

NEURODRUMMING:
TOWARDS AN INTEGRAL MENTAL FITNESS TRAINING FOR HEALTHY AGING

Presented to
California Southern University
Department of Behavioral Sciences
Irvine, California

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Psychology

By Pamela Lynn-Seraphine

ProQuest Number: 10195171

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



ProQuest 10195171

Published by ProQuest LLC (2018). Copyright of the Dissertation is held by the Author.

All rights reserved.

This work is protected against unauthorized copying under Title 17, United States Code
Microform Edition © ProQuest LLC.

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

SUPERVISOR: PROF GUY DU PLESSIS

September 17, 2016

Declaration

Student number: 6820286857

I, Pamela Lynn-Seraphine declare that **Neurodrumming: Towards an Integral Mental Fitness Training for Healthy Aging**

is my own work and all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Acknowledgments

- I would like to express deep gratitude for my mentor/supervisor, Guy Du Plessis of California Southern University for his guidance, collegiality, encouragement and unwavering support throughout the course of my thesis research. Without his expertise and mentorship this thesis would not have been possible.
- I would like to thank Dr. Robert Weathers of California Southern University for his enthusiasm, encouragement, and early insights that helped initiate this research project. I'd like to also acknowledge all members of California Southern University faculty that took the time to offer words of encouragement and support. I am truly grateful for their efforts.
- I would like to express special gratitude and thanks to Drumming's Global Ambassador, Dom Famularo for imparting wisdom and expertise when I needed it the most. His transformational leadership abilities never cease to amaze me.
- A heartfelt thank you to my husband, Danny Seraphine for keeping me happy and healthy throughout this process. His friendship and love keeps me thriving towards greater achievements.
- Many thanks and appreciations also go to my family and friends who stood by me throughout my academic journey. Their love gives me strength. Thank you.

Abstract

Humans as far back as ancient history have been leveraging the physiological and psychological benefits of drumming to enhance health, access higher states of consciousness, and cultivate shared optimal experiences. It is understandable that the applied practice of drumming is now starting to permeate into mental fitness training research as a healthy alternative toward cross training the brain. Extensive surveys conducted in the United States show that 60% of individuals who are in middle age and older complain about their memory. This translates to approximately 80 million Baby Boomers reaching the age of memory decline. Furthermore, according to the UCLA research, the main factors necessary for a healthy brain lifestyle and to combat memory decline are physical activity, social engagement, mental challenges, and unfamiliar stimuli. Neurodrumming has incorporated these findings into a therapeutic intervention that targets brain health, emotional health, stress management, and social engagement, all of which help to prevent cognitive decline, and promotes mental performance. This study offers a meta-theoretical exploration to determine the comprehensiveness of Neurodrumming as a therapeutic mental fitness intervention for healthy aging, by applying Integral Theory as an epistemological framework.

Key words: Integral Theory, Mental Fitness, Metatheory, Consciousness, Cognitive Functioning, Healthy Aging, Applied Rhythmic Entrainment, Contemplative Practices, Drumming

Table of Contents

Declaration.....	ii
Acknowledgments	iii
Abstract.....	iv
Table of Contents	v
List of Figures.....	vi
Chapter 1: Introduction	7
Clarification of Key Concepts.....	7
Background	8
Research Focus and Objectives.....	10
Significance of the Study	11
Research Methodology.....	12
Integral Theory.....	13
Research method.....	14
Data collection.	15
Evaluation Criteria.	15
<i>Criterion 1: the quadrants.</i>	<i>16</i>
<i>Criterion 2: lines of development.</i>	<i>16</i>
<i>Criterion 3: levels/stages of development.....</i>	<i>17</i>
<i>Criterion 4: state of consciousness.....</i>	<i>17</i>
<i>Criterion 5: all types.....</i>	<i>17</i>
Summary and Organization of the Remaining Chapters.....	18
Chapter 2: Literature Review.....	20
Current Approaches to Mental Fitness Training.....	20
Towards Healthy Aging	21
Neurodrumming as Mental Fitness Training	25
Introduction.....	25
Working definitions.	26
Underpinnings of Neurodrumming	29
Essential phases of neurodrumming.	32
Application of integral theory.....	35
Chapter 3: Analysis and Discussion	37

Introduction	37
Exploration of Evaluative Criteria	37
Criterion 1: quadrants.....	37
<i>Upper-right quadrant (objective)</i>	38
<i>Upper-left quadrant (subjective)</i>	40
<i>Lower-left quadrant (intersubjective)</i>	41
<i>Lower-right quadrant (interobjective)</i>	41
Lines of development.....	42
Levels/stages of development.....	44
States of consciousness.....	45
Types.....	46
Discussion of Research Findings	47
Criteria Investigations.....	48
Limitations Involving Four Quadrant Perspective.....	49
Conclusion.....	53
Significance of Findings.....	54
Limitations of current study.....	54
Recommendations for Future Research	56
References	57

List of Figures

Figure 1: The Four Quadrants in Integral Theory.....	38
--	----

Chapter 1: Introduction

It turns out that just a little change can be enough to push you away from depression and up toward a happier state. That's because in complex systems like the brain, even a little shift can change the resonance of the whole system. You may have forecast for the rain, but then the wind changes direction, the humidity drops by just 1 percent, and the day is sunny again.

(Alex Korb, 2015, p. 31)

Clarification of Key Concepts

- *Integral Theory*: In this research Integral Theory refers specifically to American philosopher Ken Wilber's Integral Model. "The word integral means comprehensive, inclusive, non-marginalizing, embracing" (Visser & Wilber, 2003). Integral Theory weaves together known systems and models of human growth from all the major disciplines of knowledge and distills their major components into five essential key factors needed to facilitate human evolution (Wilber, 2000, 2005). These essential elements signify some of the most fundamental repeating patterns of reality, and used within the creation of the Integral Model.
- *Metatheorizing*: A conceptual research approach which tests different theoretical perspectives to determine their limitations in a wider context.
- *Mental Fitness*: The ability to deploy mental skills and resources to adapt to changing circumstances and overcome challenges.

- *Applied Rhythmic Entrainment*: The physiological synchronization that occurs between the brainwave patterns of the drummer, and the rhythmic patterns that are being repeated and expanded upon.
- *Healthy Aging*: A lifestyle focused on continuously maintaining optimal physical, mental and social health in older adults as they age.
- *Contemplative Practice*: A method of learning that stresses self-reflections and contemplation of past experiences to develop personal meaning, self-regulation and attention span.
- *Neurodrumming*: At a foundational level, Neurodrumming (formerly referred to as Neurodrumming Meditation Therapy) is a rhythmic brain training modality that utilizes applied rhythmic entrainment and rhythmic mantras as a contemplative practice to reduce stress, enhance cognitive and emotional functioning, and improve quality of life. The program was researched and developed by the author, Pamela Lynn-Seraphine.

Background

It is only recently that western society has been interested in scientifically investigating the connection between the mind, consciousness, and health. Although the origin of the science of psychology reaches back some 130 years, it pales in comparison to the 2,500 years of the exploration of consciousness by our neighbors in the East (Dasher, 2006; Wallace, 2012; Yasuo, 1987; Cossellu, 2004). The scientific community has not yet accepted the body-mind connection and the significant impact of thoughts and emotions on human health, although clinical research has widely documented the connection (Brower, 2006; Woods-Giscombé & Black, 2010; Wolsko, Eisenberg, Davis, & Phillips, 2004; Nguyen., Davis, Kaptchuk, & Phillips, 2011).

Fortunately, the importance of inner life in health, healing, and personal flourishing is now receiving attention and early validation using modern science and technology (Dasher, 2006; Amen, 2010, 2012; Cash & Hochberg, 2015; Huppert & So, 2013). We now know that our mental and physical capacity is not predetermined and fixed, and our capacity for health is flexible, dynamic, and expansive (Wilber, 2001, 2016, Doidge, 2007, 2016; Schwartz & Begley, 2003).

Mental fitness training research offers an expansive look into human flourishing and healthy aging. Scientists have now verified that positive neuroplasticity contributes to the enhancement of mental fitness abilities throughout one's lifespan in direct response to intrinsic and extrinsic influences (Schaffer, 2012; Abuhamden, & Csikszentmihalyi, 2012; Begley, 2007; Vance, Roberson, McGuinness, & Fazeli, 2010). This is a drastic difference from the old way of thinking which posited that our brains are only moldable (plastic) in the early years of life. Since then, researchers have extensively studied the ability of the brain to create new neural pathways and synapses. Scientific literature provides strong evidence toward the brain's ability to adapt, change, and increase performance by implementing intensive, measurable, and sustainable mental fitness training techniques (Cusack & Thompson, 2005; Abuhamden, & Csikszentmihalyi, 2012; Davidson, & Begley, 2012; Robinson et al, 2015).

The need for mental fitness training programs amongst older adults has never been more imperative (Cusack & Thompson, 2005; Robinson., Oades, & Caputi, 2015). The United States alone is facing an unprecedented increase in the percentage of those over 65 years of age (Ortman, Velkoff, & Hogan, 2014). As a result, this aging population will have wide-ranging implications for the country and will present numerous challenges involving the healthcare industry itself (Ortman et al., 2014; Mather, Jacobsen, & Pollard, 2015). There is a growing body

of research indicating that proactive interventions, which promote healthy aging, will continue to gain significance (Jedrzejewski, Lee, & Trojanowski, 2007; Fries, Koop, Beadle, Cooper, England, Greaves, & Wright, 1993).

Neurodrumming is a rhythmic brain training modality that utilizes applied rhythmic entrainment and rhythmic mantras as a contemplative practice to reduce stress, enhance cognitive and emotional functioning, and improve quality of life. As of this time, no extensive academic research has been undertaken in exploring the usefulness of Neurodrumming in the area of mental fitness training. This research study represents the first exploratory attempt at such an investigation.

Research Focus and Objectives

This study investigates whether Neurodrumming can be considered a comprehensive and inclusive intervention as a mental fitness training program for healthy aging. The study conducts a meta-theoretical evaluation of Neurodrumming through the epistemological framework of Integral Theory. The author clarifies the appropriate understanding of mental fitness training, before moving towards the main objective of investigating the intervention and methodology of Neurodrumming through each of the five lenses of the Integral Model and see if it is adequately represented according to the epistemological parameter of each lens. The five lenses of Ken Wilber's Integral Model are also referred to as the AQAL model, with its five elements that help measure one's awareness and mental health (Wilber, 2005; Esbjörn-Hargens, 2006, 2009). The model can be used to conduct a comprehensive study of a professional domain or field of study within contemporary psychology. Since this model is central to this thesis, it is worth stating that the five elements are: all quadrants, all levels, all lines, all states and all types.

Significance of the Study

Robinson et al. (2015) argue that there is a lack of consensus regarding the definition of mental fitness and how it's measured, although the term has been increasingly used in popular and psychological literature. Cusack & Thompson (2005) suggest mental fitness be defined as “a state of mind in which we are open to enjoying our environment and the people in it, believing we have the capacity to be creative and imaginative.” Alternatively, Robinson et al. (2015) concluded the definition of mental fitness is “the modifiable capacity to utilize resources and skills to flexibly adapt to challenges or advantages, enabling thriving” (p.56). This research study has adopted the latter, but suggests that mental fitness is subsequently about keeping one's brain and emotional health in peak condition in order to develop and maintain optimal mental, social, psychological, and physical well-being.

An appropriate understanding of mental fitness training has more than just epistemological and scientific value. Mental health is undoubtedly associated with the negative stigma of shame as it is directly associated with disease and disorder (Corrigan, 2002, 2004). The World Health Organization (2001) asserts an estimated 400 million people suffer from mental, neurological, and psychosocial disorders, yet many suffer silently, and alone. Many people who would benefit from mental health services avoid pursuing help because they do not want to suffer the consequences of the stigma attached to the problem (Corrigan, 2004; Hinshaw, 2007, 2008). Adopting the term “Mental Fitness” is a way to promote preventative measures or methods without having to deal with negative connotations (Robinson et al., 2015). It also has significant effects in real world applications, because when we change our perception and

understanding of mental fitness training, we are more likely to develop alternative and sustainable treatment modalities.

A comprehensive, robust and integrally informed metatheory involving mental fitness training has yet to be developed. The purpose of the study was not to develop an integrated metatheory involving mental fitness training, but to explore Neurodrumming through the lens of epistemological lens of Integral Theory. This study aims to inspire interest in academics, clinicians, and researchers to implement case studies involving Neurodrumming's therapeutic treatment protocol to improve mental fitness for a variety of populations.

Research Methodology

The Integral Theory as developed by philosopher Ken Wilber, is often referred to as the AQAL map. A-Q-A-L (pronounced ah-qwal), refers to “all quadrants, all levels, all lines, all states, all types” (Wilber, 2005, 2007). These five elements of the AQAL model signify some of the most basic patterns of reality, and provide an important compass that can guide us toward innovation and expansiveness of human flourishing (Cook-Greuter, 2013; Esbjörn-Hargens, 2010; Dasher, 2006; Edwards, 2008).

Integral Theory has been applied to a wide range of informed therapeutic interventions such as addiction recovery, group psychotherapy, medicine, and counseling (Dupuy, & Morelli, 2007; Wilber, 2000; Marquis, 2009). Neurodrumming as mental fitness training may sound like an unlikely starting point; yet, this paper will describe how it accurately integrates the AQAL model into Neurodrumming's methodology.

