

# The Cognitive Benefits of Playing Contract Bridge in Elderly Patients with Dementia

Darwin Li\*

Upper Canada College, Toronto, Ontario, Canada

## \*Corresponding Author

Darwin Li, Upper Canada College, Toronto, Ontario, Canada

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## Abstract

*This literature review explores the potential cognitive benefits of engaging elderly individuals with dementia in the card game of contract bridge. Dementia, characterized by progressive cognitive decline, poses challenges in accurately assessing its impact on individuals, especially with the aging population and increased prevalence of comorbidities. Traditional pharmacological treatments have limitations, leading to a growing interest in non-pharmacological interventions. Cognitive training, including activities like playing bridge, emerges as a promising avenue. The review systematically examines the cognitive advantages associated with playing contract bridge in elderly individuals with dementia, defocusing on how engagement positively influences cognitive function and contributes to an enhanced quality of life. Despite some neural deterioration with age, the brain's neuroplasticity can be harnessed through challenging environments, such as bridge playing, to regulate cognitive function. The literature underscores the intricate cognitive engagement of bridge players, particularly in working memory, but also highlights research gaps, such as the learning curve for dementia patients unfamiliar with bridge. The indirect effects of bridge playing on cognitive functionality and social ties are evident in various studies. The potential of contract bridge as a cognitive intervention for dementia patients warrants further investigation to address these gaps and solidify its position in enhancing cognitive function and promoting brain health in older adults. Overall, playing bridge emerges as a multifaceted approach, not only stimulating the brain but also fostering social interaction and cognitive well-being in older adults with dementia.*

**Keywords:** Dementia, Cognitive Decline, Neuroplasticity, Contract Bridge, Cognitive Training, Elderly Patients, Working Memory, Social Interaction, Cognitive Functionality, Bridge Playing, Cognitive Benefits, Person-Centered Care, Quality Of Life, Mini-Mental State Examination (Mmse), Therapeutic Programs, Social Engagement

## 1. Introduction

Dementia is not a disease in itself but rather the manifestation of a set of symptoms that indicate an underlying and ongoing cognitive decline, disrupting the ability to function independently [1,2]. Dementia is most commonly attributed to Alzheimer's disease (AD), with over five million people currently affected by AD, and 13.8 million are projected to be affected by the year 2050 [3]. Other risk factors for developing dementia include genetics and factors contributing to cardiovascular risk [4].

Given the cognitive impairment dementia causes to older people, it is difficult for the care providers to accurately assess the impact on every individual to formulate a person-centered care plan [5]. For example, the age-related physiological changes and heightened prevalence of comorbidities in the elderly population,

the complications associated with dementia and cognitive decline become more obvious and difficult to manage.

The challenge in managing this lies not only in establishing the pathogenesis and underlying molecular mechanisms but also in the limited availability of treatment options that can target the associated potential areas [6]. In response to the limitations of pharmacological treatments, there has been a growing interest in exploring non-pharmacological interventions to address cognitive decline effectively [7]. Several experimental and non-experimental studies indicate the positive impacts of behavioral and other lifestyle-oriented therapeutic strategies for dementia [7]. One potential area of growing interest is the use of cognitive behavioral therapy and other similar approaches that can not only address the underlying pathology but also improve cognitive functionality [8].

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While age-related neurodegenerative changes lead to neuronal loss in our central nervous system, this is concurrently compensated by increased integration, manifested in the formation of neuronal circuits and an adapting brain response to such changes [9]. Leveraging this capacity can effectively enhance cognitive abilities by introducing specific non-pharmacological challenging environments, such as through cognitive training, to enhance cognitive function in older adults. Games involving social interactions, such as Bridge, not only provide cognitive stimulation and challenges for the brain but also entail reinforcement learning that could prove exceptionally beneficial for “brain health,” especially in the older age group [10]. The need for interventions promoting healthy aging and cognitive stimulation has prompted a closer examination of activities such as playing bridge [10]. This literature review delves into the potential cognitive benefits of engaging elderly individuals with dementia in the card game of contract bridge. Therefore, there is a need to do this particular study and evaluate the impact of the situation, especially on aged people, to provide quality and person-centered care [11].

