Open Access
World Journal of
Yoga, Physical Therapy and Rehabilitation
Iris Publishers

Research Article

Effects of YogaFit® vs. Zumba® Gold on Cognitive Functioning in an Elderly Female Population

Terry Eckmann, PhD*, Vicki Michels, PhD and Donald Burke, PhD

Department of Education and Kinesiology, USA

***Corresponding author:** Terry Eckmann, Department of Education and Kinesiology, USA.

Received Date: September 24, 2019

Published Date: October 23, 2019

Abstract

There is growing interest in interventions to lower the risk of cognitive decline in the aging process. The purpose of this study is to assess how Zumba® Gold or YogaFit® affect cognitive functioning in elderly adults. This research was designed to assess the benefits of these two interventions and determine which intervention might lead to greater improvement. Female participants age 65 to 91 years of age from Minot, North Dakota participated 30 minutes twice weekly for 12 weeks in either YogaFit® or Zumba® Gold classes. Cognitive functioning of participants was assessed pre-mid-post intervention. Significant improvements in cognitive functioning at mid and post assessment were found in both YogaFit® and Zumba® Gold participants. The results support that the growing body of evidence that physical activity, specifically YogaFit® and Zumba® Gold exercise, may contribute to improvements in cognitive functioning..

Keywords: Aging, Cognition; Exercise; YogaFit®; Zumba® Gold

Key Points

The purpose of this study is to assess how Zumba® Gold or YogaFit® affect cognitive functioning in elderly adults. Physical activity reduces obesity, high blood pressure high cholesterol, and insulin resistance. The results of our study support previous research indicating exercise is an important factor in maintaining and improving cognitive functioning.

As life expectancy has increased in the United States, there is growing interest in determining ways to prevent cognitive decline in the aging process [1-3]. Although it is assumed that cognitive decline begins early in life, cognitive dysfunction appears to accelerate in our 60's and 70's [4,5]. The loss of cognitive ability, from moderate cognitive decline to dementia can have profound implications on the health and well-being of affected individuals. The population living longer means increasing numbers of people experiencing cognitive decline which will have a major impact on our economy and health care system [6]. Prevention of cognitive decline is a lifelong process. There is a growing body of research that suggests improving lifestyle behaviors is a significant factor in the maintenance of cognitive functioning [7-9].

Research has demonstrated that physical activity, nutrition, stress management, mental activity, and socialization all impact cognitive health [10,11]. Fratliglioni S, et al. [12] indicate that socially integrated networks, cognitive leisure activities, and regular physical activity have significant impact on slowing the rate of cognitive decline and preventing dementia. By determining the lifestyle choices which significantly impact cognitive health over the lifespan, may encourage adults of all ages to practice critical healthy behaviors.

Exercise seems to play a significant role in maintaining cognitive health [7,13,14]. For instance, aerobic exercise increases brain-derived neurotrophic factor, insulin-like, and vascular endothelial growth factors. These changes are thought to increase neurogenesis, particularly in the hippocampus of the brain [15-16]. People with higher aerobic capacity were found to have greater grey and white brain matter volume as measured by magnetic resonance imaging [17]. According to Churchill J, et al. [18], executive functions of the type associated with frontal lobe and hippocampal regions of the brain may be maintained or enhanced in humans with higher levels of fitness. A meta-analytic study of the benefits of fitness training on cognition indicated increased performance, regardless of the type of cognitive task, the training method, or participants' characteristics [18].

Physical activity reduces obesity, high blood pressure, high cholesterol, and insulin resistance, all of which are risk factors for vascular disease and associated with dementia [10,11,15, 19]. A review of the literature suggests that moving from a sedentary lifestyle to a lifestyle of moderate physical activity has beneficial effects on cognitive performance [1]. Beginning or continuing to exercise at middle age or older reduces the risk of cognitive decline. According to Yonas E, et al. [20], moderate exercise in midlife is associated with a thirty-nine percent reduction in the development of cognitive impairment and moderate exercise in late life is associated with a thirty-two percent reduction.

Leisure-time physical activity at midlife is also associated with a decreased risk of dementia and Alzheimer's disease later in life, especially in genetically susceptible individuals [21]. Participation in structured exercise programs that includes strength, aerobic activity, stretching and balance exercises can also have a positive impact on cognition [22]. The understanding of what type of physical activity improves or maintains cognition would be helpful in determining the exercise programs that could be beneficial for adults throughout the lifespan [23]. The objective of this study was to compare the effects of YogaFit® or Zumba® Gold on the cognitive functioning of adults aged 65 or older.

