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Behavior and Emotion in Dementia

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Additional information is available at the end of the chapter

<http://dx.doi.org/10.5772/64681>

Abstract

During the course of disease, the patient and caregiver face emotional and behavioral problems that may occur. Therefore, it is important to knowing how emotions and the perception of them are modified and thus to know the impact they have on mood and behavior of the patient and caregiver. Publicizing the type of pathology, both emotional and behavioral levels, in a patient with dementia can help in the development of nonpharmacological interventions that could slow the symptoms and improve the quality of life of patients.

Keywords: reminiscence, autobiographical memory, behavior disorders, nonpharmacological therapies, dementia

1. Introduction

Given the impact of aging in today's society and the possible development of dementia throughout this stage of the life cycle; it is interesting to deal with this type of pathology. So far, studies have mainly focused on more cognitive and biological aspects, because its main symptom is a neurobiological origin. While in this disease, also changes in emotional and psychosocial part occur, which affects both the well-being of the largest and in its important work in dementia caregiver. This chapter describes the most effective methods, from the current literature by searching the database principals (scopus, science direct, psychology articles, etc.), that could provide positive effects in emotions and psychological and behavioral symptoms. The keywords used for the search were aging, dementia, emotions,

autobiographical memory, reminiscence, psychological and behavioral disorders, nonpharmacological interventions, etc. From these we selected those belonging to current and high-impact journals.

2. Emotions, aging, and dementia

Although the emotions have been studied for many years, a unanimous definition of this concept has not yet been reached. Emotions are physical responses controlled by the brain that make it possible to survive hostile environments and ensure the procreation of the species [1]. Emotions are actions expressed in the face, voice, or specific behaviors that tend to maintain the homeostasis of the organism [2]. In other words, and following other authors, the emotions are regulatory processes of action that arise in response to a trigger stimulus or identifiable object and activate estimative processes of the significance of these stimuli in relation to the goal pursued, producing changes in response systems, and different moods. Each emotion depends on a different neural network and produces specific corporal configurations that can be recognized in others [3].

We can distinguish between two main types of emotions; primary and secondary [4]. Primary emotions are considered innate and depend on the limbic system, especially the amygdala and anterior cingulate cortex. They are not culturally determined, but rather universal with a biological origin. The secondary emotions arise when the feeling is experienced, that is, when there is awareness of the emotions; they allow us to make connections between the stimuli, the situation, and the primary emotions. Secondary emotions are composed of the combination of primary emotions refined by experience, and they can give rise to possible emotional pathologies such as anxiety and depression.

For quite some time, aging has been studied on the basis of losses and gains, focusing the research above all on the cognitive part of the individual; however, it is well known that the noncognitive symptoms are disturbing to the families and caregivers of patients with dementia, and they can also seriously affect the well-being of the patients [5].

Following this line of thought, there is evidence that with age, one loses cognitive capacity. For example, it is more difficult to focus one's attention, and the memory begins to fail. This situation becomes more evident in the case of pathological aging framed within the field of cognitive impairment and dementia. However, with regard to the emotions, it is not clear to what degree their processing is affected by age or what these changes are, with contradictory results found regarding the perception of basic emotions by patients with dementia. In some cases, these patients show worse recognition of their emotions, whereas in other cases, no differences are found between patients with dementia and a group of healthy older people [6].

With regard to emotional processing in aging, this topic has been studied from two different and seemingly contradictory perspectives: the socio-cognitive approach to the emotions proposed and developed by Carstensen [7] and the neuropsychological approach, which relates certain brain areas to the processing of information with emotional content.

Both approaches study the emotions in aging, but obtaining different conclusions about the changes that occur in emotional processing. On the one hand, the sociocognitive component focuses on what people think or feel, basically studying this component and suggesting that it does not decline with age and even improves [7]. On the other hand, the neuropsychological approach, interested basically in the processing of the emotional content of stimuli, argues that in both normal and pathological aging, there is a change in the identification of the negative emotions produced by a deficit in certain cerebral areas. Therefore, the consequences of the physiological changes stemming from aging are related to their effects on people's affective lives [8].

It is well known that adequate emotional processing is fundamental for normal emotional development [9]. Alzheimer's disease (AD) has been widely studied with regard to the identification of emotions, given that the affective state declines progressively from the asymptomatic stage until the terminal phase. The patients no longer perceive their environment with the same emotional base as before the disease. It is possible that this new affective state is progressive and can be detected early, through a basic analysis of the deficits in emotional information processing that will evolve into a greater degree of cognitive and emotional impairment as the disease progresses [10].

Regarding emotional perception, in AD the deficit in emotional recognition could be due to the progressive atrophy of the amygdala, the anterior temporal cortex, and the orbital frontal cortex [11]. Their study consists of presenting faces showing the basic emotions to a sample of mild AD patients, who have to identify and indicate the name of the emotions. They repeated the task 3 years later. Their conclusions were that the recognition of emotional expression was affected as the disease progressed, and that this impairment was related to the degeneration of the cortical structures involved.

Other studies [12–14] indicate that patients with AD have an impaired capacity to process the facial expressions of emotion, probably due to the characteristic cognitive deterioration associated with the disease, especially in the attention and memory processes of the amygdala [11] and other brain structures that modulate emotional processing [15].

