Senior Living Residents’ Perceptions of the Boost Your Brain & Memory Program

Catherine O'Brien, PhD, MPH; Roscoe Nicholson, MA

ABSTRACT

This article provides an evaluation of senior living residents’ perceptions of Boost Your Brain & Memory, a multidimensional program designed to promote cognitive health through lifestyle factors. The program was implemented in 12 senior living communities in the U.S. Results indicate that the program increased participants’ knowledge and motivation to participate in behaviors associated with cognitive health, and increased their optimism and confidence related to memory.
INTRODUCTION

For many years, it was thought that Alzheimer’s disease (AD) was largely a result of an individual’s genetic makeup, and nothing could be done to reduce one’s risk. More recently there has been increasing recognition of the value of studying lifestyle factors and their potential relationship to dementia. To better understand the potential impact of modifiable behaviors on cognitive decline and AD, the National Institutes of Health (NIH) brought together a 15-member panel of experts representing medicine, public health, neurology, health services research, and related fields (Daviglus et al., 2010). The committee relied in part on a systematic review of potential risk factors for cognitive decline and AD prepared by the Duke University Evidence-based Practice Center (EPC) for the Agency for Healthcare Research and Quality (AHRQ) (Williams, Plassman, Burke, Holsinger, & Benjamin, 2010). The review examined evidence for associations between cognitive outcomes and a wide range of modifiable behaviors, including exercise, cognitive engagement, nutritional/dietary intake, social engagement, and others. Differences in methodology and inconsistency in measurement, among other factors, led them to conclude that more evidence for the impact of lifestyle on dementia risk was needed, yet there was also sufficient basis for them to call for additional higher quality research, particularly intervention studies, to examine potential risk and protective factors for cognitive outcomes.

In the five years since the 2010 statement, research in this area has continued at a fast pace, with new studies adding to the growing body of evidence that suggests much of the risk of dementia is due to lifestyle behaviors. Recently, a study from the University of Cambridge suggested that one in three cases of AD worldwide could be attributed to modifiable behavioral factors, such as physical activity and education (Norton, Mathews, Barnes, Yaffe, & Brayne, 2014). Meanwhile, a number of highly anticipated clinical trials failed to demonstrate the efficacy of medication on slowing cognitive decline. Although better medications may be on the horizon, the magnitude of the problem and the absence of effective treatment options suggest use of a multipronged approach to this problem. At the 2012 Alzheimer’s Disease Summit, one of the key recommendations called for the implementation of behavioral, lifestyle, and environmental interventions along with pharmacological treatments to maximize the potential for benefit (National Institute on Aging, 2012). Thus, the most promising strategy may include both pharmacological research and behavioral strategies that can promote cognitive health and delay onset of AD symptomatology. The research described in this article addresses the behavioral component of that recommendation by evaluating Boost Your Brain & Memory, a multipronged educational intervention designed to promote cognitive health by reducing the risk of AD and other dementias through healthy lifestyle changes among older adults in senior living communities.

The main goals of the Boost Your Brain & Memory intervention were to increase participants’ understanding of how physical activity, intellectual activity, and stress reduction affect dementia risk, and to empower them with the knowledge and confidence that would support their behavior change in each of these areas. This preliminary evaluation of the intervention focuses primarily on 1) participants’ perceptions of the impact of the Boost Your Brain & Memory program on their brain fitness-related behaviors, motivation, and knowledge; and 2) the potential impact of the program on memory optimism and confidence about memory.

Significance

AD and dementia. Every 67 seconds, someone in the U.S. develops AD (Alzheimer’s Association, 2015). The Alzheimer’s Foundation estimates that in 2015, 5.3 million Americans of all ages have the disease. Approximately a half-million Americans age 65 or younger have early-onset dementia (Alzheimer’s Foundation, 2015). Most with the disease (81%) are 75 or older; however, prevalence increases sharply with age (Alzheimer’s Association, 2015), doubling every five years beyond 65 (Alzheimer’s Foundation, 2015). Among all individuals 85 and older, roughly one-third (32%) have AD. Moreover, the prevalence of AD is projected to increase largely because of the increasing
size of the older adult population, while incidence of AD and other dementias will likely double by 2050 (Alzheimer’s Foundation, 2015).