Methods

This study was conducted in Minot, North Dakota, with a sample of age 65 and older who were recruited through television, radio, and social networking. Announcements were also circulated throughout assisted living facilities in Minot, however there were no residents in those facilities who chose to participate. Individuals 65 and older who had been sedentary or exercised sporadically (once or twice a week some weeks) for the past six months were eligible to apply for the study. Participants who received medical clearance, completed an informed consent form, and agreed to participate for 30 minutes, two times a week, in 12-weeks of either YogaFit® or Zumba® Gold classes were assigned based upon participant preference to either the YogaFit® or Zumba® Gold group. Fifty percent of the participants indicated a preference for YogaFit® or Zumba® Gold; the other half were assigned to equally distribute the subjects. Participant preference was provided as an option to increase retention and participant comfort. Zumba® Gold classes were held in the group exercise room of the Minot YMCA and YogaFit® classes were held in the activity room at an assisted living facility. The study was approved by the Minot State University Institutional Review Board.

Participants

Thirty-seven female participants age 65 to 91 were divided into two groups and placed in either the YogaFit® or Zumba® Gold group. There were no men who responded to the study's call for participants. The average age for the yoga participants was 75.5 with a mean Body Mass Index (BMI) of 26.79. The Zumba® Gold group had an average age of 77.89 with a BMI of 27.11. There was no significant difference between the two groups' age or BMI. Six participants dropped out prior to the end of the study due to personal or family health issues.

Intervention

YogaFit® classes and Zumba® Gold classes were offered for 30 minutes, three times a week. Participants were required to attend two classes per week. All participants whose data was analyzed attended two classes per week.

YogaFit® class participants were given the option of executing poses seated in a chair or standing on the floor on a yoga mat, or a mix of the two. The intensity and complexity of poses gradually increased over the 12-week period. The YogaFit® Seniors poses introduced and taught throughout the intervention included: mountain, lateral flexion, chest expansion, airplane, chair, warrior 1 modified, warrior 2 modified, bent knee forward fold, monkey modified, tree modified, cat cow, spinal balance, extended child's pose, plank modified, down dog, neck stretch, seated spinal twist, knees to chest, bridge, hamstring stretch, abdominal work, and final relaxation. Participants were encouraged to follow the YogaFit® guideline of honoring yet challenging the body. Two instructors taught each class to provide a high level of modeling, instructional cues, feedback, and consistent observation of alignment. All instructors had completed YogaFit®Level 1 and YogaFit® Seniors training.

Zumba® Gold class participants followed the Zumba® Gold Basic Class choreography. Classes included Zumba® Gold warm-up sequence, merengue, salsa, cumbia, tango, and cooldown and balance sequence. Participants were given instruction on modifications of these Zumba® Gold dance movements and encouraged to work at their level of skill and fitness. All participants chose to perform the movement independently, without the use of a bar on the wall or being seated in a chair. Some participants executed the Zumba® Gold dance moves in place instead of traveling the movement forward and backward or horizontally. Participants were required to wear a pair of fitness shoes. All instructors had completed Basic and Zumba® Gold training.

Physical and Cognitive Assessment

Six physical measurements and three cognitive tests were administered at baseline, after six weeks and following the 12-week session. The physical measurements were the chair stand, arm curl, 2-minute step, sit/reach, back scratch, up and go [24]. The three cognitive tests were the Stroop Color and Word Test, the Geriatric Depression Scale and the Benton Visual Retention Test (BVRT). Only the cognitive results will be addressed in this article.

Stroop Color and Word Test Golden CJ, et al. [25] is a measure of executive functioning. First, participants are asked to read a card, which has the names of colors printed in black ink. The subject is to read as many words as they can within 45 seconds. The second card consists of symbols that are printed in different colors and the participants are to name as many colors as they can within the time limit. The last card has the names of colors printed in a

different color than the name of the color and the participants are to name the color and not read the word that is printed as quickly as possible within 45 seconds. For our research the raw scores of the Word, Color, and Color-Word sections were analyzed.

Benton Visual Retention Test (BVRT) assesses visual perception, memory, and spatial abilities [26]. The test has 10 design cards, which were presented one at a time. The participant was asked to recreate the drawing from memory. Geriatric Depression Scale (short form) is a self-report survey of depressive symptoms. The Scale has 15 yes and no questions, which measure a person depression level.