Taking the emotional process into account, some studies have pointed out that the depressive disorder is associated with a greater risk of developing cognitive alterations in aging [16] especially in AD [17]. Considering this relationship, some researchers have examined the temporal relationship between depression and AD in order to understand whether depression is simply a prodromic symptom of the disease that precedes the appearance of cognitive deficits, or whether a history of depression could be an independent risk factor for the development of the disease. Moreover, depression can occur in 30/40% of patients with AD [18], and it affects the clinical evolution of the disease. Many depressed people ignore positive information and focus on memories that support negative emotions, thus impeding the maintenance and achievement of psychological well-being or life satisfaction, while worsening the conservation of their identity in the present and, therefore, their quality of life.

However, people with AD can feel diverse emotions, even though they generally do not remember what sparked them [19]. Therefore, the emotions remain in the individual and,

therefore, can be worked with as a way to improve the emotional well-being of patients with AD.

One of the aspects most linked to emotional well-being is the feeling of identity. People who have AD have limited access to the autobiographical memories related to identity maintenance, self-knowledge, and self-image.

Along these lines, the autobiographical memory (AM) plays a fundamental role in the construction and conservation of personal identity [20]. It is indispensable for maintaining a sense of continuity and understanding the self throughout the life cycle. In addition, it contributes to the development of daily activities such as social relationships, decision making, or problem solving [21].

Memories related to personal events from the past are much more complex and emotional than nonautobiographical memories, and they also contain more intimate information related to the self [22, 23]. Thus, they are more likely to be kept in the memory than nonautobiographical memories, even in pathological aging.

Therefore, autobiographical memories are an essential aspect in the progression of AD because they allow the preservation of the identity, which will contribute to the development of positive emotions or emotional well-being.

3. Autobiographical memory

3.1. Autobiographical memory: what it is and its main characteristics

Autobiographical memory (AM) is part of the episodic memory, as it deals with specific memories accompanied by a temporal and spatial context. However, the main characteristic that defines autobiographical knowledge and makes it distinctive is that the memories form part of a personal context because they are experiences the person had throughout the life cycle [24]. Generally, autobiographical memory consists of information about places, actions, people, objects, thoughts, and emotions. Some authors define it as the memory of our *self* (of our identity) in relation to the world and other people [22–25]. Thus, autobiographical memories, in addition to being situated in a specific time and place like any other memory, are also related to the individual; that is, the person experienced the past event to be remembered first-hand, and he/she is not only aware of the objective event, but also his or her own feelings, perceptions, and interpretations.

Although it is true that AM is based on episodic memory, there is also another much more generic and abstract type of autobiographical memory. AM involves two types of knowledge about oneself: episodic and semantic [26]. The episodic component consists of personal and specific events located in a specific place and time, and the semantic component stores general knowledge from the past, such as names, addresses, or general events [27–30].

These two components are associated with a different state of consciousness [31]: on the one hand, autothetic consciousness, associated with the episodic component and, on the other,

noetic consciousness, associated with the semantic component [32, 33]. Auto-noetic consciousness is defined as the feeling of re-experiencing or reliving a past event, in other words, subjectively traveling in time to our past. Not only is the event itself recalled, but sensory-perceptual details derived from the event are also recovered, that is, experiences that contain perceptual, affective, and temporal-spatial details. They give the memory a personal meaning that makes it form part of our identity and goes beyond mere knowledge. By contrast, noetic consciousness is the capacity to know or have certain information about the world or about our lives, without any contextual details.

Some studies [34–36] show the dissociation between aspects of the two types of consciousness in aging. As we age, we go from an auto-noetic consciousness to a noetic consciousness. Therefore, with age, the semantic component of autobiographical memory increases, whereas the episodic component decreases.

Along the same lines, the AM forms part of the remote memory and, therefore, that its initial nature is episodic [37]. However, they propose that this information can gradually lose its contextual association and the details about a specific place and time, gradually acquiring semantic characteristics, with a generic and decontextualized organization like other semantic knowledge.

3.2. Localization of autobiographical memories

Regarding the temporal distribution of autobiographical memories throughout the life cycle, have been revealed a similar pattern of memory localization in older people [38, 39]. This irregular pattern is characterized by three key memory points: childhood amnesia, the reminiscence peak or *bump*, and the recency effect (see **Figure 1**).

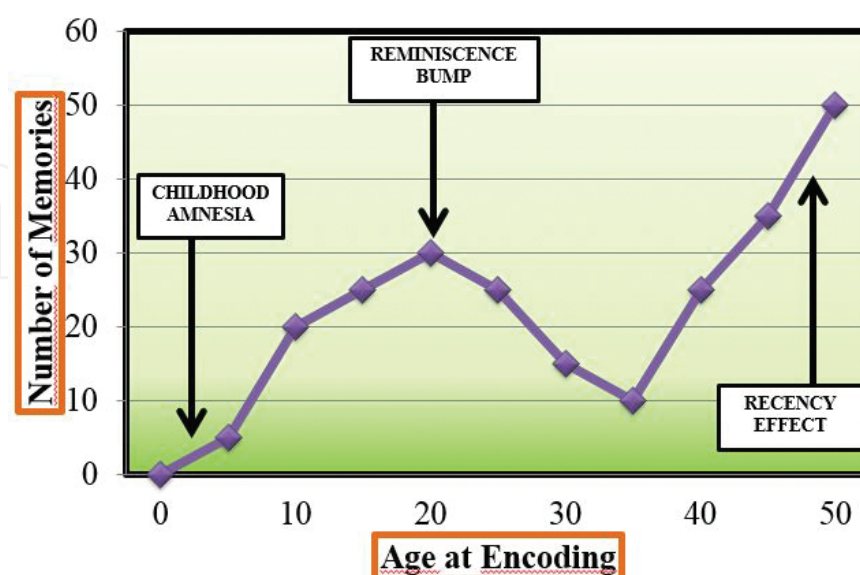


Figure 1. Localization of autobiographical memories.

