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Review Article

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# Playing Bridge Dementia Prevention or Therapy As Well

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***Abstract***

*We conducted two experiments: first in Alzheimer's Center in Warsaw and second in two Welfare Houses in Toruń. In April 2018 Alzheimer's Center in Warsaw accepted bridge lessons for their patients with Mild Cognitive Impairment. We checked if MCI patients could learn new skills and play a simple version of the game bridge. Thirteen out of twenty patient -volunteers played one year every 3 hours a week. Patients and the control group were tested with MMSE initially and after one year. An average loss of MMSE results in the „playing group" was more than two and a half times lower than in the control. In 2019 we applied bridge lessons to patients of Welfare Houses, mostly MCI. Initially and after 20 weeks of intervention, we checked them with MMSE, Geriatric Depression Scale (GDS), and PERMA. Unlucky, due to COVID-19, we couldn't complete the MMSE results. In effect, depression, initially close to pathological, almost disappeared, and well-being rose significantly. In both experiments, social relations were created within playing tables, what's surprising, especially in the Alzheimers Center case. Playing bridge has been accepted there as one of the essential therapies.*

**Keywords:** **MMSE** (Mini-Mental State Examination), **GDS** (Geriatric Depression Scale), **MCI** (Mild Cognitive Impairment), **PERMA** (prof. Martin Seligman's well-being test), **AD** (Alzheimer's Disease), **CDT** (Clock Drawing Test)

## Introduction

Among many games and other types of mental activity, the game of bridge is the most complex and engaging in counting, reasoning, planning, and psychological operations. It makes the game the most difficult and the only one where World Champions stay unbeaten by the computer program. When reading Global Council on Brain Research (GCBH) report recommendations, one can see that:" Incorporating enjoyable cognitively stimulating activities as part of a healthy lifestyle will help maintain your brain health and reduce the risk of cognitive decline as you get older". The report shows why it works and how [1].

Prof. M.C. Diamond from Berkeley University California reported that playing bridge lowers the Chance of Alzheimer's Disease by as much as 75%.

The most exciting and depth review of possible interventions for healthy ageing and cognitive stimulation presents R. Ashworth, Prof. Samantha Punch, and Dr Caroline Small confirming all cited above conclusions. They also are trying to answer if the Bridge card game is linked to dementia [2].

Even if many other researchers confirmed the above findings, one paper presents a less optimistic opinion. National Academies Committee sees promising but inconclusive evidence on cognitive activity interventions to prevent cognitive decline and dementia [3].

The main goal of our research was to show that by lessons and playing bridge, we can make changes in elderly life.

For patients of Alzheimer's Center, first, we reminded them how to count to ten, thirteen, to forty, how to keep cards in hand properly, and they had yet to play bridge before. It was pure learning a new skill. The parallel goal was to slow cognitive decline.

The intervention was one year, every week, 3 hours of bridge lessons, preceded and completed by MMSE tests (also for the control group with no bridge lessons).

For pensioners in Welfare Houses (they stay hopeless waiting for the end in double rooms, where meals determine the rhythm of every day), besides slowing cognitive decline, we wanted to raise their well-being and lower depression.

The intervention was 20 weeks, 3 hours a week, teaching game of

bridge lessons and play, preceded and completed by MMSE, GDS, and PERMA tests.

Results were processed with statistical methods, and geriatrics estimated the clinical importance of results.

## Materials and Methods

### *Design Patients*

We got 20 volunteers, patients of the Alzheimer Center out of 120 brought to the Center by their families daily who wanted to learn bridge. Initially, they could not count to ten and keep cards in hand properly; this was the first time anyone played bridge before. All have been diagnosed with Alzheimer's Disease (AD). Shortly only 13 of them stayed in the group, which we called "bridge". Dropouts were caused by unacceptable behavior or other health problems.

At the same time, we selected a "control" group from outstanding patients also with diagnosed AD and reduced them to 13 persons similar to the "bridge" one in terms of age and gender.

### *Baseline parameters*

All patients from both groups were tested with Mini-Mental State Examination, and the average results in the "bridge" group were 25,3 and the "control" one 24,7.

Both groups had ten female and three male members with an average age in the "bridge" group 81,15 and "control" 81,53.

### *Bridge lessons*

None of our patients played bridge earlier in his life, so the game rules were new.
Having problems with counting, adding, or deducting, they slowly started to do it correctly. Week by week, in 3 hours sessions divided by 15 minutes breaks, they made progress. We did not teach them bidding, so they had to play or defend a given contract. After six months, 13 (out of the initial 20) played a regular game and stayed in the group. Counting to 40, adding and deducting was no big problem for those who survived. Considering that initially, they had problem counting to ten and keeping cards properly in hand, returning to using mathematics is impressive. Some also played at home with families when taken from Alzheimer's Center in the afternoon.