Data Analysis

All data was analyzed for errors and completed prior to analysis. For the few missing pieces of data the SPSS "Replace Missing Values" function was utilized to complete the data set. Descriptive statistics were used to present the data's means, standard deviations, and line plots. A repeated measures ANOVA was utilized to determine significant changes for each cognitive measure in the YogaFit® and Zumba® Gold treatment groups. A split-plot repeated measures analysis was performed to determine the interaction effect between time and treatment. For the statistical analysis SPSS V. 16.0 (SPSS, Chicago, IL) was employed.

Results

The purpose of this research was two-fold. First, to determine if exercise provided by YogaFit® and Zumba® Gold would help the cognitive functioning of the elderly. Secondly, would there be an interaction between the two types of exercise. Thirty-seven subjects were recruited with 31 completing the programs (15 YogaFit® group and 16 Zumba® Gold group). Tables 1-3 lists the means and standard deviations for each testing for the YogaFit® and Zumba® Gold groups. Figure 1 provides the slope of the YogaFit® and Zumba® Gold groups over the time trials.

Table 1: Mean and standard deviations by group and time.

	Yoga						Zumba					
	Time 1		Time 2		Time 3		Time 1		Time 2		Time 3	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Stroop Word Score	99.38	7.51	101.69	6.52	104.44	9.39	94.33	14.03	97.4	15.88	99.67	16.7
Stroop Color Score	65.19	8.03	64.75	9.25	68.13	10.3	58.33	13.93	62.93	14.78	62.27	14.76
Stroop Color Word Score	31.5	9.28	32.69	8.86	37.81	13.82	27.67	9.18	31.07	9.64	33.67	10.91
Depression Score	1.27	1.03			1.00	1.41	1.00	1.47			1.00	1.41
Benton Score	5.31	2.02	6.44	1.63	6.88	1.31	5.13	2.1	6.07	1.67	6	1.58

Table 2: Repeated Measures ANOVA for Yoga and Zumba groups.

	Yoga		Zumba	
	DF	F	DF	F
Stroop	2,30	4.01*	2,28	5.40**
Word Score				
Stroop	2,30	5.58**	2,28	2.65
Color Score				
Stroop	1.24,18.66***	2.47	2,28	6.66**
Color word Score				
Depression Score	1,14	0.65	1,13	0
Benton Score	2,30	5.15*	2,28	3.06

Note: *p<.05, **p<.01 *** Mauchly's Test of Sphericity indicated the assumption of sphericity had been violated. The Greenhouse-Geisser estimates were utilized.

Table 3: Mean and standard deviations by group and time.

	Yoga						Zumba					
	Time 1		Time 2		Time 3		Time 1		Time 2		Time 3	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Stroop Word	99.38	7.51	101.69	6.52	104.44	9.39	94.33	14.03	97.4	15.88	99.67	16.7
Score	99.33	7.84	101.87	6.71	104.67	9.68	92.69	15.04	95.25	17.59	97.44	18.44
Stroop Color Word Score	31.67	9.58	33.13	8.98	35.6	9.26	27.69	8.87	31.63	9.58	33	10.87
Depression Score	1.27	1.03			1.07	1.44	1.13	1.46			1	1.59
Benton Score	5.6	1.72	6.53	1.64	7.07	1.1	5.19	2.04	6.06	1.61	6	1.51