3.2.1. *Childhood amnesia*

Memories from the first years of life are practically nonexistent, a phenomenon known as childhood amnesia. This absence of memories occurs because up to the age of 5, the brain structures that make it possible to codify and store memories are not fully developed. Everyone presents an almost complete absence of memories coming from the first years of life [40].

3.2.2. *The reminiscence bump*

From 10 to 30 years old, we have a large number of memories; in fact, it is the period in life that is remembered the most. Research shows that the memories most evoked by older people are those that took place during adolescence and early adulthood [41], which makes sense given that the majority of a person's relevant life events take place in this phase, such as the first love, first job, wedding, or in many cases, emigration to other places.

3.2.3. *Recency effect*

The last phenomenon presented on the autobiographical memory curve is the "recency effect". This effect involves events that took place in recent years, that is, a person's most recent memories. As time passes, the "recent" memories become "remote" and lose quality [42]. This fact can be observed in the figure, where, from the point of recency backward, the number of memories is lower as one tries to remember times further in the past.

3.3. **Autobiographical memory during aging**

Scientific research has pointed out that, as the years go by, the aging process affects memory in general. With regard to autobiographical memory, research reveals that there is deterioration in the episodic part of autobiographical memory in standard aging. Most studies have compared young subjects (about 35 years old) to older subjects [34, 43–47], but other studies have reported a progressive decline in episodic autobiographical memory, comparing healthy subjects aged 50–100 [35, 36, 45, 48, 49]. However, the fact that the loss of episodic details leads to a greater production of semantic memories can be interpreted as a process of "**semantization**" of autobiographical memory. In other words, the episodic memory is not lost, but instead it becomes semanticized [34, 35].

Nevertheless, even though AM decreases with age, there are memories that revive affective and perceptual details, present spontaneity, and mix the perspectives of field and observer [36]. This may be due to the fact that certain autobiographical memories are characterized by defining our identity, as they contain affective and visual imaginary aspects with a high level of practice (due to being narrated many times). They also have a high level of personal relevance and are linked to similar memories that share the same topic and accessibility [50].

3.4. **Autobiographical memory decline in the course of Alzheimer-type dementia**

Numerous studies have investigated the AM losses experienced by subjects with AD. Most studies agree that there is a deficit in this type of memory [37, 51–58], but there is disagreement

about the pattern of the deficit: which component is more deteriorated, the episodic or the semantic? Which memories show a greater degree of decline, the recent ones or the remote ones?

All the studies agree that in AD, the episodic component of AM is deteriorated [37, 48, 54, 55, 57, 59–61]. In other words, there are great difficulties in mentally reviving past events and phenomenological aspects such as visual images [48]. In this direction, it has been shown that patients with AD presented a worse capacity to recover specific autobiographical events [62], a deficit related to the lack of ability to mentally recover these events. This loss leads to the decontextualization or semantization of autobiographical memories, and a change in the ability to mentally recover events from the past. Thus, AD patients have a more general feeling of familiarity, expressed as the feeling of “having experienced this before”.

In the case of semantic autobiographical knowledge, the conclusions do not coincide. On the one hand, some studies observe impairment in this type of autobiographical knowledge from the first stages of the disease [54, 57], while others point out that it is preserved until moderate phases of the disease [48, 63, 64].

3.5. Loss of identity

As mentioned above, AM is necessary for the development and maintenance of personal identity. Autobiographical memories contribute to the development of social relationships, decision making, or problem solving [21].

Patients with AD have limited access to memories that make up their self-awareness, self-knowledge, and self-image, leading to a compromised sense of identity. This problem has been evaluated in various studies, observing that poor autobiographical knowledge was significantly correlated with a weak sense of identity [54].

However, based on the fact that remote memories are better recalled than recent ones, at least until moderate phases of AD, certain personal memories would be expected to be relatively preserved in the memory. These memories probably come from the reminiscence bump stage, which includes the most important events that have defined their life stories. This stage is the one most studied in the literature, as it is the memory component most related to identity and, therefore, contains more self-defining memories and events with a high emotional charge and a strong impact on the sense of identity [22].

Along the same lines, many studies have investigated the effect of AD on self-defining memories. One of these studies pointed out that most of the autobiographical memories of participants with AD also came from their reminiscence bump. However, it has also been shown that the subjects with AD contribute fewer specific self-defining memories, compared to control subjects [45]. Therefore, self-defining memories, or memories that are highly relevant to one’s self-image, seem to decline from moderate stages of AD, which can explain the reduced sense of identity that occurs in this disease. Even so, it should be mentioned that in AD the semantic component of autobiographical memory is maintained until moderate phases of the disease. Different studies have shown that the personal semantic memory contributes to numerous cognitive processes related to self-referential thinking, as a reflection of the self in

the past, imagining the personal future, and maintaining one's self-identity [65]. In fact, the semantic AM supports the knowledge about personal traits, roles, thoughts, and beliefs, aspects related to self-referential thinking, which is highly conceptual and independent from the medial temporal lobe [65]. Therefore, semantic AM, which is relatively preserved in the initial and moderate stages of AD, can be used as an aid to improve self-identity and self-continuity, and to develop the self-referential cognition strategy.