## 2. Methods

This review examines the cognitive benefits of non-pharmacological interventions, particularly cognitive training through playing contract bridge, for elderly patients with dementia. The focus is on understanding how engagement in contract bridge positively influences cognitive function and contributes to an enhanced level of functionality in people affected by dementia. Identifying cognitive benefits associated with playing bridge will inform the development of targeted interventions for individuals with dementia. This knowledge may contribute to the design of therapeutic programs that incorporate bridge playing to enhance cognitive function. The study findings will guide caregivers in incorporating bridge playing into the care routines of individuals with dementia. This literature review employed a systematic search strategy across databases, including PubMed, Google Scholar and Scopus, to investigate the cognitive benefits of playing bridge in older individuals with dementia. Inclusion criteria focused on peer-reviewed articles in English, specifically targeting studies examining cognitive advantages associated with bridge playing in the elderly population. Because of the limited research work available on the topic, the specific range of publishing years was not set. After screening titles and abstracts, eligible articles were selected based on full-text reviews, with reasons for exclusion documented. Data extraction involved gathering pertinent information on author names, publication years, study designs, participant characteristics, key findings, and methodologies. Thematic analysis was conducted to identify recurring patterns, and findings were synthesized to provide a comprehensive overview of the cognitive benefits observed in elderly individuals with dementia engaging in bridge playing. This literature review incorporated a meticulous quality assessment of the nearly 60 included studies, considering factors such as study design and sample size, and acknowledged potential limitations in the scope

and methodology.

## 3. Literature Review

The brain is a complicated and fascinating organ, made up of over 100 billion neurons communicating messages to each other [12]. Brains exposed to different environmental events such as sensory stimuli, drugs, diet, hormones, or stress thus may develop in very different ways [13]. This ability of the brain called “Neuroplasticity” is better described as “the ability of the nervous system to change its structure and function, as part of the processes that underlie learning and memory, to adapt to environmental changes, and to recover function after brain lesions” [14].

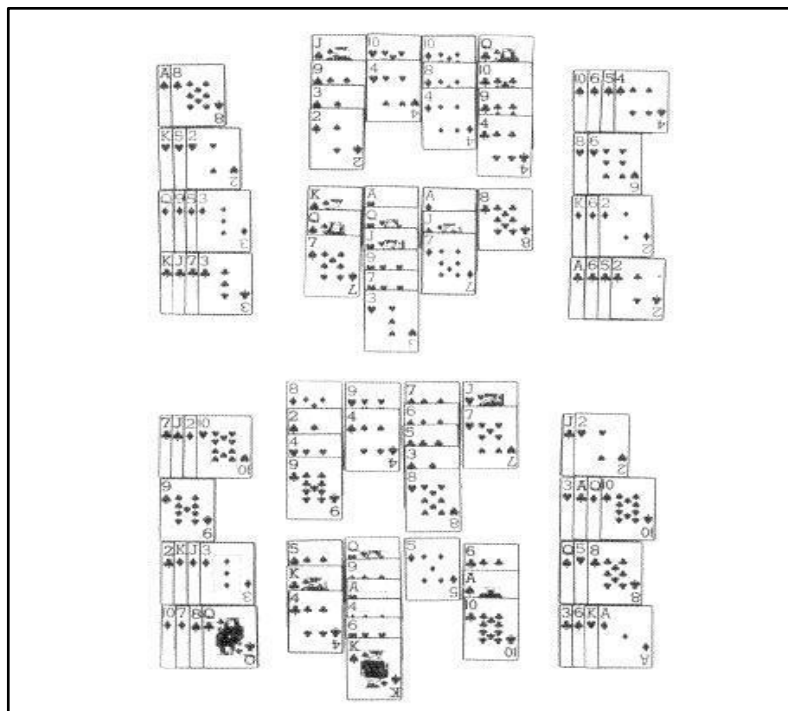
A wide range of therapeutic options are designed to influence the brain’s ability to reorganize and adapt, ultimately enhancing its functional capabilities and addressing specific symptoms or impairments [15]. Using games to screen for cognitive functioning has several advantages compared to classic neuropsychological screening tests [16]. The results from a study conducted by Karsten Gielis Vero Vanden Abeele (October 2018) suggest that card games can be used to screen for cognitive functioning [16]. Participating in specific thought-provoking and challenging activities, such as playing bridge, along with cognitive-behavioral therapy, has been proven beneficial for overall cognitive functionality in various experimental trials [17-19].