In addition to the impact of AD on those who have it, the disease affects many more family members who provide care in the home (Alzheimer’s Foundation, 2015). Extensive literature indicates that caring for a person with AD or other dementias is associated with poor health outcomes for the caregiver, including emotional stress and depression (Schulz & Beach, 1999; Williamson & Schulz, 1993). Caregivers also have increased utilization of health services (Kiecolt-Glaser, Dura, Speicher, Trask, & Glaser, 1991) and more frequent use of psychotropic medications (Baumgarten et al., 1992; Grafstrom, Fratiglioni, Sandman, & Winblad, 1992). Helping an older adult maintain his/her cognitive health could reduce the impact on the individual, as well as the physical and emotional burden felt by those caring for that person. Even a modest reduction in disease progression would have a significant societal impact and contribute to mitigating the financial impact of dementia on the health care system and the workplace.

**Support for a multimodal approach.** Few interventions targeting cognitive health have been multimodal in nature. Positive findings from the Miller et al. study (2011), however, provide a partial basis for further exploration in this area. In that study, the researchers found that a six-week program including memory training and promotion of lifestyle factors improved encoding and recalling of new verbal information and self-perception of memory ability in older adults. In addition, Karp et al. (2006) found that participation in a combination of lifestyle behaviors (mental, physical, and social) reduced the risk of dementia. More specifically, they found that high participation in at least two of the three domains was associated with the greatest decrease in risk of dementia six years later. Scarmeas et al. (2001) additionally found that as an individual increased the number of protective behaviors he/she engaged in, the risk of dementia decreased. Another study (Lee et al., 2008) demonstrated similar findings. In this case the researchers looked at physical activity, smoking behavior, vegetable consumption, and social activity. At two years following the study, each of these lifestyle behaviors was found to be independently associated with cognitive performance. These researchers also found that there was an additive benefit obtained by participating in more than one lifestyle behavior.

The best evidence for the potential of a multidimensional brain fitness intervention comes from the Finnish Geriatric Study to Prevent Cognitive Impairment and Disability (FINGER), which examined the cognitive impact of a multidimensional brain fitness program for older adults judged to be at risk for dementia. This was a randomized controlled trial involving 1,260 older adults. The brain fitness intervention program lasted two years and incorporated diet, exercise, cognitive training, and vascular risk monitoring. After two years, the group in the multidimensional program had overall neuropsychological test battery (NTB) cognitive evaluation scores that were 25% higher compared to controls. Looking at specific areas of cognition, the group in the multidimensional program showed an 83% higher score in executive functioning ($p = .039$) and a 150% higher score on processing speed ($p = .029$), although there were no statistically significant differences between the two groups on the memory tests. The intervention group also showed better measurements of BMI, dietary habits, and physical activity. This study provides compelling evidence that, even for at-risk individuals late in life, participation in a multidimensional brain fitness program can provide measurable cognitive benefit (Ngandu et al., 2015).

**The impact of self-efficacy.** The aforementioned research suggests that programs successful in motivating individuals to adopt brain-health behaviors can have cognitive benefits. There is also reason to believe that just having confidence related to memory can actually improve memory performance. Several studies support the importance of memory self-efficacy in relation to reasoning (Kingston & Lyddy, 2013) and memory performance. In one such study, researchers examined the relationship between memory self-efficacy (MSE) and memory functioning in a sample of Dutch older adults. They found that after six years, the total MSE score was positively associated with memory performance. Those who perceived their memory as worsening did not perform as well as those with a more
positive perception at the six-year follow-up (Ventijn, Hill, Van Hooren, Bosma, Van Boxtel, Jolles, & Ponds, 2006). Another study examined the impact of a training program specifically designed to improve self-efficacy and memory performance among older adults (West, Bagwell, & Dark-Freudeman, 2008). This program stressed the capacity for memory improvement at all ages, and included exercises in goal setting and mastery along with memory training. The researchers found that final test scores were positively associated with self-efficacy.