3.6. Clinical rehabilitation of the autobiographical memory in AD

The objective of the clinical rehabilitation of the AM in AD is to recover, as much as possible, the inaccessible memories, or at least maintain the "pool" of autobiographical memories that are still available. There are different therapeutic strategies, one of which is reminiscence therapy.

This therapy focuses on the conscious recall of personal memories from one's life in order to report, think about, tell, or show something about our experiences from the past. Reminiscence was originally proposed by Butler [66], who has promoted it as a tool to improve well-being and reduce depressive symptoms in older adults. Since then, reminiscence has been widely applied in cognitive rehabilitation in aging, including in pathologies like AD.

4. Reminiscence therapy

Initially, reminiscence was developed for elderly people with normal aging to offer them a chance to remember and organize the most significant events in their lives [66]. However, the idea of using reminiscence therapy in people with dementia was introduced in 1979 [67].

Reminiscence, defined by Webster [68] as "the present recall and interpretation of life events experienced at some time in the past, generally in the distant past", is a way of maintaining the personal past and perpetuating the person's identity. It is a very complete technique because it uses stimulation, communication, socialization, and entertainment [69]. In addition, reminiscence involves the systematic recall of old memories: recalling personal events in all their depth, noises, smells, images, emotions, as a way of activating the personal past [70]. Thus, reminiscence can be described as the organized and systematic use of memories and recollections to awaken or strengthen identity and self-esteem.

Some definitions of reminiscence refer to recalling personally important memories from the past, a selective process in which the memories are events in the life of a person or group of people [71]. It is an organized, complex mental activity with an important purpose: to reawaken or strengthen identity and self-esteem, recoding them in scenarios and scenes, people, events, traumas, and topics based on autobiographical memory [72].

The definition of reminiscence in the field of dementias frequently appears in the literature and offers a more detailed description of the processes that intervene in it [73]. Reminiscence therapy includes the discussion of past activities, experiences, and events with another person or group of people, generally with the help of eliciting stimuli or indications [73].

Reminiscence has been shown to be a useful intervention in interdisciplinary work between the neuropsychologist and gerontologist, due to its low cost and because it allows the psychostimulation mainly of the language and memory functions. It establishes connections between the past, present, and future person, promoting sociability and openness to interpersonal relationships, confirming a sense of identity, and reinforcing feelings of self-esteem, personal worth, coherence, and continuity [74]. This intervention has commonly been used in people with cognitive impairment [75]. In fact, some authors [74, 76] show that people with dementia can benefit from this intervention to foment and/or strengthen their current relationships and maintain them over time, and protect themselves from isolation and withdrawal. In addition, others indicate an improvement in cognition, mood, and behavior in general, and a reduction in caregiver stress [73].

Before explaining the process of holding a reminiscence session for people with dementia and the benefits of doing so, it should be mentioned that Wong and Watt described six types of reminiscence [77], and in 2007 Cappeliez et al. [78] added two others, finally yielding eight types of reminiscence, defined in **Table 1**.

Integrative	Its main function is to try to give meaning to the person's relationship with his her past
Preparation for death	Which connotes a certain spirituality by facing the topic of death and the afterlife with a degree of serenity
Obsessive	In which certain individual problems are observed in integrating problematic past situations
Evasive or Escapist	In which the fantasy of some memories is used to "escape" from the individual s current situation
Instrumental	Takes advantage of the subject's previous experiences to resolve and deal with current problems
Transmitter	Where the person realizes that the reminiscence transmits to a younger generation some of the knowledge and lasting values he she acquired over time
Intimacy	Where the cognitive and emotional representations of important people in our lives who are no longer with us are recalled instead of their physical appearance
Narrative	Defined as the description of past events, in order to acquire biographical information, and for the pleasure of narrating them

Table 1. Types of reminiscence.

These eight types of reminiscence have been grouped in an integrated model through a triadic system [79] (see **Figure 2**). Therefore, the eight types of reminiscence are divided into three specific functions: the *self*, reminiscences of an interpersonal nature that seek coherence and meaning; *orientation*, in terms of recalling and sharing personal knowledge and experiences; and *social connectedness*, providing the basic elements for maintaining relationships, with an interpersonal and continuity nature, and proposing emotion management as a basic characteristic. Although the first two functions mainly refer to coping and the orientation, other authors point out that both involve the reactivation and strengthening of a feeling of personal

competence or self-efficacy [79]. Therefore, there is a degree of overlapping between the function of guide and the *self*, especially in integrative reminiscence.