In terms of activity complexity and the level of mental stimulation involving calculations, problem-solving, analysis, and processing, playing Bridge is the most challenging task [20].

This section reviews the literature on the benefits of playing contract bridge as a non-pharmacological cognitive intervention to improve cognitive functioning in the elderly patients with dementia.

Playing Bridge is much more likely to lead to the consolidation of memory compared to playing chess, and the player who can process more information has a clear advantage [21]. When evaluating the impact of playing Bridge on individuals with dementia, those who have participated in Bridge, even at some point in their lives, demonstrate a much stronger correlation compared to non-players and this is evident in the experimental study conducted by Randall W. Engle & Lee Bukstel (December 1978), that assessed the memory process among bridge players, a structured and unstructured deal was used in memory and perception tasks as shown below (Figure1) [10].

It was mentioned that “ This gives strong support to Chase and Simon’s argument (1973) that superior performance of expert players in tasks such as recall of chess positions and, in this case, recall of bridge hands, is a result of activation of existing cognitive structures that are much more numerous and sophisticated in nature than those available to a novice” [21].



**Figure 1:** [Example of structured (top) and unstructured (bottom) deal used in memory and perception tasks [21]]

As mentioned previously, the beneficial effects of contract bridge seem to be more marked in those who have been playing this game currently or in the past. But is the acquisition of bridge as a cognitive intervention potentially challenging for individuals learning it for the first time, particularly for those with dementia? Although the question of whether individuals with dementia are cognitively capable of learning or playing the game of Bridge remains unanswered, the game's inherently high cognitive stimulation and social elements, makes it a compelling topic for further research [10].

In reference to earlier studies, it is worthwhile to examine the paper by Louise Clarkson Smith and Alan A. Hartley, dated November 1990, it was concluded that "Bridge players demonstrate superior performance in terms of working memory and reasoning compared to those who have never participated in playing. However, it is inconclusive whether playing bridge attracts individuals already proficient in these cognitive tasks" [22].

It was found in the study conducted by Berkeley researcher, Marian Cleeves Diamond (2000) that "Bridge players plan ahead, they use working memory, they deal with sequencing, initiation and numerous other higher-order functions with which the dorsolateral cortex is involved" [23]. It is essential to recognize the significant role of the dorsolateral prefrontal cortex in the working memory process and its regulation of a diverse range of cognitive functions, including but not limited to decision-making and conflict resolution processes [24,25]. While this assertion underscores the cognitive

engagement of bridge players, a critical analysis calls for a closer examination of the specific evidence supporting these claims and the overall credibility of the source. Further research and empirical validation may provide a more comprehensive understanding of the link between bridge playing and the intricate cognitive functions associated with the dorsolateral prefrontal cortex.

This may also raise challenges for people with dementia as the condition impairs working memory [26]. Working memory is the small amount of information that can be held in mind and used in the execution of cognitive tasks, in contrast with long-term memory, formed in the process of memory consolidation over the span of life [27]. Working memory is unique in its relation to a specific type of dementia, as highlighted by recent studies, allowing differentiation between Alzheimer's dementia and other causes of dementia based on the impact on working memory [28]. The question in people with dementia is whether they would be able to learn to play bridge or alternatively what could be the impact of dementia on the working memory of a known contract bridge player and whether the specific type of dementia diagnosis has an impact on this aspect, could impact the use of bridge as an intervention.

