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CARING FOR OLDER ADULTS: BIO-PSYCHO-SOCIAL ASSESSMENT AND WELL-BEING IN NURSING HOMES

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To my sisters, my certainties.
To mom and dad, for the gift of life.

…To all older adults met along their journey…

Abstract

Nursing homes play a vital role in providing care and support to older adults, particularly those who require specialized assistance due to chronic illnesses, disabilities, or cognitive impairments. The aging demographic shift has led to an increased demand for nursing home services. Older adults often face complex health issues, which necessitate comprehensive, multidimensional care. The approach to older adults in Nursing Homes, precisely because of the aforementioned complexity, is based on the use of reference theories that guide the professional in taking charge, the application of models that allow for hypothesizing the life experience of that person, with their history, clinical, social, and relational characteristics, at that specific moment. It also relies on the use of a methodology that, through assessment tools and scales, allows for setting goals for the well-being of the elderly person, evaluating the effectiveness of implemented interventions, and adjusting the care plan based on the bio-psychosocial changes that the elderly individual may undergo. Multidimensional geriatric assessment (MGA) represents the preferred means for monitoring the care process and facilitates the integration of perspectives among professionals with diverse skills and training, all in order to ensure continuity and consistency for the elderly person.

The most prominent issues that both professional and family caregivers, as well as residents, confront on a daily basis include major neurocognitive disorders (or dementia), depression, end-of- life care, and death. Relational aspects, the environmental and social context, and the activities undertaken all play an important role in the psychophysical well-being of the elderly person. In addition, the COVID-19 pandemic has brought about significant changes implemented by organizations to try to limit the spread of the virus.

This thesis includes five chapters. The first one serves as a broad introduction to aging and its main characteristics within Italian nursing homes, with specific reference to the Lombardy region. It explores topics related to a person-centered approach, multidimensional geriatric assessment, and the key assessment scales that make up the Individualized Care Plan (ICP) of nursing home residents.

The chapter then delves into the trajectory of pathological aging, focusing on two of the conditions that most affect institutionalized elderly individuals: neurocognitive disorders, distinguishing

between delirium, minor neurocognitive disorder, and major neurocognitive disorder, and depression. In the second chapter we present a longitudinal study carried out on a sample of two nursing homes in Northern Italy. In this work entitled "Bio-Psycho-Social Well-Being of Nursing Home Residents During the COVID-19 Pandemic: A Three-Year Longitudinal Study" we investigated the impact of the Covid-19 pandemic on the bio-psycho-social functioning of N = 247 residents in the three-year period 2018-2021. Results suggest that there is a trend of worsening of residents' well-being during the pandemic, regardless of whether individuals tested positive for COVID-19. It was surprising to note that frequent interactions with family caregivers did not appear to have a protective effect, and, in fact, deteriorating conditions were linked to increased subsequent social contacts. These findings shed light on the intricate interplay of biological, psychological, and social factors affecting the well-being of individuals residing in institutional settings. Furthermore, they carry significant implications for public health. By dissecting the roles of the pandemic timeline, COVID-19 status, and social interactions, this study provides valuable insights into the worsening of neuropsychiatric symptoms, as well as functional and clinical indicators, among nursing home residents. This study is currently under review in *Psychology and Aging*.

In the third chapter we address the topic of death and end-of-life, a significant aspect of everyday life in nursing homes and which it was imperative to focus on after the deaths that occurred during the Covid-19 pandemic.

In chapter 4, we present the results of a project entitled "Bio-Psycho-Social Variables and Late Life Depression in Nursing Homes: A Temporal and Contemporaneous Network Analysis Exploration". In this study (N = 180, partially overlapped with the sample of the first study), we explored, through the use of psychometric network analysis, the presence of predictive relationships between the most important indicators of well-being (clinical, functional, motor) in the period from February 2021 to August 2022. The study provides valuable insights into the predictive connections among bio-psycho- social variables that describe the functioning of residents in nursing homes, both within the same assessment period and over subsequent semesters. This not only helps in identifying links between protective and risk factors but also offers guidance to healthcare and social organizations to implement both interventions and prevention strategies.