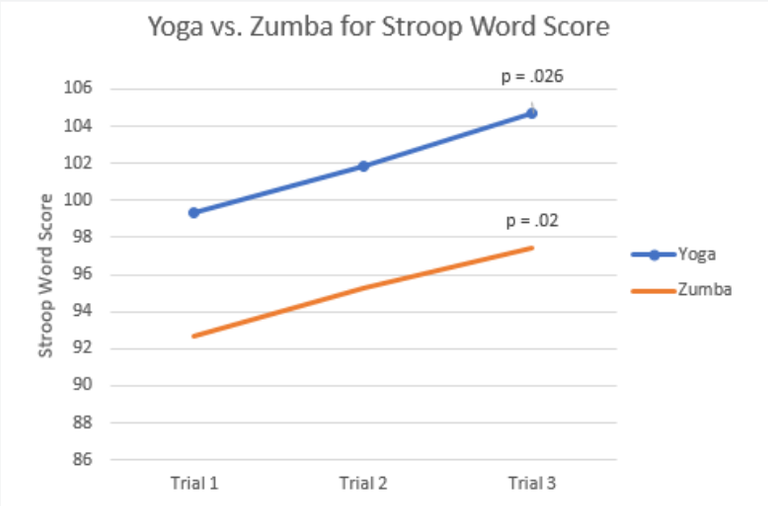

Figure 1

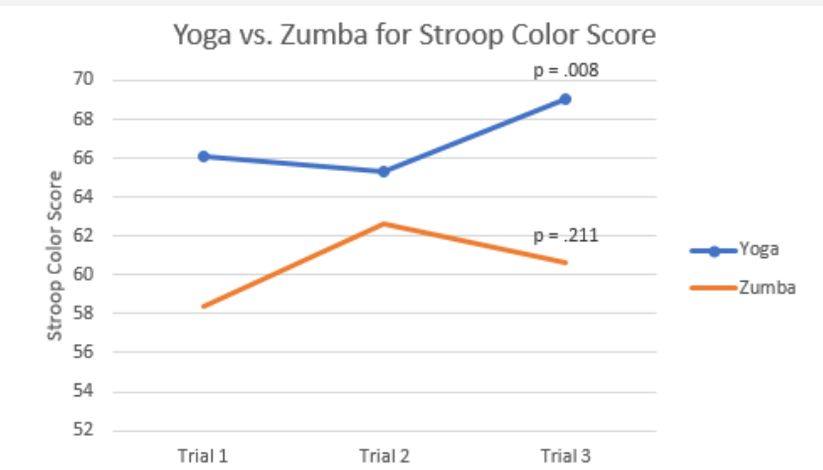

Figure 2

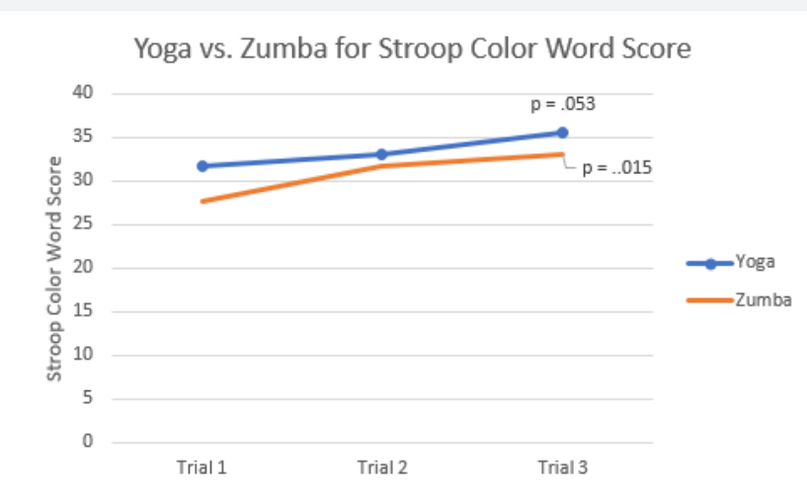

Figure 3

A one-way Repeated Measures ANOVA was run on the YogaFit® and Zumba® Gold groups to determine if significant cognitive gains had been made from each of these exercise protocols. Significant gains were made on the Stroop Word Score by both the YogaFit® group, $F(2,28) = 4.19$, $p = .026$, $\eta^2 = .23$ and Zumba® Gold group, $F(2,30) = 4.48$, $p = .02$, $\eta^2 = .23$. On the Stroop Color Score, the YogaFit® group changed significantly, $F(2,28) = 5.79$, $p = .008$, $\eta^2 = .292$ but the Zumba® Gold group was not significant, $F(1.39,20.9)$

* = 1.689, p = .211, η^2 = .101. The reverse was true for the Stroop Color Word Score with YogaFit® having an F (2,28) = 3.27, p = .053, η^2 = .189 and Zumba® Gold having an F (2,30) = 4.85, p = .015, η^2 = .244. Participants in the YogaFit® showed significant gains on the Benton, F (2,28) = 4.124, p = .027, η^2 = .228 whereas Zumba® Gold did not show significance, F (2,30) = 3.03, p = .063, η^2 = .168. Neither group showed significance on the Beck's Depression Scale, YogaFit® group, F (1,14) = .34, p = .567, η^2 = .024 and Zumba® Gold group, F (1,15) = .172, p = .684, η^2 = .011 There was no significant interaction for the Stroop Word Score, F(2,58) = .05, p = .952, η^2 = .002; the Stroop Color Score, F(2, 58) = 2.74, p =.073, η^2 = .086; the Stroop Color Word Score, F(2,58) = .546, p = .582, η^2 = .018; the Depression Scale, F(1,29) = .027, p = .87, η^2 = .001; nor the Benton score, F(2,58) = .627, p. = .538, η^2 = .021. All of the Partial Eta Squared statistics were in the low or midrange so it is unlikely larger sample sizes would affect the outcome (Figures 1-4).

