A Survey of Home-Based Cognitive Stimulation Activities in Thai Patients with Mild Cognitive Impairment and Mild Dementia

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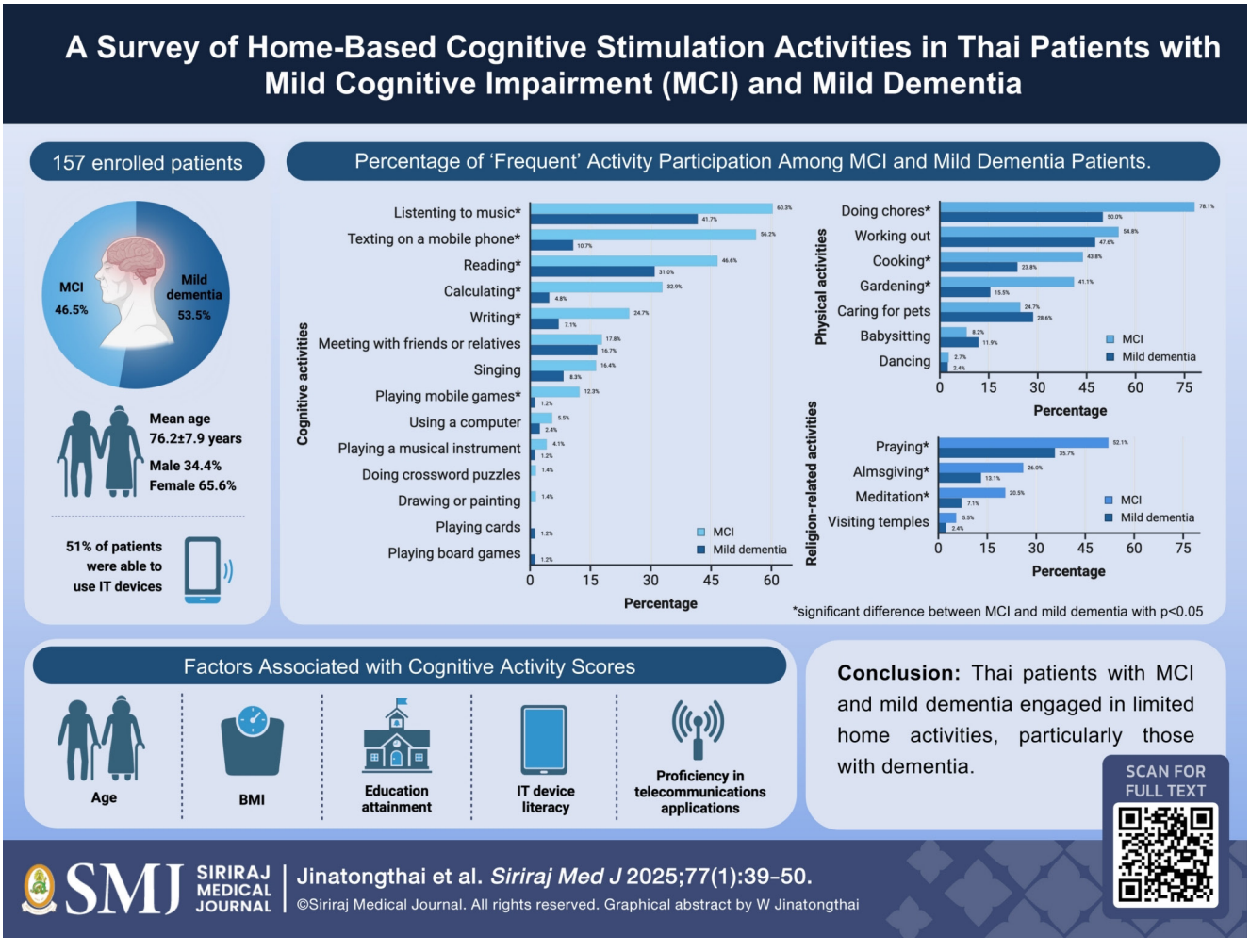

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ABSTRACT

Objective: This study investigated the characteristics of home-based activities in individuals with mild cognitive impairment (MCI) and mild dementia, as well as factors related with those activities.

Materials and Methods: A cross-sectional, questionnaire-based study was conducted on patients with MCI and mild dementia at Siriraj Hospital. Data on patient and caregiver characteristics, home cognitive activities, and proficiency in using information technology (IT) devices and telecommunications applications were collected. Home activities were categorized into cognitive, physical, and religion-related activities based on their type and frequency.