Integral Theory

Ken Wilber's Integral Theory is referred to as the AQAL model, with AQAL (pronounced ah-qwal) standing for all quadrants, all levels, all lines, all states, and all types (Wilber, 2005). These five elements are not merely theoretical concepts; they are essential building blocks towards one's own awareness and can be used within any professional domain, or field of study, to insure full comprehensiveness and inclusiveness in any topic area.

Wilber (2005) states that Integral Theory helps one see both yourself and the world around you in more effective and comprehensive ways. Therefore, Integral Theory has already been used as a comprehensive map in a variety of disciplines, including health and medicine (Dacher, 2006; Schlitz, 2008; Esbjörn-Hargens, 2006, 2009; Edwards, 2010).

Integral scholars believe that it is essential to include all of these elements in order to ensure that no major part of any solution is left out or neglected (Du Plessis, 2014a; Edwards, 2008, 2013; Esbjörn-Hargens, 2009), regardless of whether we are applying it to business, medicine, psychotherapy or everyday living and learning circumstances (Wilber, 2005). The strength of Integral Theory is in its ability to provide a meta-theoretical framework that honors comprehensiveness rather than a reductionist application (Du Plessis, 2014a; Edwards, 2008, 2013; Esbjörn-Hargens, 2006).

It is important to point out that Integral Theory is not strictly a theory, but rather meta-theoretical in that its five main elements are derived from the analysis of other theories (Du Plessis, 2014a, Edwards, 2008a; Esbjörn-Hargens, 2006). In the context of this study, Integral Theory primarily aims at assessing the comprehensiveness of Neurodrumming as a mental fitness training program for healthy aging by using evaluative criteria.

Research method.

The author acknowledges that in scholarly work, “methods” are practical methodical steps for doing research (Jaccard & Jacoby, 2009; Kazdin, 2010, 2015). As indicated previously, the research methodology of this research investigation involves conceptual/theoretical analysis of the existing theories involving mental fitness, healthy aging, Neurodrumming, as well as of an existing metatheory, Integral Theory. Since the data being analyzed consists of various existing theories, and an exciting metatheory, this investigation uses a conceptual/theoretical analysis which is commonly known as metatheorizing (Du Plessis, 2014a). Mark Edwards (2010) states that metatheorising “is a form of conceptual research that recognizes the validity of each theoretical perspective, while also discovering their limitations through accommodating them within some larger conceptual context” (p. 387).

The central aim of this study is to investigate whether or not Neurodrumming is a comprehensive intervention as mental fitness training for healthy aging when viewed through the meta-theoretical framework of Integral Theory. Once again, this entails the need for a meta-theoretical exploration by applying AQAL model as an epistemological framework.

Data collection.

The data in this study consisted of the most current etiological theories involving mental fitness training, healthy aging, consciousness research, and the therapeutic protocol used in Neurodrumming. In the broadest sense, this investigation is about fundamentally redefining mental fitness training through the lenses (the five elements) of the AQAL model (Wilber, 2005).

The key words such as mental fitness, brain health, contemplative practices, meditation and mindfulness, rhythmic entrainment, healthy aging, dopamine, cognition, consciousness, Tai Chi, yoga, drumming, metatheory, meditative movement, healthcare, psychosocial/spiritual health, neuropsychology, neuroplasticity, mental skills as well as many others were entered into electronic search engines such as psychological literature (PsycINFO), PubMed, Google Scholar and others. The data collection helped to clarify the prominent theories used in this investigation.

Evaluation Criteria.

A metatheoretical analysis was conducted to determine the comprehensiveness of Neurodrumming as a therapeutic intervention for healthy aging by applying Ken Wilber's Integral AQAL model as an epistemological framework. This study involved the five lens of Integral Theory as an evaluative criterion to determine the comprehensiveness of Neurodrumming.

The author hypothesizes that Neurodrumming is a comprehensive mental fitness program for healthy aging. The author investigated the criterion elicited from the AQAL model (Wilber, 2005, 1997; Esbjorn-Hargens; 2009). This criteria (the five elements of Integral Theory) is considered to represent essential features of any comprehensive program.

The five essential features of the AQAL model are described in further detail below:

Criterion 1: the quadrants.

Integral Theory stipulates that reality has at least four universal perspectives, the subjective, intersubjective, objective, and interobjective, (Esbjorn-Hargens et al., 2009; Wilber, 1997, 2000, 2005) which must be considered when attempting to fully understand any aspect of reality (Du Plessis, 2014b). Simply put, the quadrants are the inside and the outside of the individual and the collective, and the point is to include all four quadrants if we want something to be as inclusive as possible (Wilber, 2005). The four quadrants can also be understood as the ways in which the human experience expresses itself: psychosocial, biological, interpersonal, and worldly (Dasher, 2006).

Criterion 2: lines of development.

According to Integral Theory, the four quadrants have specific capacities that progress developmentally; these are known as lines of development (Esbjörn-Hargens, 2009). Wilber (2005) has theorized that each individual has multiple lines of development, similar to Howard Gardner's theory of using multiple intelligences to describe major stages of development lines. These developmental lines can be plotted on a psychograph, and can represent lines of development relevant to health and healing, and exemplify the evolution from body to mind to spirit.

Criterion 3: levels/stages of development.

Levels (stages) of development represent actual milestones of growth and development (Wilber, 2005). Once you reach a stage of growth and development, you can access the qualities of that stage at any time, and continue to evolve toward higher stages. The idea being each stage represents a level of organization or complexity. Generally, the Integral Theory model works with 8-10 levels of development. For simplicity sake, the author prefers to have each quadrant contain three levels of development which are represented as body, mind, and spirit (Dasher, 2006). With each step up, we acquire more profound and comprehensive knowledge of ourselves and our lives.

Criterion 4: state of consciousness.

“In addition to levels and lines there are also various kind of states associated with each quadrant. States are temporary occurrences of aspects of reality” (Esbjörn-Hargens, 2009, p. 13). Wilber (2000) suggests that although there are all sorts of states of consciousness, there are three major natural ones: waking, dreaming, and deep sleep. As mentioned previously, unlike stages which are considered permanent, states of consciousness are transient. States of consciousness provide motivation, meaning, and drives within each individual (Wilber, 2000). No matter what their capacity, they come and go, and no Integral Theory approach can ignore them.

Criterion 5: all types

The final component within the Integral Theory model is referred to as type. “Types simply refer to items that can be present at virtually any stage or state” (Wilber, 2005, p. 14). Simply put, each of the previous components has a masculine and feminine type. It is widely believed that male logic is based on terms of autonomy, justice, and rights; whereas female logic

tends to be based on terms of relationship, care, and responsibility (Wilber, 2005). Although the author does not necessarily agree with the respected terms listed, the author acknowledges that masculine and feminine features must be included into any Integral Theory model of investigation.

Summary and Organization of the Remaining Chapters

Beneath the surface of a paradigm shift lies an underlying need for a change in one's perception. A scientific paradigm, in the most basic sense of the word, is a framework containing commonly accepted basic beliefs, and main principles that guide the direction of research (Guba & Lincoln, 1994). For example, a scientific researcher with knowledge in eastern medicine will adopt a different paradigm compared to the choice of a purely western researcher. Likewise, the author of this paper inhabits a different paradigm (theoretical perspective) towards mental fitness training, than someone who has no experience or understanding of the health benefits involved in the underlying processes of applied rhythmic entrainment, and/or Neurodrumming. The reason is that the author, being the creator of Neurodrumming, has insights into its features and objectives.

The effects of repetitive musical rhythm on the brain and nervous system are relatively unknown to the medical profession and the healthcare industry in general. However, empirical research documentation is growing strong and scientists are beginning to uncover details that support the hypothesis that rhythmic entrainment can have profound effects on mental states, which sometimes catalyze dramatic changes in arousal, mood and emotions (Berger & Turow, 2011; Nozaradan, 2014; Clynes, M, 1982; Manes, 2013; Phillips-Silver, Aktipis & Bryant, 2010; Levitin, Chordia & Menon, 2012). As clinical implications of rhythmic entrainment research begin to take hold, the development of its therapeutic applications is expanding steadily. In

regards to mental fitness training, the time for a paradigm shift has come. The next few chapters will investigate how Neurodrumming is indeed at the forefront of these changes.

Chapter 2: Literature Review explores models and theories involving current approaches to mental fitness training derived principally from longevity, healthy aging and neuroscience research. The discussion is structured under the following headings: Current Approaches to Mental Fitness Training, Towards Healthy Aging, Neurodrumming as Mental Fitness Training, Working Definitions, Underpinnings of Neurodrumming, Essential Phases of Neurodrumming, Evaluation Criteria, and Summary.

Alternately, *Chapter 3: Analysis and Discussion* will attempt to integrate the Neurodrumming model into discussion by investigating and comparing it to the five criteria represented in the AQAL model. The conclusion of this chapter will include the following headings: Discussion of Research Findings, Conclusion, Significance of Findings, Limitations of Study, and Recommendations for Future Research.

Chapter 2: Literature Review

Current Approaches to Mental Fitness Training

Behind the data of longevity and healthy aging comes new optimism for the future of mental fitness training research. Scientists have now verified that positive neuroplasticity contributes to the enhancement of mental fitness abilities throughout one's lifespan in direct response to intrinsic and extrinsic influences (Schaffer, 2012; Abuhamden, & Csikszentmihalyi, 2012; Begley, 2007; Vance, Roberson, McGuinness, & Fazeli, 2010). This is a drastic difference from the old way of thinking which posited that our brains are only moldable (plastic) in the early years of life. Since then, researchers have extensively studied the ability of the brain to create new neural pathways and synapses. Scientific literature provides strong evidence toward the brain's ability to adapt, change, and increase performance by implementing intensive, measurable, and sustainable mental fitness training techniques (Cusack & Thompson, 2005; Abuhamden, & Csikszentmihalyi, 2012; Davidson, & Begley, 2012; Robinson et al., 2015).

Professionals in the field of longevity and healthy aging research are increasingly aware of the beneficial effects that education and learning have on general mental health as people age, yet there remains conceptual confusion within the field of mental fitness training. For example, “*mental health*” and “*mental illness*” are used interchangeably, yet “*physical health*” and “*physical illness*” are not (Robinson et al., 2015). Additionally, “*brain fitness*” and “*mental fitness*” are often used interchangeably, yet there has been relatively no consensus in relation to theory, definition, and measurement of either. Consequently, although mental fitness is just as important as physical fitness, it tends to still be neglected by research professionals and the general public.

With this being said, researchers in the field of mental fitness training are facing two primary challenges. First, how can the term “mental fitness” be utilized much in the same way as “physical fitness” to reduce the negative stigma against its association with mental health and mental illness? Second, how does one further engage and motivate the wider community to not only become proactive in their own positive mental health strategies and activates, but to sustain them (Robinson et al., 2015). It has been suggested that a more familiar framework be developed via an easy-to-understand language that is not negatively stigmatized (Keyes, 2007). Be that as it may, the field of mental fitness training continues to be divided into separate intervention categorization strategies, without the use of a consistent and coherent overall framework.

Towards Healthy Aging

Healthy aging is becoming a necessary topic for baby boomers everywhere. “Healthy aging is not defined simply as the avoidance and management of chronic diseases” (Carlson, 2011). Leveraging healthy lifestyle behaviors, including physical activity, social support, collaborative engagement, and cognitive activity remain fundamentally important to overall health, well-being and quality of life (Sweeney & Green, 2013; Fernandez, Elkhonon, & Michelon, 2013; Amen, 2012; Weinberg & Gould, 2015).

Presently, mental fitness training programs incorporate strong support for the use of three domains involving the continuum of healthy aging. This blue print supports and verifies the validity of facilitating cognitive, physical, and social interventions to facilitate healthy aging, and reduce health care costs associated with a rapidly aging population (Rowe & Kahn, 1998; Hertzog, Kramer, Wilson, & Lindenberger, 2008; Carlson, 2011).

Fortunately, proof of neurogenesis in humans regardless of age has marked a milestone in brain plasticity (Shafer, 2012; Eriksson, Perfilieva, Björk-Eriksson, Alborn, Nordborg, Peterson

& Gage, 1998; Kempermann, Gast & Gage, 2002). Confirmation of positive neuroplasticity allows for a wide range of opportunities to exist within the field of mental fitness training (Mahncke, Bronstone & Merzenich, 2006). Of course, proof is not all that is needed to promote proactive interest in cultivating positive neuroplasticity. The author believes that there is some, albeit limited evidence for the need of mental fitness interventions that adhere to a comprehensive Integral Theory approach. With this in mind, we can review the current approaches being used for mental fitness training, before moving forward with a new perspective.

Targeted cognitive interventions for healthy aging are becoming wildly popular, especially memory training interventions (Williams & Kemper, 2010). Memory training classes have been known to demonstrate that elders, like young adults, can improve their performance on cognitive tasks including perceptual discrimination, visual search, recognition, recall, and spatial perception (Hertzog, Kramer, Wilson & Lindenberger, 2008; Engvig, Fjell, Westly, Moberget, Sundseth, Larsen & Walhovd, 2010; Buschkuhl, Jaeggi & Jonides, 2012). These programs typically teach older adults to use mnemonic strategies, concentration and attention, and relaxation as ways to improve cognitive health. However, not all kinds of mental activity have the same impact on cognitive performance.

