

# Nostalgia and Its Impacts on Patients with Alzheimer's Disease

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**ABSTRACT:** Dementia is a category of conditions involving a decline in cognitive function that may further influence an individual's typical day-to-day abilities. Recently, there has been a rise in the exploration of the role of nostalgia as a proposed treatment for Alzheimer's disease (AD). This literature review seeks to examine the previous research conducted and consider nostalgia's connection to AD and memory networks, as well as various attempts of administering nostalgia, observing its positive impacts relating to cognitive function, self-esteem, and social connectedness. This review will highlight the prospective benefits of induced nostalgia and introduce its role as an area that should be explored to aid seniors with AD who are unable to access the standard of care.

**KEYWORDS:** Neuroscience, Memory, Alzheimer's Disease, Nostalgia, Cognitive Function.

## ■ Introduction

In 2021, there were 57 million patients with dementia. This number continues to rise as there are an additional 10 million cases each year.<sup>1</sup> Alzheimer's disease (AD) is a neurodegenerative disease. Neurodegenerative diseases involve loss of neurons over time; in AD, there is damage to neurons in the hippocampus, resulting in deterioration in a person's memory that involves a decline in cognitive function and basic skills. The deterioration of the hippocampus prevents the development of new long-term memories.

Nostalgia is a feeling in which an individual recollects a memory from their past; it is a feeling that heavily features one's own typically positive memories. It is involved with brain regions associated with reward processing, autobiographical memory, and self-reflection, including the prefrontal cortex and the amygdala.<sup>2</sup>

In this field, there has been promising research in the exploration of nostalgic reminiscence on the psychological resources of AD patients.<sup>3</sup> It has been observed that music therapy utilizing music that had been encoded over time with standard care can support cognitive function and reduce negative emotions in AD patients.<sup>4</sup> It has also been seen that cues in nostalgia-inducing films can augment emotion and psychological reactions and lead to more retrieval of autobiographical information.<sup>5</sup> When compared to a control group that received ordinary biographical memories--general recollections of the self and personal experiences--members of an experimental group recalling nostalgic memories self-reported greater feelings of optimism, social connectedness, and meaning in life.<sup>6</sup>

Historically, AD has been treated using therapeutic interventions that improve cognitive function in patients but cause unwanted side effects, including nausea, vomiting, confusion, and headaches.<sup>7</sup> These treatments may also prove to come at high costs, making them inaccessible to some patients with a pressing need for them.<sup>8</sup> Recent research indicates the possibil-

ity of new treatments for Alzheimer's patients that can improve their quality of life without causing the unwanted side effects that are a result of pharmaceuticals. While there has been extensive research regarding new pharmacological interventions such as rasagiline and ladostigil, the impact of nostalgia has been underexplored in its ability to serve as an alternative to traditional treatments.<sup>9</sup>

This literature review aims to examine the positive impacts of nostalgia on the brain and how it can alleviate the impacts of Alzheimer's disease and impact memory recall, and thus serve as a viable treatment for Alzheimer's patients. This review seeks to examine the positive impacts of nostalgia on Alzheimer's disease by reviewing published papers that provide empirical data and a consensus regarding the possibilities for nostalgia in this field. It is important to consider the uses of induced nostalgia for AD patients as it may outline potential benefits and theoretical possibilities for future clinical applications. This review will demonstrate how nostalgia can aid patients with AD, alleviating various negative psychological emotions and improving cognitive function, and thus may have implications as a future treatment for nostalgia.

The connection between nostalgia and memory will be examined and the relationship between AD and memory will be discussed; both nostalgia and AD will be discussed in the following section. It will also outline nostalgia-inducing therapies, including reminiscence therapy and nostalgia induced by stimuli in the senses, concluding with remarks about future research. The review will focus on papers comparing the psychological conditions of various groups of individuals after facing nostalgia-inducing therapies, with individuals in control groups that do not experience nostalgic intervention. The review will examine impacts on self-esteem, overall mood, cognitive function, and emotional reactivity.