Results: Of 157 enrolled patients with a mean age of 76.2±7.9 years, 46.5% were diagnosed with MCI and 53.5% with mild dementia. The MCI group exhibited significantly higher frequencies of activities such as reading, writing, playing mobile games, texting, calculating, music listening, meditation, praying, almsgiving, doing chores, cooking, and gardening (all $p<0.05$). Approximately 51% of patients were able to use IT devices. MCI patients demonstrated greater proficiency in using smart IT devices and teleconferencing applications than those with mild dementia (79.5% vs. 26.2%, and 49.3% vs. 11.9%, both $p<0.001$). Cognitive activity scores were associated with age ($r=-0.34$, $p<0.001$), body mass index ($r=0.16$, $p=0.04$), educational attainment ($r=0.38$, $p<0.001$), IT device literacy ($r=0.41$, $p<0.001$), and proficiency in using telecommunications applications ($r=0.55$, $p<0.001$).

Conclusion: Thai patients with MCI and mild dementia engaged in limited home activities, particularly those with dementia. IT device literacy was surprisingly prevalent and contributed to higher cognitive activity scores. Developing home-based cognitive stimulation programs for Thai patients facing cognitive challenges utilizing telecommunication may be feasible.

Keywords: Home-based activity; cognitive activity; mild cognitive impairment; mild dementia; Thai (Siriraj Med J 2025; 77: 39-50)

INTRODUCTION

Leisure activities impact cognitive decline in geriatric adults. Engaging in activities such as board games, reading, musical instruments, crossword puzzles, dancing, household chores, walking, swimming, and caregiving significantly reduces the risk of cognitive decline.[1]

A survey conducted in 2020 on Thai individuals aged over 60 during the COVID-19 pandemic revealed difficulties in activities such as leaving the house for errands, shopping, medical appointments, religious ceremonies, social activities, and visiting relatives or friends.[2] The pandemic has also notably affected the decline in Mini-Mental State Examination scores in dementia patients, with a more significant decline during the lockdown.[3,4] A systematic review suggests that cognitive training can improve cognitive function in patients with mild to moderate dementia.[5] However, caregiver-led cognitive stimulation therapy at home did not significantly improve cognitive function in dementia patients, likely due to inconsistent engagement in cognitively stimulating activities within the study samples.[6,7]

There is evidence showing that factors such as low education attainment, depression, physical inactivity, obesity, or social isolation can contributed to modifiable risk factors for dementia.[8] In the Thai population, previous studies have identified several factors associated with dementia in the elderly. These factors include male gender, advanced age, low education levels, diabetes, depression, lack of mobile phone use, limited skills in computer and internet use, infrequent social participation, and minimal engagement in religious activities.[9,10] Moreover, advanced ageing people are likely to experience home-activities limitation due to many possible factors, such as health status, depression, psychosocial factors, body mass index (BMI), or education level.[11] Previous research suggests that engaging in activities such as computer use and arts or crafts may lower the risk of mild cognitive impairment (MCI).[12] These activities may also promote cognitive reserve, neuronal function, neural growth, and alternative neural pathways, thereby facilitating the maintenance of cognitive function.[13]

Other studies have shown associations between leisure activities and dementia risk, indicating potential protective effects against dementia.[14-18] However, a large longitudinal study suggested that reduced activity participation may indicate prodromal dementia, despite an unclear association with dementia incidence.[19] Nonetheless, a systematic review in 2016 confirmed the positive association between mentally stimulating leisure activities and cognitive function, as well as decreased cognitive decline.[20]

Clinical guidelines recommend cognitive training for patients with cognitive impairment to slow disease progression. However, previous studies on home-based, caregiver-led cognitive stimulation therapy showed limited effectiveness in improving cognitive function for dementia patients, possibly due to difficulties in consistently engaging participants in cognitively stimulating activities.[6,7] Limited information exists on home-based cognitive training for dementia patients in Thailand. This study aimed to investigate the characteristics of home activities that contribute to cognitive function in individuals with MCI and mild dementia, as well as factors influencing these activities. The findings may facilitate the development of home-based tools or activities to stimulate cognitive function at home.

MATERIALS AND METHODS

Patient population and data collection

This cross-sectional study was conducted at a single center university hospital between September and December 2022 and was approved by the Siriraj Institutional Review Board (COA no. Si 448/2022). Eligible participants were (1) individuals aged 60 years old or older who visited the memory clinic or related clinics at Siriraj Hospital, (2) diagnosed with MCI or mild dementia, and (3) had at least one caregiver. MCI was defined as having a measurable objective cognitive impairment such as a Montreal Cognitive Assessment[21] (MoCA) score below 25, while having the Thai Mental State Examination[22] (TMSE) score of 24 to 30. The TMSE is an adaptation of the Mini-Mental State Examination (MMSE). Patients with MCI were also characterized by having normal activities of daily living, as indicated by a Functional Assessment Staging[23] (FAST) scale score of 3 or a Global Deterioration Scale[24] (GDS) score of 3. Mild dementia was defined as having a TMSE score of 18 to 23, a FAST score of 4, or a GDS score of 4. The diagnosis of MCI or mild dementia was then re-validated by at least two experienced neurologists. The exclusion criteria were (1) severe visual, auditory, or mobility impairments that hindered daily activities and cognitive tests, and (2) cognitive decline caused by reversible processes such as vitamin B12 deficiency or thyroid disorders.