To date, the general public does not seem to realize that mental activity is not the same as mental challenge. Mental activity takes place every waking moment, but baseline activity does not significantly generate neuroplasticity changes in the same way that mental exertion does (Ferandez et al., 2013). Research indicates one needs to go beyond mere mental activity to generate significant changes to the brain. Exposing oneself to activities that are stimulating and challenging, such as learning a musical instrument (Landau., & D'esposito, Mark, 2006; Small &

Vorgan, 2012) or a second language, is what builds and strengthens neural connections (Viorica, Chabal, Bartolotti, Bradley & Hernandez, 2014).

With this being said, research continues to demonstrate that increasing mental challenge (Fernandez et al., 2013; Small & Vorgan, 2012) as well as cognitive performance and reserve helps to ensure that the brain will maintain its ability to learn, remember, and have good mental acuity as it ages. (Gross, Parisi, Spira, Kueider, Ko, Saczynski & Rebok, 2012). Healthy aging literature suggests incorporating mental dexterity exercises into daily life in order to reap the benefits of a sharper mind and a healthier body for years to come (Dasher, 2006; Rahe, Petrelli, Kaesberg, Fink, Kessler & Kalbe, 2015). Given the range of interconnectedness of our brain functions, no single activity is enough to sustain the mental challenge needed to enhance brain function. This is not to say that mental fitness programs are not effective; rather achieving such cognitive improvements requires stimulating a range of brain functions such as attention, concentration, mental stamina, and mental acuity.

Another important domain on the continuum of mental fitness training interventions involves physical activities. Many studies have investigated physiological benefits of physical exercise in aging (Kramer, Erickson, & Colcombe, 2006; Stewart, 2005). However, only recently have researchers begun to examine potential cognitive benefits. In a recent study, Etnier, Nowell, Landers, and Sibley (2006) discovered physical activity does indeed enhance cognition due to the increase of cerebral blood flow and oxygen delivery to the brains, which in return increases neuron formation and maintains brain volume.

Parallel literature also confirm that physical activity has substantial effects on brain morphology and function, and enhances older adults' cognitive function, particularly aspects of fluid intelligence and executive function (Weuve, Manson, Breteler, Ware & Grodstein, 2004;

Dacher, 2006). Even research from decades ago suggests cross-training mind/body activities that fuse physical movement and contemplative practices have the potential to cultivate sustaining transformational results (Ross & Thomas, 2010; Jin, 1992; Lan, Lai, Chen, & Wong, 1998; Fotuhi & Antoniadis, 2013). Regardless of the age, one can rest assured that performing physical activities will benefit both the body and the brain.

In a like manner, social interventions are proving to be another key contributor towards positive mental health. “Growing evidence strongly suggests that social engagement contributes to optimizing brain health” (Fernandez, Goldberg & Michelon, 2013, p. 125). A recent meta-analysis of control trials, which included 18,766 U.S. women aged 70 to 81 years aiming to reduce depression, found that social support interventions are highly effective with older adult populations (Llopis, Hosman, Jenkins & Anderson, 2003). Evidence has also shown that low social engagement in mid- to late-life increases the risk of Alzheimer’s disease (Fernandez et al., 2013; Wang, Karp, Winblad & Fratiglioni, 2002).

In 2011 researchers conducted a study focused on the amygdala, a structure that is part of the limbic system and plays a major role in regulating emotions in relation to modification via neuropathic changes caused from social engagement. They measured the size of the amygdala of 60 adults in relation to the complexity of their social networks, and results showed that the larger the social network a person had, the larger their amygdala had developed in size (Bickart, Wright, Dautoff, Dickerson, & Barrett, 2011). Although evidence is still needed to confirm if making new friends increases the size of one’s amygdala, or if people with larger amygdalae actually make more friends, it does pose interesting possibilities into future research studies.

As for why social engagements boost brain function, research continues to show that social interactions provide embedded brain exercise, which in return stimulates executive

functions and contributes to both short-term performance, as well as the cultivation of cognitive reserve (Fernandez et al., 2013). Other studies have also shown an association between the size of one's social support and one's cognitive functioning. For example, Krueger et al. (2009) looked at the social habits and cognitive functioning of 838 healthy individuals, 80 years old on average. After a lengthy assessment measuring social activity frequency, size of social network, and perceived social support, results indicated that more frequent participation in social activities and higher level of perceived social support led to higher levels of cognitive functioning (Krueger, Wilson, Kamenetsky, Barnes, Bienias & Bennet, 2009). With this in mind, it is understandable why scientists continue to investigate the positive implications of expanding one's social life as a priority for optimizing brain functioning.

Neurodrumming as Mental Fitness Training

Introduction.

Within the emerging field of medical ethnomusicology (Dirksen, 2012; Pettan & Todd Titon, 2015), which aims at combining efforts from experts in music and health-related specialties to work on health and disease related issues from a global perspective, comes a revolutionary pedigree of brain rhythm enthusiasts (Braz & Cohen, 2006). Brain rhythms are essential for organizing motor actions, cognition, and how we experience the world (Buzsaki, 2006). Scientists have found that brain rhythms are correlated with various cognitive phenomena, and that rhythm has a critical influence on perception, attention, working memory, learning, language and motor functioning (Levitin, 2007, 2013; Thaut, McIntosh & Hoemberg, 2014; Thaut, 2003; Molinari, Leggio, De Martin, Cerasa & Thaut, 2003). Neurodrumming harnesses those mental benefits with the added bonus of lowering stress, increasing brain health, and

positive emotions through optimal musical experiences. Key topic areas addressed throughout the program are listed in, but are not limited to, the following: enhancement of fine motor skills, visual, tactile and auditory stimulation, memory and recall, hand/eye coordination, stress/energy management, social engagement, cognitive development, mental stamina, and social engagement. Furthermore, within this life enhancing curriculum lies conscious steps participants must make in order to fully utilize the health benefits that this mental fitness training program entails.

Working definitions.

As with any new therapeutic practice with diverse applications, a few working definitions must be reviewed in order to ensure an accurate understanding of the words involved. As mentioned earlier, the following definition is being presented to describe what ‘rhythmic entrainment’ refers to in this context: Rhythmic entrainment refers to physiological synchronization that occurs between the brainwave patterns of the drummer, and the rhythmic patterns that are being repeated, and expanded upon (Lynn-Seraphine, 2013). The application of applied rhythmic entrainment in the Neurodrumming program can be explained as a way to learn how to alter natural brainwave patterns, by playing the drum patterns at different tempos while simultaneously stimulating one’s brain and quieting one’s mind, which subsequently is similar to other meditation practices that use rhythmic phrases to create an altered state of consciousness.

Another essential definition to clarify is ‘contemplative practice’. According to the director of the Institute of Contemplative Education, Dr. Jared Kass, “Contemplative practice is an experiential mode of learning and self-inquiry” (Kass, 2006). The use of contemplative practices have been around since the beginning of civilization and exist within many religious,

spiritual, and secular traditions (Teng & Lien, 2016; Loizzo, 2014; Jahnke, Larkey, Rogers, Etnier & Lim, 2010; Jou & Shapiro, 1983; Kerr, Sacchet, Lazar, Moore & Jones, S. R. 2013). The word contemplation derives from *contemplari*, to “gaze attentively,” but the word was originally linked to the act of cutting out or creating a space, as in “to mark out a space for observation” (Barbezat & Bush, 2014, p. 21). The objectives of engaging in a contemplative practice are to hone attention, cultivate self-regulation, and to develop personal insight and meaning. Neurodrumming utilizes these capabilities and incorporates these elements into its curriculum, with the added dimension of other therapeutic strategies such as psychological skill training, and cognitive behavioral techniques.

The benefits of participating in a contemplative practice seem to be unlimited. A sizable amount of research has shown how contemplative introspection provides opportunity for individuals to develop insight, creativity, deep-focused attention, compassion, resiliency, attention, analytical problem solving, and a deeper connection to others (Wallace, 2012; Siegel 2007; Varela, Thompson & Rosch, 1991; Payne & Crane-Godreau, 2013). In addition to this, contemplative practices have also been shown to profoundly improve health and reduce stress, increase effects, and even increase natural immunity (Barbezat, et al., 2014; Didonna, 2009; Goleman, 2003).

Although the exact biological underpinnings of contemplative practices are still somewhat unknown, it is generally thought that repeated engagement of relevant brain networks mediate positive, cognitive, emotional, and behavioral outcomes through the application of neuroplasticity (Hasenkamp & Barsalou, 2012). With the occurrence of mental health illnesses on the rise, it is easy to understand why there has been substantial increase in the clinical application of contemplative practices. Focused meditation and mindful meditation practices are

both being used to great effect in helping lower levels of depression, anxiety, pain and psychological distress while increasing clients' immune systems and general physical health (Marchland, 2012; Goleman, 2003; Bewer, Worhunsky, Gray, Tang, Weber & Kober, 2011). Mindfulness practices in particular have become increasingly used as complementary therapeutic interventions for a variety of medical and psychiatric conditions (Wallace, 2007; Didonna, 2009; Desbordes, Gard, Hoge, Hölzel, Kerr & Lazar et al. 2014). Neurodrumming may become potentially added to the growing list of holistic alternatives.

One more fundamental definition to clarify is rhythmic mantras. Rhythmic mantras are used in a similar way that traditional mantras are used in meditative practices. For the most part, a mantra is a phrase or a word that is continuously repeated over an extended period of time (Shapiro & Walsh, 2009). In Neurodrumming, rhythmic mantras are referred to as any four patterned rhythmic phrases that are repeated and expanded upon over an extended period of time. These rhythmic mantras are effectively used to facilitate optimal mind/body conditioning. Rhythmic mantra's can also be used as effective approach to slow regression of speech and language skills. Rhythm-based exercises paired with words are known to enhance speech intelligibility thus resulting in strategy that may be used as a tool to access language in ways that verbal language cannot (Guy & Neve, 2005).

The rhythmic mantras in the learning program help participants cultivate three main skills:

- The ability to deeply concentrate for an extended amount of time.
- The ability to cultivate the practice of mindfulness and self-regulation.
- The ability to access a higher state of consciousness.

These three powerful components make this contemplative discipline not only biologically, mentally and emotionally beneficial, but spiritually healing as well.

Underpinnings of Neurodrumming

As mentioned earlier, Neurodrumming is a rhythmic brain-training modality that utilizes applied rhythmic entrainment and rhythmic mantras as a contemplative practice to reduce stress, enhance cognitive and emotional functioning, and improve quality of life. It was researched and developed by world percussionist, Pamela Lynn-Seraphine. Empirical research from a variety of cross-disciplinary applications such as behavioral medicine, sports psychology, and cognitive neuroscience were used as its conceptual framework for the program curriculum. More specifically, Neurodrumming was designed to stimulate the prefrontal-limbic system in order to create an upward spiral of healing and recovery for a variety of general and clinical populations including those suffering from trauma, memory loss, addictions, and stress-related illnesses.

The original curriculum was designed to be used effectively as a standalone program for individuals and/or group participants, and offered a rewarding therapeutic experience for program participants, therapists, and extended members of any community. Level one of the beginner's curriculum has been designed to be taught within an eight-week time frame, but can be shortened or extended to suit the needs of the population being addressed. Upper levels of the program are offered to sustain lasting health benefits; one-on-one care is also available.

Since its conception, the program has been revised many times in order to accommodate for the growing number of assisted therapeutic applications including but not limited to Alzheimer/Dementia populations, and extended long-term care and assisted living residence. Neurodrumming Assisted Therapy offers additional curriculum developed specifically for

assisted care involving Alzheimer/dementia treatment and has been successfully implemented as a mental fitness training program which focuses on the following four core elements: cognitive health, speech and communication, motor skills, and social engagement.

In the last few decades, neuroscientists have made tremendous breakthroughs toward understanding how our brains can benefit from learning to play a musical instrument. We now know that learning to play a musical instrument engages practically every area of the brain at once (White-Schwoch, Carr, Anderson, Strait & Kraus, 2013), especially the visual and auditory courtesies (Zuk, Benjamin, Kenyon & Gaab, 2014). Learning rhythmic patterns, in particular, are known to cause a positive effect on neural circuitry via applied rhythmic entrainment (Berger & Turow, 2006; Winkelman, 2003; Friedman, 2002; Wright, 1991; Fotuhi & Antoniades, 2013). Neurodrumming takes advantage of the neurobiological effects of applied rhythmic entrainment by harnessing the brain's rewards circuitry, which is located within the limbic system.

The limbic system is primarily responsible for the mechanisms for emotion, memory, and learning (Mogenson, Jones & Chi YiuYim, 1980; Lautin, 2001; Isaacson, 2012). In Neurodrumming, participants learn about the significance of stimulating their prefrontal cortex and how to harness their brain's reward and pleasure circuitry (Kringelbach & Berridge, 2008; Teresi & Haroutunian, 2011) by leveraging their natural tendency to repeat patterns and experiences that bring them pleasure and reward through the release of dopamine and other biochemicals. The neurotransmitter dopamine is the known contributor to pleasure emotions and is the driving force behind attention, wanting, motivation, desire, and addictive cravings responses (Burgdorf, et al., 2006; Kringelbach & Berridge, 2008). Drummers learn to leverage pleasurable sensations by what is referred to as "chasing rhythms." This process involves harnessing the anticipation, novelty, and challenge of being able to combine and repeat rhythmic

patterns that are within their reach but just outside their comfort zone. More novelty equals more dopamine, but that is just the beginning of the upward spiral (Fredrickson & Joiner, 2002; Fredrickson, 2009).