**Theoretical Foundation**

**Neuroplasticity.** A key concept underlying the routes by which lifestyle affects brain health is neuroplasticity. Neuroplasticity refers to the capacity of the brain to reorganize, change its neural structure, and form new neural connections throughout life (Roberston & Murre, 1999). The brain can form new connections and alter existing synapses and structures in response to certain environmental input. Brain injury is one such catalyst for such rewiring of brain circuitry. Numerous studies have explicated the brain's ability to change to compensate for injury in these ways (Albensi & Janigro, 2003; Bach-y-Rita, 2003). Other studies have demonstrated the brain's ability to grow new cells. This neurogenesis stands in contrast to the previously entrenched view that no new neurons can be grown in adulthood. Researchers now recognize that the brain is able to produce new neurons even late in life. For example, in one of the earliest studies to demonstrate neurogenesis in humans, a dye that only attached to neurons formed after study participants had undergone chemotherapy revealed the growth of new nerve cells in the hippocampus of chemotherapy patients even in their eighties (Eriksson et al., 1998). Similarly, a study of London cab drivers demonstrated that the brain grows new cells and can show an increase in the size of the hippocampus. Growth in the hippocampus is particularly noteworthy due to its importance for memory. More specifically, cab drivers who successfully completed a complicated and taxing training program that challenged their visual and spatial memory showed brain growth in areas of the hippocampus associated with visual and spatial memory; cab drivers who dropped out of the program did not show such brain growth (Woollett & Maguire, 2011). Other environmental factors such as exercise can also stimulate changes in the brain. For example, studies have demonstrated that aerobic exercise can increase the level of brain-derived neurotrophic factor (BDNF), a hormone that promotes growth of new brain cells. The levels of this hormone have also been associated with larger volumes in the hippocampus and better cognitive function in older age (Middleton, Barnes, Lui, & Yaffe, 2010). A study by Erickson and Prakash et al. (2011) demonstrated the effect of exercise on cell growth in the hippocampus by comparing the brains of those who participated in an aerobic exercise intervention with those who participated in an intervention focused on stretching and toning. After six and 12 months, there was a 3.4% difference in the average sizes of the two groups' hippocampuses. Those in the aerobic exercise group showed an approximate 2% increase in the size of their hippocampus compared to those in the stretching group, whose hippocampus volume declined by 1.4%, a degree considered normal to the aging process. These and many other studies provide further evidence that certain lifestyle behaviors such as exercise can actually change their brain in ways that may compensate for disease pathology.

**Cognitive reserve.** The ability for the brain to change is related to the theory of cognitive reserve, which is integral to understanding how lifestyle factors can impact long-term cognitive health. Dr. Yakaav Stern originally proposed cognitive reserve after observing that, among individuals whose brains showed an equal amount of AD pathology, presence of clinical symptoms of the disease varied widely (Stern, 2002). In comparing the brains of individuals with similar levels of disease pathology who did and did not exhibit symptoms of dementia, researchers found that individuals who did not exhibit dementia symptoms were more active intellectually, physically, and socially. To explain these observed differences, Stern theorized that certain cognitively stimulating activities created a kind of reserve, or accumulation of additional abilities, which could compensate for declining memory or thinking caused by amyloid plaques and tangles. It is important to note that this theory describes the potential for delaying symptoms of the disease rather
than preventing the disease entirely, but because many people develop dementia in their last years of life, a two-year delay could mean the absence of symptoms of the disease for their lifetime.

**METHODS**

**Study Design**

This study evaluated a six-week version of the Boost Your Brain & Memory Program, an intervention designed to promote cognitive health among older adults in senior living. Although the population is predominantly from continuing care retirement communities (CCRCs), we use the term “senior living” to be inclusive of the independent living community that is also part of our sample.

The intervention consisted of two main components: (1) a six-week educational initiative to promote cognitive health through adoption of behaviors thought to be associated with reduced cognitive decline, AD, or mild cognitive impairment; and (2) practice of memory training techniques. The primary purpose of this study was to examine the feasibility of the program among the targeted population, and to assess the impact of the intervention on behavior change and self-reported memory.

