective baseline of personal information relevant to the older adults in my study at church. It will help me gather facts, as best they can be recalled, to gain insights into life experiences and stories. It will inform me as to where they have come from developmentally and how these factors may have been influential in where they are today as professing and effective Christians. It is designed to dig and mine out clues from an individual's history; yet, when the information is pooled it also collectively helps shape an image of the present older adult population in the congregation. Although everyone is different and entirely unique in life experiences there are some commonalities that help form a model of older adults in the church.

This model can be used in Christian education to guide and point the direction of our ministry. Through understanding the cognitive health and development of older adults and their church experiences within this community, this survey helps me meet them where they are in their journey and encourage their continued growth in the Lord.

The churches in this area are dwindling and closing. Those that appear to be growing are not theologically sound. Other world religions are moving into the area. Yet, our community and churches are filled with a plethora of older adults and, as recently published scores for the school district attest, a community of underachieving youth. The advent of Covid-19 has isolated people, claimed lives, and has imposed a time to pause and reflect on the sanctity of life and God's purposes for aging, suffering, dying, and death. I would suggest we be better stewards of our minds so that we would be able to present to God "a heart of wisdom" (Ps 90:12).

Part I: Participant's Contact and Demographic Information

During the six weeks of research there is work to be done with each participant. Having the following information allows clear communication should anything arise or cause the situation to change.

What is your preferred method of contact? Phone Call____ Text____ Email ____

Do you text on your cell phone? Yes ____ No____

What is the best time of day to reach you?

Morning _____ or Afternoon _____ or Evening _____

Do you use a computer on a regular basis? Yes ____ No ____

Part II: Family Life and History

Family and culture make significant and long-lasting impressions on us as we grow and develop. It has been shown that having a person who mediates and models an example for us can help us grow. To the extent to which you are comfortable sharing, the following information would be helpful.

Name:	Home Phone:	Cell Phone:	Email Address:
Mailing/Street Address:	City:	State:	Zip Code:
Date of Birth:	Age:	Gender:	Alternate Contact Information
Family History		Responses	
Is your biological family originally from Casey County? If not, where are they from?		Yes____ No____ My mother's side of the family is from: My father's side of the family is from:	
Were you born in Casey County? If not, where were you born?		Yes____ No____ Place of birth:	

How long have you been a resident of Casey County?	
In what part of the county is your home?	
Have you lived anywhere else besides Casey County?	Yes____ No____ If yes, where else have you lived? When was this? For how long?
Family of Origin	
Were you reared by your biological parents in a traditional 2-parent household? If not, who were the parental figures in your life?	Yes____ No____ The parental figures in my life were (list as many as you would like):
How many siblings did you have?	Number of siblings:
How many sisters?	Number of sisters:
How many brothers?	Number of brothers:
What is your number in the birth order? For example, were you the 1 st , 2 nd , 3 rd ?	Place in birth order:
Do you know if there was any difficulty with your birth?	Yes____ No____
Did you know your grandparents or any other older relatives?	Yes____ No____
Did you know any elderly neighbors?	Yes____ No____
Where there any specific adults who were influential in your development?	Yes____ No____

	<p>If yes, who were they?</p> <p>How old were you when they influenced you?</p>
Were there any stresses involved in your living situation?	<p>Yes____ No____</p> <p>You may explain if you would like to share.</p>
As a young person, how would you describe your relationship to family members?	Description of your relationship to family members:
Current Family Dynamics	
What is your marital status?	<p>Single/never married ____</p> <p>In a relationship ____ How long? ____</p> <p>Married ____ How long? ____</p> <p>Separated ____ How long? ____</p> <p>Divorced ____ How long? ____</p> <p>Spouse Deceased ____ How long ago? ____</p>
Currently, how many people live in your household?	Number of people in your household:
Who do you currently live with?	<p>Live alone ____</p> <p>Live with parents ____</p> <p>Live with friends/roommates ____</p> <p>Live with children ____</p> <p>Live with grandchildren ____</p> <p>Live with partner ____</p> <p>Live with others ____</p>
Did you have any children?	Yes____ No____
If you had children, how many did you have?	<p>Boys? ____</p> <p>Girls? ____</p>
If you had children, do you see them on a regular basis?	Yes ____ No ____

<p>Please share any other information you think will be helpful about family dynamics, support, or influence.</p>	
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Part III: Educational & Early Development History

Although it is not the only factor, research informs us that a person's early stages of development have an influence on outcomes in education and quality of life. If all the receptors of information flow to the brain did not function properly at the time it was presented, it could have interfered with how information was received, processed, and transferred.