Drumming also involves activating other beneficial neurochemical circuits. Chasing rhythms is not only mentally stimulating, but a physically engaging activity as well. Increasing physical exercise is known to play a significant role in reversing symptoms of depression. “Movement increases the firing rate of serotonin neurons, which causes them to release more serotonin” (Korb, 2015). Neurodrumming implements the increase of movement through tempo changes that can range from 60 bpm (beats per minute) to an increase of 130+ bpm. Increase in physical activity also contributes to the increase of norepinephrine as well (Dimeo, Bauer, Varahram, Proest & Halter, 2001), making drumming a rewarding neurochemical cocktail of positivity attributes.

The other significant part of the curriculum involves educating individuals on how the prefrontal cortex is the center of their thinking and planning part of the brain (Siddiqui, Chatterjee, Kumar, Siddiqui & Goyal, 2008). Having a basic understanding on how to stimulate the prefrontal cortex empowers the client with the ability to make wise choices. “In depression, it is responsible for worrying, shame, problems with thinking clearly, and indecisiveness” (Korb, 2015). Changing activity in the prefrontal cortex can alleviate depressive symptoms and help to change bad habits through goal-directed behavior (Davidson & Begley 2012).

The Neurodrumming program helps clients develop process-focused goals as well as results-focused goals. Clients are encouraged to make a decision on what rhythmic mantras they want to focus on learning, and then proceed to focus their attention on attaining process-centered goals. “When you decide on a goal, the prefrontal cortex changes the way the rest of the brain

perceives the world” (Korb 2015). Keeping track of measurable goals helps enable clients to engage in confidence-building exercises that result in real-world benefits. For example, a client may choose to focus on a specific exercise in self-awareness by utilizing the mindfulness phase of their practice time. On one hand, they are using introspection to develop a great sense of personal insight, and on the other, they are learning tangible musical composition that allows for objective critiques for improvement.

In other words, Neurodrumming is not based entirely on a subjective experience because the rhythmic mantras are designed as musical compositions, and they can therefore be evaluated objectively. The process of attaining goals helps to cultivate enhanced levels of self-awareness, self-worth, and self-respect, which in return, increases enjoyment and the continuation of an upward positive spiral toward health and well-being (Barron & Harackiewicz, 2001; Deci & Ryan, 2000).

Essential phases of Neurodrumming.

The practice of Neurodrumming is facilitated in three essential phases which are often practiced in a circular formation, and played on a variety of world hand drum instruments. These three phases can be easily remembered as, “Find the Rhythm. Repeat the Rhythm. Be the Rhythm.” Each phase incorporates one of the three key components of a quality contemplative practice: retraining attention, mindfulness, and access toward a shift in consciousness (Wallace, 2012). The contemplative practice of each phase is used as a tool to explore an individual’s inner world, and gain access to the subtle levels of the mind which include witnessing consciousness, the mental state of calm-abiding, and the pure awareness of unity consciousness.

Participants begin their Neurodrumming practice with the first phase: Find the Rhythm. This is the phase where they learn to re-train their brain with deep, focused concentration. Participants must start with a rhythmic mantra that specifically suits their need for a challenging pattern that is neither too easy nor too difficult. Skilled therapists are able to accommodate a wide range of abilities by adjusting the patterns to suit each individual's needs. The first few patterns played must always be easily performed in order to facilitate an individual's confidence and/or group cohesiveness.

This phase activates the limbic system as well as the prefrontal cortex, which also involves retention and building of short- and long-term memory (Shenhav, Botvinick & Cohen, 2013). Retraining attention is highly important since the ability to sustain deep focus and concentrate for extended periods of time provides benefits all aspects of life. This phase is also designed to calm the body's stress response, and participants are taught how to center themselves using deep-breathing techniques, and slowly playing increasingly difficult rhythmic patterns.

This phase requires focused attention and can vary in the length of time in which participants can continue. Participants are then introduced to all four patterns of the mantra, and begin to work at playing them simultaneously. The Neurodrumming practitioner must learn when to increase the tempo and difficulty of the program without overwhelming the participants. The participants are given the choice as to when they are ready to move forward.

The second phase of the Neurodrumming practice is: Repeat the Rhythm. It is based on cultivating mindfulness and self-regulation, which plays a vital role towards strengthening psychological and emotional functioning (Teper & Inzlicht, 2012). This phase occurs when participants have learned a rhythmic mantra by motor memory and when they are somewhat ready to move forward with more challenging activities. Participants learn how to move through

patterns without always consciously having to stay focused on them. This phase allows them to experience a detached observation of their thinking while simultaneously engaging in a musical experience. This is when muscle memory plays a significant role in the learning process. Participants are taught to cultivate mindfulness as they make their way through each rhythm. They learn to have the ability to observe their thoughts as they are without criticism.

Mindfulness embraces a non-judgmental style of self-monitoring, self-observation, and self-regulation (Siegel, 2007). Emotional self-regulation is a complex process that can have positive effects on all areas of one's life (Kabat-Zinn, Lipworth & Burney, 1985). Participants may find this phase the most challenging part of the program, as it will require them to learn how to observe and accept the internal voice in their head that often tries to distract them from playing.

The third phase of the Neurodrumming practice is: Be the Rhythm. This is when participants are able to play the rhythmic mantra by motor memory, and learn to express emotions through the rhythms being played. They also learn to simultaneously stay open to experiencing a higher state of consciousness. Reaching this phase of a mantra practice allows each participant to immerse themselves into the mantra being played, while still having the ability to expand on what they know. It is the phase where improvisation is supported and adding personal self-expression is celebrated. There are no hard rules or structural specificity for this phase. Complete freedom of self-expression, creativity, and empowerment are the essential goals in this phase of the process.

A participant's attraction to Neurodrumming may very well be ingrained in our natural tendency to gravitate towards rhythmic influences (Geiser, Kerry, Walker & Bendor, 2014). Perhaps it involves the rhythmic neural activity in our central nervous system (Başar,

2013) or, it could simply be that because one's heart is the metronome of our bodies' bio rhythm, we feel intense synchronization with life when we are in rhythm with our natural selves. Regardless of what causes the attraction, it is clear that there is a demand for interactive, rhythmic brain-based therapeutic interventions within the healthcare community.

Application of integral theory.

It has been estimated that by the end of 2016, Alzheimer's and other dementias will cost the nation \$236 billion dollars (ALZ, 2016). Consequently, many scholars, institutions and clinicians continue to seek understanding of this complex phenomenon of healthy aging, and pressure to develop preventative healthcare interventions continues to rapidly increase. The Integral health care model is addressing this concern by acknowledging multiple dimensions of living, healing, and curing—dimensions that go beyond reduction of symptoms (Schlitz, 2008; Ross, 2009).

Neurodrumming's integral approach to mental fitness training is similar to integral health care model in that it speaks to the need to attend multiple factors including the biological, sociological, and spiritual dimensions of the human experience. The author agrees with Schlitz (2008) in that an integral approach is dynamic and requires a profound appreciation for the fact that the only constant in nature is change and transformation. Integral Theory has the capacity (but is not limited) to evaluate the comprehensiveness of Neurodrumming as a mental fitness training program for healthy aging via use of the AQAL evaluative criteria. To clarify, AQAL model refers to "all quadrants, all levels, all lines, all states, all types" (Wilber, 2000, 2005). This research study represents the first in-depth attempt at such an investigation.

In this chapter, details involving mental fitness training, healthy aging, and the theoretical framework of Neurodrumming were all explored to support the literature review of this research

project. The following chapter will continue towards the exploration of the evaluative criteria used to investigate the comprehensiveness of Neurodrumming as mental fitness training for healthy aging.

Chapter 3: Analysis and Discussion

Introduction

In this section, the author focuses directly on a metatheoretical exploration to determine the comprehensive of Neurodrumming as a therapeutic intervention for mental fitness training for healthy aging, by applying Integral Theory as an epistemological framework. The five elements of integral theory serves as evaluative criteria in exploring the comprehensiveness of Neurodrumming. It was pointed out earlier the criteria for this investigation includes the following components: all quadrants, all levels, all lines, all states, all types. This chapter will view Neurodrumming through each of five lenses or elements of Integral Theory, and then offer a discussion of how the theory and practice of Neurodrumming is represented in each of these lenses, and its prominent research findings.

Exploration of Evaluative Criteria

Criterion 1: quadrants.

Integral Theory stipulates that reality has at least four universal perspectives, the subjective, intersubjective, objective, and interobjective, (Esbjorn-Hargens et al., 2009) which must be considered when attempting to fully understand any aspect of reality (Du Plessis, 2012, 2013, 2014a, 2014b). Neurodrumming acknowledges these four quadrants as ways in which the human experience expresses itself: psychospiritual, biological, interpersonal, and worldly (Dasher, 2006). All four aspects of each are interconnected and are always impacting one another.

Figure 1 below displays the quadrant model of Integral Theory (Esbjorn-Hargens, 2009). When referring to the integral map, the author refers to the right half as the two *outer* aspects of

life: the biological and worldly. On the other hand, the author refers to the left half as the two *inner* aspects: psychospiritual and interpersonal. The top two quadrants, psychospiritual and biological are considered to be personal areas of development. The bottom two quadrants interpersonal and worldly, which are aspects of ourselves that we share with others. This integral map serves as a valuable reminder of the need to address each aspect of our experiences in order to truly experience totality of health and integrative healing (Schlitz, 2008).

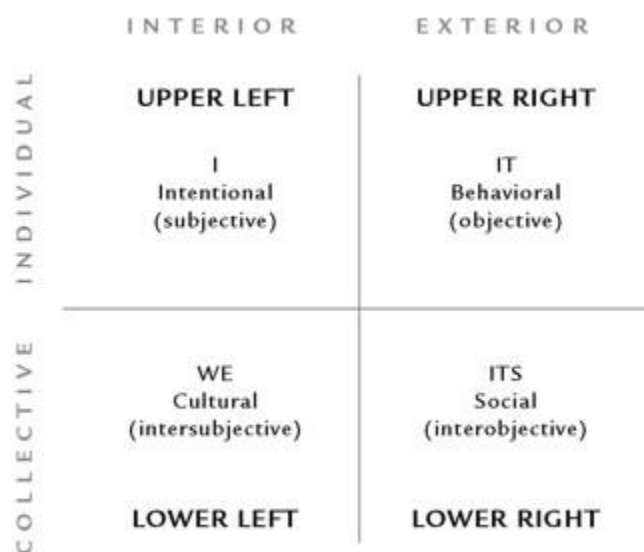


Figure 1: The Four Quadrants in Integral Theory (Esbjorn-Hargens, 2009).

Upper-right quadrant (objective).

In attempting to understand Neurodrumming as mental fitness training for healthy aging through exploring objective aspects of an individual — from the upper-right quadrant perspective — we notice that health and disease both have a biological component. In fact, many of our current efforts toward totality of health are limited only to biological interventions. For example, mental distress is often addressed by simplistically reducing it to neurobiological abnormalities and addressing it with psychoactive drugs (Dasher, 2006). As mental fitness is

influenced by both physical and neurological well-being, an effective treatment model needs to address these areas.

To ensure an effective mental fitness program and sustainable recovery of physical and neurological health, Neurodrumming addresses these areas by emphasizing on physical and neurological aspects that contribute to healthy aging. There are many factors that can contribute to deterioration of cognitive and physical functioning such as genetics, stress, poor nutrition, physical or emotional trauma, and lack of mental and/or physical stimulation as well as environmental factors (Sweeney & Green, 2013). If not rectified, brain chemistry imbalances can begin to accelerate causing a plethora of undesirable physical, emotional, and psychospiritual effects (Schlitz, 2008).

Cultivating mental fitness and the optimization of health is more than just about adding mental exercises to one's daily rituals. Cognitive engagement must include physical engagement in order to optimize brain health and overall human performance. Empirical research has shown that physical and cognitive exercises interact and are synergetic (Gordon, Jaffe & Bresler, 1984). "To explain, we know that both exercise and cognitive stimulation affect the brain itself" (Fernandez et al., 2013.p. 89). For example, both exercise and cognitive stimulation regulate brain chemistry responsible for the enhancement of specific cognitive functioning. The combination of the two has shown to make the brain more receptive to mental training, and may have a direct influence on day-to-day activities (Gordon et al., 1984).

Neurodrumming addresses brain and body exercises by implementing a wide variety of mental and physical strategies that stimulate physical cognitive, emotional, and executive functioning. Furthermore, the program addresses supplementary elements such as fine motor skills, visual stimulation, tactile stimulation, tactile discrimination, auditory stimulation, memory

and recall, oral stimulation, hand-eye coordination in addition to cognitive and physical development.

Upper-left quadrant (subjective).

Exploring Neurodrumming from the upper-left quadrant perspective includes the personal/subjective and phenomenal dimensions of individual consciousness and psychospiritual life. The author agrees with Dasher (2006) in that our psychospiritual life is our most underdeveloped part in western society, even though it is the primary source of epidemics of mental suffering, unanticipated disease, and is the greatest obstacle of human flourishing. Within this context, psychospiritual life refers to all effects involving the mind, body, emotions and spirit as it applies to our health and consciousness. “Consciousness is the driving force that takes us toward integral health and life” (Dasher, 2006, p. 39). Without the awareness of the dimensions of consciousness and the cultivation of a healthy psychospiritual life, individuals cannot be expected to flourish (Schlitz, 2008).