The present analysis involved conducting independent sample t-tests comparing intervention and waitlisted control groups on survey items that asked about optimism about maintaining memory and about perceived memory ability. From course evaluations, we also provide participants’ perception of the degree to which they met course objectives related to knowledge and behavior change as a result of the class. T-tests were also utilized to assess the potential impact of demographic differences. Additionally, descriptive statistics from items focused on participant evaluations of the program structure and organization are provided from the course evaluations. The data presented here from course evaluations also include the evaluations of the waitlisted control group once they had completed the course.

**Study Population**

Older adults were recruited for participation from 11 CCRCs and one independent living residence across the U.S. Participants were male and female, 62 years old and older. Inclusion criteria included English-speaking, at least 55 years old, no diagnosis of dementia, able to hear well enough to participate in class discussion, and able to see well enough to read course material. Twelve senior living communities participated in the study. One of these was located in the Northwestern U.S., while the remaining were from the Midwest. Overall, 162 older adults completed the course, and there were 24 dropouts. Characteristics of the sample are described in Table 1 and in the results. Those participants who dropped out of the course were more likely to report lower life satisfaction, $t(177) = 2.94, p = .04$, and rate their health as poorer, $t(178) = -2.19, p = .03$. No other statistically significant differences were seen between dropouts and those who completed the course. The only significant demographic difference between controls and intervention group was the average age, with an intervention group average age of 82.5 and control average age of 80.5, $t(178) = 2.10, p = .04$.

<table>
<thead>
<tr>
<th>Variables</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14.1%</td>
</tr>
<tr>
<td>Female</td>
<td>85.9%</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian (non-Hispanic/Latino)</td>
<td>96.2%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>1.9%</td>
</tr>
<tr>
<td>Black/African American</td>
<td>1.3%</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>.6%</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>34.0%</td>
</tr>
<tr>
<td>Living with a partner</td>
<td>1.3%</td>
</tr>
<tr>
<td>Separated or divorced</td>
<td>10.9%</td>
</tr>
<tr>
<td>Widowed</td>
<td>50.0%</td>
</tr>
<tr>
<td>Never married</td>
<td>3.8%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Some high school</td>
<td>1.3%</td>
</tr>
<tr>
<td>High school graduate</td>
<td>13.2%</td>
</tr>
<tr>
<td>Some college</td>
<td>28.3%</td>
</tr>
</tbody>
</table>
College graduate 29.6%
Master’s or professional degree 20.4%
Doctoral or medical degree 7.2%

**Household Income**
- Less than $20,000/year 12.0%
- $20,000-$49,999/year 29.3%
- $50,000-$79,999/year 31.6%
- $80,000 or more/year 27.1%

**Self-Reported Health**
- Poor 1.3%
- Fair 21.8%
- Good 63.5%
- Excellent 13.5%

**Life Satisfaction**
- Poor 3.2%
- Fair 8.3%
- Good 55.8%
- Excellent 32.7%

The selection of these communities as study sites was made because residents in senior living communities are a primary target audience of this program moving forward. It was anticipated that the sample would not be representative of the larger population, however. Most of the sites have a resident population that is predominantly white. Older adults recruited from senior living residences also tend to have considerably higher incomes than the general population. Because of the association between income and health, the sample is also likely to have better health than the general population of older adults and is more likely to enter the program with a greater frequency of the targeted behaviors. This makes it less likely to demonstrate significant behavior change since participants had less room for improvement.

**Procedures**

Prospective participants were recruited through various forms of outreach (e.g., e-mails, inclusion on a community calendar, word of mouth) by senior living staff at each respective community. In some communities, staff held “brain fairs” to advertise the project and recruit participants. At these events, brain-healthy foods were made available and information about the program was distributed. Interested individuals registered for an information and consent meeting that was conducted by senior living staff to assess eligibility and complete the consent process.

Participants were randomized into the intervention arm or a control arm for the study. After enrolling all subjects into the study, names were drawn from a hat, with the first half being assigned to the intervention arm and the second to the waitlisted control arm. Exceptions were made to place spouses in the same class and to accommodate vacation schedules. All study participants completed measures at baseline, defined as the time period within three weeks prior and one week following the start of the course for the intervention group. Participants in control and intervention groups also completed measures within three weeks following the course attended by the intervention group (i.e., the waitlist control group completed the second set of measures before the beginning of the course they attended). Participants in both control and intervention groups also completed measures within three weeks of when the control group completed taking the course.