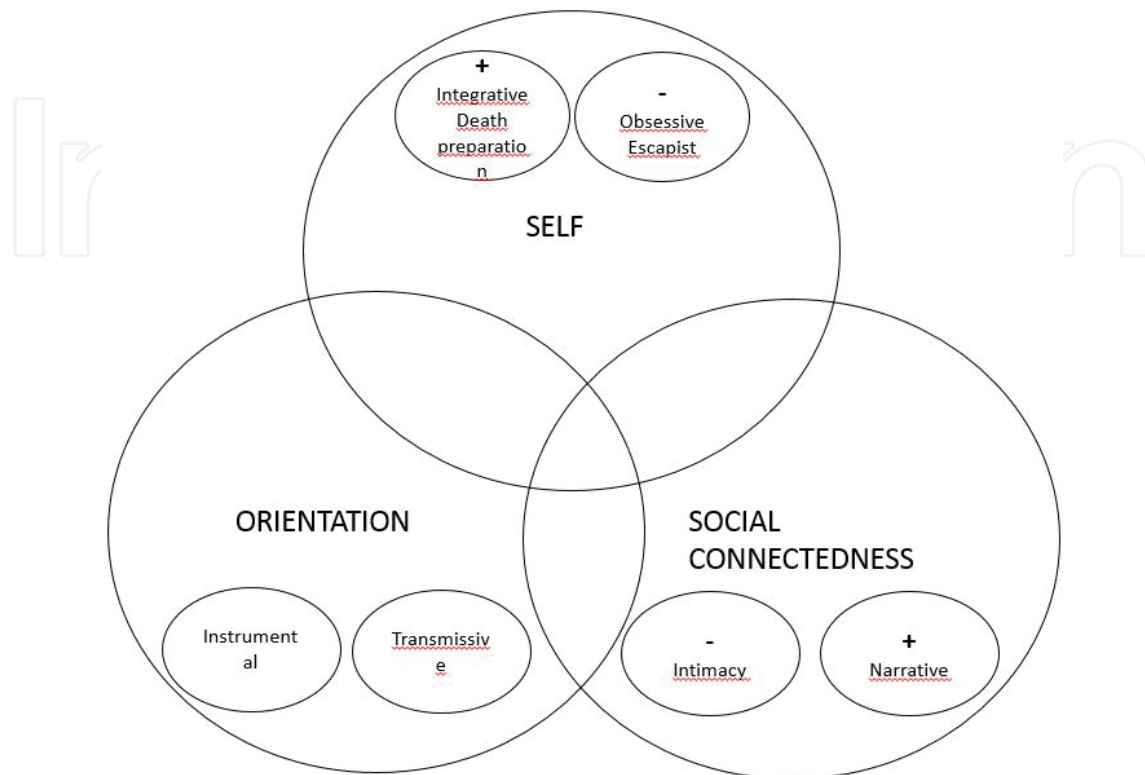


Figure 2. Triadic reminiscence system.

Using reminiscence with people with dementia is not the same as using this type of intervention with people who have no cognitive pathologies. It is necessary to make a series of changes or modifications [80]. The objectives of the sessions have to be flexible enough to adapt them to the participants and their cognitive ability. The materials used should be as close as possible to the participants to facilitate the evocation of the memory. The groups must be small, and the cognitive performance of the participants should be taken into account. It is important to obtain the participation of family members in preparing the sessions, or they can even participate in them. In this way, there is better knowledge about the participants' personal information, and they can refer to their own biography during the sessions and provide support when necessary. It is advisable and important to refrain from correcting memories that diverge from reality, as the main objective of the activity must be the emotional validation of the orientation, and not of the memory itself.

The intervention must be directed by a psychologist or professional trained in carrying out these types of programs. Normally, it will consist of 10 or 15 sessions lasting 60 min each, with one session per week. In each session, all the life stages will be worked on (childhood, youth, adulthood, and old age) through a specific topic. All the sessions must follow the same structure: at the beginning, the members of the group are welcomed and told what topic will be addressed. After that, two activities are performed using specific stimuli (music, images,

objects, etc.) to evoke their memories and sayings and quotations related to the topic of the session. In both cases, participants perform a free-association exercise that consists of saying or writing the first word or expression the stimulus brings to mind; then open questions are formulated to facilitate the emergence of positive personal memories; finally, participants try to connect these memories with the present [81].

With regard to the results obtained from reminiscence therapy in people with dementia, various studies have shown their efficacy and effectiveness, especially in improving mood and reducing depressive symptoms, increasing life satisfaction, and reducing agitation behaviors [75, 82–85].

In the case of depressive symptomatology and self-esteem, some studies reveal the effectiveness of this type of therapy [86–91]. This therapy has been shown to have the main consequence of reducing depressive symptomatology, reducing feelings of desperation and loneliness, and increasing positive mood state. Moreover, if we take into account the relationship between this type of therapy and positive psychology, some authors [92] indicate that one of the most characteristic facets of reminiscence is its capacity to transform negative events into good results, as the intervention fosters the positive reevaluation of less favorable situations for the participants. Thus, the use of this type of intervention leads to positive results in improving the life satisfaction of people who participate in reminiscence sessions [83, 93, 94].

In addition to the improvement in mood, an increase has also been found in some of the dimensions of psychological well-being, self-acceptance, positive relations with others, autonomy, and control over the environment [71, 81, 87, 95, 96].

