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Effect of Brain-Stimulating Games and Physical Activity on Cognitive Functioning in Dementia in Calabar

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Introduction: Dementia is fast becoming a priority health problem among the aged in Nigeria because of associated stigma and substantial burden to families and care givers. Lack of understanding about the condition has resulted in stigmatization, rejection, and neglect of the affected; with old people with cognitive impairment and *behaving out of the ordinary being branded insane or possessed by evil spirits. It is therefore commonplace to find such affected relatives being taken far away from home and abandoned; or in affluent families being locked up and said to have 'traveled abroad.'* Despite skepticism there has been evidence to suggest that video games, brain teasers, and physical activity have a positive effect on cognitive functions of the aged (Groot et al, 2016; Lamb et al, 2018; Palaus et al, 2017; West et al, 2017). These modes of alternative treatment therefore present a potential for improving memory and mood in adults with mild cognitive impairment. However studies on such alternative procedures in dementia are scarce in Nigeria.
Aim of study: To determine the short-term effects of brain-stimulating games and physical activities on cognitive functions in people with mild dementia.
Methods: This mixed methods (Intervention and exploratory) study had 21 participants made up of 13 old people with mild cognitive impairment identified in Old People's Homes in Calabar, and 8 caregivers (called 'caretakers'). To be eligible for inclusion, Community Screening Interview for Dementia and the Five-Word Test were used for screening. Only people with scores indicating mild cognitive impairment were recruited along with the caregivers. Ethical clearance was obtained from the State Research Ethics Committee, with permission from relevant gatekeepers, and voluntary informed consent from participants.
Intervention: Participants were engaged in physical activities (supervised aerobics for 30 minutes along with group walk for 30 minutes each day on alternate days; and group dancing for 45 minutes on alternate days) for 12 weeks. Participants also played 5 selected Google play games and 5 mentally stimulating board and word games (Sudoku, Crossword puzzle, Draft, Jigsaw puzzle, and Scrabble) for one hour daily for the 12 weeks. These games focused on speed of processing information, reasoning

and memory. Participants (both the aged and caregivers) were encouraged to learn and play new games, but only few agreed to learn Chess and interactive online games.
Data collection: Quantitative data assessed 5 cognitive functions **(**reasoning, processing speed, judgment, memory of everyday events, and attention), and were collected three times (before intervention, one week after the 12 weeks intervention, and 8 weeks later). Instrument was a validated 32-items tool (with maximum of 4 points on each item) and included a module for logical verbal reasoning. Some items were adapted from 2 standardized instruments - Mini-Mental State Examination (MMSE by Folstein et al, 1975); and test of everyday attention (TEA, by van der Leeuw et al, 2016). Qualitative data (verbal responses on perceptions, and impressions about changes in behaviour in the aged etc.) were collected from caregivers after collection of quantitative data, through structured open-ended interview with responses recorded on audiotape and field notes.
Data analysis: Quantitative data were analysed on SPSS 20.0, while qualitative data were transcribed and coded for thematic content analysis using NVivo 10.
Results: The results were for a combination of both mind-stimulating games and physical activity, since all participants had both interventions. Scores on all assessed cognitive functions showed that mentally stimulating games and physical activity interventions positively and significantly influenced cognitive functions in patients with mild dementia, both at the first and second post-tests. Reasoning scores increased from 12.4 to 18.9 at post-test 1 ($p = 0.01$), and 20.5 at post-test 2 ($p = 0.001$); Processing speed increased from 10.5 to 14.0 at post-test 1 ($p = 0.05$), and 16.7 ($p = 0.001$) at post-test 2; Judgment 11.0 to 16.9 post-test 1 ($p = 0.\ 01$), and 19.7 post-test 2 ($p = 0.001$); Memory of everyday events increased from 10.2 to 13.4 at post-test 1 ($p = 0.05$), and 15.8 at post-test 2 ($p = 0.01$); and Attention from 11.6 to 18.8 at post-test 1 ($p =0.001$), and 21.1 at post-test 2 ($p < 0.001$). There was no significant difference in scores on the basis of gender.
Caregivers reported that they had noticed significant changes in mood, memory and attention span of the old people who participated in the study. Three themes emerged from qualitative data: '*eagerness to engage in activities'; 'taking better care of self-hygiene';* and *'looking happier and more friendly'*
Discussion: Results are similar to other studies (Raleigh & Shaha, 2014; Lamb et al, 2018; and Groot et al, 2016 for exercises); but different from Forbes et al, (2013) who found no clear evidence of benefit from exercise on cognitive functioning. Results are also in line with report by Anderson, (2016) that studies in Sydney and Montreal found that brain training through engaging games are capable of improving memory, mood, and attention in older people with mild cognitive impairment.
Implications: Findings have both local and global implications for enhancing social engagement, self-esteem and wellbeing of people with dementia.
Conclusion: A combination of mentally stimulating games and exercises improves cognitive functions in old people with mild dementia. Further study should involve effect of these interventions on people with severe dementia.