In the last chapter, we summarize the concepts and the results presented in the previous chapters and we discuss potential extensions of our research that can help to overcome its limitations.

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Chapter 1. Introduction

Highlights

- We introduce the general concept of care and personhood approach.
- We present Multidimensional Geriatric Assessment (MGA).
- We discuss the main evaluation scales for redacting the Individualized Care Project (ICP).

Abstract

This introductory chapter delineates aging as a complex process, encompassing biological, psychological, social, and bodily dimensions. Emphasis is placed on the prevalence of chronic conditions, neurodegenerative diseases, and depressive disorder among the institutionalized older adults, impacting autonomy and quality of life. The chapter delves into the intricacies of frailty, considering various risk factors that contribute to autonomy loss, institutionalization, and mortality. The chapter explores the Individualized Care Project (ICP) and Multidimensional Geriatric Assessment (MGA) as comprehensive strategies, emphasizing a multidimensional, multiprofessional, and interdisciplinary approach to address the diverse needs of residents. Insights into the rating scales within the MGA are provided, focusing on biological, functional, psychological, and social aspects. Special attention is given to the neurocognitive disorders and depressive disorder, addressing the prevalence, risk factors, and impact in nursing home settings.

The imperative for a comprehensive psychological approach to improve the well-being of older adults in nursing homes is highlighted.

Introduction

The age of the world's population has changed profoundly over the past two centuries. In particular, there is an increase in the number and proportion of the elderly population defined as 65 years of age and of the very elderly, as 80 years of age (Newman & Cauley, 2012, pp 4-5). By 2030, 1 out of 6 people in the world will be aged 60 years or over; and by 2050, the world's population of people aged 60 years and older will double (2.1 billion). In sum, the number of persons aged 80 years or older is expected to triple between 2020 and 2050 (Word Health Organization, 2022). As a consequence of this growth, health and quality of life become central issues that impact on the health system and on taking charge of the older adults and their needs.

Aging is a complex process that is characterized by changes that occur at different levels:

- biological, given by the impact of the accumulation of molecular and cellular damage over time. The visible manifestation of the aging process, the phenotype, is the result of the interaction of a variety of environmental, genetic-epigenetic events and of stimuli that affect our body throughout life (Cevenini et al., 2008). To date, however, molecular, cellular or physiological changes are the most important drivers of the aging process are still unknown;
- psychological, given by the personal meaning of changes and physical losses (for example in autonomy, medical chronicity);
- social, given by the changing in life sphere concerning physical and human environment (for example, retirement and change of role in society, nursing home entrance), and relational aspects (for example, loss of friendships, death of spouse and family members);
- bodily, given by changes in the physical (for example skin, face, hair, height, weight, voice, proprioception, cardiovascular system) and sensory level (for example in the decrease of strength, vision or hearing, taste and smell).

Referring to aging as a series of changes that occur during a person's lifespan (Colloca et al., 2020) it is possible to identify three phases: elderly or early old age, senile or middle old age and late old age (or long-livers). Early old age ranging from 60 to 75 years is the period of initial involution of human physical capabilities. Then follows the middle old age, from 76 to 90 years, the period of further involution of human motor functions. Finally, after 90 years of age, a late old age is following; it is a period of decline in human physical abilities (Dodig et al., 2019).

The increase in life expectancy made possible by the improvement of living conditions in terms of hygiene, food, environment and the increase in medical knowledge and the tools available for the study of pathologies, has made it possible to distinguish between normal aging and chronic disease (Borella et al., 2015) bringing to light new kinds of chronic and neurodegenerative diseases.