The intervention was delivered using a train-the-trainer model. Senior living staff from each of the 12 study sites served as trainers. It was expected, though not required, for trainers to have academic backgrounds in nursing, exercise physiology, and gerontology, and for two to three staff from each site to serve as trainers. These staff members attended one of three one-day train-the-trainer sessions conducted by project staff. During these training sessions, project staff delivered the content for the intervention, discussed teaching strategies, and explained procedural items such as taking attendance.

Mather LifeWays’ Institutional Review Board (IRB) approved the proposal for this study (protocol number #13-004).

**Program Content**

*Education on lifestyle behaviors related to cognitive health.* The educational intervention was delivered in six one-hour sessions. This included one introductory session, three sessions focused on lifestyle factors, one session on behavior change, and one concluding session. The
introductory session introduced foundational concepts (e.g., dementia, brain plasticity, cognitive reserve), and provided an overview of the structure of the course and specific topics to be covered. With the exception of the introductory session, the instructor began each session by asking participants to report progress and engage in a brief discussion about overcoming any barriers or obstacles they may encounter in trying to increase their participation in a given area. Next, the instructor presented material covering literature related to brain health. This material included discussion of current research linking specific lifestyle behaviors to cognitive health and the mechanisms by which these behaviors promoted brain health. Following the presentation, the instructor led participants in a brief activity related to the topic area. Participants were also asked to set short-term goals relating to increasing their activity in the area addressed.

Trainers utilized a training guidebook and PowerPoint slides prepared by the project staff. The presentations were scripted, providing for a high degree of fidelity in implementation. Participants were given a participant workbook that included key information presented in the slides, log sheets to record activity participation, and a list of common activities associated with each of the three areas covered (e.g., for physical activity, the list included running and walking).

Memory Training. In addition to discussing lifestyle behaviors, the instructor presented information about each of the following memory training techniques: (1) Improve Attention to Improve Memory, which involves strengthening attention-related skills such as listening through training in divided attention tasks; (2) Link-It, which entails creating imaginary links between items that are to be remembered (e.g., using images, sentences, and senses); (3) Get Organized, or categorization, which uses grouping of similar items together so that the conceptual group serves as a cue; (4) Roman Room Method (aka Method of Loci), which associates each item to be remembered with a known place so that seeing the place will prompt memory of the item; (5) Rehearsal, which uses repetition of information to enhance encoding in memory; and (6) External Memory Aids, such as creation of lists.

RESULTS

Memory Self-Efficacy and Optimism

After the intervention group completed the course, both intervention and control groups were asked whether 1) they were more optimistic about their memory; and 2) how they felt about their ability to remember everyday things (self-efficacy) compared to six weeks earlier (prior to the beginning of the course for the intervention group). On both items, over the same six-week interval, the intervention group increased memory optimism and self-efficacy to a greater degree than the control group. In terms of memory optimism, 87% of the intervention group reported feeling more optimistic about maintaining their memory as they aged compared to 38% of the control group, *t*(121.78) = -7.36, *p* < .001. As for their perceived ability to remember everyday things (e.g., “where you left your keys,” “where you parked your car,” etc.), 60% of the intervention group reported feeling “a little better” about their ability compared to just 18% of the control group on a 3-point scale where 1 = “a little worse,” 2 = “about the same,” and 3 = “a little better,” *t*(156.88)= -6.07, *p* < .001. On this scale, the intervention group had a mean score of 2.6 (SD = 0.49) compared to 2.15 (SD = .44) for the control group.