Neurodrumming addresses the individual’s psychospiritual life through the essential elements of a contemplative practice. Both concentrative and non-direct methods of meditation encourages embracing yet transcending the reasoning mind in order to expand one’s capacities which are required to further health and human flourishing (Wallace, 2012; Brewer et al., 2011; Desbordes, 2014). If an individual’s psychospiritual life is not addressed they may continually migrate towards seeking dysfunctional ways to deal with their turbulent inner worlds, ineffective object-relations, and unresolved issues that will continue to be detrimental to their health and wellbeing. Neurodrumming fully acknowledges that mental fitness training requires the development of a psychospiritual life in order to maximize the potential for healthy aging, and personal development.

Lower-left quadrant (intersubjective).

Understanding Neurodrumming from the lower-left quadrant, the “we” space or perspective, includes the intersubjective dimension of the collective. For individuals to develop a healthy and stable sense of self, they need to be in a supportive and knowledgeable social environment. The author agrees with Schlitz (2008) in that unhealthy relationships and low levels of social involvement can be detrimental to one’s health and wellbeing. Relationship can be a major challenge in that they force us to develop our inner and outer life. The intersubjective/interpersonal domain focuses on the nature of the connections between people.

Neurodrumming addresses the need for social engagement by facilitating verbal and nonverbal language that invites trust, deep listening, and respect, as well as limitless creative possibilities through social collaboration. Participants learn how to enhance their capacity through authentic communication by learning ways to appropriately express themselves. Through the implementation of a variety of musical games and collaborative exercises, participants learn to truly engage with others, learn from them and even follow their lead when it is appropriate to do so. They learn to work together as a musical team, which reinforces their understanding of the value of others.

Lower-right quadrant (interobjective).

Exploring Neurodrumming from the lower-right quadrant includes the interobjective perspective of systems, addressing shared objectives such as economic structures, and civic resources as a worldly component (Marquis, 2008). The worldly quadrant includes, but is not limited to, the influence of sedentary lifestyle, work-related stress, environmental limitations, as well as poor access to preventative healthcare. At times, the complexity involved within the dimensions of healthcare can seem overwhelming. With so many interests at stake, and so many

complex relationships between institutions and individuals, there is an underlying need to address the situation with an integral model that supports a shift from a disease-centered approach to one that seeks to build optimal healing environments (Jonas & Chez, 2004). This type of optimal care requires attention to all aspects of an environment.

The author agrees with Moore, (2013) in that real changes in our healthcare community cannot be done by individuals alone. Neurodrumming addresses this need by including a fully integral system that includes support from the home, the workplace, and the individual. For example, the world drumming community includes a global network of systems that is supported in nearly every culture in existence (Redmond, 1997; Winkelman, 2003; Hart & Lieberman, 1991). In the United States for example, it is not difficult to find support of other drummers with the desire to connect through rhythm; whether it be through cultural traditions, musical instructions, therapeutic interventions, or drum circles for wellness, community, connection, and celebration.

There is also an unlimited amount of informational resources available via books publications, instructional DVDs musical CDs as well as other digital outlets to sustain an individual's interest in drumming. Although Neurodrumming is not designed to be culture-specific, or performance based, it does integrate the ability to fully connect into the global network of drummers and resources that support the practice. In other words, it completely embraces the worldly quadrant in many ways, and is not limited to an individual's immediate environment.

Lines of development.

According to Integral Theory, each aspect of the quadrants has distinct capacities that progress developmentally; these are known as lines of development (Esbjörn-Hargens, 2009).

Wilber (2000) has theorized that each person has multiple lines of development, similar to how Howard Gardner's theory of multiple intelligences suggests that we all have the capacity to advance along different lines of intelligence such as musical, kinesthetic, interpersonal, mathematical, and linguistic. Other examples include Daniel Goleman's (1998) research on emotional intelligence and Abraham Maslow's (1943) theory on the hierarchy of needs.

Viewing and quantifying Neurodrumming metaphorically from a lines of development perspective provides easily accessible insight to therapists and clients as to what aspects of the participant's mental fitness program can be improved. From the biological quadrant for example, human life in relation to lines of development can be interpreted as anatomical body, physiological body, mind/body, and spiritual body. These lines show growth and development, as they unfold in progressive stages.

From the psychospiritual quadrant, the author agrees with Dasher (2006) that it is imperative to acknowledge consciousness development from sensorimotor, witness mind (the ability to observe one's mind and its thoughts, feelings, and images), clam-abiding (gaining access to the stillness of the mind), and unity consciousness (a pure state of awareness). Once again, Neurodrumming helps to support lines of development in that it is a contemplative practice that requires deep introspection, mindfulness, and optimal flow (Csikszentmihalyi, 1990) experiences.

From the interpersonal quadrant, Neurodrumming interprets interpersonal growth as a shift from "I" to "us" to "all of us." This shift is supported by the three core phases of the program as listed earlier: 'Find the Rhythm, Repeat the Rhythm, Be the Rhythm.' In the first phase Find the Rhythm, participants are new to the program and are solely coming from an "I" perspective. They are focusing on their own needs, desires, and goals. Once they learn to play

and Repeat the Rhythm, they open themselves up to the group and begin to interact with the rest of the participants and become open to the idea of reaching out to their friends and family as a way to support their new interest. It isn't until the final stage, Be the Rhythm, that the shift can be seen in participant desire to share their new enthusiastic love for the program with others. They usually become much more aware of the global infrastructure that supports the drumming community, and no longer see distance between themselves and others.

From the worldly quadrant (Dacher, 2006), Neurodrumming interprets the lines of development as being survival, creative expression, fulfillment, and service. For example, the survival stage is interpreted as the earlier stage of the program when participants act out of dependency rather than self-reliance, fear rather than confidence, and scarcity rather than abundance (Dasher, 2006). As they gradually progress in development, the world becomes safer to them, and they begin to open up to creative self-expression.

It is at this point that participants begin to contribute to the group as a whole rather than continue to only take what they can. As their contribution to the group increases, so does their appreciation of others as well as the therapist, and those involved with facilitating the program. Gradually they shift from ego-centered to fulfillment and service to others. It is at this point that they often report having a sense of renewed and revitalized sense of health, happiness, and wholeness. Neurodrumming supports these lines of development by facilitating optimal environments where participants can feel safe, encouraged, motivated, and valued.

Levels/stages of development.

Integral Theory works within eight to ten stages or levels of consciousness development; each stage represents a level of complexity (Wilber, 2000, 2005). These are considered to be permanent milestones along the evolutionary path of human development (Wilber, 2016). Within

the interior left-hand quadrants there are levels of depth and within the exterior right-hand quadrants there are levels of complexity (Esbjorn-Hargens, 2009).

Level or stages can be understood within a variety of options such as stages of energy, culture, moral development, or consciousness. Neurodrumming acknowledges these stages as body, mind, and spirit. “The developmental movement from body to mind to spirit is a shift in experience and identity from the realm of the psychical with its emphasis on survival, instinct, and self to the subtler and intangible realm of the mental with its focus on ideas, intentions, and interconnectedness to the more subtle spiritual realm or awareness, wisdom and oneness” (Dasher, 2006, p. 80).

In relation to Neurodrumming for example, the physical body represents the “me” stage, followed by the mind which represent the “us” stage, subsequently inducing the spirit “all of us” stage. This is the same developmental sequence which can be understood as the outer to the inner to the innermost. Since Neurodrumming is a mind/body fitness program, participants have the opportunity to move through these stages of development via their own contemplative practice within the mental fitness training curriculum.

States of consciousness.

“In addition to levels and lines there are also various kind of states associated with each quadrant. States are temporary occurrences of aspects of reality” (Esbjörn-Hargens, 2009, p. 13). Understanding healthy aging from a state perspective may be one of the missing links in contemporary mental fitness programs that attempt to create sustainable treatment protocols. There is in fact considerable experimental evidence demonstrating that the more an individual utilizes their ability to reach higher states of consciousness, such as meditative states, the faster they are able to progress through stages of development (Wilber, 2000, 2006).

Being that Neurodrumming can be facilitated as a contemplative practice, it can be used to introduce participants to a full spectrum of states of consciousness, and bodily experiences such as peak flow experiences, meditative experiences, altered states of consciousness, and so on. As mentioned, states of consciousness are unlike stages of development in that they can be assessed more readily and are not necessarily built upon a predecessor. The Neurodrumming curriculum places a heavy emphasis on concentrative meditation, as well as mindful non-directive meditation, both of which are known to permit access to higher states of consciousness (Wallace, 2012). These types of higher states of training are the hallmark to any integral approach to the totality of any transformation (Wilber, 2000, 2006).

Types.

Types are the variety of consistent styles that arise in various domains and occur irrespective of developmental levels (Esbjorn-Hargens, 2009; Cook-Greuter, 2004). Drawing on a drummer's metaphor, one can think of types as being as many as there are different kinds of drummers—those who like to go fast, those who play slow, those who like to learn lots of new patterns, those who like to stick with just a few, those who love to perform, and those that prefer to play in seclusion and so on. These kinds of people tend to drum like this regardless of what kinds of patterns they are on or what kind of drums they are playing, or even what phase of the program they are moving through; they bring their unique style wherever they go. As with the other elements, types have expressions in all four quadrants.

Neurodrumming acknowledges there are also the gender types of masculine and feminine. In general, individuals have access to both masculine and feminine qualities and thus tend to have a unique combination of traits associated with each type (Esbjorn-Hargens, 2009). The author believes both masculine and feminine distinctions become integrative and individuals

start to befriend both the modes of masculine and feminine when given the opportunity to do so. Neurodrumming supports this belief in that strategies and exercises are specifically created to encourage both types. For example, psychological skill training strategies from sport psychology is used throughout the program to stimulate masculine interests such as peak performance, strength, endurance, independence, mental toughness, mental stamina, autonomy, and self-discipline (Williams, 1993; Ungerleider, 2005; Weinberg & Gould, 2015).

Alternatively, personal empowerment exercises and strategies are used throughout the program to facilitate more feminine qualities such as social collaboration, communion with others, compassion, and fulfillment via interactive musical engagement. This is not to say that each quality is only feminine or masculine, rather the opportunity exists to experience a whole *type* approach to mental fitness training. Understanding the “voice” of the masculine and feminine types allows for the therapist to choose an appropriate therapeutic treatment plan if need be in order to bring that “voice” into healthy balance.

Discussion of Research Findings

The preceding discussion of the five elements of the AQAL model provided an evaluative framework to determine the comprehensiveness of Neurodrumming as a therapeutic intervention for mental fitness training for healthy aging. As mentioned, the AQAL model indicates five lenses or elements; all of which must be considered when attempting to fully understand any aspect of reality (Du Plessis, 2014a). The criteria were listed as the following: all quadrants, all levels, all lines, all states, all types (Wilber, 2000, 2005).

Criteria Investigations

For the first criterion, the author investigated the quadrants in relation to the Neurodrumming protocol. Integral Theory stipulates that reality has at least four universal perspectives, the subjective, intersubjective, objective, and interobjective, (Esbjorn-Hargens et al., 2009; Wilber, 2005). The Neurodrumming protocol is consistent with Dasher (2006) in that these four quadrants acknowledges ways in which human experience expresses itself: psychospiritual, biological, interpersonal and worldly. These quadrants encompass the totality of our inner, outer, personal and shared experiences.

The strength of the Neurodrumming protocol was found to be in the fact that it addresses each quadrant in relation to mental fitness training by including all aspects of an individual's reality. For example, the biological components are addressed through the specificity of altering neurochemistry and physical acuity through movement based contemplative protocol. The psychospiritual component is addressed through a mixture of introspection, meditation, mindfulness and stress reduction which leads to greater self-awareness and flourishing.

The interpersonal component of mental fitness is addressed through strategies that enhance communication, active listening, problem solving, social awareness, self-regulation, responsibility and accountability. Finally, the worldly component is addressed through adhering to an active lifestyle that motivates participants through social collaboration, creativity and leadership. A comprehensive approach to mental fitness training must consider all aspects of a person's reality; Neurodrumming is designed to do exactly that.

Limitations Involving Four Quadrant Perspective

The limitations of Neurodrumming from the four quadrant perspective may be found within each participant's lack of ability to commit and apply the protocol itself. As with any other contemplative practice, a significant amount of time must be spent in practice in order to cultivate the extended benefits. Unfortunately, mental fitness training is often completely overlooked and undervalued by the general public. Biological interventions such as quick fix remedies, therapies and energetic approaches as well as psychoactive drugs are often the preferred choice when it comes to cognitive and emotional maladies. Psychospiritual as well as worldly components are often dismissed when it involves dealing with mental illnesses, or mental health concerns. Consequently, the motivation to cultivate a contemplative practice such as Neurodrumming is often overlooked, leaving many lacking an understanding of the full and wondrous complexity involved in being human.

The second criterion involved the investigation of Lines of Development according to Integral Theory. As mentioned, each aspect of the quadrants has specific capacities that progress developmentally; these are known as lines of development (Esbjörn-Hargens, 2009). The Neurodrumming protocol addresses lines of development from the biological quadrant as human life to be interpreted as anatomical body, physiological body, mind/body, and spiritual body. These lines show growth and development, as they unfold in progressive stages of time. More specifically, Neurodrumming addressed lines of development as treatment, prevention and health promotion. This investigation showed how the Neurodrumming protocol allows for practitioners

and individuals to customize their program based on specific needs and abilities by addressing key factors needed for their totality of health.

From the psychospiritual quadrant, the Neurodrumming protocol acknowledges consciousness development from sensorimotor, witness mind (the ability to observe one's mind and its thoughts, feelings, and images), clam-abiding (gaining access to the stillness of the mind), and unity consciousness (a pure state of awareness). Neurodrumming helps to support lines of development in that it is a contemplative practice that requires deep introspection, mindfulness, and optimal flow (Csikszentmihalyi,1990) experiences. This investigation showed how each phase of the Neurodrumming protocol (Find the Rhythm, Repeat the Rhythm, Be the Rhythm) supports psychospiritual growth and flourishing.