The sample size was calculated using the formula for infinite population proportion and drew upon information from a previous study.[1] The proportion of individuals regularly engaging in leisure and physical activities was set at 0.25, with an acceptable margin of error of 0.07 and a type 1 error of 0.05. The calculated sample size was 147 individuals. After adding 10 percent to account for incomplete data, the adjusted sample size was 162 individuals. However, five participants were excluded after recruitment because they were initially classified as having mild dementia but were later found to have moderate dementia upon further review.

During routine outpatient visits, patients and their caregivers were apprised of the study and subsequently invited to engage in the research. Caregivers who agreed to participate provided written informed consent. The caregivers then completed a comprehensive questionnaire on (1) the patient and caregiver characteristics, (2) patient and caregiver proficiency with information technology (IT) devices and aptitude in utilizing telecommunications applications, and (3) patient engagement in cognitive stimulation activities at home.

Home-based cognitive stimulation activities and activity scores

Twenty-five home-based cognitive stimulation activities were categorized into three groups. The first group consisted of 14 cognitive-related activities: reading; writing; playing cards; board games; crossword puzzles; mobile games; texting; computer use; calculations; drawing/painting; playing musical instruments; listening to music; singing; and socializing with friends/relatives. The second group included four religion-related activities: meditation; praying; almsgiving; and temple visits. The third group encompassed seven physical activities: dancing; chores; cooking; babysitting; pet care; gardening, and exercise. Each activity was rated based on frequency: never; occasionally; 1–2 days/week; 3–5 days/week; and daily.

According to a previous study by Verghese J et al[1], activity scores were calculated as follows: 0 point for never and occasionally; 1 point for 1–2 days/week; 4 points for 3–5 days/week; and 7 points for daily participation received. Thus, the maximum scores in our study for cognitive-related, religion-related, and physical activities were 98, 28, and 49, respectively. Furthermore, Participation was classified as "frequent" for 3–7 days/week engagement and "rare" for 0–2 days/week engagement.

IT device literacy and ability to use telecommunications applications

IT device literacy data from the questionnaires were divided into two categories: simple devices (CD players, radios, and mobile phones for basic calls) and smart devices (smartphones, tablets, and computers). The ability to use telecommunications applications was also classified into two categories: simple applications (such as LINE for texting, Facebook, and YouTube) and smart applications (for example, LINE for video calls, Facetime, or Zoom).

Statistical analysis

Statistical analyses were conducted using PASW Statistics, version 26 (SPSS Inc, Chicago, IL, USA). Age, BMI, TMSE, MoCA, and Thai Geriatric Depression Scale-15[25] are reported as the mean and standard deviation. Nonparametric continuous data are presented as a median with an interquartile range, and categorical data are shown as percentages. Statistical comparisons for categorical data were performed using Pearson's chi-square test, while the Mann–Whitney *U* test was used for continuous variables. The independent samples Kruskal–Wallis test was employed to compare three or more categorical variables with nonparametric data. Spearman's rank correlation coefficient was used to assess variable correlations. Statistical significance was defined as a p-value < 0.05.

RESULTS

The study included 157 patients with a mean age of 76.2 ± 7.9 years, 65.6% of whom were female. Of these, 73 (46.5%) were diagnosed with MCI, whereas 84 (53.5%) were identified with mild dementia. Statistically significant differences were observed in the mean age, generation, BMI, education level, TMSE scores, and MoCA scores of the MCI and mild dementia patient groups (Table 1). The caregivers of the patients in the two groups had no significant differences in their characteristics (Table 2). While the level of confidence and anxiety in caregiving in the two groups did not significantly differ, the caregivers of patients with mild dementia experienced a significantly greater burden of care (p < 0.001).

Table 3 showed significant differences in the IT device literacy and ability to use telecommunications applications of the two groups. A majority (79.5%) of MCI patients were proficient in using smart devices, compared to only 26.2% of mild dementia patients (p < 0.001). Similarly, 49.3% of MCI patients could use video-call or conference applications, while only 11.9% of mild dementia patients possessed this capability (p < 0.001). Conversely, there were no significant differences in IT device literacy and the ability to use telecommunications applications among the caregivers in the two groups. Regarding the activity scores, the patients in the two groups exhibited significant differences in their cognitive (p < 0.001), physical (p < 0.001), and religion-related activity scores (p = 0.004).