Title:

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Keywords:

Cognitive functions, Dementia and Physical activity

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Abstract Summary:

Participants at this session will learn about using easily implemented alternative strategies (video games and physical activity) to enhance cognitive functioning in old people with mild dementia in developing economies.

Content Outline:

Introduction:

Dementia is fast becoming a priority health problem among the aged in Nigeria because of associated stigma and substantial burden to families and care givers. Lack of understanding about the condition has resulted in stigmatization, rejection, and neglect of the affected.

Video games, brain teasers, and physical activity have been found to have a positive effect on cognitive functions of the aged (Groot et al, 2016; Lamb et al, 2018; Palaus et al, 2017; West et al, 2017), but studies on such alternative procedures in dementia are scarce in Nigeria.

Aim of study:

To determine the short-term effects of brain-stimulating games and physical activities on cognitive functions in people with mild dementia.

Methods:

Design: Mixed methods (Intervention and exploratory)

Participants: 21 participants made up of 13 old people with mild cognitive impairment identified in Old People's Homes in Calabar, and 8 caregivers (called 'caretakers'). Ethical clearance was obtained from the State Research Ethics Committee, with permission from relevant gatekeepers, and voluntary informed consent from participants.

Intervention: Participants were engaged in physical activities (supervised aerobics for 30 minutes along with group walk for 30 minutes each day on alternate days; and group dancing for 45 minutes on alternate days) for 12 weeks. Participants also played 5 selected Google play games and 5 mentally stimulating board and word games (Sudoku, Crossword puzzle, Draft, Jigsaw puzzle, and Scrabble) for one hour daily for the 12 weeks. These games focused on speed of processing information, reasoning and memory.

Data collection: Quantitative data assessed 5 cognitive functions (reasoning, processing speed, judgment, memory of everyday events, and attention), and were collected three times (before intervention, one week after the 12 weeks intervention, and 8 weeks later). Qualitative data (verbal responses on perceptions, and impressions about changes in behaviour in the aged etc.) were collected from caregivers after collection of quantitative data, through structured open-ended interview with responses recorded on audiotape and field notes.

Qualitative Instrument was a validated 32-items tool (with maximum of 4 points on each item) and included a module for logical verbal reasoning. Some items were adapted from 2 standardized instruments - Mini-Mental State Examination (MMSE by Folstein et al, 1975); and test of everyday attention (TEA, by van der Leeuw et al, 2016).

Data analysis: Quantitative data were analysed on SPSS 20.0, while qualitative data were transcribed and coded for thematic content analysis using NVivo 10.
Results: Scores on all assessed cognitive functions showed that mentally stimulating games and physical activity interventions positively and significantly influenced cognitive functions in patients with mild dementia, both at the first and second post-tests. There was no significant difference in scores on the basis of gender.
Caregivers reported that they had noticed significant changes in mood, memory and attention span of the old people who participated in the study. Three themes emerged from qualitative data: '*eagerness to engage in activities'; 'taking better care of self-hygiene';* and *'looking happier and more friendly'*
Discussion: Results are similar to other studies (Raleigh & Shaha, 2014; Lamb et al, 2018; and Groot et al, 2016 for exercises), and Anderson (2016 for games); but different from Forbes et al, (2013) who found no clear evidence of benefit from exercise on cognitive functioning.
Implications: Findings have both local and global implications for enhancing social engagement, self-esteem and well being of people with dementia.
Conclusion: A combination of mentally stimulating games and exercises improves cognitive functions in old people with mild dementia. Further study should involve effect of these interventions on people with severe dementia.

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