Behavior Change

One objective of the program was to motivate participants to change their lifestyle by adopting behaviors positively associated with brain health. Almost all program participants reported meeting this objective. Only 8% of participants reported not having made any lifestyle changes over the six weeks of the course. Of those who reported making lifestyle changes, just approximately a third (34%) reported making changes to a slight extent, 43% reported making changes to a moderate extent, and 15% reported making changes to a great extent (see Table 2). Asked about intent to continue the changes made during the course, almost half (48%) reported planning to do this to a moderate extent, and just over a third (38%) planned to continue the changes to a great extent (Table 2).
Participants were also asked about whether they planned to make even more lifestyle changes in coming months to decrease risk of dementia. Here, 17% planned to make even more changes to a slight extent, 41% reported planning to make more changes to a moderate extent, and 39% planned to make changes to a great extent (Table 2). Those participants who rated their life satisfaction as fair or poor were significantly more likely to report planning to make lifestyle changes in the coming months than those who rated their life satisfaction as good or excellent, with mean scores of 3.53 (SD = 0.52) versus 3.1 (SD = 0.89) on a 4-point scale, t(144) = 2.05, p = .041. Participants without a college degree were significantly more likely to report planning to make lifestyle changes in the coming months compared to those with a college degree or higher, with mean scores of 3.36 (SD = 0.78) versus 2.98 (SD = 0.83), t(139) = -2.75, p = .007. Participants who were not married or living with a partner were also more likely to report planning to make additional lifestyle changes in the coming months compared to those with a college degree or higher, with mean scores of 3.27 (SD=0.80) versus 2.91 (SD=0.82), t(143) = 2.64, p = .009. When asked about how the information learned about brain health motivated them to live a healthy lifestyle, just under half (44%) reported that the course motivated them “a lot more,” while slightly more than half (53%) reported that it motivated them “a little more.” Only 2.5% reported it “did not motivate” them.

**Knowledge**

Another objective of the program was to empower program participants with knowledge upon which to base their behavior change. Again, participants reported meeting this objective to a high degree. When asked about the degree to which they felt they met the objectives of the course “as a result of the course,” more than half (54%) reported understanding how lifestyle affects dementia risk to a great extent, while 39% reported understanding this to a moderate extent (see Table 3). Asked about their understanding of how the adult brain changes, about half (49%) reported understanding more about how the adult brain changes to a great extent, and 41% reported understanding this to a moderate extent (Table 3). The theory of cognitive reserve was provided as the foundation to understanding the impact of lifestyle on cognition, and on the item stating “I know how to use the theory of cognitive reserve to reduce my risk of dementia,” 34% reported feeling this way to a great extent, and 49% reported understanding how to use this theory to a moderate extent (Table 3).

The participants were also asked about each of the three core content areas of the course separately, and the survey responses for each of these areas suggest a similar level of confidence across all three areas. Results are reported in Table 3. Those participants who reported being in fair or poor health also reported understanding how physical activity lowers dementia risk to a greater extent than those who reported their health as good or excellent, with mean scores of 3.74 (SD = 0.44) versus 3.53 (SD = 0.71) on a 4-point scale, t(90.45) = -2.13, p < .036.

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**Table 2. Course Objectives: Behavior Change.**

<table>
<thead>
<tr>
<th>I feel I have achieved the following objectives as a result of this class:</th>
<th>Not at All</th>
<th>To a Slight Extent</th>
<th>To a Moderate Extent</th>
<th>To a Great Extent</th>
<th>Average Score</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have made changes in my lifestyle based on course (n = 158)</td>
<td>7.6%</td>
<td>34.2%</td>
<td>43.0%</td>
<td>15.2%</td>
<td>2.66</td>
<td>.83</td>
</tr>
<tr>
<td>I plan to continue changes I made (n = 151)</td>
<td>4.0%</td>
<td>10.6%</td>
<td>47.7%</td>
<td>37.7%</td>
<td>3.19</td>
<td>.78</td>
</tr>
<tr>
<td>I plan to make even more lifestyle changes in the coming months to lower dementia risk (n = 151)</td>
<td>3.3%</td>
<td>16.6%</td>
<td>41.1%</td>
<td>39.1%</td>
<td>3.16</td>
<td>.81</td>
</tr>
</tbody>
</table>
Course Relevance and Usefulness

A secondary objective of the study was to assess perceptions of the course relevance and usefulness. Participants rated both highly, with a high majority (85%) of participants reporting that they found the material useful. Another large majority (80%) said they enjoyed the course (see Table 4). Asked about the relevance of the information presented in the course, 38% of the participants rated the relevance as excellent, and just over half (52%) rated it as good. The average score was 3.27 ($SD = 0.67$) on a scale of 1 to 4 with 4 being the highest (Table 4). Participants also rated the usefulness of the activities included in the course at an average of 3.03 ($SD = 0.74$) on a 4-point scale (Table 4). Overall, the great majority (86%) of participants reported that they would recommend the course to a friend.