Patients with MCI engaged in reading, writing, playing mobile games, texting, calculating, and listening to music more frequently than those with mild dementia. Patients with MCI also had higher frequencies of home physical activities (chores, cooking, gardening) and religion-related activities (meditation, praying, almsgiving). Most patients did not report that COVID-19 had negatively impacted their activities; however, meeting with friends or relatives, visiting temples, and almsgiving were affected, with 47.1%, 28.7%, and 19.1% of patients, respectively, reporting an adverse impact (Table 4).

The results revealed significant associations between cognitive-related activity scores and physical activity scores, religion-related activity scores and BMI (Fig 1). A significant inverse association was found between cognitive activity scores and the Geriatric Depression Scale-15 as well as patient age. Furthermore, patients' cognitive-related, religion-related, and physical activity scores significantly differed based on their IT device literacy and ability to use telecommunications applications (Fig 2). Patients who could use smart devices or video call/conference applications had higher scores for all three cognitive-stimulation activity groups. When comparing the impact of different levels of education and family income on each home-based activities, only a significant difference in level of education was found in the scores of cognitive-related activities.

DISCUSSION

This study is the first to investigate home-based activities in Thai patients with MCI and mild dementia. The findings suggest that home activities, including reading, writing, playing mobile games, texting, calculating, listening to music, meditating, praying, giving alms, doing chores, cooking, and gardening, showed significant differences in frequency between individuals with MCI and those with mild dementia. A previous study compared home activities in elderly individuals who developed dementia with those who did not, indicating that certain activities, such as reading, playing board games, playing musical instruments, and dancing were found to be less common among patients who would go on to develop dementia.1 Despite cultural differences, we also observed that activities like reading were less frequent among patients with dementia in our study. However, our study compared individuals with dementia to those with MCI, rather than assessing the risk of developing dementia as was done in the previous study.

The study found significant associations between older age, lower BMI, lower education level, IT device literacy, and ability to use telecommunications applications with poorer cognitive function. Our study results align with previous research, which consistently identifies age and education level as significant risk factors for cognitive impairment.[26,27] While research on the influence of information and communication technology (ICT)

TABLE 1. Baseline characteristics of patients and comparison between MCI and mild dementia groups.

Characteristics	All patients n=157	MCI n=73	Mild dementia n=84	*p*
Age, years (mean±SD)	76.2±7.9	72.5±6.9	79.4±7.3	**<0.001**
Generation (%)				
Baby boomers	52.9	61.4	38.6	**<0.001**
The silent generation	47.1	29.7	70.3	
Female (%)	65.6	68.5	63.1	0.478
BMI, kg/m² (mean±SD)	23.2±3.8	24.1±3.8	22.5±3.6	**0.005**
Education (%)				
Primary school or lower	34.4	20.5	46.4	**0.001**
Secondary/High school	18.5	19.2	17.9	
Graduate or higher	47.1	60.3	35.7	
Comorbidities (%)				
Hypertension	72.0	68.5	75.0	0.365
Diabetes	38.2	42.5	34.5	0.307
Dyslipidemia	73.2	67.1	78.6	0.106
Cardiac disease	15.3	16.4	14.3	0.709
Stroke	24.2	20.5	27.4	0.319
CKD	13.4	9.6	16.7	0.194
Other	5.7	8.2	3.6	0.211
TMSE (mean±SD)	22.6±4.1	26.0±2.8	21.2±3.8	**<0.001**
MoCA (mean±SD)	20.8±4.7	21.9±4.2	19.2±5.0	**0.006**
TGDS-15 (mean±SD)	3.9±2.8	3.9±2.7	3.8±3.0	0.650

Abbreviations: BMI, body mass index; CKD, chronic kidney disease; MCI, mild cognitive impairment; MoCA, Montreal Cognitive Assessment; TGDS-15, Thai Geriatric Depression Scale; TMSE, Thai Mental State Examination

use on cognition is relatively limited, previous studies have also demonstrated that ICT usage is associated with cognitive benefits, including enhancements in memory and executive function in older adults over time.[28,29]

Surprisingly, 51.0% of patients in our study were able to use IT devices. Patients with MCI showed a high level of proficiency in using smart IT devices and teleconferencing applications than those with dementia. This finding was consistent with a study involving 2,172 people with dementia and MCI in Spain and Sweden, which reported that approximately 54.14% of participants used a smartphone almost every day, while only 9.76% utilized specific application or software to support their memory.[30] In our study, 44.9% of participants were able to use any application; however, we did not collect data on the specific applications they used.