Although, apparently, it may seem that contract bridge is not a particularly effective intervention for people with dementia, the following studies show that the indirect effects of playing contract bridge play an equally vital role in improving cognitive functionality when compared to its direct influence on working

memory. In 2017, Diarmuid McDonnell, Professor Samantha Punch, and Dr. Caroline Small determined that “A significant number of participants expressed that engaging in bridge provided personal advantages, characterized by the game’s competitive

nature, the opportunity for social interaction with friends, and, most frequently, the mental stimulation derived from the activity, leading to a sense of enjoyment” [29]. The advantages of playing bridge as summarized in this study are shown in table 1 [29].

<b>Advantages</b>	<b>Responses %</b>	<b>Cases %</b>
Other advantages	0.32	1.64
Commitment to partnership	7.42	37.85
Interacting with people from different generations	8.32	42.41
Sense of belonging to a community	8.60	43.87
Welcome distraction/Relaxing	9.37	47.78
<b>Socializing with friends</b>	<b>12.38</b>	<b>63.13</b>
Competitive element	16.14	82.26
<b>Mentally stimulating</b>	<b>18.55</b>	<b>94.56</b>
Enjoyable activity	18.89	96.30
Total	100.00	100.00

**Table 1: Advantages of playing bridge [29]**

It is clear that playing bridge not only stimulates the brain by providing a challenging environment but also helps players interact with people and strengthens their social ties. This benefit is supported by a study conducted by Shari S. Bassuk et al. (1999), which concluded that “Social disengagement poses a risk of cognitive decline in older individuals” [30]. Cognitive stimulation tasks not only prevent further decline but also contribute to improving overall cognitive functionality [31]. As seen in Table 1, playing bridge, apart from being mentally stimulating, facilitates socializing with friends. Therefore, it can be established from the aforementioned studies that playing bridge helps counteract an important risk factor among the elderly—namely, ‘Social disengagement’, which is related to cognitive impairment and

cognition itself is primarily composed of memory and learning processes [32]. Usually, when the ongoing cognitive decline reaches a point where it impairs daily activities and functionality, only then does dementia become evident [33].

Tihana and colleagues (2018) concluded in their research “Positive impacts of playing bridge were reported by all the participants in terms of better QoL (Quality of Life). Playing bridge benefited the participants by advancing social affiliation (communicating with people of all ages, finding new friends, getting social support, recognition and status, and going out of home), enhancing sense of accomplishment (learning, solving problems, competing, advancing, and winning), and mental fitness (staying intellectually

fit), confirming benefits proposed by Major (2001) serious leisure model” and also “findings of this research strongly suggest that contract bridge has power to work as a protective mechanism in seniors, due to its social, cognitive, and competitive benefits” [34].

Lastly, a more recent experimental study conducted by Małysa, M. (2022) is worth noting. For MCI patients in Warsaw research, volunteers previously diagnosed with Alzheimer’s disease, who had no prior experience in playing bridge, underwent training at the center. In addition to this group of participants (referred to as

the Bridge group), another group (Control) with similar age and gender characteristics was included. After a one-year period, all participants underwent the Mini-Mental State Examination. The variations in results can be observed in Tables 2 and 3 below. The study concluded that “Cognitive decline was significantly lower in the Bridge group (1.22 points) compared to the Control Group (2.63 points). Overall, playing bridge can be considered one of the most effective therapies for individuals diagnosed with Alzheimer’s disease at the Mild Cognitive Impairment (MCI) stage.” [20].

