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Running head: THE EFFECTS OF SAIDO LEARNING ON DEMENTIA

The Effects of SAIDO Learning on the Cognition of Patients with Dementia: A Retrospective Study

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## Abstract

SAIDO Learning is a cognitive and social intervention developed by the Kumon Institute in 2004 to slow the progress of symptoms in patients diagnosed with dementia. Today, twenty-three nursing facilities nationwide utilize SAIDO Learning. The data in this retrospective study compare the baseline Mini-Mental State Exam (MMSE) scores to the MMSE scores obtained six months after SAIDO Learning is implemented from patients diagnosed with dementia at Waterford Place in Jenison, Michigan. These scores are reassessed every 6 months as a standard of care. The data was deidentified by the staff of Waterford Place before given to the research team. A paired t-test found  $p > 0.05$ , showing a lack of significant change between scores. This was expected as MMSE scores decline with the natural progression of dementia. The MMSE scores decreased by a mean of 0.6 points, a much slower progression when compared to the decrease of 1.7 points in patients with dementia and no interventions (Tan, Libon, Rascovsky, Grossman, & Xie, 2013).

The Effects of SAIDO Learning on the Cognition of Patients with Dementia: A Retrospective  
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**Introduction**

According to the World Health Organization (2018), the prevalence of dementia has more than doubled since 2000 and dementia has been the world's fifth leading cause of death since 2016. Although many pharmacological therapies have developed over the years, dementia continues to have no cure. A new nonpharmacological therapy called SAIDO Learning, developed by Dr. Ryuta Kawashima and the Kumon Institute of Education in 2004, has shown the potential to prolong the cognitive abilities of patients with dementia and slow the progression of the disease (Kawashima et al., 2005; Kumon, 2019).

SAIDO Learning is based on the understanding that blood flow to the brain decreases in patients with dementia, resulting in cognitive decline. The goal of the therapy is to stimulate blood flow in the prefrontal cortex through arithmetic, reading, writing, counting, and receiving praise (Kawashima et al., 2005; Russo & Graham, 2020). SAIDO Learning sessions take thirty minutes to administer and are composed of three main sections: simple arithmetic, reading aloud, and a number board. Within the session, the individual administering SAIDO, known as the "supporter", will work with two "learners" and give praise consistently throughout the session. These sessions are performed once a day, five days a week (Russo & Graham, 2020).

Today, SAIDO is practiced in over one thousand facilities across Japan (Kumon, 2019). In 2015, SAIDO Learning was introduced to the United States during a cross-cultural study (Kawashima et al., 2012). The findings of Dr. Kawashima and colleagues (2012) showed equal success with the program in the United States as shown in Japan (2005). Due to the newness of the program, no further study has been conducted to replicate or systematically review the

findings from the original two studies conducted by Dr. Kawashima and his research teams (2005; 2012). This retrospective study endeavors to explore the effects of SAIDO Learning on the cognition of patients with dementia for the span of six months and further validate SAIDO Learning as a successful therapy for dementia. It is the belief of the research team that the data will show SAIDO Learning slows the cognitive decline of dementia as evidenced by the baseline and six month Mini-Mental State Exam (MMSE) scores. The desirable outcome through statistical analysis is to fail to reject the null hypothesis.

## **Methods**

### **Location**

Waterford Place in Jenison, Michigan is one of twenty-three skilled nursing facilities to practice SAIDO Learning in the United States. As a model community for SAIDO Learning, Waterford Place holds one of the highest compliance rates among facilities worldwide. As a standard of care, each patient with dementia on the Memory Care Unit is tested every six months with the MMSE. The data collected are from these previously recorded scores. To protect confidentiality of the subjects, staff at Waterford Place deidentified data and assigned each participant a subject number before giving the research team access. To maintain subject anonymity, limited demographic data was provided (see Table 1).