The study also examined the impact of religion-related activities on cognitive status. Previous research has shown a positive association between religious or spiritual involvement and cognitive function.[31-33] However, limited information exists regarding younger individuals and non-Christian groups. Given that nearly all participants in the present study were Buddhist (99%), it appears that common practices in Thai culture, such as meditation, almsgiving, and praying, are significantly associated with cognitive function.

The study has its limitations. this study relied on a questionnaire asking caregivers about the past activities of patients. As such, it may be subject to recall bias, as the accuracy of the responses depends on the caregivers' memory and perception. Moreover, there is a possibility that the accompanying caregiver during the outpatient

TABLE 2. Baseline characteristics of caregivers and group comparison.

Characteristics	All patients n=157	MCI n=73	Mild dementia n=84	*p*
Caregiver's age, years (mean±SD)	52.9±14.9	52.4±15.5	53.4±14.4	0.510
Caregiver, female (%)	70.6	64.3	75.9	0.116
Caregiver's relationship (%)				
Spouse	24.0	29.0	19.8	0.375
Offspring	62.0	56.5	66.7	
Other	14.0	14.5	13.5	
Caregiver's education level (%)				
Primary school or lower	4.7	2.9	6.2	0.091
Secondary/high school	11.9	7.1	16.0	
Graduate or higher	83.4	90.0	77.8	
Caregiver with comorbidities (%)	44.1	41.4	46.3	0.543
Family income, Baht/month (%)				
Less than 20,000	12.5	7.2	16.9	0.218
20,001 – 50,000	48.0	52.2	44.6	
50,001 – 100,000	18.4	15.9	20.5	
More than 100,000	21.1	24.6	18.1	
Caregiver's availability for home cognitive training (%)	77.1	70.0	83.1	0.054
Available hours in a day, median (IQR)	2.0 (1.0-3.0)	2.0 (1.0-3.0)	1.0 (1.0-3.0)	0.084
Available days in a week, median (IQR)	6.0 (3.0-7.0)	6.0 (2.5-7.0)	6.0 (3.0-7.0)	0.848

Abbreviation: MCI, mild cognitive impairment

visit may not be the primary one. Hence, the information accuracy might have been affected. Lastly, our study did not collect data on underlying factors that might influence impaired mobility, which could potentially contribute to a lower activity frequency.

In future research, the cross-sectional design of this study limits the ability to establish clear causality or identify which specific activities may contribute more significantly to a decline in cognitive function in patients with MCI and mild dementia. A longitudinal study will be needed to determine which activities that should be targeted for future intervention. The high prevalence of IT device use among patients with MCI and their caregivers in our study highlights the potential for future interventions using mobile or telecommunication devices in Thai patients with MCI. In dementia patients, IT literacy is lower, so developing interventions through their caregivers may be a more feasible approach.

CONCLUSION

The current investigation provides valuable insights for home-based activities of Thai patients with MCI and mild dementia. Approximately half of them were able to use IT devices, a factor that may be associated with higher cognitive activity scores. Developing home-based cognitive stimulation programs for Thai patients with cognitive issues using telecommunication technology is potentially feasible.

TABLE 3. IT device literacy and telecommunications application proficiency of patients and caregivers, with patients' activity scores.

Variable	All patients n=157	MCI n=73	Mild dementia n=84	*p*
Patient IT device literacy (%)				
Unable to use any device	21.0	4.1	35.7	**<0.001**
Only simple devices *	28.0	16.4	38.1	
Smart devices †	51.0	79.5	26.2	
Caregiver IT device literacy (%)				
Unable to use any device	0.7	1.4	0	0.235
Only simple devices *	1.3	0	2.5	
Smart devices †	98.0	98.6	97.5	
Patient ability to use telecommunications applications (%)				
Unable to use any application	54.1	27.4	77.4	**<0.001**
Simple applications ‡	16.6	23.3	10.7	
VDO call/conference app §	29.3	49.3	11.9	
Caregiver ability to use telecommunications applications (%)				
Unable to use any application	4.6	4.2	4.8	0.382
Simple applications ‡	12.3	8.5	15.7	
VDO call/conference app §	83.1	87.3	79.5	
Cognitive-related activity score (maximum score = 98)				
median (IQR)	10.0 (4.0-20.5)	15.0 (7.5-27.5)	7.0 (1.0-14.0)	**<0.001**
Religion-related activity score (maximum score = 28)				
median (IQR)	4.0 (0.0-8.0)	7.0 (0.0-14.0)	1.0 (0.0-7.0)	**0.004**
Physical activity score (maximum score = 49)				
median (IQR)	14.0 (7.0-21.0)	21.0 (11.0-22.0)	10.0 (4.2-18.0)	**<0.001**