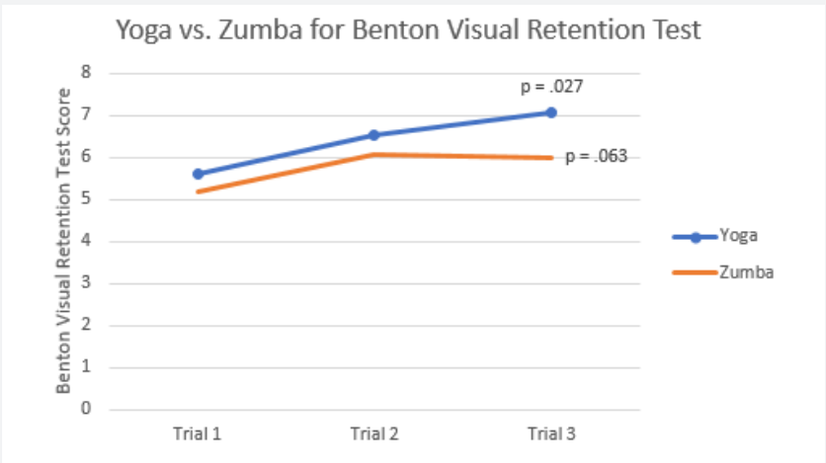

Figure 4

Discussion

The results of our study support previous research indicating physical exercise is an important factor in maintaining and improving cognitive functioning [6,7,14]. Our research findings suggest that elderly people benefit cognitively from 30 minutes YogaFit® and Zumba® Gold exercise twice weekly. The improvement occurs in a relatively short period of time, with no significant change in depression. This result was probably because our participants reported very low levels of depression at baseline.

Similar to the results of Colcome S, et al. [27] the type of training method was not a significant factor for most of the measures; both the YogaFit® and the Zumba® Gold groups demonstrated improvement on some measures without significant differences between the two groups. Processing speed, cognitive flexibility and visual memory all improved.

The two groups did differ in the improvement pattern on the Stroop Color Word score, which is a measure of cognitive flexibility. The YogaFit® group experienced a small improvement between times one and two and increased at a greater increment between times two and three while the Zumba® Gold group's improvement showed a steady gradual increase over time. The overall amount of change was not different, only the pattern of change. Differences in aerobic intensity or type of movement required for the different exercises may affect how quickly or gradually the improvement occurs.

Several factors contributed to improving cognitive functioning in our groups. Firstly, exercise improves one's overall physical health and aerobic capacity, which can create positive, changes in the brain [15,16]. In addition to improving brain functioning, as people develop more physical capability, it becomes easier for people to be active in general which may demand more varied use of cognitive skills leading to improving mental ability. Secondly, the participants had to learn a new exercise regime and novel stimulation has been shown to improve fluid intelligence [28]. Lastly, group exercise increases socialization, and higher levels of social activities are associated with higher levels of cognitive functioning [10,11,15]. Any or all of these factors may have facilitated the cognitive improvement of the participants.

The study was limited because of the small sample size and lack of control group. Given the age of our participants it is not likely the improvements were due to maturation. However, without a control group, we cannot determine which of the three or combination of the three factors discussed previously may have contributed to the change in cognitive functioning. Future research using a comparison group of individuals doing YogaFit® and Zumba® Gold alone rather than in a group, a group completing the exercises together, a group using exercises they have previously used, and a control group would help discern how much socializing, exercise, and novel activities each contribute to improving mental facilities.

Acknowledgment

None.

Conflict of interest

No conflict of interest.