In the teacher's opinion, there were no significant changes in cognitive ability during this one year of bridge lessons.

### Outcome Measures

After one year of our practical lessons, all of them were measured with Mini-Mental State Examination, and the results were as below:
for the "bridge" group average results of the final test was 24,8, so the loss of cognitive ability was 1,22 points, for the "control" group average results of the final test was 22,07, so the loss of cognitive ability was 2,63

According to the Folstein scale, MMSE "control" group, on average, dropped to a lower level.
Geriatrics found these changes clinically significant, so we can say that playing bridge can be treated as one of the best therapies for patients with diagnosed AD at the MCI stage.

## Bridge In Welfare Houses

### Objective

"Bridge as dementia prevention" was designed to assess the efficacy of learning and playing bridge on cognitive ability change in people over sixty years old. The pilot study in two Welfare Homes in Toruń (Poland) took six months.

Thirty-four people over 60 years old were selected randomly from 270 residents of two Welfare Homes.
Most of them had various health limitations, some in wheelchairs, some with MCI but not diagnosed with Alzheimer's.

They were initially tested with BDNF (Brain-Derived Neurotropic Factor) as studies suggest that neurotrophic factors have a protective role against amyloid-beta toxicity, MMSE, CDT, GDS, PERMA, and other tests of physical abilities.
After initial tests, bridge lessons and play were applied to the "bridge" group.

### Interventions

Lessons of the game bridge, the most brain-activating mind- game, started with the so-called mini-bridge where cards are open, and the teacher explains the game rules. It is essential to start the real game as soon as possible to avoid early dropouts. After three weeks of "open game", residents started normal supervised play. Few had to stay on a mini-bridge level longer due to their cognitive limits. Similarly, physiotherapists had two hours a week of exercises with a "bridge and physical exercises" group in addition to bridge lessons and play. All activities were appropriate to physical restrictions.

### Outcome measures

Unfortunately, the COVID lockout of Welfare Houses didn't allow us to complete all final tests. Only internal Staff could make them, so we had to reduce it to GDS and PERMA tests.

### *Partial report on the measurement of well-being with the PERMA questionnaire*

The study was performed in two dependent samples: a pre-test and a post-test. The pretest measures well-being (self-esteem of mental sense) before starting bridge training ; and the post-test after a finished training series. The report compares the general result of the PERMA questionnaire, calculated as an ordinal variable and an interval variable. The measurement level was performed using the mean and standard deviation for a small sample N = 33. For this reason, the interval measurement was treated only as indicative

and an external criterion for the actual size. The overall test score is a score that indicates long-term well-being or malaise.

The presented analyses were to answer the question about the differences between the two dependent measures (on the same sample) of well-being. In this natural experimental study design, differences or lack thereof can be attributed to the manipulation between measurements that was bridge training. A control sample still needed to be introduced into the model. Therefore, the analyses were performed as dependent samples. In both measurements, small but statistically significant differences were obtained between the pre-test and post-test results. Statistical significance of 0.05 means that we can say with a 95% probability that the recorded differences between the measurements can be attributed to the procedure used, not to measurement errors. Thus, the bridge training changed the results of the well-being test. How? People who felt well in the pretest did not change it in the post-test, but people who felt unwell in the pre-test - generally - achieved better mental well-being. These results are preliminary, based on non-standardized measurement, but show that the hypothesis about the increase in positive thinking about oneself under the influence of bridge training makes empirical sense. The study of this phenomenon should be continued on larger samples and using standardized measurement tools.

**Table 1: Interval measurement – comparison of averages**

| | N | Minimum | Maximum | Average | Standard Deviation | Variance | Slant | |
|---|---|---|---|---|---|---|---|---|
| | Statistics | Statistics | Statistics | Statistics | Statistics | Statistics | Statistics | Standard error |
| Pretest PERMA | 33 | 29.00 | 96.00 | 56.8485 | 19.14439 | 366.508 | .547 | .409 |
| Posttest PERMA | 33 | 37.00 | 96.00 | 61.0000 | 17.06422 | 291.187 | .391 | .409 |
| N Valid | 33 | | | | | | | |

**Table 2: Statistics for dependent samples**

| | | Average | N | Standard deviation | Standard average error |
|---|---|---|---|---|---|
| Pair | Pretest PERMA | 56.8485 | 33 | 19.14439 | 3.33261 |
| | Posttest PERMA | 61.0000 | 33 | 17.06422 | 2.97050 |