From the interpersonal quadrant, the author has shown that the Neurodrumming protocol interprets interpersonal growth as a shift from "I" to "us" to "all of us." This shift was supported by the three core phases of the program: Find the Rhythm, Repeat the Rhythm, Be the Rhythm. In the first phase Find the Rhythm, participants come from an "I" perspective and are focusing on their own needs, desires, and goals. They then proceed to the second phase, Repeat the Rhythm, and begin to interact with others and embrace reaching out to their friends and family as a way to support their new interest. In the final stage, Be the Rhythm, a shift occurs and participants often share their new enthusiastic love for the program with others. It is at this phase they usually become aware of the global infrastructure that supports the drumming community, and no longer see distance between themselves and others.

From the worldly quadrant, the author investigated how the Neurodrumming protocol interprets the lines of development as being survival, creative expression, fulfillment, and service. As the participants gradually progress in development, the world becomes safer to them,

and they begin to open up to creative self-expression. Participants begin to contribute to the group as a whole, and as their contribution to the group increases, so does their appreciation of others as well as the therapist, and those involved in the program. They then often shift from ego-centered to fulfillment and service to others. Neurodrumming protocol supports these lines of development by providing an enriched learning environment where participants can experience transformational growth.

The third criterion the author investigated from Integral Theory was levels/stages of development. As mentioned, Integral Theory works within eight to ten stages or levels of consciousness development; each stage represents a level of complexity (Wilber, 2000, 2005). These are considered to be permanent milestones along the evolutionary path of human development (Wilber, 2005, 2016). The author's investigation explained that within the interior left-hand quadrant, there are levels of depth and within the exterior right-hand quadrant, there are levels of complexity (Esbjorn-Hargens, 2009).

Level or stages can be understood within a variety of options such as stages of energy, culture, moral development, or consciousness. The Neurodrumming protocol acknowledges these stages as body, mind, and spirit. An example was given as the following: The physical body represents the "me" stage, followed by the mind which represents the "us" stage, subsequently inducing the spirit "all of us" stage. Since Neurodrumming is a mind/body fitness program, participants have the opportunity to move through these stages of development via their own movement based contemplative practice within the mental fitness training curriculum. The author confirmed that Neurodrumming supports level or stages of development by adhering to a contemplative practice outline that addresses an individual's development from outer to the inner to the innermost.

The fourth criterion the author investigated from Integral Theory was states of consciousness. The author posited that understanding healthy aging from a state perspective may be one of the missing links in contemporary mental fitness programs that attempt to create sustainable treatment protocols. Since Neurodrumming can be facilitated as a contemplative practice, it can be used to introduce participants to a full spectrum of states of consciousness, and bodily experiences such as peak flow experiences, meditative experiences, altered states of consciousness, and so on. The Neurodrumming curriculum address states of consciousness by placing a heavy emphasis on concentrative meditation, as well as mindful non-directive meditation, both of which are known to permit access to higher states of consciousness (Wallace, 2012). These types of higher states of training are the hallmark to any Integral Theory approach to the totality of any transformation (Wilber, 2000, 2006).

The fifth criterion the author investigated from Integral Theory was types. Types are the variety of consistent styles that arise in various domains and occur irrespective of developmental levels (Esbjorn-Hargens, 2009; Cook-Greuter, 2004). The author explained types by drawing on the drummer's metaphor as follows: One can think of types as being as many as there are different kinds of drummers—those who like to go fast, those who play slow, those who like to learn lots of new patterns, those who like to stick with just a few, those who love to perform, and those that prefer to play in seclusion and so on. These kinds of people tend to drum like this regardless of what kinds of patterns they are on or what kind of drums they are playing, or even what phase of the program they are moving through; they bring their unique style wherever they go. As with the other elements, types have expressions in all four quadrants.

This investigation showed that the Neurodrumming protocol acknowledges there are also the gender types of masculine and feminine by carefully implementing strategies and exercises

that are specifically created to encourage both types. The author highlighted that psychological skill training strategies from sport psychology are used throughout the program curriculum to stimulate masculine interests such as peak performance, strength, endurance, independence, mental toughness, mental stamina, autonomy, and self-discipline (Williams, 1993; Ungerleider, 2005; Weinberg & Gould, 2015).

Alternatively, personal empowerment exercises and strategies are used throughout the program to facilitate more feminine qualities such as social collaboration, communion with others, compassion, and fulfillment via interactive musical engagement. The Neurodrumming protocol addresses the need for each “voice” of the masculine and feminine types to be utilized. However, limitations with *Types* exist in that practitioners may not be as sensitive to the needs of masculine and feminine voices and therefore risk offering an incomplete program design.

Conclusion

The question addressed in this study was whether Neurodrumming can be seen as a comprehensive intervention as mental fitness training for healthy aging when viewed through the metatheoretical framework (Edwards, 2013) of Integral Theory (Wilber, 2000, 2005). This inquiry represented a meta-theoretical exploration to determine the comprehensive of Neurodrumming as a therapeutic intervention for mental fitness training for healthy aging, by applying the AQAL model as an epistemological framework. This study indicated that Neurodrumming is sufficiently represented when viewed through the lenses of all-quadrants, all-levels, all-lines, all-states, all-types, of the AQAL model. Consequently, it can be concluded that the theory and practice of Neurodrumming can be considered comprehensive according to the evaluative criteria.

This study has also shown that Neurodrumming has immense potential to be used as a promising intervention for health aging, as well as other clinical applications. Although the author of this investigation acknowledges the need for further research involving the Neurodrumming protocol, this particular investigation has contributed to a philosophical understanding of Neurodrumming as mental fitness training. Only a truly Integral Theory approach may be able to adequately address the complexity of mental fitness training for healthy aging, and other populations in need of comprehensive therapeutic intervention.

This study has indicated that Neurodrumming, as an integral approach to mental fitness training, has great potential to cultivate a deeper understanding of what is required for true flourishing of the body, mind and spirit. Perhaps, even more importantly, the study could have significant value in the world, because our understanding of mental fitness training has more than merely scientific and epistemological value — simply put, it is helping to redefine positive mental health and advance our healthcare culture to migrate toward the next quantum leap in health and healing.

Significance of Findings

Limitations of current study.

The results in this study are not intended to mask the complexity of defining, measuring and improving mental fitness. The primary limitation of this study was that it attempted to address a large amount of complex topics within a restricted research format. Other limitations are listed as follows:

- In addition to the inherent challenges of interdisciplinary work, the field of research involving Neurodrumming may have been compromised by the author's subjective bias towards the benefits of the program itself.
- The use of metatheory building and metatheorizing is still a rather unknown form of conceptual research (Edwards, 2008). With this being said, this study attempted to address a large and complex set of topics which may have resulted in some significant factors being overlooked. As of this time, there is lack of formal research methods for carrying out meta-level research. "Metatheorizing can and should be done as a rigorous and methodical research activity and that AQAL metatheory needs to participate in this process if it is to be truly grounded in the scientific tradition" (Edwards, 2013).
- Moreover, the author limited the study by investigating only the criteria from the Ken Wilber's AQAL model. If alternative criteria were used, the study may have led to a different outcome.
- Furthermore, the author acknowledges that limited specificity was given within this study, rendering the need for a more in-depth investigation involving the criteria from Ken Wilber's AQAL model.
- What is more, this investigation requires details about which exercises and strategies are used to address each AQAL criterion; thus, rendering the investigation beyond the scope of this study.

Recommendations for Future Research

There are several recommendations involving future research that could follow on from this study:

- Further research investigations involving the *Neurodrumming* protocol and mental fitness improvement in relation to health-related quality of life (HRQOL) measurements. As well as further research involving Neurodrumming Therapeutics treatment protocol for Alzheimer/dementia care. For example, this may involve reliable scales such as Quality of life (QOL) or DEMQOL or other reliable measurement scales.
- Investigations into whether Neurodrumming helps to prevent cognitive decline and/or provides reversal of cognitive decline via use of neurotechnology such as functional magnetic resonance imaging (fMRI) scans and along with complete psychiatric evaluations could prove to be potentially highly valuable toward Alzheimer/Dementia research.
- Further investigation involving the relationship between Neurodrumming and each criterion of the AQAL model.
- Systematic investigations involving attributes and qualities of the Neurodrumming program through pilot studies and randomized clinical trials involving a variety of populations is highly recommended.

References

- Abuhamden, S., & Csikszentmihalyi, M. (2012). The importance of challenge for the enjoyment of intrinsically motivated, goal-directed activities. *Personality and Social Psychology Bulletin*, 38, 317-330. doi:10.1177/0146167211427147.
- Amen, D. (2010). *Change your brain, change your life: Use your brain to keep the body you've always wanted*. New York: Three Rivers Press.
- Amen, D. (2012). *Use your brain to change your age: Secrets to look, feel, and think younger every day*. New York: Crown Publishing Group.
- Barbezat, D., P., & Bush, M. (2014). *Contemplative practices in higher education: Powerful methods to transform teaching and learning*. San Francisco, CA: Jossey-Bass.
- Barron, K. E., & Harackiewicz, J. M. (2001). Achievement goals and optimal motivation: A multiple goals approach. In C. Sansone & J.M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp.229-254). New York: Academic Press.
- Barz, G., & Cohen, J. M. (2011). *The culture of AIDS in Africa: hope and healing through music and the arts*. New York: Oxford University Press.
- Başar, E. (2013). Brain oscillations in neuropsychiatric disease. *Dialogues in Clinical Neuroscience*, 15(3), 291–300.
- Begley, S. (2007). *Train your mind change your brain: How a new science reveals our extraordinary potential to transform ourselves*. New York: Ballantine Books.
- Berger, J., & Turow, G. (2011). *Music, science and the rhythmic brain: Cultural and clinical implications*. Abingdon, Oxon: Routledge.

- Berridge, K. C., & Kringelbach, M. L. (2008). Affective neuroscience of pleasure: reward in humans and animals. *Psychopharmacology*, 199, 457-480. doi:10.1007/s00213-008-1099-6.
- Bickart, K. C., Wright, C. I., Dautoff, R. J., Dickerson, B. C. & Barrett, L. F. (2011). Amygdala volume and social network size in humans. *Nature Neuroscience*, 14, 163-164, doi: 10.1038/nn.2724.
- Brewer, J. A., Worhunsky, P. D., Gray, J. R., Tang, Y. Y., Weber, J., & Kober, H. (2011). Meditation experience is associated with differences in default mode network activity and connectivity. *Proceedings of the National Academy of Sciences*, 108, 20254–20259. doi: 10.1073/pnas.1112029108.
- Brower, V. (2006). Mind–body research moves towards the mainstream. *EMBO Reports*, 7(4), 358–361. Retrieved from <http://doi.org/10.1038/sj.embor.7400671>.
- Buschkuehl, M., Jaeggi, S. M., & Jonides, J. (2012). Neuronal effects following working memory training. *Developmental Cognitive Neuroscience*, 2, S167-S179. Retrieved from <http://dx.doi.org/10.1016/j.dcn.2011.10.001>.
- Buzsáki, G. (2006). *Rhythms of the brain*. Oxford University Press. Retrieved from <http://www.caam.rice.edu/~yad1/miscellaneous/References/Neuroscience/Papers/Hippocampus/RythmsOfTheBrainBuszaki.pdf>.
- Carlson, M.C. (2011). *Promoting healthy, meaningful aging through social involvement: building an experience corps*. Retrieved from <http://dana.org/Cerebrum/Default.aspx?id=39463>.

- Carlson, M.C., Erickson, K.I., Kramer, A. F., Voss, M. W., Bolea, N., Mielke, M., et al. (2009). Evidence for neurocognitive plasticity in at risk older adults: The experience corps program. *Journals of Gerontology Series A: Biological Sciences of Medical Sciences*, 64 (12), 1275-1282.
- Cash, S. S., & Hochberg, L. R. (2015). The emergence of single neurons in clinical neurology. *Neuron*, 86(1), 79–91. Retrieved from <http://doi.org/10.1016/j.neuron.2015.03.058>.
- Centre for Disease Control and Prevention (2016). *Health-related quality of life (HRQOL)*. Retrieved from <https://www.cdc.gov/hrqol>.
- Clynes, M. (1982). *Music, Mind, and Brain: The Neuropsychology of Music*. Boston, MA: Springer US Imprint Springer.
- Cook-Greuter, S. (2004). *Industrial and commercial training: Making a case for a developmental perspective*. Wayland, MA: Emerald Group Publishing Limited.
- Cook-Greuter, S. (2013). Assumptions versus assertions: Separating hypotheses from truth in the integral community. *Journal of Integral Theory and Practice*, 8(3&4), 227-236.
- Corrigan, P. W., & Watson, A. C. (2002). Understanding the impact of stigma on people with mental illness. *World Psychiatry*, 1(1), 16–20.
- Corrigan, P. (2004). How stigma interferes with mental health care. *American Psychologist*, Vol 59(7), Oct 2004, 614-625. doi:10.1037/0003-066X.59.7.614.
- Cossellu, M. (2014). Western and Indian theories of consciousness confronted: A comparative overview of continental and analytic philosophy with Advaita Vedanta and Madhyamaka Buddhism. *Gothenburg University Library*. Retrieved from https://gupea.ub.gu.se/bitstream/2077/34915/1/gupea_2077_34915_1.pdf.

- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper Perennial.
- Cusack, S., & Thompson, W. (2005). *Mental fitness for life: 7 steps to healthy aging*. Boulder, Colorado: Bull Publishing Company.
- Dacher, E. (2006). *Integral health: The path to human flourishing*. Laguna Beach, CA: Basic Health Publications, Inc.
- Davidson, R. J., & Begley, S. (2012). *The emotional life of your brain: How its unique patterns affect the way you think, feel, and live-and how you can change them*. London, England: Plume Printing.
- DCRC, (2016). Dementia specific health related quality of life measures. Retrieved from <http://www.dementia-assessment.com.au/quality>.
- Deci, E. L., & Ryan, R. M. (2009). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11 (4), 227-268. Retrieved from http://dx.doi.org/10.1207/S15327965PLI1104_01.
- Desbordes, G., Gard, T., Hoge, E. A., Hölzel, B. K., Kerr, C., Lazar, S. W. et al. (2015). Moving beyond mindfulness: defining equanimity as an outcome measure in meditation and contemplative research. *Mindfulness*, 6, 356-372. doi: 10.1007/s12671-013-0269-8.
- Didonna, F. (2009). *Clinical Handbook of Mindfulness*. New York, NY: Springer. doi: 10.1007/978-0-387-09593-6.
- Dimeo, F., Bauer, M., Varahram, I., Proest G., & Halter, U. (2001) Benefits from aerobic exercise in patients with major depression: A pilot study. *British Journal of Sports Medicine*; 35:114-117 doi:10.1136/bjism.35.2.114.

- Dirksen, R. (2012). Reconsidering theory and practice in ethnomusicology: Applying, advocating, and engaging beyond academia. *Ethnomusicology Review*, 17. Retrieved from <http://ethnomusicologyreview.ucla.edu/journal/volume/17/piece/602>.
- Doidge, N. (2007). *The brain that changes itself: stories of personal triumph from the frontiers of brain science*. USA: Viking Press.
- Doidge, N. (2016). *The brains way of healing: remarkable discoveries and recoveries from the frontiers of neuroplasticity*. USA: Penguin Group.
- Dupuy, J., & Morelli, M., (2007). Towards an integral recovery model for drug and alcohol addiction. *AQAL: Journal of Integral Theory and Practice* 2.3 (2007): 26-42. Retrieved from http://www.if.integralesforum.org/fileadmin/user_upload/FACHGRUPPEN/FG_imove/downloads/INTEGRALRECOVERY_071907.pdf.
- Du Plessis, G. P. (2012). Toward an Integral Model of addiction: By means of integral methodological pluralism as a metatheoretical and integrative conceptual framework. *Journal of Integral Theory and Practice*, 7(3), 1-24.
- Du Plessis, G. P. (2013). The Import of Integral Pluralism in Striving Towards an Integral Metatheory of Addiction. *Third Biennial Integral Theory Conference*, CA: San Francisco, 20 July, 2013.
- Du Plessis, G. P. (2014a). Towards an Integral Metatheory of Addiction. Master Dissertation. University of South Africa.
- Du Plessis, G. P. (2014b). An Integral Ontology of Addiction: A multiple object existing as a continuum of ontological complexity. *Journal of Integral Theory and Practice*, 9(1), 38–54.

- Edwards, M. (2008). Where is the method to our integral madness? An outline for integral meta-studies. *Journal of Integral Theory and Practice*, 3 (2), 165-194.
- Edwards, M. (2008). Evaluating integral metatheory: An Exemplar Case and a Defense of Wilber's Social Quadrant. *Journal of Integral Theory and Practice*, 3(4), 61-83.
- Edwards, M. (2010). *Organizational transformation for sustainability: An integral metatheory*. New York: Routledge.
- Edwards, M. (2013). Towards an integral meta-studies: Describing and transcending boundaries in the development of big picture science. *Integral Review*. Vol.9, No. 2.
- Engvig, A., Fjell, A. M., Westlye, L. T., Moberget, T., Sundseth, Ø., Larsen, V. A., & Walhovd, K. B. (2010). Effects of memory training on cortical thickness in the elderly. *Neuroimage*, 52(4), 1667-1676.
- Erdmann, M. (2014). Ken Wilber's blind spot: A giant deluded in his seeing, dazed by the simple feeling of being. Retrieved from <http://www.integralworld.net/erdmann8.html>.
- Eriksson, P. S., Perfilieva, E., Björk-Eriksson, T., Alborn, A. M., Nordborg, C., Peterson, D. A., & Gage, F. H. (1998). Neurogenesis in the adult human hippocampus. *Nature medicine*, 4(11), 1313-1317.
- Esbjörn-Hargens, S. (2006). Integral research: A multimethod approach to investigating phenomena. *Constructivism and the Human Sciences*, 11(1), 79-107.
- Esbjörn-Hargens, S. (2009). *An all-inclusive framework for the 21st century and overview of integral theory*. Retrieved from <https://integrallife.com/integral-post/overview-integral-theory>.
- Esbjörn-Hargens, S. & Zimmerman, M. E. (2009). *Integral ecology: Uniting multiple perspectives on the natural world*. New York: Integral Books.

- Esbjorn-Hargens, S. (2010). *Integral theory in action: Applied, theoretical, and constructive perspectives of the AQAL model*. New York, NY: State University New York Press.
- Etnier, J.L., Nowell, P.M., Landers, D.M., & Sibley, B.A. (2006). A meta-regression to examine the relationship between aerobic fitness and cognitive performance. *Brain Research Reviews*, 52, 119–130.
- Fernandez, A., Goldberg, E & Michelon, P. (2013). *The SharpBrains Guide to Brain Fitness*. CPSIA. US: SharpBrains Inc.
- Fotuhi, M., & Antoniadis, C. B. (2013) *Boost your brain: The new art and science behind enhanced brain performance*. USA: HarperCollins Publishers.
- Fries, J. F., Koop, C. E., Beadle, C. E., Cooper, P. P., England, M. J., Greaves, R. F., & Wright, D. (1993). Reducing health care costs by reducing the need and demand for medical services. *New England Journal of Medicine*, 329(5), 321-325.
- Fredrickson, B. (2009). *Positivity*. New York, NY: Crown Publishing.
- Fredrickson, B. L., & Joiner, T. (2002). Positive Emotions Trigger Upward Spirals toward Emotional Well-Being. *Psychological Science*, 13(2), 172-175. Retrieved from <http://www.jstor.org/stable/40063861>.
- Freidman, R. L. (2000). *The healing power of the drum: A psychotherapist explores the healing power of rhythm*. Oakland, CA: White Cliffs Media Co.
- Geiser, E., Kerry, M., Walker, M., Bendor, D. (2014). Global timing: a conceptual framework to investigate the neural basis of rhythm perception in humans and non-human species. *Front. Psychol.* doi: 10.3389/fpsyg.2014.00159.
- Goleman, D. (1998). *Working with emotional intelligence*. New York, USA: Batam Books.

- Goleman, D. (2003). *Healing emotions: Conversations with the Dalai Lama*. Boston, MA: Shambhala Publications.
- Gordon, J., Jaffe, D., & Bresler, D. (1984) *Mind, body, and health: toward an integral medicine*. Human Sciences Pr.
- Gross, A. L., Parisi, J. M., Spira, A. P., Kueider, A. M., Ko, J. Y., Saczynski, J. S., & Rebok, G. W. (2012). Memory training interventions for older adults: A meta-analysis. *Aging & Mental Health*, 16(6), 722–734. Retrieved from <http://doi.org/10.1080/13607863.2012.667783>.
- Guy, J., & Neve, A. (2005). *Music therapy, alzheimer's disease & dementia fact sheet*. San Diego, CA: The Music Therapy Center of California.
- Harman, W. (1994). The scientific exploration of consciousness: Towards an adequate epistemology. *Journal of Consciousness Studies* 1 (1), pp. 140–148.
- Hart, M., & Lieberman, F. (1991). *Planet drum: A celebration of percussion and rhythm*. Petuluma, CA: Harpercollins Publications.
- Hasenkamp, W., & Barsalou, L. W. (2012). Effects of meditation experience of functional connectivity of distributed brain networks. *Frontiers in Human Neuroscience*, 6, 38. doi:10.3389/fnhum.2012.00038.
- Hertzog, C., Kramer, A.F., Wilson, R.S., & Lindenberger, U. (2008). Enrichment effects on adult cognitive development: Can the functional capacity of older adults be preserved and enhanced? *Psychology Science Public Interest*, 9(1), 1-65. doi: 10.1111/j.1539-6053.2009.01034.x.
- Hinshaw, S. P. (2007). *The mark of shame: stigma of mental illness and an agenda for change 1st edition*. New York, NY: Oxford University Press.

- Hinshaw, S. P. (2008). *Breaking the silence: Mental health professionals disclose their personal and family experiences of mental illness*. New York, NY: Oxford University Press.
- Huppert, F. A., & So, T. T. C. (2013). Flourishing across Europe: Application of a new conceptual framework for defining well-being. *Social indicators research*, 110(3), 837–861. Retrieved from <http://doi.org/10.1007/s11205-011-9966-7>.
- Isaacson, R. (2012) *The limbic system*. New York, NY: Springer Publishing.
- Jaccard, J., & Jacoby, J. (2009). *Theory construction and model-building skills: A practical guide for social scientists*. New York, NY: Guildford Publications, Inc.
- Jahnke, R., Larkey, L., Rogers, C., Etnier, J., & Lim, F. (2010). Comprehensive Review of Health Benefits of Qigong and Tai Chi. *American Journal of Health Promotion*, 24, 6, e1-e25.
- Jané-Llopis E., Hosman C., Jenkins R., & Anderson P. (2003). Predictors of efficacy in depression prevention programs. *British Journal of Psychiatry*, 183, 384-397. doi: 10.1192/bjp.183.5.384.
- Jou, T. H., and Shapiro, S. (1983). *The Tao of Tai Chi Chuan: Way to Rejuvenation*. Rutland, VT: C.E. Tuttle Company.
- Jedrziwski, M. K., Lee, V. M.-Y., & Trojanowski, J. Q. (2007). Physical activity and cognitive health. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 3(2), 98–108.
- Jin, P. (1992). Efficacy of Tai Chi, brisk walking, meditation, and reading in reducing mental and emotional stress. *Journal of Psychosomatic Research*, 36(4), 361-37.
- Jonas, W. B., & Chez, R. A. (2004). Toward optimal healing environments in health care. *J Altern Complement Med*. 2004, 10, S1-6.

- Kabat-Zinn, J., Lipworth, L., Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal of Behavioral Medicine*, 8, (2), 163-190.
- Kazdin, A. E. (2010). *Research design in clinical psychology*. (4thed.) Pearson Publishing.
- Kezdin, A. E. (2015). *Methodological issues and strategies in clinical research*. (4thed.) American Psychological Association (APA).
- Kempermann, G., Gast, D., & Gage, F. H. (2002). Neuroplasticity in old age: Sustained fivefold induction of hippocampal neurogenesis by long-term environmental enrichment. *Annals of Neurology*, 52(2), 135-143.
- Kerr, C. E., Sacchet, M. D., Lazar, S.W., Moore, C. I., & Jones, S. R. (2013). Mindfulness starts with the body: somatosensory attention and top-down modulation of cortical alpha rhythms in mindfulness meditation. *Frontiers in Human Neuroscience*. Retrieved from <http://dx.doi.org/10.3389/fnhum.2013.00012>.
- Keyes, C (2007). Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. *American Psychologist*, 62(2), 95–108.
- Korb, A. (2015). *The upward spiral: Using neuroscience to reverse the course of depression one small change at a time*. Oakland, CA: New Harbinger Publications, Inc.
- Kramer, A. F., Erickson, & Colcombe. (2006). Exercise, cognition, and the aging brain. *Journal of Applied Physiology*, 101(4), 1237-1242.
- Kramer, A.F., Hahn, S., Cohen, N.J., Banich, M.T., McAuley, E., Harrison, C.R., Chason, J., Vakil, E., Bardell, L. & Colcombe, A. (1999). Aging, fitness, and neurocognitive function. *Nature*, 400, 418-519.
- Knutson, A. L. (1963). New perspectives regarding positive mental health. *American Psychologist*, 18, 300-306.

- Krueger, K.R., Wilson, R. S., Kamenetsky, J. M., Barnes, L. L., Bienias, J. L., & Bennet, D. A., (2009). Social engagement and cognitive function in old age. *Experimental gaining research*, 35 (1), 45-60.
- Lan, C., Lai, J. S., Chen, S. Y., & Wong, M. K. (1998). 12-month Tai Chi training in the elderly: its effect on health fitness. *Medicine and Science in Sports and Exercise*, 30(3), 345-351.
- Landau, S. M., & D'esposito, M. (2006). Sequence learning in pianists and nonpianists: An fMRI study of motor expertise. *Cognitive Affective & Behavioral Neuroscience*, 6(3), 246 – 259. doi:10.3758/cabn.6.3.246.
- Lautin, A. L. (2001). *The limbic brain*. New York, NY: Springer Publishing.
- Levitin, D. J., Chordia, P., & Menon, V. (2012). Musical rhythm spectra from Bach to Joplin obey a 1/f power law. *Proceedings of the National Academy of Sciences of the United States of America*, 109(10), 3716–3720. Retrieved from <http://doi.org/10.1073/pnas.1113828109>.
- Levitin, D. J. (2007). *This is your brain on music. The science of a human obsession*. New York, NY: Penguin Publishing.
- Loizzo, J. (2014). Meditation research, past, present, and future: perspectives from the Nalanda contemplative science tradition. *Annals of New York Academy of Science*, 1307: 43–54. doi:10.1111/nyas.12273.
- Lynn-Seraphine, P. (2013). *The drummer's manifesto: Empowering your musical brain for optimal health*. Los Angeles, CA:Global Reach Media.
- Manes, E. (2013). *The power of music: Pioneering discoveries in the new science of song*. New York, NY: Walker Publishing Company.