References

1. Lovden M, Xu W, Wang HX (2013) Lifestyle change and the prevention of cognitive decline and dementia. Curr Opin Psychiatry 26(3): 239-243.
2. Singh Manoux (2012) Timing of onset of cognitive decline: results for Whitehall II prospective cohort study. BMJ 344: 7622.
3. Deary I, Corley J, Gow A, Harris S, Houlihan M, et al. (2009) Age-associated cognitive decline. Br Med Bull 92: 135-152.
4. Hayden K, Reed B, Manly J, Tommet D, Pietrzak R, et al. (2011) Cognitive decline in the elderly: an analysis of population heterogeneity. Age Ageing 40(6): 684-689.
5. Salthouse T (2009) When does age-related cognitive decline begin? Neurobiol Aging 30(4): 507-514.
6. Cadar D, Pikhart H, Mishra G, Stephen A, Kuh A, et al. (2012) The role of lifestyle behaviors on 20-year cognitive decline. Journal of Aging Research. 2012: 1-13.
7. Barber S, Clegg A, Young J (2012) Is there a role for physical activity in preventing cognitive decline in people with mild cognitive impairment? Age Ageing 41(1):5-8.
8. Williams K, Kemper S (2010) Exploring Interventions to Reduce Cognitive Decline in Aging. J Psychosoc Nurs Ment Health Serv 48(5): 42-51.
9. Andrade C, Radhakrishnan R (2009) The prevention and treatment of cognitive decline and dementia: An overview of recent research on experimental treatments. Indian J Psychiatry 51(1):12-25.
10. Nussbaum P (2006) Brain Health Through the Lifespan. Brain and Learning Conference. Mind, Brain, and Education Program Harvard University.
11. Small G (2002) What we need to know about age related memory loss. BMJ 324(7352): 81-84.
12. Fratiglioni S, Paillard Borg S, Winblad B (2004) An active and socially integrated lifestyle in late life might protect against dementia. Lancet Neurol 3(6): 343-353.
13. Baker L, Frank L, Foster Schubert K, Green P, Wilkinson C, et al. (2010) Effects of Aerobic Exercise on Mild Cognitive Impairment: a Controlled trial. Arch Neurol 67(1):71-79.
14. Lytle M, Vanderbilt J, Rajesh P, Hiroko D, Ganguli M (2004) Exercise level and cognitive decline: the MoVIES Project. Alzheimer Dis Assoc Disord 18(2): 57-64.
15. Ratey J (2008) SPARK: The Revolutionary New Science of Exercise and the Brain. Little Brown and Company, USA.
16. Van Pragg H (2009) Exercise and the brain: something to chew on. Trends Neurosci 32(5): 283-290.
17. Colcombe S, Kramer AF (2003) Aerobic fitness reduces brain tissue loss in aging humans. J Gerontol A Biol Sci Med Sci 58(2): 176-180.
18. Churchill J, Galvez R, Colcombe S, Swain R, Kramer A, et al. (2002) Exercise, experience and the aging brain. Neurobiol Aging 23(5): 941-955.
19. Kravitz L (2007) The 25 most significant health benefits of physical activity and exercise. IDEA Fitness Journal 4(9): 54-63.
20. Yonas E, Roberts R, Knopman D, Christianson T, Pankratz S, et al. (2010). Physical Exercise, Aging, and Mild Cognitive Impairment: A Population-Based Study. Arch Neurol 67(1): 80-86.
21. Rovio S, Kareholt I, Helkala E, Vittanen M, Winblad B, et al. (2005) Leisure-time physical activity at midlife and the risk of dementia and Alzheimer's disease. Lancet Neurol 4(11): 705-711.
22. Shubert T, Mc Culloch K, Hartman M, Giuliani C (2010) The effect of an exercise-based balance intervention on physical and cognitive performance for older adults: a pilot study. J Geriatr Phys Ther 33(4): 157-164.
23. Bherer L, Erickson K, Liu Amborse T (2013) A review of the effects of physical activity and exercise on cognitive and brain functions in older adults. J Aging Res 2013: 657508.
24. Rikli R, Jones CJ (2001) Senior Fitness Test Manual. Champaign, Il: Human Kinetics, USA.
25. Golden CJ, Freshwater SM (2002) The Stroop Color and Word Test; A Manual for Clinical and Experimental Uses. Wood Dale, IL: Stoelting Co.
26. Sivan A (1992) Benton Visual Retention Test Manual, 5th Edition. MN: Pearson, USA.
27. Colcome S, Kramer AF (2003) Fitness effects on the cognitive function of older adults: a meta-analytic study. Psychol Sci 14(2): 125-130.
28. Tranter LJ, Koutstaal W (2008) Age and flexible thinking: An experimental demonstration of the beneficial effects of increased cognitively stimulating activity on fluid intelligence in healthy older adults. Neuropsychol Dev Cogn B Aging Neuropsychol Cogn 15(2): 184-207.
29. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, et al. (2011) American College of Sports Medicine position stand Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise. Med Sci Sports Exerc 43(7): 1334-1359.
30. Center for Disease Control (2012) Data from the National Vital Statistics System (NVSS). Retrieved July 2014 from http://www.cdc.gov/nchs/data/hus/hus12.pdf#018.