As described above, Alzheimer-type dementia is produced as a characteristic of the loss of consciousness of the self. Therefore, the increase in or maintenance of the self-acceptance dimension, as shown in the studies highlighted, could slow down the appearance of dependence in the person with this pathology and play a large role in the reconstruction of the self, approaching the idea of integrity developed by Erikson [97]. Regarding the dimension of positive relationships with others, authors highlight that there is an active interaction among the members of the group, making this therapy a stimulating, happy and integrating activity and establishing a connection among the participants that creates positive relationships [98]. This quality is achieved through the narrative contributions made by the group members throughout the sessions, as they help people with greater cognitive impairment and difficulty in evoking their memories to be able, for a few moments, to glimpse in their memory some hint of their past or a similar situation experienced and share it with the other members of the group. Finally, the application of this type of therapy has increased their independent thinking, the feeling of control and competence in managing the environment they deal with in daily life, and their ability to choose and create contexts adapted to their own needs.

With regard to the results obtained on autobiographical memory after reminiscence intervention and life review procedure, results suggest that people with dementia who attend reminiscence sessions improve their autobiographical memory [85, 99, 100], being observed improvements in recalling both facts and events, that is, in semantic memory and episodic memory.

Numerous studies [85, 101–103] have shown the benefits of this therapy, observing that elderly people with AD who had participated in a reminiscence program, compared to a control group that did not participate, showed an improvement in the amount of autobiographical memory, specifically semantic AM.

Therefore, reminiscence therapy is a useful intervention that has many benefits for both the healthy population and people with cognitive impairment. Specifically in the AD population, positive effects have been observed at the emotional, cognitive, and psychosocial levels.

However, and on the emotional plane, in addition to the changes mentioned, there is a broad range of emotional or psychological and behavioral impairment in AD that has to be treated in order to improve the quality of life of the patient and his/her family context.

5. Behavioral disorders in dementia

The psychological and behavioral symptoms of dementia (BPSD) are the most worrisome symptoms because they significantly affect the patient and his/her family or main caregivers. However, they are classically the symptoms that have received less attention. These are symptoms such as depression, anxiety, irritability, hallucinations, delirium, aggressiveness, etc. In fact, this symptomatology has a high degree of frequency and is present in at least 50–90% of patients [104, 105]. Nevertheless, there is great variability in the percentages published, which shows the difficulty of estimating their prevalence.

BPSD have great repercussions because they cause a lot of problems for the patient and his/her family and social environment. They represent one of the consequences of the disease that produce the greatest disability, and one of the greatest threats to coexistence and the daily life of the family. They hinder the patient's autonomy and lead to frequent medical visits and admissions in emergency services and healthcare institutions. They have a decisive influence because they reduce the patient's quality of life and his/her level of functional autonomy [106], which leads to a decided reduction in the quality of life of the caregivers, increasing their stress. Thus, the caregivers of people with dementia suffer the consequences of these types of symptoms the most. Therefore, these symptoms become an important source of depression and desperation in caregivers [107], producing a large number of consultations with General Practitioners and becoming one of the main reasons for the institutionalization of AD patients [108, 109].

It is important to highlight that there is great heterogeneity in the appearance of these behavioral symptoms, given that not all patients present the same alterations, and they will not always appear in the same stages of the disease or increase linearly as the disease progresses [110].

Throughout the literature, diverse nomenclatures have been established to refer to this symptomatology. However, in 1996 the International Psychogeriatric Association coined the term psychological and behavioral symptoms of dementia (BPSD) to refer to the alterations in

perceptions, mood, or behaviors that are often present in patients with dementia [111]. Specifically, they include a variety of manifestations, such as physical aggressiveness, shouting, restlessness, agitation, erratic wandering, hyperactivity, culturally inappropriate behaviors, sexual disinhibition, abuse, inappropriate language, following another person around, etc. [112]. Below, **Table 2** shows the main alterations.

Symptoms	Definition
Delirium	Irrational or false idea or thought that distances them from a true comprehension and perception of the surroundings
Hallucinations	False perceptions that can affect any perceptual sphere
Anxiety	Feelings of anticipator fear of a danger that they consider imminent
Apathy	Loss of motivation that affects the behaviors, emotions and cognition, manifested as behaviors of lack of initiative, indifference, and loss of interest
Emotional lability	Fluctuations and brusque changes in their feelings and emotional expressions
Anomalous motor behavior	Imperious need to move without any defined objective, often accompanied by anxiety, wandering, walking around, motor hyperactivity
Sleep disorder	Insomnia, hypersomnia or parasomnias
Appetite disorder	Capricious eating, compulsive eating, or lack of appetite
Aggressiveness	Behaviors of physical or verbal violence toward people or objects, manifested as great activity involving movements, shouting, and aggression
Depression	Sadness, anhedonia, feeling of being a burden, lack of hope ...
Euphoria	Abnormally good or inappropriate humor
Apathy	Lack of interest, motivation, feeling, emotion or concern
Disinhibition	Lack of social tact in language, body language, and other behaviors
Irritability	Bad mood, quick, unjustified changes in mood, impatience, intolerance
Repeated vocalizations	Any bothersome sound or vocal expression that is not due to a change in the patient or the environment

Table 2. Main behavioral and psychological symptoms of dementia.

The evaluation and diagnosis of the BPSD is carried out through observation and interviews with the patient and his/her caregivers. In addition, instruments such as the Behavioral Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD) [113] and the neuropsychiatric inventory (NPI) [114] can be quite useful.