**Conclusion:** The hypothesis about the occurrence of differences in measurements was confirmed.

*Nominal-ordinal measurement-dependent samples (Test 1)*

**Table 3: Marked Wilcoxon rank test for paired samples. Summary of the hypothesis test**

| | Null hypothesis | Test | Relevance | Decision |
|---|---|---|---|---|
| 1 | The median of differences between pretest PERMA and posttestPERMA equals zero | Marked Wilcoxon rank test for paired samples | .000 | Reject the zero hypothesis |

The Asymptotic .significance is presented. The significance level is .050

**Table 4:Summary of the Wilcoxon Marked Rank Test for Related Samples**

| | |
|---|---|
| Total N | 33 |
| Test statistics | 462.000 |
| Standard error | 50.654 |
| StandardizeStandardisedstic | 4.225 |
| Asymptotic significance (two-tailed test) | .000 |

*Friedman's test (Test 2)*

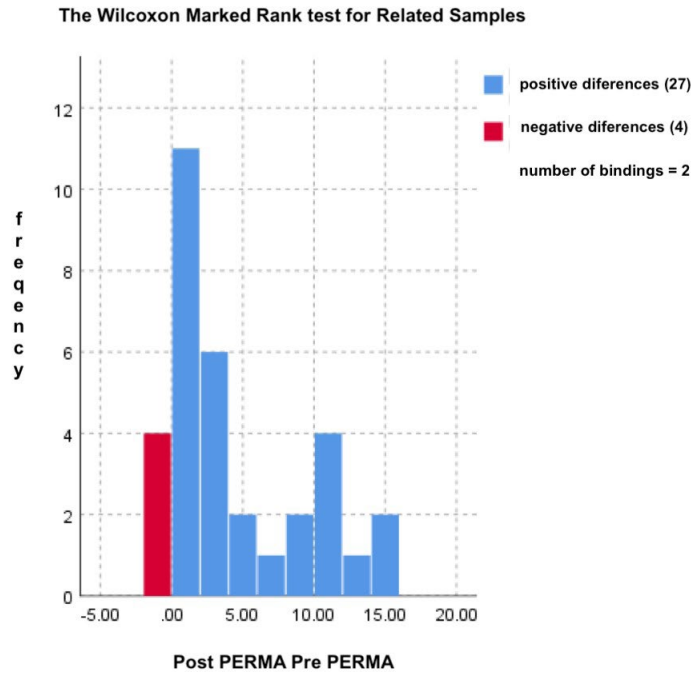
**Table 5: Rank Average rank**

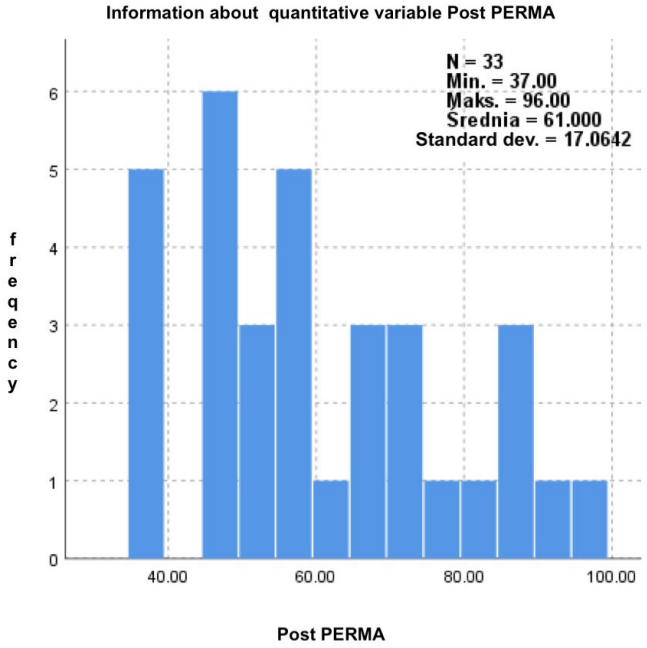
| | |
|---|---|
| Pretest PERMA | 1.15 |
| Posttest PERMA | 1.85 |

**Table 6: Test value**

| | |
|---|---|
| N | 33 |
| Chi-square | 17.065 |
| df | 1 |
| Asymptotic significance | .000 |

**Conclusion:** Tests 1 and 2 confirm the hypothesis that there are differences in both measurements.



### *GDS Results*

The results revealed that in the studied group, the average severity of depressive symptoms was at the pathological level, both in the first measurement: GDS M = 12.7 (the norm is below 6 points) and in the second one: GDS M = 9.9. The subjective feeling of mood (WHO-5) in the first measurement was at the M = 12.4, while in the second: M = 15.2, which indicates an average quality of life rating.

In both experiments, the primary research is just running, financed by Foundation „Bridge to the People" in cooperation with Nicolaus Copernicus University.

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