* Simple devices: CD players, radios, or phones for simple calls

† Smart devices: smartphones, tablets, or computers

‡ Simple applications: Line application for texting, Facebook, or YouTube

§ VDO call applications: Line application for video calls, Facetime, or Zoom

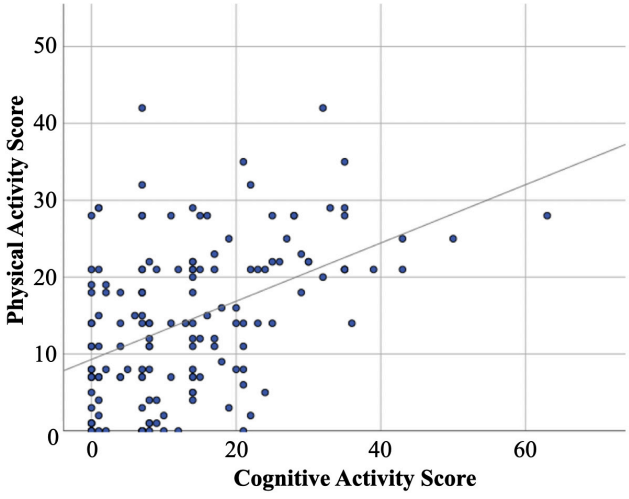
Abbreviations: app, application; MCI, mild cognitive impairment

TABLE 4. Frequency of home activities (cognitive, physical, and religion-related) and group comparison.

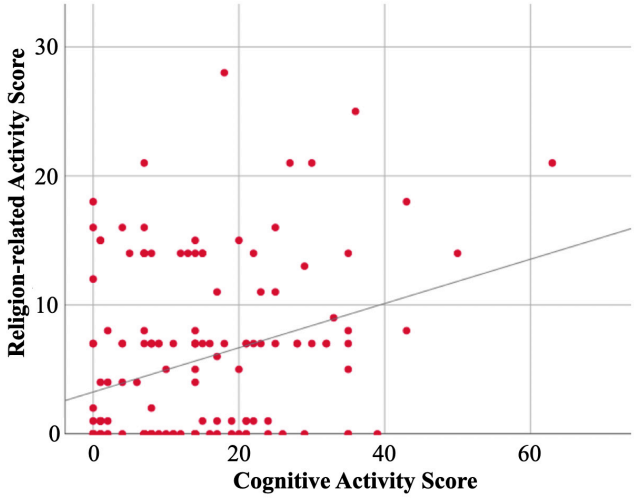
Home activities and frequency (%)	All patients n=157	MCI n=73	Mild dementia n=84	*p*
Cognitive activities				
Reading				
Rare	61.8	53.4	69.0	**0.045**
Frequent	38.2	46.6	31.0	
Writing				
Rare	84.7	75.3	92.9	**0.002**
Frequent	15.3	24.7	7.1	
Playing cards				
Rare	99.4	100.0	98.8	0.350
Frequent	0.6	0.0	1.2	
Playing board games				
Rare	99.4	100.0	98.8	0.350
Frequent	0.6	0.0	1.2	
Doing crossword puzzles				
Rare	99.4	98.6	100.0	0.282
Frequent	0.6	1.4	0.0	
Playing mobile games				
Rare	93.6	87.7	98.8	**0.004**
Frequent	6.4	12.3	1.2	
Texting on a mobile phone				
Rare	68.2	43.8	89.3	**<0.001**
Frequent	31.8	56.2	10.7	
Using a computer				
Rare	96.2	94.5	97.6	0.312
Frequent	3.8	5.5	2.4	
Calculating				
Rare	82.2	67.1	95.2	**<0.001**
Frequent	17.8	32.9	4.8	
Drawing or painting				
Rare	99.4	98.6	100.0	0.282
Frequent	0.6	1.4	0.0	
Playing a musical instrument				
Rare	97.5	95.9	98.8	0.247
Frequent	2.5	4.1	1.2	
Listening to music				
Rare	49.7	39.7	58.3	**0.020**
Frequent	50.3	60.3	41.7	
Singing				
Fare	87.9	83.6	91.7	0.120
Frequent	12.1	16.4	8.3	
Meeting with friends or relatives				
Rare	82.8	82.2	83.3	0.850
Frequent	17.2	17.8	16.7	
Physical activities				
Dancing				
Rare	97.5	97.3	97.6	0.887
Frequent	2.5	2.7	2.4	
Doing chores				
Rare	36.9	21.9	50.0	**<0.001**
Frequent	63.1	78.1	50.0	
Cooking				
Rare	66.9	56.2	76.2	**0.008**
Frequent	33.1	43.8	23.8	
Babysitting				
Rare	89.8	91.8	88.1	0.446
Frequent	10.2	8.2	11.9	
Caring for pets				
Rare	73.2	75.3	71.4	0.581
Frequent	26.8	24.7	28.6	
Gardening				
Rare	72.6	58.9	84.5	**<0.001**
Frequent	27.4	41.1	15.5	
Working out				
Rare	49.0	45.2	52.4	0.370
Frequent	51.0	54.8	47.6	
Religion-related activities				
Meditation				
Rare	86.6	79.5	92.9	**0.014**
Frequent	13.4	20.5	7.1	
Praying				
Rare	56.7	47.9	64.3	**0.039**
Frequent	43.3	52.1	35.7	
Almsgiving				
Rare	80.9	74.0	86.9	**0.040**
Frequent	19.1	26.0	13.1	
Visiting temples				
Rare	96.2	94.5	97.6	0.312
Frequent	3.8	5.5	2.4	