Table 4. Course Evaluation.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Poor</th>
<th>Fair</th>
<th>Good</th>
<th>Excellent</th>
<th>Average</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization of content ($n = 158$)</td>
<td>1.9</td>
<td>10.8</td>
<td>55.7</td>
<td>31.6</td>
<td>3.17</td>
<td>.69</td>
</tr>
<tr>
<td>Relevance of info ($n = 157$)</td>
<td>1.3</td>
<td>8.9</td>
<td>51.6</td>
<td>38.2</td>
<td>3.27</td>
<td>.67</td>
</tr>
<tr>
<td>Usefulness of activities ($n = 159$)</td>
<td>1.9</td>
<td>20.1</td>
<td>50.9</td>
<td>27.0</td>
<td>3.03</td>
<td>.74</td>
</tr>
<tr>
<td>Usefulness of visual aids ($n = 156$)</td>
<td>3.8</td>
<td>17.9</td>
<td>42.9</td>
<td>35.3</td>
<td>3.10</td>
<td>.83</td>
</tr>
<tr>
<td>Trainer knowledge ($n = 159$)</td>
<td>.6</td>
<td>4.4</td>
<td>35.8</td>
<td>59.1</td>
<td>3.53</td>
<td>.61</td>
</tr>
<tr>
<td>Trainer teaching style ($n = 158$)</td>
<td>.6</td>
<td>9.5</td>
<td>36.7</td>
<td>53.2</td>
<td>3.42</td>
<td>.69</td>
</tr>
</tbody>
</table>
Course Design

The organization of course materials and usefulness of visuals aids were also evaluated positively. The organization of course content had an average score of 3.17 (SD = 0.69) on a 4-point scale, with just under a third (32%) of participants rating this as excellent and more than half (56%) rating this as good. The usefulness of visual aids had an average rating of 3.10 (SD = 0.83) (Table 4). Only 16% indicated that there was anything they felt was missing that they wanted to learn about. Of those who wanted additional information, the most requested additional information was additional strategies, techniques, or exercises that could be employed to help ward off cognitive decline. Diet and nutrition, which were covered in more detail in an earlier version of the course and in the most recent version of the course, were also topics on which participants requested additional information.

Use of Train-the-Trainer Model

One important issue in any train-the-trainer program is the degree to which instructors with little existing expertise in the given content area can successfully take and implement a new program. Instructor ratings provide one measure of this. Relative to this program, participants rated their instructors’ knowledge and teaching styles highly. The average knowledge score was 3.53 (SD=0.61) on a 4-point scale, with 59% of participants rating trainer knowledge as excellent (Table 4). Participants without a college degree were more likely to rate the trainers’ knowledge more highly, with average scores of 3.67 (SD = 0.54) versus 3.43 (SD = 0.66) on a 4-point scale, t(145.25) = -2.4, p = .018. Trainers’ teaching styles were also scored highly, with an average of 3.42 (SD = 0.69), with just over half (53%) rating their instructors’ teaching style as excellent (Table 4).

DISCUSSION

Taken together, the findings from this multidimensional brain fitness program paint a picture of program participants who are leaving the course motivated to change their lifestyles and confident in their knowledge of the core subject matter of the course. This course was of much shorter duration than the two-year multidimensional FINGER brain fitness program, which showed cognitive improvements in its intervention group, and a program of the FINGER study’s length and intensiveness may not be within the capabilities of many senior living settings. An educational brain fitness program such as the one evaluated here may be much easier to implement in senior living or aging services settings, but it also places the impetus for lifestyle change on the participants. Such change can be encouraged and assisted during the course, but in such courses it becomes important that participants emerge with both motivation to make and continue lifestyle changes and the knowledge of what behaviors can promote cognitive health. As a result of the information provided in this course, almost all participants reported having made lifestyle changes during the course and greater motivation to change behavior, and planning to make further changes.