## ■ Discussion

### *Nostalgia and Memory:*

Nostalgia has strong connections to long-term memory and, subsequently, may be implemented to aid AD patients. Nostalgia consists of self-reflection, autobiographical memory, emotional regulation, and reward.<sup>2</sup> Nostalgia is closely related to autobiographical memory, which involves memories of specific events that may be recalled and encoded in the hippocampus, and information about oneself.<sup>10</sup> The intrinsic memory-reward network is a reward system in which the hippocampus relays a signal to the nucleus accumbens and ventral pallidum, which continues the signal to the ventral tegmental area (VTA), where activity increases in the VTA dopamine cells, and dopamine may be released.<sup>11</sup> The subiculum is a structure between the hippocampus and the entorhinal cortex and processes information before relaying it to other areas. The nucleus accumbens, located in the basal forebrain, receives dopamine after the hippocampus sends a signal associated with glutamate to the nucleus accumbens and the ventral pallidum. The ventral pallidum is a structure in the basal ganglia that aids in the integration of the signals and consequently regulates behaviors. Along with the signal, the hippocampus releases dopamine, further activating long-term potentiation (LTP). It has been observed that during nostalgic experiences, there is simultaneous activation between memory and reward regions, indicating that both memory and reward systems have an influence on the formation and feeling of nostalgia.<sup>12</sup> Thus, inducing nostalgia can lead to stimulation in both the memory and reward regions, possibly reinforcing positive feelings of reward in AD patients, which will encourage them to adopt a more positive outlook on life as well as improved psychological resources.

### *Impact of Nostalgia:*

The loss of memories caused by AD can lead to the loss of a sense of self and individual identity, leading to anxiety and depression, common conditions that arise from AD.<sup>13</sup> Nostalgia-inducing therapies may be implemented to alleviate this indirect impact caused by the loss of memory because the emotion can stimulate positive feelings about self-esteem and optimism, possibly reducing the impact of negative feelings in AD patients.

Generally, nostalgia has a positive impact on individuals who do not have AD. Along with previously discussed positive impacts, nostalgia can also stimulate motivation. Induced nostalgia in populations has been shown to increase feelings of motivation.<sup>14</sup> Nostalgia's impact on approach, desire to pursue, and avoidance, desire to move away from motivation was examined. About approach motivation, 120 participants were randomly assigned to the experimental group, induced nostalgia, and the control group; the experimental group was instructed to recall a nostalgic event and write down four keywords, and the control group was instructed to do the same while recalling an ordinary event.<sup>15</sup> Then, they self-reported their agreement or disagreement with a set of statements provided. Ultimately, they found that induced nostalgia strengthens the behavioral activation or approach motivation

(BAS) on fun seeking and drive, indicating greater approach motivation. Therefore, understanding how nostalgia can create positive feelings and motivation may be utilized to aid AD patients who face difficulties from the condition.

The emotion is also able to increase self-esteem, as seen in a study that required individuals to recall nostalgic experiences or daily occurrences.<sup>16</sup> 72 participants were divided into two groups, with 35 participants in the nostalgic recollections group—the experimental group—and the typical recollections group—the control group. The researchers measured self-esteem using a modified version of the Rosenberg Positive Self-Esteem Scale (SES); it was found that the scores of the group tasked to reminisce about nostalgic events were significantly higher than those of the group tasked to recall regular events. While different from self-esteem, it is seen that optimism also rises when self-esteem rises. This effect had been observed in a study involving 102 participants randomly assigned to either nostalgic or controlled conditions; in the former condition, participants recalled a nostalgic event, whereas in the latter condition, participants recalled an ordinary event. Those in the experimental group experienced a higher proportion of expressions of optimism, indicating that nostalgia may be positively associated with optimism.<sup>17</sup> Hence, nostalgia may induce positive emotions in individuals with AD and limit side effects.

### *Alzheimer's Disease and Memory:*

AD negatively impacts memory and can lead to many negative side effects, including loss of cognitive function and a decline in psychological resources. In AD, neurons become dysfunctional and lose connections, particularly impacting the connections in the hippocampus, an area of the brain associated with memory encoding and recollection. Neurofibrillary tangles, an issue that occurs as a result of abnormal deposits of tau, a protein that stabilizes microtubules, leading to the detachment of neurons from certain molecules and attachment to other molecules, further contribute to the loss of memories by inhibiting interneural action potentials.<sup>18</sup> Additionally, patients experience more declining production of episodic autobiographical memories than healthy older adults, and over time, the ability to recall specific details in memory declines, leading to the shift of autobiographical memories into semantic autobiographical memories that are more general about the self.<sup>13</sup>

It was found that older AD patients were able to recall personal and semantic memories “from the remote past relative to the recent one.”<sup>19</sup> This finding is consistent with the idea that the connection between neurons forming older memories has been strengthened over time due to recall in childhood and young adulthood, making those memories the most impactful on the lives of AD patients.<sup>20</sup> Conversely, relatively new memories have not had as much time to develop and strengthen their neural connection and are therefore more vulnerable to neurofibrillary tangles. Since nostalgia involves the recollection of events from the past, inducing nostalgia can strengthen those neural connections and thus may have implications on the rate of memory degradation that occurs due to the entangling of neural fibers.

