

CHAPTER I

INTRODUCTION

A. Background

According to the World Health Organization (WHO, 2023), the elderly are someone who has entered the age of 60 years and above. The elderly are an age group in humans who have entered the final stages of their life phases, both men and women. World Health Organization (WHO), In 2023, the number of elderly population will increase over time. By 2030 the WHO estimates that the number of elderly people in the world will reach 1 billion, which will further increase to 2.1 billion people by 2050. As the elderly population continues to grow, the number of people suffering from health problems related to decreased physiological function (e.g., muscle weakness, joint pain, hearing loss, vision impairment, depression, cognitive decline) is increasing worldwide (Hutasuhut et al., 2022).

In the elderly, there is a gradual and progressive decline in physiological function throughout life and often results in reduced daily activities at the physical and cognitive levels. Elderly people with cognitive impairments are prone to disorders such as dementia or memory impairment can affect the ability to think, communicate, and decrease activities in carrying out daily activities (Dewi and Nardina, 2024). The elderly experience cognitive decline characterized by problems in at least three of the five aspects of neurological function, including language, memory, speech, vision and comprehension. Increasing age will decrease the number of brain cells every day and last throughout life. The brain will atrophy, which results in a weight loss of about 5-10%, the shape of the brain will change more flat and wide, the nerve connections will be reduced and the sensory nerves will shrink. These changes result in reduced cell repair processes, reduced vision, hearing loss, reduced memory, perception and psychomotor

in the elderly (Wiratma et al., 2021).

WHO data (2023) states that out of 727 million elderly people in the world, 121 million elderly people (16.7%) worldwide have cognitive function impairments. In Indonesia, the decline in cognitive function of the elderly is estimated at 4.2 million elderly (12.9%) out of 32.42 million elderly people. According to the Central Statistics Agency (BPS) 2021, the number of elderly people in Indonesia is 29.3 million (Prahasasgita and Lestari, 2023). Based on data from the Bengkulu Provincial Health Office in 2023, the number of elderly people in Bengkulu Province is 173,720 people, and in 2024 there will be an increase in the number of elderly people by 209,126 people, spread throughout Bengkulu Province (Bengkulu Provincial Health Office, 2025). Based on data in (Bengkulu City Health Office, 2024), it was found that there were 35,845 elderly people aged >60 years spread across 20 Puskesmas working areas in Bengkulu City.

The elderly can be said to experience a decline in cognitive function when showing symptoms such as disturbances in terms of lifestyle, attention (attention), memory (memory), orientation of time and place, thought processes (Manik et al., 2023). Impaired cognitive function occurs in almost all individuals in the elderly and its prevalence continues to increase with age (Triyulianti and Ayuningtyas, 2022). Some of the factors that affect the decline in cognitive function in the elderly are age, education, gender, family history, health factors, depression and comorbidities. These various factors are the main problems that result in decreased cognitive function. Decline in cognitive function also occurs because increasing age results in anatomical changes, such as shrinkage of the brain and biochemical changes in the Central Nervous System (CNS) so that in itself can lead to a decline in cognitive function. This causes the elderly to experience a gradual cognitive decline from forgetfulness to progression to dementia (Manik et al., 2023). Decreased cognitive function in the elderly has a direct impact on the decline in the ability to remember, think, and make decisions, thereby inhibiting independence in carrying out daily activities such as self-care and medication management. This condition

also increases the risk of dependence, depression, social isolation, as well as unwanted events such as falls and misuse of medications, which ultimately aggravates the burden on families and health services (Prince, 2021).

There are several ways to improve cognitive function in the elderly, both pharmacologically and non-pharmacally. Compared to pharmacological interventions, the use of non-pharmacological interventions plays a more important role in the elderly. Interventions that can be carried out to improve the cognitive function of the elderly are with exercises or games that train concentration or attention, orientation (place, time and situation) and memory (Azis et al., 2024). Games have a stimulating effect on memory and communication in the elderly, can alter the function of the brain's hippocampus and improve memory (Shiddieqy et al., 2022).

Common pharmacological actions given include cholinesterase inhibitor such as donepezil, rivastigmine, and galantamine which work by increasing acetylcholine levels in the brain so that it can support memory function and thinking skills, as well as memantine as an NMDA receptor antagonist used in moderate to severe dementia to reduce nerve damage due to glutamate toxicity. Non-pharmacological therapy or complementary therapy by performing therapy *reminiscence* (memory therapy), multisensory therapy, activity therapy (*Brain Gym*, play *Puzzle*, music therapy, gardening) and so on (Ratnasari et al., 2025). One of the non-pharmacological therapies is *Brain Gym* which can improve cognitive function in the elderly.

Brain Gym is a series of simple movement exercises that can improve concentration, increase confidence, strengthen motivation to learn, and better control stress. *Brain Gym* promotes the balance of activities of both hemispheres of the brain simultaneously, improves blood circulation and oxygen to the brain, and improves the ability of brain structure and function to continue to develop due to stimulation. *Brain Gym movements* provide stimulation or stimulation to both hemispheres of the brain that are physiologically coordinated through the corpus callosum, so that it can increase memory and other cognitive functions.