In addition to the importance of knowledge as a basis for changing behavior, knowledge can also promote self-efficacy. As discussed earlier, research on memory self-efficacy suggests that an individual’s beliefs about their memory ability has consequences for his/her memory performance. Increasing general knowledge regarding the importance of modifiable behaviors to dementia risk is one way in which the course promotes self-efficacy. In addition, it arms participants with behavioral strategies they can put into action and includes research utilizing older adult populations that demonstrates the capacity for memory improvement at any age. Our findings suggest that the program was successful in increasing participants’ memory optimism and self-efficacy. Although our study did not directly assess improvements in memory performance, previous research supports the notion that increasing levels of these traits may be a way to promote better memory performance.

As noted in the findings, examination of demographic variables relative to participant responses revealed several differences that merit further consideration. The greater intention of those participants with lower self-reported life satisfaction to make new changes in coming months could be a result of those participants also viewing their lives as having greater room for improvement. In such
In cases, the motivating and empowering aspects of such a course may have a greater impact in conjunction with a preexisting dissatisfaction with life. Also notable was that participants who were not married or living with a partner planned to make greater behavior changes than those who were living with a spouse or partner. This could be because living with a partner already influenced them to make changes and so they didn’t see as much need for change.

Analyses also demonstrated that less educated participants were more inclined to make greater lifestyle changes as a result of the course. This could be because those participants may have been less exposed to information about cognitive health prior to the course and thus had more room to change. Less educated participants also reported a greater understanding of the course material “as a result of the course,” which could again be a result of less exposure to the material prior to their participation in the program.

**Limitations**

All but one of the participating senior living settings were CCRCs, which is indicative of a higher socioeconomic status that may not be clearly reflected in the reported household income. As evident in the demographics table, the population studied here also lacks ethnic and racial diversity, with only 3.8% of participants being non-Caucasians. The sample population, senior living residents, was purposefully chosen to match the intended audience of the program. Differences in the aforementioned demographic characteristics, however, mean that the study findings can’t be generalized for more diverse populations. The number of participants also limits that statistical power available, which means that some smaller demographic differences may not have reached statistical significance that a larger study could reveal. Although the focus of this article has been on perceptions of the multidimensional brain fitness program, another limitation of this article is the reliance on course evaluation data that lack a comparison group, with the exception of comparison of the intervention group and controls on the memory ability and optimism self-report items. Additionally, where the intervention group is compared to control, since this is a waitlist control study, it is possible that residents within the same community may discuss the program, such that treatment residents may share program information and materials with waitlist control residents, resulting possibly in contamination that could weaken the effect of the intervention.

The data presented here also only look at self-reported behavior change, knowledge, and memory optimism at a single point in time. As a result, these data do not speak to whether the reported behavior change and memory optimism were maintained over time following the conclusion of the course.

This study also relies exclusively on self-report data and so all the standard caveats about the reliability of self-report data will apply here. This evaluation does not examine participants’ actual behavior changes/activities. Likewise, here we measured participants’ perceptions of their memory improvement rather than objective measures of memory ability and improvement.

**Conclusion**

**Recommendations for Senior Living Providers**

This study provides a preliminary evaluation and summary of resident perceptions of the Boost Your Brain & Memory Program. The program was implemented by senior living providers for senior living residents in 12 different communities, and, as a result, provides findings of clear relevance to providers who are seeking to offer brain health education in their community. Specifically, the findings suggest that senior living organizations choosing to implement the Boost Your Brain & Memory Program can reasonably expect the program to be well received by residents, who will also find it relevant and useful. In addition, communities can expect that the staff they select to implement the program will have the capacity to deliver the program in a way that residents consider effective. Equally important, the program offers providers with an educational program that leaves residents motivated to make positive behavior changes and equipped with the knowledge to do so.
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AUTHORS

Catherine O’Brien, PhD, MPH
Mather LifeWays Institute on Aging
1603 Orrington Ave., #1800
Evanston, IL 60201
cobrien@matherlifeways.com

Roscoe Nicholson, MA
Mather LifeWays Institute on Aging
1603 Orrington Ave., #1800
Evanston, IL 60201
rnicholson@matherlifeways.com

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