It has been found that inducing momentary nostalgia, using nostalgic landmarks, has offered benefits to AD patients in their self-esteem, social connectedness, and self-continuity, as well as improved their ability to recognize pictures from their past; this research indicates that nostalgia may have a positive impact on AD patients.<sup>21</sup> Moreover, since both nostalgia and AD are involved with memory networks, stimulating feelings of nostalgia in patients may be able to improve cognitive function and aid in memory recall. Thus, exploring their connection may offer insight into future clinical applications for nostalgia in the field of AD.

#### ***Impact of Nostalgia in Alzheimer's (Treatment):***

Reminiscence therapy and therapies that target the senses and induce nostalgia for patients have been observed to have overall positive impacts on patients' psychological state. The impacts of both interventions will be discussed.

#### ***Reminiscence Therapy Inducing Nostalgia in Alzheimer's:***

Reminiscence therapy is a form of therapy that instructs patients to think of a previous action or memory, of which recalling a prior memory is more closely associated with nostalgia, to help patients with dementia reduce indirect impacts and improve cognitive function, as well as improve their psychological condition. It has been seen in a study that the therapy improved subjective observations of patients by close friends and family members.<sup>22</sup> In the study, 14 participants with dementia and 4 participants without dementia performed activity reminiscence therapy to investigate the impact of this form of reminiscence therapy on their cognitive condition and social interactions. They would reminisce for ten minutes before the therapy, and their initial cognitive state was identified before the activity reminiscence therapy and after the activity reminiscence therapy had been completed. It was found that for dementia patients, there had been increased cognition, memory, and attention span. When conferring with family members, it was found that some individuals exhibited a more cheerful demeanor, were more eager to attend the following session, and had improved relationships with their peers in the form of friendships and staff. Therefore, nostalgia administered using reminiscence therapy may have a positive impact on patients with dementia, including AD patients, and may be able to reduce negative feelings surrounding daily tasks that lead to more serious conditions such as depression and anxiety.

Reminiscence therapy may also be effective in producing a positive impact on cognitive function for patients with AD. In a systematic review that examined 3291 articles, it was found that 5 specifically outlined reminiscence therapy with reference to cognitive function and quality of life.<sup>23</sup> In the studies, participants with cognitive deterioration underwent trials that sought to apply methods to improve their cognitive condition. It was found that the moderate cognitive deterioration experienced in AD patients can be reduced or stabilized by reminiscence therapy, further implicating that nostalgia, when induced in an individual with AD, may be able to benefit their cognitive abilities and consequently might be able to impact the rate of memory decline. Utilizing reminiscence therapy

to stimulate the neural networks and inadvertently leading to nostalgic recollection may be a beneficial approach to aiding AD patients with moderate cognitive decline or pessimistic attitude.

#### ***Stimulus-Induced Nostalgia in the Senses for Alzheimer's:***

Stimulus-induced therapy involves stimulating nostalgia in the various senses to elicit a change in memory or psychological state in participants. It has been effective when considering the auditory system and visual system in improving recall of memories and in stimulating positive emotions.

There has been promising information in the auditory system. It has been found that the regions that deteriorate due to AD have a minimal impact on the regions associated with long-term musical memory encoding, such as the pre-supplementary motor area that helps control voluntary actions and the caudal anterior cingulate gyrus that aids in cognitive and emotional function.<sup>24</sup> Since these regions are involved with the encoding of long-term musical memory and are relatively unimpacted by AD, it would be useful to explore the impact of music-evoked nostalgic therapy on the cognitive function of AD patients. In a study involving 63 participants with mild-to-moderate AD, the impact of integrating induced nostalgia into typical activities and into music was tested.<sup>4</sup> To test the impact of the therapy, they relied on the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment Scale (MOCA), which test the cognitive function of individuals. Additionally, the Self-Rating Anxiety Scale (SAS) and the Zung Self-Rating Depression Scale (SDS) were used to examine psychological conditions. Scores from both the control and experimental groups were acquired and compared before and after the experiment to determine the efficacy of treatment. Prior to intervention, scores between both groups had no significant difference, but after the experiment was completed, it was found that the MMSE and MOCA groups testing for cognitive function were higher in the experimental group. This finding demonstrates that stimulating nostalgia in the auditory system may have contributed to an improvement in cognitive function in individuals and may be able to have a role in repairing memory recall after AD has caused it to decline. Moreover, both the SAS and SDS scores of the patients in the treatment group experienced a greater decline when compared to the control group. Therefore, musical therapy inducing nostalgia might have a role in improving the mental status of AD patients and preventing them from undergoing unwanted indirect effects, such as depression and anxiety. By preventing depression and anxiety from harming AD patients, music therapy can change their feelings about themselves and about others, as well as their positive outlook on life, which can prevent further deterioration of their mental condition.