5.1. Main causes of behavioral disorders

Behavioral problems have different origins. Below, a classification of these origins is presented:

5.1.1. Medical causes that lead to behavioral problems

First, many medications can produce secondary effects and cause confusion and changes in the level of functioning. In this situation, it is important to prepare a report of the changes occurring in the person.

Second, the sensory deficits that usually occur and accompany aging can lead to vision or hearing problems that can cause behavioral problems. Thus, it is important to carry out periodic revisions to avoid these problems.

Third, comorbidity with other diseases such as urinary infection, pneumonia, gastrointestinal infection, etc. can produce symptoms such as fever, which in turn will aggravate the confusion in the person with dementia, possibly leading to behavioral problems.

Fourth, situations of dehydration, constipation and other physiological causes such as hunger, sleepiness, or physical discomfort (e.g., headache, dizziness, etc.) can produce a strong feeling of distress and cause the person to behave in an irregular way.

5.1.2. Causes related to the environment:

At times, certain aspects or stimuli in the environment can produce some uncertainty, stress, or confusion in the patient. For example, very large and/or untidy spaces, too much stimulation, or a lot of activity in the environment (music while talking, too many people around, etc.) can make the person with dementia react with anger or frustration. In addition, an excess or lack of decorative elements, furniture, and lighting (e.g., visual contrasts between the wall and the floor, too much furniture, mirrors, etc.) and unfamiliar environments can interfere with orientation, creating more confusion.

Finally, people with dementia need a set routine and daily structure because environments without routines and disorganized surroundings can give rise to certain behavioral disorders.

5.1.3. Causes related to the task:

Certain characteristics of the task can cause some problem situations, for example:

A complicated task: Sometimes we ask a person with dementia to do tasks that are too difficult, even though they seem simple to us. Examples would be getting dressed or bathing.

An unfamiliar task: People with dementia gradually lose the ability to learn new tasks. If they are asked to do something they have never done before, they will not be able to learn it, no matter how simple it is. For example, if an appliance is changed, they will be incapable of learning how it works.

Too many tasks to do: The person is no longer able to do two or three things, especially at the same time. They do not know how to organize themselves or the order in which to do things, and they leave things half done and start something else, etc.

5.1.4. Causes related to communication:

Another possible cause of these problems stems from the existence of comprehension and/or expression difficulties. Communication between the family and the person with dementia is extremely important and can be difficult. People with dementia often become angry or agitated because they do not understand what is expected of them, or they get frustrated because they cannot make themselves understood. These difficulties in communication and adaptation to their surroundings arise because there are hidden or unsatisfied needs, due to behavioral learning (reinforcement systems), greater vulnerability to the environment, or less adaptation to stressful situations.

When there are hidden or unsatisfied needs that have not been identified, they can cause inappropriate behavior. These needs are often not detected by caregivers, or they do not know how to respond to them (e.g., sensory deprivation, boredom, etc.). In a recent study, the number of unaddressed needs was the main factor associated with BPSD [115]. Among these needs, there are three main types: biological (lack of food, sleep, lighting, temperature, etc.); psychological (security, empathy, affect, etc.); and social (social company, boredom, respect, etc.). The most frequently detected needs were related to doing activities, company, and help with psychological distress [115].

Regarding behavioral learning, the environmental stimuli maintain, extinguish, or change a behavior, depending on the associated reinforcement. Thus, in the presence of an antecedent stimulus, a behavior is produced, which has a consequence. But if there is a change in the antecedent or the consequence, there is a direct change in the behavior. When referring to the consequences of a behavior, we can talk about different behavioral reinforcement systems. Depending on the reinforcement applied, we can cause a behavior to increase, remain the same, or disappear. However, often the behavior of the caregiver can be creating or maintaining the BPSD, given that they positively reinforce behaviors that should be eliminated, thus producing an increase in these behaviors. For example, a caregiver could be reinforcing an agitated behavior if he/she only pays attention to the person with dementia when he/she is restless or agitated. Other caregiver behaviors that can create or maintain BPSD are: paternalistic authoritarian or infantilizing treatment, ignoring the patient, imposing things or power struggles, or frequently asking the same thing so that the patient will remember it [116]. Therefore, we must eliminate the positive reinforcement of inappropriate behaviors and promote the positive reinforcement of appropriate ones. We can also establish the learning of new behaviors by generating new stimulus-response associations; for example, if we want the patient to learn a new behavior, we have to encourage it as a response to a stimulus and reinforce it positively every time it appears.

Finally, another reason for this type of disorder is the vulnerability to the environment or poor adaptation to stressful situations. This vulnerability arises because patients gradually lose their ability to adapt to their surroundings or cope with a situation of stress, perceiving the envi-

ronment as stressful and threatening. When the environmental stimuli surpass their stress tolerance threshold, they can cause anxiety, and this can lead to inappropriate behaviors. Examples of some stressful factors would be loud or irritating noises, shouts, excess heat/cold, unknown places that can be perceived as threatening, etc. Thus, in this situation, we must try to adapt the environment to the person's needs.

5.2. Intervention in behavioral disorders

Nonpharmacological therapies, specifically behavioral interventions, are usually the treatment of choice for BPSD, and although there are few results in the literature supporting its efficacy, a set of actions have been identified that integrate psychosocial and medical perspectives and respond to a coordinated and established plan. However, when these types of disorders are more serious, behavioral intervention is combined with pharmacological treatment. In practice, professionals should at least know about the essential components of the care management plan, promoting interactions between the parties involved in an agile and comfortable way for the person with dementia and the caregiver.