- Mahncke, H. W., Bronstone, A., & Merzenich, M. M. (2006). Brain plasticity and functional losses in the aged: scientific bases for a novel intervention. *Progress in Brain Research*, Vol. 157. ISSN 0079-6123.
- Marchland, W. R. (2012). Mindfulness-based stress reduction, mindfulness-based cognitive therapy, and Zen meditation for depression, anxiety, pain, and psychological distress. *Journal of Psychiatric Practice*. 18, 233-52. doi: 10.1097/01.pra.0000416014.53215.86
- Marquis, A. (2009). An Integral taxonomy of therapeutic interventions. *Journal of Integral Theory & Practice*, 4(2), 13-42.
- Mather, M., Jacobsen, L. A., & Pollard, K. M. (2015). Aging in the United States. *Population Bulletin*, 70.
- Minnesota Department of Health. (2006). *Creating Healthy Communities for an Aging Population*. Community and Family Health Division. Retrieved from <http://www.health.state.mn.us/divs/orhpc/pubs/healthyaging/hareportnofs.pdf>.
- Mogenson, G. J., Jones, D. L., & Chi YiuYim, (1980). From motivation to action: Functional interface between the limbic system and the motor system. *Progress in Neurobiology*, 14, 69-97.
- Molinari, M., Leggio, M. G., De Martin, M., Cerasa, A., & Thaut, (2003). Neurobiology of rhythmic motor entrainment. *Annals of New York Academy of Sciences*, 999, 313-2.
- Murray, T. (2009). What is the integral in integral education? From progressive pedagogy to integral pedagogy. *Integral Review*, 5(1).
- Nozaradan, S. (2014). Exploring how musical rhythm entrains brain activity with electroencephalogram frequency-tagging. *Philosophical Transactions Biological Sciences*, 369, 20130393. doi: 10.1098/rstb.2013.0393.

- Nguyen, L. T., Davis, R. B., Kaptchuk, T. J., & Phillips, R. S. (2011). Use of complementary and alternative medicine and self-rated health status: results from a national survey. *Journal of General Internal Medicine*, 26(4), 399–404. Retrieved from <http://doi.org/10.1007/s11606-010-1542-3>.
- Ortman, J. M., Velkoff, V. A., & Hogan, H. (2014). *An aging nation: The older population in the United States*. Retrieved from <https://www.census.gov/prod/2014pubs/p25-1140.pdf>.
- Patel, D., Iversen J. R. (2014). The evolutionary neuroscience of musical beat perception: the action simulation for auditory prediction (ASAP) hypothesis. *Frontiers in Systems Neuroscience*, 8, 57, doi:10.3389/fnsys.2014.00057.
- Payne, P., and Crane-Godreau, M. A. (2013). Meditative movement for depression and anxiety. *Frontiers in Psychiatry*, 4, 71. doi:10.3389/fpsy.2013.00071.
- Phillips-Silver, J., Aktipis, C. A., & Bryant, G. A. (2010). The ecology of entrainment: Foundations of coordinated rhythmic movement. *Music Perception*, 28(1), 3–14. Retrieved from <http://doi.org/10.1525/mp.2010.28.1.3>.
- Pettan, S., & Titon, J. T. (2015). *The Oxford Handbook of Applied Ethnomusicology*. Oxford University Press.
- Rahe, J., Petrelli, A., Kaesberg, S., Fink, G. R., Kessler, J., & Kalbe, E. (2015). Effects of cognitive training with additional physical activity compared to pure cognitive training in healthy older adults. *Clinical Interventions in Aging*, 10. doi:10.2147/CIA.S74071.
- Redmond, L. (1997). *When women were drummer's: A spiritual history of rhythm*. New York, NY: Three Rivers Press.
- Robinson, P., Oades, L. G., & Caputi, P. (2015). Conceptualizing and measuring mental fitness: A Delphi study. *International Journal of Wellbeing*, 5(1), 53-73. doi:10.5502/ijw.v5i1.4.

- Ross, A., & Thomas, S. (2010). The health benefits of yoga and exercise: a review of comparison studies. *The Journal of Alternative and Complementary Medicine*, 16(1), 3-12.
- Ross, C. L. (2009). Integral Healthcare: the benefits and challenges of integrating complementary and alternative medicine with a conventional healthcare practice. *Integrative medicine insights*, 4, 13.
- Rowe, J., & Kahn, R. (1998). *Successful aging*. New York: Pantheon/Random House.
- Schlitz, M. M. (2008). The Integral model: Answering the call for whole systems health care. *The Permanente Journal*, 12(2), 61–68.
- Schneider, E. L., & Guralnik, J. M. (1990). The Aging of America: Impact on Health Care Costs. *JAMA*, 263(17), 2335-2340. doi:10.1001/jama.1990.03440170057036.
- Schwartz, J., & Begley, S. (2003). *The mind and the brain: Neuroplasticity and the power of mental force*. New York, NY: HarperCollins Publishers.
- Shaffer, J. (2012). Neuroplasticity and positive psychology in clinical practice: A review for combined benefits psychology. *PSYCH*, 3(12A), 1110-1115. doi: 10.4236/psych.2012.312A164.
- Shapiro, D., & Walsh, R. (2009). *Meditation: classic and contemporary perspectives*. Co., New York: Adline Pub.
- Siddiqui, S. V., Chatterjee, U., Kumar, D., Siddiqui, A., & Goyal, N. (2008). Neuropsychology of prefrontal cortex. *Indian Journal of Psychiatry*, 50(3), 202–208. Retrieved from <http://doi.org/10.4103/0019-5545.43634>.
- Siegel, D. (2007). *The mindful brain. reflection and attunement in the cultivation of well-being*. New York. NY: W.W Norton & Company, Inc.

- Sheehan, B. (2012). Assessment scales in dementia. *Therapeutic Advances in Neurological Disorders*, 5(6), 349–358. Retrieved from <http://doi.org/10.1177/1756285612455733>.
- Shenhav, A., Botvinick, M., & Cohen, J. (2013). The expected value of control: an integrative theory of anterior cingulate cortex function. *Neuron* 79(2), 217-240. doi: 10.1016/j.neuron.2013.07.007.
- Shuttleworth, M. (Oct 24, 2008). *What is a paradigm?* Retrieved Jul 06, 2016 from Explorable.com: <https://explorable.com/what-is-a-paradigm>.
- Spoor, & Swift G. W. (2000). The Huygens entrainment phenomenon and thermosacoustic engines. *J Acoust Soc Am*. 108(2), 588-99.
- Small, G., & Vorgan, G. (2012). *The Alzheimer's prevention program: Keep your brain healthy for the rest of your life*. New York, NY: Workman Publishing.
- Stewart, K. J. (2005). Physical activity and aging. *Annals of the New York Academy of Sciences*, 1055(1), 193-206.
- Sweeney, M., & Green, C. R. (2013). *National geographic complete guide to brain health: How to stay sharp, improve memory and boost creativity*. National Geographic Society.
- Teng, S. C. & Lien, Y. W. (2016). What Confucius practiced is good for your mind: Examining the effect of a contemplative practice in Confucian tradition on executive functions. *Conscious Cognition*, 42, 204-215. doi: 10.1016/j.concog.
- Teper, R., Inzlicht, M. (2012). Meditation, mindfulness and executive control: The importance of emotional acceptance and brain-based performance monitoring. *SocCogn Affect Neurosci*, 8(1), 85-92.

- Teresi, L., & Haroutunian, H. (2011) *Hijacking the brain. How drug and alcohol addiction hijacks our brains the science behind twelve-step recovery*. Bloomington, IN: AuthorHouse, LLC.
- Thaut, M. H. (2003). Neural basis of rhythmic timing networks in the human brain. *Annals of New York Academy of Sciences*, 999, 364–373. doi:10.1196/annals.1284.044.
- Thaut, M. H., McIntosh, G. C., & Hoemberg, V. (2014). Neurobiological foundations of neurologic music therapy: rhythmic entrainment and the motor system. *Frontiers in Psychology*, 5, 1185. Retrieved from <http://doi.org/10.3389/fpsyg.2014.01185>.
- Ungerleider, S. (2005). *Mental training for peak performance: Top athletes reveal the mind exercises they use to excel*. USA: Holtzbrinck Publishers.
- Varela, F. J., Thompson, E., and Rosch, E. (1991). *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: MIT Press.
- Vance, D. E., Roberson, A. J., McGuinness, T. M. & Fazeli, P.L. (2010). How neuroplasticity and cognitive reserve protect cognitive functioning. *Journal of Psychosocial Nursing and Mental Health Service*, 48(4), 23-30.
- Viorica, M., Chabal, S., Bartolotti, J., Bradley, K., Hernandez, A. E. (2014). Differential recruitment of executive control regions during phonological competition in monolinguals and bilinguals. *Brain & Language*, 139, 108–117.
- Visser, Frank. (2003). *Ken Wilber: Thought as passion*. Albany, NY: SUNY Press.
- Wang, H. X., Karp, A., Winblad, B., & Fratiglioni, L. (2002) Late-life engagement in social and leisure activities is associated with a decreased risk of dementia: A longitudinal study from the Kungsholmen project. *Am J Epidemiol*, 155, 1081–1087. doi: 10.1093/aje/155.12.1081.

- Wallace, B., A. (2012). *Meditations of a buddhist skeptic: A manifesto for the mind sciences and contemplative practice*. New York, NY: Columbia University Press.
- Weinberg, R. S., & Gould, D. (2015). *Foundations of sport exercise psychology*. (6thed.). Champaign, IL: Human Kinetics.
- Weuve, J., Kang, J., Manson, J. E., Breteler, M. M. B., Ware, J.G., & Grodstein, F. (2004). Physical activity, including walking, and cognitive function in older women. *Journal of the American Medical Association*, 292(12), 1454–1461. doi:10.1001/jama.292.12.1454.
- White-Schwoch, T., Carr, K. W., Anderson, S., Strait, D. L., & Kraus, N. (2013). A commentary on older adults benefit from music training early in life: biological evidence ‘for long term training-driven plasticity. *Neurosci*. 33, 17667–17674. doi:10.1523/JNEUROSCI.2560-13.2013.
- Wilber, K. (1997). An integral theory of consciousness. *Journal of Consciousness Studies*, 4(1), pp. 71-92.
- Wilber, K. (2001). *A brief history of everything*. 2nd edition. Boston, M.A.: Shambhala Publications.
- Wilber, K. (2000). *Integral psychology: Consciousness, spirit, psychology, therapy*. Shambhala Publications.
- Wilber, K. (2005). Introduction to Integral Theory and practice: IOS basic and the AQAL Map. *Journal of Integral Theory and Practice*. Retrieved from <http://in.integralinstitute.org/pdf/E122CFD2-03E0-40e1-BA1D-B2A37D2E216E.pdf>.
- Wilber, K. (2007). *Integral spirituality: A startling new role for religion in a modern and postmodern world*. Boston MA: Shambhala Publications.

- Wilber, K. (2016). *Integral Meditation: Mindfulness as a path to grow up, wake up, and show up in your life*. Boulder, Colorado: Shambhala Publications, Inc.
- Williams, J. M. E. (1993). *Applied sport psychology: Personal growth to peak performance*. Mayfield Publishing Co.
- Williams, K., & Kemper, S. (2010). Exploring interventions to reduce cognitive decline in aging. *Journal of Psychosocial Nursing and Mental Health Services*, 48(5), 42–51. doi.org/10.3928/02793695-20100331-03.
- Winkelman, M. (2003). Complementary Therapy for Addiction: “Drumming Out Drugs.” *American Journal of Public Health*, 93(4), 647–651.
- Wolsko, P. M., Eisenberg, D. M., Davis, R. B., & Phillips, R. S. (2004). Use of mind–body medical therapies: results of a national survey. *Journal of General Internal Medicine*, 19(1), 43–50. Retrieved from <http://doi.org/10.1111/j.1525-1497.2004.21019.x>.
- Woods-Giscombé, C. L., & Black, A. R. (2010). Mind-body interventions to reduce risk for health disparities related to stress and strength among African American women: The potential of mindfulness-based stress reduction, loving-kindness, and the NTU therapeutic framework. *Complementary Health Practice Review*, 15(3), 115–131. Retrieved from <http://doi.org/10.1177/1533210110386776>.
- World Health Organization. (2001). *The world health report 2001: Mental health: new understanding, new hope*.
- Wright, P. A. (1991). Rhythmic Drumming in Contemporary Shamanism and Its Relationship to Auditory Driving and Risk of Seizure Precipitation in Epileptics. *Anthropology of Consciousness*, 2, 7–14. doi:10.1525/ac.1991.2.3-4.7.

Yasuo, Y. (1987). *The body: Toward an eastern mind body theory*. New York; NY: State University of New York Press.

Zuk, J., Benjamin, C., Kenyon, A., & Gaab, N. (2014). Behavioral and neural correlates of executive functioning in musicians and non-musicians. *PLoS ONE*, 9(6). doi:10.1371/journal.pone.0099868.