Abbreviation: MCI, mild cognitive impairment

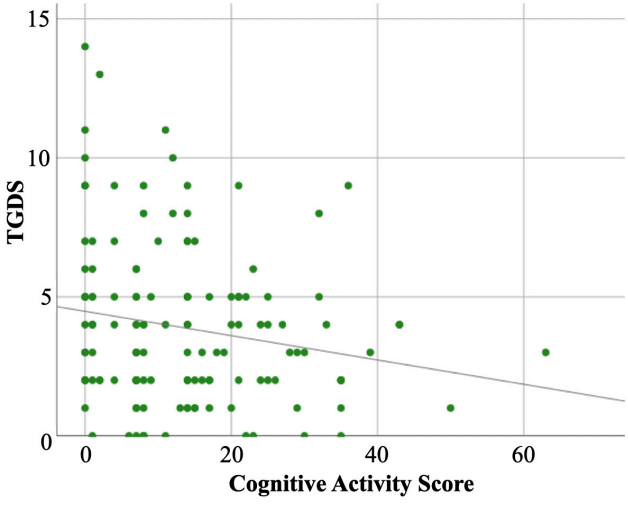
r = 0.436; p<0.001



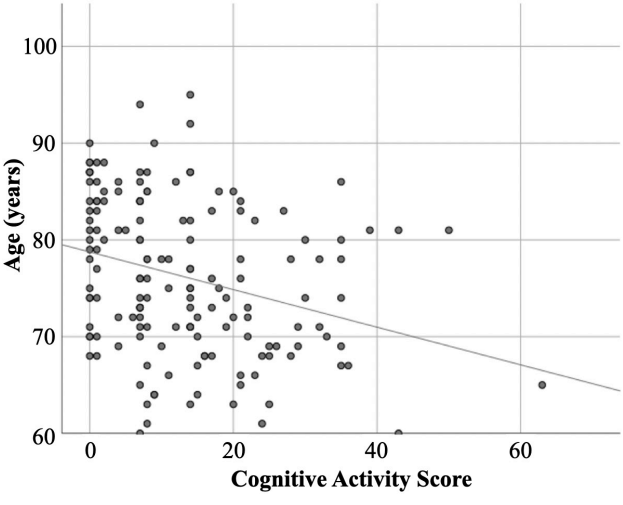
r = 0.276; p<0.001



r = -0.171; p=0.043



r = -0.340; p<0.001



r = 0.163; p=0.043

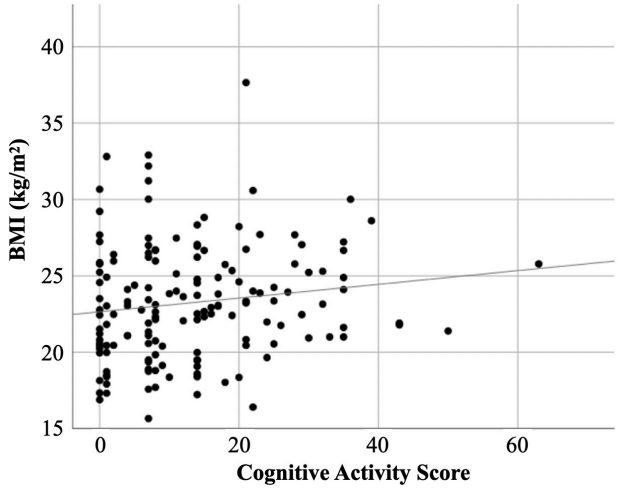


Fig 1. Correlations between scores for cognitive-related, religion-related, and physical activity scores, TGDS-15 scores, age, and BMI of patients.