The results of a study conducted by Fadli et al., (2023), show that the therapy *Brain Gym* effective for improving cognitive function in the elderly with dementia (Fadli and Patoding, 2023). Research by Lasmini, (2022), shows that *Brain Gym* (brain exercises) is effective for improving cognitive function in the elderly with dementia (Lasmini and Sunarno, 2022). The results of the research by Wulandari et al, (2020), show that the therapy *Brain Gym* Highly effective for improving cognitive function in the elderly with dementia (Wulandari et al., 2020).

Another alternative nonpharmacological therapy that can be applied to improve cognitive function in the elderly is *Puzzle therapy*. Puzzle Therapy is a picture that is divided into pieces of pictures that aim to hone thinking, train patience and get used to sharing skills. In addition, *Puzzles* can also be used for educational games because they can and practice eye and hand coordination, train reason, train patience, with *Puzzles* can improve cognitive function in the elderly and delay the development of dementia which will become more severe.

The results of a study conducted by Margiyati et al., (2021), show that the administration of therapy *Puzzle* Effect on the improvement of cognitive function in the elderly in Lempuyangan Hamlet (Margiyati et al., 2021). The results of the research of Delvia et al, (2023), show that there is an influence of therapy *Puzzle* on improving cognitive function in the elderly at the Dahlia Health Center, Mariso District, Makassar City (Delvia Padatu and Manda, 2023). The results of the research conducted by Wahyuningsih et al., (2024), show that there is an influence of therapy *Puzzle* on improving cognitive function in the elderly in the area of the Batujajar Health Center, Galanggang Village, West Bandung.

Looking at the results of previous researches that have been carried out by researchers that *Brain Gym* therapy has an influence on improving cognitive function in the elderly as well as *Puzzle* therapy. Given that there are no researchers who have combined the two therapies, researchers are interested in combining the two therapies whether they have a more effective effect if the

two therapies are combined.

Based on data at the Bengkulu City Small Bridge Health Center, the elderly aged >60 years are quite high, which is 2,948 people (Bengkulu City Small Bridge Health Center, 2026). Based on an initial survey conducted by researchers at the Jembatan Kecil Health Center in Bengkulu City on Tuesday, August 12, 2025 through observations and interviews on 6 elderly people, it was obtained that from the 6 elderly there were 2 people who did not have cognitive function impairments, 2 elderly people experienced mild cognitive function impairments with a score of 24 and 21, while 1 person experienced moderate cognitive function impairment with a score of 18, and 1 person had severe cognitive function impairment with a score of 10.

Based on the results of interviews with the person in charge of the elderly at the Jembatan Kecil Health Center in Bengkulu city, it was found that the health center held elderly posyandu activities once a week and elderly gymnastics was carried out once a week, but currently there is no action to overcome the problem of cognitive function disorders in the elderly with *Brain Gym* therapy and *Puzzle therapy*. Based on the description above, the researcher is interested in conducting a study on "The Effect of *Brain Gym* Therapy and *Puzzle* Therapy on Improving Cognitive Function in the Elderly".

B. Problem Formulation

According to WHO data (2023), out of 727 million elderly people in the world, 121 million elderly people (16.7%) worldwide have cognitive function impairments. Nonpharmacological therapy that can be carried out is *Brain Gym* therapy and *Puzzle* therapy to improve cognitive function, but currently there is no action to overcome the problem of cognitive function disorders in the elderly with *Brain Gym* therapy and *Puzzle therapy* in the Work Area of the Jembatan Kecil Health Center, so the formulation of the problem in this study is "Is there an Effect of *Brain Gym Therapy* and *Puzzle* on the Improvement of Cognitive Function in the Elderly in the Working Area of the Small Bridge Health Center of Bengkulu City in 2026?".

C. Research Objectives

1. General Purpose

- a. The Effect of *Brain Gym* Therapy and *Puzzle Therapy* on Improving Cognitive Function in the Elderly in the Working Area of the Small Bridge Health Center in Bengkulu City in 2026.

2. Special Purpose

- a. It is known that the characteristics of the elderly include age, education level, and history of diseases in the elderly with cognitive function disorders in the working area of the Bengkulu City Small Bridge Health Center.
- b. It is known that the average cognitive function score in the elderly before and after *Brain Gym* and *Puzzle therapy* is carried out in the intervention and control group in the Bengkulu City Small Bridge Health Center Working area.
- c. It is known that the difference in average cognitive function scores in the elderly before and after *Brain Gym* and *Puzzle therapy* is carried out in the intervention and control groups in the work area of the Small Bridge Health Center in Bengkulu City.

D. Research Benefits

1. For Educational Institutions

The results of this study can be used to add reading sources related to the use of non-pharmacological therapies in the form of *Brain Gym* therapy and *Puzzle therapy* to improve cognitive function in the elderly, especially in the application of family nursing care at home, and can also add to the collection of library materials and can be used as journal publication material for health workers. The results of this study are expected to be a reference or information in making policies in the preparation of elderly health programs.

2. For Health Services/Puskesmas

It can provide information on alternative non-pharmacological therapies to improve cognitive function by using *Brain Gym* therapy and

Puzzle therapy in the elderly.

3. For other researchers

It can be used as a reference for future researchers to conduct research on cognitive function and develop non-pharmacological interventions for the elderly who experience cognitive decline

4. For the Community

Getting information about *Brain Gym* therapy and *Puzzle* therapy as one of the alternatives independently that can be used to improve cognitive function, especially in the elderly.