			MM SE	MMS E				MM SE	MMS E
No	M/F	Age	Initial	Final	No	M/F	Age	Initial	Final
1	F	90	30	26	1	F	89	27	21
2	M	70	22	27	2	M	77	24	26
3	F	96	27	26	3	M	83	24	18
4	F	67	25	25	4	F	80	25	19
5	F	83	22	21	5	F	76	25	27
6	F	83	29	27	6	F	78	25	25
7	M	79	29	27	7	M	89	18	15
8	F	89	27	27	8	F	86	23	23
9	F	92	27	24	9	F	83	29	27
10	F	95	26	19	10	F	88	22	21
11	M	73	26	17	11	F	75	27	22

12	F	60	18	17	12	F	85	26	26
13	F	78	21	20	13	F	73	26	17
<p><b>Table 2 [ Initial and final values Mini-Mental State Examination Bridge group (20) ]</b></p>					<p><b>Table 3 [ Initial and final values Mini-Mental State Examination Control group (20) ]</b></p>				

In 2019, the second experiment was conducted by Malysa, M. (2022) in two Welfare Houses titled “Bridge as dementia prevention”. This study aimed to explore the influence of playing bridge on cognitive functionality, specifically focusing on individuals aged above 60. Patients, mainly those with Mild Cognitive Impairment, underwent bridge lessons, and the outcomes were assessed weeks later. Various evaluation methods were employed, including the Mini-Mental State Examination. It was concluded, “In both experiments, social relations were created within playing tables, what’s surprising, especially in the Alzheimer’s Center case. Playing bridge has been accepted there as one of the essential therapies” [20].

So far, contract bridge has been found to have cognitive benefits for elderly patients with dementia. Studies have shown that engaging in bridge can improve cognitive performance, including memory and problem-solving abilities [20,34,35]. Bridge has also been found to enhance social affiliation, providing opportunities for communication, making new friends, and receiving social support [36]. Additionally, bridge can contribute to a sense of accomplishment, as players learn, compete, and experience the satisfaction of winning [37].

Exploring the potential of using contract bridge as a preventive measure against dementia, rather than solely relying on its implementation for a cure, adds an intriguing dimension to the topic of interest. Engaging in mentally stimulating activities is not only therapeutic in role but also aids in preventing the progression of cognitive decline and dementia, particularly in the elderly and this potential benefit is attributed to their positive impact on cognitive reserve [38, 39]. The inherent capacity of the human brain to counteract the consequences of damage, including atrophies and other lesions, is known as the cognitive reserve of the brain [40]. The game of bridge is not only easily accessible, affordable, and adaptable to player preferences, but it is also considered much more mentally stimulating than other cognitively engaging leisure activities [41]. Playing bridge not only reduces the overall risk of

dementia by providing mental stimulation but also due to its social component and this combination of mental engagement and social interaction is believed to have positive effects on brain function and overall well-being [42,43]. It has also been demonstrated in the recent study by Malysa, M. (2022) that “specifically, playing bridge is particularly effective at delaying the onset of Alzheimer’s and other forms of dementia” [20].

From this literature review, it is evident that bridge has been shown to have positive effects on mental fitness, enhancing cognitive functionality, helping individuals stay intellectually fit, and preventing dementia. However, more structured and comparable experimental studies are needed to further investigate the cognitive advantages of bridge and cognitive therapy and their role as a preventive measure for elderly patients with dementia.

#### 4. Conclusions and Recommendations

In conclusion, while the literature presents compelling evidence regarding the cognitive benefits of playing contract bridge for individuals with dementia, critical research gaps are evident. Insufficient research has been conducted on this topic, indicating a need for more robust evidence to substantiate the effectiveness of contract bridge as a cognitive intervention for individuals with dementia. The lack of studies addressing the learning curve for dementia patients unfamiliar with contract bridge, the absence of information on the duration required for learning, and the dearth of comparative analyses with other interventions underscore the need for further investigation. A more comprehensive understanding of the long-term cognitive impact and a rigorous exploration of contract bridge’s unique advantages are essential to solidify its position as a viable cognitive intervention for dementia. Closing these research gaps will not only contribute to the scientific knowledge in this domain but also inform practical strategies for implementing contract bridge as an effective and tailored cognitive intervention for individuals with dementia.



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