Abbreviation: TGDS, Thai Geriatric Depression Scale; BMI, body mass index

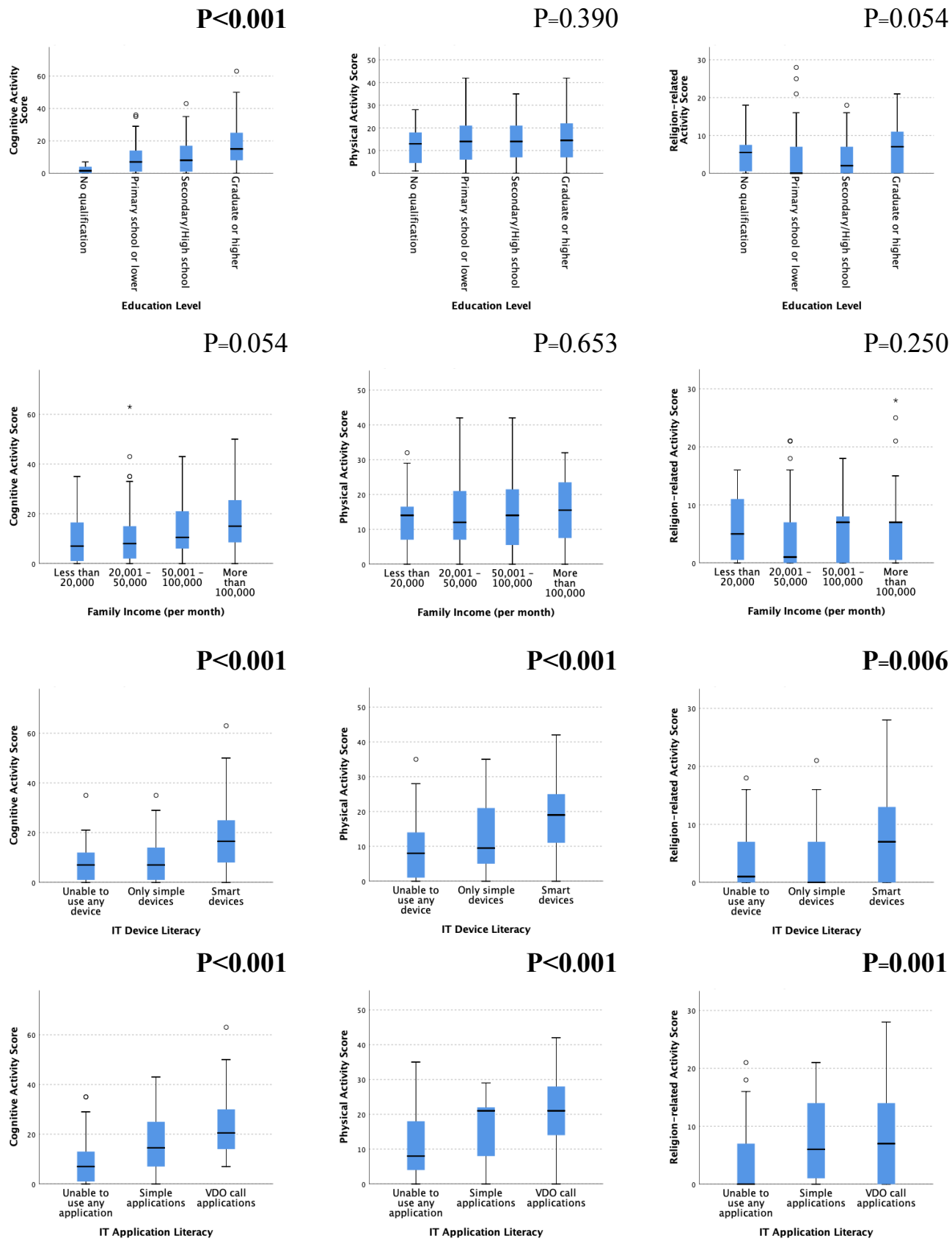


Fig 2. Activity scores stratified by education level, family income, IT device literacy, and telecommunications application proficiency.

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DECLARATION

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Conflict of Interests

The authors declare no conflict of interest.

Author Contributions

Conceptualization and methodology, W.J., K.T., V.S. and C.R. ; Investigation, W.J. and C.R. ; Formal analysis, W.J. and C.R. ; Visualization and writing – original draft, W.J. and C.R. ; Writing – review and editing, K.T., V.S. and C.R. ; Funding acquisition, W.J. and C.R. ; All authors have read and agreed to the final version of the manuscript.

Use of artificial intelligence

The authors declare no use of artificial intelligence.

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