Research also informs us there are “windows of opportunity” developmentally but that these areas may yet be addressed later in life. We also are aware there are various learning styles which may not fit into a traditional classroom setting. These factors can influence how we perceive the learning process or how we feel about education.

When you were in school:	Responses
Overall, how were your grades?	Poor___ Fair___ Average___ Excellent___
Did you have any homework problems? If yes, to the level you are comfortable, please explain.	Yes___ No___ Explanation of homework problem(s):
Did you have any specific learning challenges? You may share details if you would like.	Yes___ No___
What were your strengths in school?	In school, my strengths were:
Did you have any problems with reading? Do you remember at what age you began reading?	Yes___ No___ Age you began reading: _____
Did you have any problems with writing? Do you remember when you began drawing or writing?	Yes___ No___ Age you began writing: _____
Did you have any problems with mathematics? Do you have any early memories of arithmetic?	Yes___ No___ Memories of working with numbers:

<p>Did you have any problems with vision?</p> <p>If you used corrective glasses in school, do you remember at what age you started wearing them?</p>	<p>Yes ____ No ____</p> <p>If you wore glasses, what age did you start wearing them?</p>
<p>Did you have any problems with hearing?</p> <p>Did you wear hearing aids or have any corrective action if you had hearing issues?</p>	<p>Yes ____ No ____</p> <p>Yes ____ No ____</p>
<p>Did you have any problems with comprehension or understanding?</p>	<p>Yes ____ No ____</p>
<p>Were you able to concentrate during lessons?</p>	<p>Yes ____ No ____</p>
<p>Did you take classes in art?</p>	<p>Yes ____ No ____</p>
<p>Did you take classes in music?</p>	<p>Yes ____ No ____</p>
<p>Did you have any classes in physical education?</p> <p>Were you involved in sports or athletics of some type?</p>	<p>Yes ____ No ____</p> <p>Yes ____ No ____</p>
<p>What aspects of school did you enjoy the most?</p> <p>Why do you think you enjoyed it?</p>	<p>The aspect I enjoyed the most was:</p> <p>I enjoyed it because:</p>
<p>Did you have friends?</p> <p>Did you have very many friends?</p>	<p>Yes ____ No ____</p> <p>I spent time alone ____</p> <p>I had one friend ____</p> <p>I had a few friends ____</p> <p>I had a lot of friends ____</p>

Did you have any discipline issues?	Yes ____ No ____
Childhood and Development	
<p>Do you know if there was any difficulty with our motor, language, social, behavioral, or emotional development?</p> <p>If yes, did you receive any therapies? (For example: speech therapy or physical therapy)</p>	<p>Motor development? Yes ____ No ____</p> <p>Language development? Yes ____ No ____</p> <p>Social development? Yes ____ No ____</p> <p>Behavioral development? Yes ____ No ____</p> <p>Emotional development? Yes ____ No ____</p> <p>I received:</p>
As a child, did you have any special objects (blankets, dolls, etc.)?	Yes ____ No ____
Were you able to express your feelings?	Yes ____ No ____
Did you have any fears or phobias?	Yes ____ No ____
Is there any other information you believe would be helpful to share?	Please share:

Part IV: Education, Work, and Volunteer History

Education History	
Did you complete a formal K-12 education?	Yes____ No____
If you did not complete a formal education, did you complete a GED?	I have a GED____ I did not complete a GED____
What is your highest education level completed?	Grade 8____ Associates Degree____ Grade 9____ Bachelor's Degree____ Grade 10____ Master's Degree ____ Grade 11____ Doctoral Degree ____ Grade 12
If you hold a college degree, what was your major area of study?	Area of study: _____
Did you complete vocational, trades, special skills, or on-the-job training? If yes, in what area?	Yes____ No____ Area or specialty? _____
At what age did you complete your highest level of education, training, or certification?	Age: _____
Are you currently involved in any educational program?	Yes____ No____
Work History	
If you are currently employed, how many years do you plan to continue working?	Number of years planning to work: _____
If currently employed, what is your employment type?	Type of employment: _____
If retired, what was your employment type?	Type of employment: _____
If retired, was it your choice to retire?	Yes____ No____
Over the years, how many positions or jobs did you hold?	Number of positions or jobs held: _____
Homemaking has been a full-time and yet monetarily "unpaid" position. Were you a homemaker?	I was a homemaker_____ I still am a homemaker_____
Volunteer History	
I have volunteered since my youth.	Yes____ No____
I have begun volunteering in retirement.	Yes____ No____
I volunteer in community/civic projects.	Yes____ No____
I volunteer in schools.	Yes____ No____

I volunteer in my church.	Yes ____ No ____
I volunteer in a parachurch organization.	Yes ____ No ____
I volunteer in stateside missions.	Yes ____ No ____
I volunteer in overseas missions.	Yes ____ No ____
Any other volunteer information or specifics you would like to share?	My other volunteer experience information:

Part V: Church Attendance/Service History

Early Childhood to Middle School Years	
As a child I attended church.	Yes ____ No ____
How old were you when you first attended church?	Age: _____
If you attended church, with whom did you attend?	I attended church with my: Parents ____ Grandparents ____ Aunts or Uncles ____ Neighbors ____ Friends ____ Others ____
Did you enjoy attending?	Yes ____ No ____
Please share why you did, or did not, enjoy attending church.	As a child I enjoyed church because: As a child I did not enjoy church because:
High School Years	
I attended church in my high school years.	Yes ____ No ____
I my church had a youth group/ministry.	Yes ____ No ____
I participated in the youth group.	Yes ____ No ____
Did you enjoy the youth group? Why or why not?	Yes ____ No ____ Why, or why not?
Young Adult/College Years	
I attended church regularly.	Yes ____ No ____

My church had a ministry/program for young adults.	Yes ____ No ____
I participated in the young adult ministry.	Yes ____ No ____
I enjoyed the young adult ministry program	Yes ____ No ____ Why, or why not?
Adult Years	
As an adult, I have never found my place in the church.	Yes ____ No ____
I attended church regularly.	Yes ____ No ____
My church had an active adult discipleship program.	Yes ____ No ____
I participated in the church programs and services.	Yes ____ No ____
I have served my church.	Yes ____ No ____ If yes, I have served my church as: greeter/usher ____ Sunday school teacher ____ nursery worker ____ vacation Bible school volunteer ____ deacon ____ deaconess ____ elder ____ pastor ____ ministry leader ____ missionary ____ trustee ____ worship leader ____ part of the worship team/choir ____ support person in church functions ____ other ____
Older Adult Years	
I attend church regularly.	Yes ____ No ____
Older adults serve in my church.	Yes ____ No ____
As an older adult I serve in my church.	Yes ____ No ____

Older adults are included in my church.	Yes ____ No ____
As an older adult I am able to share and participate with the younger generations.	Yes ____ No ____
As an older adult I am growing in my faith.	Yes ____ No ____
As an older adult I am no longer able to physically attend my church.	Yes ____ No ____
If you are no longer able to physically attend church, do you hear from the pastor or other church members on a weekly basis?	Yes ____ No ____
If you are no longer able to physically attend church, do you reach out to connect with others?	Yes ____ No ____
Are you aware of older adults who are no longer participating or connected to the church?	Yes ____ No ____
Have you given thought to the role of an older adult church member?	Yes ____ No ____
Other Information	
I was baptized as an infant.	Yes ____ No ____
I was baptized when I placed my faith in Jesus.	Yes ____ No ____
How old were you when you were baptized?	Age ____
How old were you when you had your own Bible?	Age ____
Did you ever participate in catechism?	Yes ____ No ____
Do you participate in communion?	Yes ____ No ____
How old were you when you first participated in communion?	Age ____
Have you ever been discipled?	Yes ____ No ____
Have you ever discipled someone else?	Yes ____ No ____
Do you have a regular Bible reading plan?	Yes ____ No ____
Do you have a regular prayer time?	Yes ____ No ____
Were you ever taught how to study your Bible?	Yes ____ No ____
Are you a member of a church small group?	Yes ____ No ____