### **Subjects**

Waterford Place provided data for twenty-seven participants of SAIDO Learning. Subjects used for this study were required to meet the following inclusion criteria: (a) participants must be residents of the Memory Care Unit at Waterford Place and (b) actively participate in SAIDO Learning for at least six months. Of the twenty-seven subjects provided by Waterford Place, nineteen were included. Eight participants were excluded due to participating in

SAIDO Learning for less than six months. Because all residents of the Memory Care Unit at Waterford Place are enrolled in SAIDO, a control group within the facility was not possible to achieve. A study conducted by Kay Tan et al. (2013) mapped out the progression of dementia in a longitudinal study by assessing MMSE scores every six months for four years on patients diagnosed with dementia who were not using interventions. The data from this study will be used as a control group and has a sample size of one hundred six participants.

Due to the rarity of SAIDO Learning implementation in the United States, the sample population to draw subjects from is small. Waterford Place has only practiced SAIDO Learning for one year; this also effects the number of subjects that meet the inclusion criteria. This has been a pattern as the original study conducted in 2005 (Kawashima et al.) had a sample size of sixteen participants and the study of 2012 (Kawashima et al.) had a sample size of twenty-three participants. To ensure proper statistical analysis on this study's sample size of nineteen, a confidence interval of 95% was used and the degrees of freedom were set at 18 for a T-test statistic of 2.101.

### **Research Design**

This is a retrospective study that analyzes MMSE scores collected by staff at Waterford Place on patients with dementia participating in SAIDO Learning. Each participant was given a baseline MMSE score before beginning SAIDO Learning sessions. Every six months the participants were tested again with the MMSE. The staff at Waterford Place removed all identifiable information from the data before the research team was granted access. The only information given to the research team was the gender, age group ([<69], [70-79], [80-89], [90+]), staff-assigned subject number, and MMSE scores for baseline, six months, and one year after implementation. Only four of the nineteen participants had MMSE scores for one year after

beginning SAIDO Learning. Due to the small sample size, this study only focuses on comparing the baseline scores to the follow-up scores after six months of SAIDO Learning.

In both studies conducted by Dr. Kawashima and colleagues (2005; 2012), the MMSE and Frontal Assessment Battery (FAB) were used as measures of the subjects' cognitive function. Although Waterford Place collects FAB scores in addition to MMSE scores, the research team did not find a suitable control group for FAB comparison and therefore chose to focus solely on the MMSE findings. The MMSE is an assessment of cognitive function that is scored from zero to thirty, a score of thirty reflecting intact cognitive function. This exam is one of the most widely used cognitive measures in clinical practice; it is convenient to administer and evaluates a broad scope of cognitive abilities such as recall, attention, orientation, memory, visual construction, and language (Matias-Guiu, Valles-Salgado, Rognoni, Hamre-Gil, Moreno-Ramos, & Matias-Guiu, 2017; Arevalo-Rodriguez et al., 2015 ; Sheehan, 2012). The MMSE has high screening accuracy and, although it is not designed for diagnostics, can be combined with other tests or biomarkers to indicate Alzheimer's disease (Matias et al., 2017; Palmqvist et al, 2012; Pozueta et al., 2011). In a 2016 review of accuracy, the MMSE scored a sensitivity of 0.85 and specificity of 0.90, reflecting only 15% would be misdiagnosed as not having dementia and 10% misdiagnosed as having dementia (Creavin et al.).

### **Ethical Considerations**

Due to the noncontact between the research team and the subjects of the study, the Institutional Review Board (IRB) determined this study does not qualify as human subject research and therefore does not require IRB oversight. Because the data had already been collected and deidentified by Waterford Place, the research team did not need to acquire

informed consent from the subjects. To maintain confidentiality and protect the deidentified information, all data was stored on an encrypted file accessible only by the research team.

### **Results**

The MMSE scores at baseline and six months after participating in SAIDO Learning were compared using a paired t test. Statistical significance was set at  $\alpha = 0.05$  for a confidence level of 95%. For a sample size of nineteen, the T-test statistic is set at 2.101. The resulted t value was 0.694, therefore  $p > 0.05$  and we failed to reject the null hypothesis (see Table 2).