The essential aspects of the care management plan are early diagnosis, specific pharmacological treatment, control over comorbidity, prevention and treatment of the BPSD, and the continuous guidance and support for the patient and caregiver [117].

Before making changes, it is necessary to make a general proposal to find out what we want to change. Therefore, first the behavior to be modified must be defined. The definition of the behavior must be carried out in a specific and concrete way. Thus, this proposal includes:

1. Identify the BPSD that should be modified and make the clearest and most concise definition possible in order to better delineate the problem. In this way, the best action strategy for this specific BPSD (it is better to address them one by one) can be identified.
2. In order to adequately define the BPSD, information has to be gathered about it: what time of day it appears, in what environment or context, who is present, how often it appears, etc.
3. Locate the antecedents or triggers and consequences of the behavior. There can be various triggers, and the more the interrelations among these factors are determined, the more successful the intervention will be. Regarding the consequences of the behavior, they allow us to establish the intensity of the problematic symptom or behavior, and in analyzing the consequences, the key to the triggers can often be found.
4. Realistic goals have to be set, beginning with small ones that are easy to achieve. A realistic goal does not involve making all the behavior problems disappear completely and forever. Goals have to be established in relative terms. The objective might be for the behavior to appear less frequently, be less intense, last less time, produce less discomfort in the patient, and/or be better tolerated by the caregiver. The changes are slow, and it takes time to begin to see them.

5. Establish the right strategy for the change. Every strategy requires the involvement of both people, caregiver and patient, and the achievement of the intervention objectives and goals.
6. Continuously evaluate and modify the objectives and strategies employed. They must be continuously reviewed to determine whether they are efficacious and to what degree, whether they are useful, or by contrast, ineffective or even counter-productive, which would mean redefining the action plan and see or detect where the problem is.

However, in order for a behavioral intervention to be successful, it is important to take into account the environment and the family setting, so that they remain constant and do not produce stress. In addition, this environment must continually be adapted to the patient's different needs and the evolution of the disease. However, it is also reasonable to imagine that other nonpharmacological therapies that have a special influence on the affective sphere (reminiscence, music therapy, leisure activities, etc.) also avoid the appearance of BPSD [81, 103, 118].

Nevertheless, and in spite of the consensus between professionals and scientific societies about the priority of nonpharmacological management, certain circumstances, such as the lack of human resources for the necessary care, make it necessary to use pharmacological treatment for the BPSD. In this case, treatment with cholinesterase inhibitors reduces the appearance of apathy, hallucinations, and motor hyperactivity [119, 120], while memantine prevents the appearance of agitation and aggressiveness [121].

Specifically, for intervention in the main BPSD:

Thought alterations, hallucinations and delirium: Avoid triggers, arguing about the truth or joking; do not reinforce or increase the content of the altered thinking; orient and distract the person toward other topics.

Aggressiveness: Review the existence of a possible deprivations or a need that may be provoking it; promote autonomy and privacy (avoid robbing the patient of his/her dignity); approach the patient face-to-face calmly, warn, use nonverbal communication, explain, negotiate, reinforce, etc.

Depression: Identify the possible trigger and modify it (mourning, entering a nursing home, etc.); provide light, open, and pleasant spaces; stimulate social interaction; establish a plan for pleasant and enjoyable activities (strolls, workshops, etc.).

Anxiety: Reduce stimuli; continuous explanation of what is going to happen and predicting new situations; offer security verbally and nonverbally; avoid distractors, etc.

Euphoria: Do not imitate or reinforce the patient; do not trivialize, try to put him/her in the place of others. Correct or offer affection in a respectful way.

Apathy: Verbal or physical requests, propose, and persuade the patient to do pleasant or group activities, imitation, and modeling, stimuli with movement and an affective component (music, animals, etc.). The caregiver must understand and know how to manage this symptom.

Disinhibition: Study possible triggers (getting undressed because they are hot or because a label irritates their neck), respect without judging, avoid getting irritated or angry about behaviors, understand the behavior as part of the disease, correct them with tact, etc. In the case of inappropriate sexual behaviors, try to carry out stimulus control, allowing the behavior in certain places and for a certain time and impeding it in other situations (differential and selective reinforcements).

Irritability: Study a possible modification of the environment (noise, caregiver's treatment, social setting, etc.), accept the limitations, propose realistic, and alternative activities, etc.

Motor-ambulation hyperactivity: Make sure shoes are suitable, appropriate spaces, and establishing safety measures such as constant supervision, railings, good lighting, direction signals, signs, eliminate obstacles, black rugs, etc., offer objects to manipulate, do not create obstacles, etc.

Repeated vocalizations: Check basic needs with special attention to social isolation, lack or excess of stimuli, or pain; reinforce calm moments.

Sleep alterations: Balanced diet, brief naps, activity during the day, delay bedtime, avoid noise, etc.

Increase in appetite: Reduce or avoid exposure to food or substances.

Loss of appetite: Reinforce with aromas, flavors and presentation of food, dental hygiene and check-ups, conversation during meals, select favorite meals, etc.

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