The visual system is connected to areas that have seen degeneration as a result of AD.<sup>25</sup> It has been seen that patients exhibit issues between connections between the visual corticocortical regions, regions that process visual stimuli, in the brain, and thus face problems such as problems with spatial recognition and facial recognition. Despite these findings, it has been seen that induced nostalgia is able to produce a

positive response in the visual system when involving other systems, such as the auditory system, positively affecting the cognitive function and psychological condition of AD patients after treatment. Specifically, there have been findings involving films that stimulate nostalgia that illustrate the impact of this treatment on individuals. 21 participants with AD, the experimental group, and 22 participants without cognitive impairments, the control group, were further divided into a group that did not watch a nostalgia-inducing film and another group that did watch a nostalgia-inducing film.<sup>26</sup> They first watched nostalgic films and then were tasked to narrate “events that have been important in [their] life” in fifteen minutes. It was found that groups that watched nostalgic films had more episodic specificity, a detailed recall of an event from the past, than did the groups that did not watch the films. The results underline the idea that inducing nostalgia with films can help AD patients remember more details from their past that they were unable to recall prior to watching the film. This finding is further supported by Rasmussen *et al.*, who studied the ability of stimulated nostalgia to stimulate involuntary autobiographical memories (IAMs).<sup>5</sup> The control group involved 22 older adults without cognitive impairment, and the experimental group involved 21 patients with AD. Of these groups, they were further subdivided into a group that recalled memories prior to watching the nostalgic film and a group that did not recall memories before watching the film. The involuntary recall was observed after participants had either been tasked with recalling previous memories before the study or had not been tasked to do so. Biomarkers, such as heart rate and electro-dermal activity, and emotional reactions were recorded while participants watched these nostalgia-inducing films. The study found that AD participants had more emotional responses and experienced more IAMs after watching the films. Within the AD group, it was found that those who reminisced before being instructed to watch the film recalled more memories. Therefore, nostalgia-inducing films may have a beneficial impact on AD patients in both emotional and cognitive aspects. Further, when combined with standard reminiscence therapy administered before watching a film with details that connect with an individual’s long-term memories, therapies that target both visual and auditory stimuli can aid AD patients in recalling their memories and face less confusion, one of the main side effects of the neurodegenerative condition.

#### ***Caveats to Implementing Nostalgic Therapies:***

There may be a few considerations before implementing induced nostalgia as a treatment for AD. Though the results are not specific to AD, it is important to deliberate on nostalgia’s impact on loneliness.<sup>27</sup> In a study testing the negative impacts of nostalgia on the psychological condition of individuals, it was found that—when tasked to respond on a 7-point scale with 1 completely disagreeing and 7 completely agreeing with the statement—nostalgia may be able to worsen feelings of loneliness and increase longing for companionship. This research is further supported by a section of the study by Abeyta *et al.*, who observed nostalgia’s impact on loneliness and how those

feelings impacted social confidence.<sup>28</sup> Participants completed a UCLA questionnaire, answering questions related to their feelings of isolation, support from others, and companionship. Those who felt lower levels of nostalgia felt a negative correlation between loneliness and social-efficacy. However, the study demonstrates how increased levels of nostalgia can reduce the correlation between the two, and that “lonely individuals who report stronger nostalgic feelings, report less of a deficit in social confidence.”<sup>28</sup> Nostalgia’s ability to increase self-confidence was able to act against the feelings of loneliness to increase social confidence. This finding would further support the notion that the feelings of loneliness experienced by individuals with AD may gradually dissipate as a result of the increased social connection caused by the emotion. Moreover, the increased social connection can lead to more relationships that then decrease isolation and prevent or mitigate the formation of indirect side effects impacting the psychological resources, such as anxiety and depression. Overall, induced nostalgia has been seen to have positive impacts on the mental condition of patients as well as have benefitted cognitive function.

#### **Conclusion**

The research review explored the various interactions between memory and nostalgia, introducing how nostalgia may serve as an important resource to aid patients with AD by treating inadvertent side effects or by improving the cognitive function of patients, possibly creating a positive impact on their ability to recall memories about themselves. Ultimately, the use of nostalgia for patients with AD may be implemented to alleviate negative feelings associated with the condition, but more research is required to confirm its posited advantages and whether it will have a more important role in supporting the standard of care or be implemented by itself as an alternative treatment.

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