The means were calculated for both the SAIDO Learning baseline and six-month data sets and compared to the means from the study in 2013 (Tan et al.) as a control group. The control group had an average decline of 1.7 points on the MMSE after six-months without intervention, whereas the SAIDO Learning group had an average decline of 0.6 points (see Table 3).

### **Discussion**

By failing to reject the null hypothesis, we have shown there is not a statistically significant difference between the baseline MMSE scores and the six-month MMSE scores. This shows that the MMSE scores for the SAIDO Learning group did not significantly decrease during the six-month interval. The average difference between the baseline and six-month scores of the SAIDO Learning group is less than half of the difference in the control group. This supports our initial hypothesis that SAIDO Learning slows the loss of cognitive function in patients with dementia.

### **Comparison to Original Studies**

In the Japanese study conducted in 2005, Dr. Kawashima and colleagues set out to demonstrate SAIDO Learning, then called Learning Therapy, was effective at improving the

cognitive function of patients diagnosed with dementia. Unlike this study, Dr. Kawashima and his research team explored the effects of Learning Therapy on verbal communication and independent ability in addition to cognitive function. Like this study, Dr. Kawashima and colleagues found no statistically significant decrease in the MMSE six-month scores compared to the baseline scores of the learning group (2005). The 2005 study also found a significant decrease in the MMSE scores of the control group (Kawashima et al.). In the follow-up study conducted in the United States (2012), Dr. Kawashima and his research team found statistically significant improvement in MMSE scores after the 6 months of SAIDO Learning.

### **Limitations**

The nature of this study limits the demographic understanding of the sample population. Due to the deidentification of the data, little is known about this sample pool. No subject is younger than 70, and men and women represent 21.05% and 78.95% respectively. Therefore, the findings of this study cannot be generalized to patients with dementia younger than 70 years old, and caution should be used when generalizing the findings for men.

Threats to internal validity are limited because of the noncontact between the research team and the participants. In this format, there is no attrition rate and the researchers are completely blind to the subjects. However, the small sample size of nineteen places the findings at risk for low statistical power and therefore can cause a type II error in the analysis. The failure to reject the null hypothesis could be the result of a small sample size. Although the sample size for the control group was much larger, the data set was unavailable for statistical analysis and therefore weakens the comparison.

The MMSE is a tool designed for screening dementia, the appropriateness of using this tool as scale for cognitive function is questionable. The MMSE has limited sensitivity to change

with both floor and ceiling effects (Sheehan, 2012). This affects the statistical validity of the findings. The construct validity is also threatened as the MMSE was the only tool used to measure the study variable.

### **Conclusion**

This study demonstrated that SAIDO Learning successfully slows the cognitive decline of dementia. This holds clinical significance by offering a valid, nonpharmacological intervention as a therapy for patients diagnosed with dementia. By slowing the progression of the disease, SAIDO Learning can offer patients with dementia a prolonged and new quality of life. Additional studies with more research participants should be conducted to further validate the effectiveness of SAIDO Learning as a therapy for patients diagnosed with dementia.

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## Tables

Table 1

Age Bracket and Gender of SAIDO Learning Participants

	Male	Female	Total
< 69	0	0	0
70 – 79	0	3	3
80 – 89	3	6	9
90 +	1	6	7
Total	4	15	n = 19

Table 2

Paired T-Test Between SAIDO Learning Baseline Scores and Six-Month Scores

Pair 1	Mean	Std. Deviation	Std. Error Mean	T-test statistic at $\alpha = 0.05$	t	df
Baseline-6 Months	.526	3.306	.758	2.101	.694	18

Table 3

Mean MMSE Scores at Baseline and Six Months

	SAIDO Learning	Control (Tan et al.)
Baseline	14.1	22.5
6 Months	13.5	20.8
Difference	0.6	1.7
	n = 19	n = 106