Are you a member of a Sunday school class?	Yes ____ No ____
Please share any other information you think will be helpful.	Other information

Part VI: About Routines

Research shows that exercise, sleep, diet, and nutrition play a role in our overall health and in how well we age. To a certain extent genetics may be a factor. Each of these factors has also been shown to affect our cognitive health.

Exercise	
Do you exercise regularly?	Yes ____ No ____
What time of day do you exercise?	Morning ____ Afternoon ____ Evening ____
What do you do for exercise?	Walk ____ Jog ____ Bike ____ Swim ____ Go to the gym ____ Other:
Do you exercise with a friend?	Yes ____ No ____
What is your exercise routine?	Once a week ____ Twice a week ____ Three times a week ____ Daily ____ Other:
For how long?	10 minutes ____ 15 minutes ____ 20 minutes ____ 30 minutes ____ 40 minutes ____ 45 minutes ____ 1 hour ____
Any other comments about exercise?	Other comments about exercise:

Sleep	
How many hours of sleep do you get at night?	Hours?
Do you sleep through the night?	Yes ____ No ____
Do you have a regular bedtime?	Yes ____ No ____
Do you have a regular bedtime routine?	Yes ____ No ____
Do you have a regular wakeup time?	Yes ____ No ____
Do you wake up feeling rested?	Yes ____ No ____
Any other comments about sleep?	Other comments about sleep:
Diet	
Do you follow a special diet?	Yes ____ No ____
Has a doctor prescribed a particular diet for you?	Yes ____ No ____ If yes, do you follow it? Yes ____ No ____
Have you made modifications to your diet over the years?	Yes ____ No ____
Have you ever been taught how to plan balanced meals?	Yes ____ No ____
In General:	
Have you adjusted your exercise, sleep, or diet for cognitive benefits in aging?	Yes ____ No ____
If you could improve your thinking, would you try?	Yes ____ No ____
Are you concerned about your cognitive health and aging?	Yes ____ No ____
Have you struggled or been concerned about your brain aging?	Yes ____ No ____
How do you spend your time?	Most days I: ____ read ____ listen to music ____ watch TV ____ garden ____ talk with friends ____ enjoy playing games ____ sew

	<div><div></div> shop</div> <div><div></div> clean house</div> <div><div></div> care for a family member</div> <div><div></div> struggle to get out of bed</div> <div><div></div> other: please specify</div>
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APPENDIX D

EQUIPPING MINDS POST-PARTICIPATION

Thank you for helping me with this research by participating in our 6-week cognitive training program! I would like to hear how it influenced you and welcome your feedback.

Please take a moment to respond and share your thoughts.	Please circle yes (Y) or no (N)
1. At any point, did participating in this program influence your exercise, diet, or sleep habits?	Y/N
a. Did you make any exercise changes? If yes, what changes did you make that you would like to share?	Y/N
b. Did you make any diet changes? If yes, what changes did you make?	Y/N
c. Did you make any changes to your sleep habits? If yes, what changes did you make?	Y/N
2. Did you notice any changes in your thinking, processing, or cognitive abilities? If so, what did you notice?	Y/N

<p>3. Did participating in the study influence how you think about your brain and aging? Please share anything you think would be helpful to know.</p>	Y/N
<p>4. Did participating in the study influence your spiritual life? If so, what have you experienced?</p>	Y/N
<p>5. If we were to implement this program in our church, what suggestions do you have? You may continue writing below and on the back.</p>	Y/N

Your input is highly valued. Please continue to share any comments or questions you may have.

Thank you for your participation and input!

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