Among the main chronic pathologies in aging, we find osteoarthritis, arterial hypertension and diabetes. These aspects are confirmed by the ISTAT survey on Health conditions and use of health services[1] (year 2019) which reports that hypertension affects 47% of the Italian population aged 65 or over, arthrosis 47.6%, and diabetes 16.8%. Among the chronic neurodegenerative diseases we find dementia, where the most common forms are Alzheimer disease (AD), Vascular Dementia (VD), Levy Body Dementia (LBD), Fronto-Temporal Dementia (FTD), and Parkinson's Disease (PD) (World Health Organization, 2012; National Health Institute, 2013). These chronic diseases can interfere with the daily functioning of the elderly person in terms of basic and instrumental personal autonomy, motor skills, cognitive functionality, as well as by affecting the quality of life of older adults and their family caregivers.

The complexity linked to the aging process is therefore characterized by all those bio-psycho-social changes described above which manifest themselves as intrinsic characteristics of the passage of time and the subjective modifications that it entails together with the possible occurrence of chronic and neurodegenerative pathologies which lead to the concept of frailty (Fried et al., 2004; Strandberg & Pitkälä, 2007). We can define it as a decrease in individuals' resources that make them unable, at various levels, to face everyday life. Several risk factors contribute to determining the frailty of older adults. Among these, we can find the age over 75, a recent hospitalization, poor social network, low economic level, cognitive decline, dementia and depression. None of these aspects, taken individually,

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[1] https://www.istat.it/it/archivio/204655

determines the fragility of the individual, but the presence of two or more of them constitutes a risk factor for the loss of autonomy, institutionalization and death (De Beni, 2015).

The choice of institutionalization is often due to the need for ongoing social and health care where incoming residents appear increasingly compromised in terms of severity of comorbidities and clinical instability (Kojima et al., 2019). This aspect is one of the consequences of the scarce social-health residential offer on the national territory (Guaita & Colombo, 2023). In Italy, the presence of long-term care facilities (LTCFs) is inhomogeneous with different gradients of distribution from North to South, with differences also in the same region: higher values result in northern regions inconsistently with the distribution of chronicity and frailty. Recent studies in European countries showed how the percentage of older adults with severe dementia or total disability in everyday activities is higher in Italy than, for example, in Germany (Honinx et al., 2019; Onder et al., 2012). This opens an important reflection on the theme of polypathology and the bio-psycho-social factors that are evaluated and monitored within nursing homes.

Therefore, given this framework of complexity, the aim of this broad introduction is to present and explore the issues we deal with when working in nursing homes.

Bio-psycho-social approach and multidimensional geriatric assessment

In 1948, the World Health Organization (WHO) defined health as "*a state of complete physical, mental and social well-being*" (WHO Interim Commission, 1948, pp.1[2]), laying the foundations for overcoming paradigm that see a disease as a direct organic expression of pathology. Together with the biological aspect, the WHO definition considers social factors (i.e., culture, relationships, roles), psychological factors (given by personal characteristics and individual experiences that shape the subjective gaze that the person brings to the world and to relationships), and environmental factors, related for example to the physical characteristics of the living space (Sartorius, 2006). Adopting this type of approach towards nursing home residents implies shifting attention from the "to cure" approach to the "take care" one (Polidori & Ferrucci, 2023). This means that geriatric complexity, given by multi-morbidity and by factors intrinsic to the changes that institutionalization entails (and the meanings that the person attributes to them), is faced in a multidimensional, multiprofessional, and interdisciplinary way. In this view, interventions are more centered on the specific person in a flexible and variable way, with a particular attention to the resident's social system and personal characteristics (Chadborn et al., 2019). This approach is closer to one centered on *Personhood*, a term introduced by Tom Kitwood (Kitwood, 1997) with which he refers to a condition or standing that is attributed to an individual by others within the context of their social interactions and relationships. This concept implies acknowledgment, esteem, and confidence in the person's abilities or qualities (Kitwood & Bredin, 1992; Kitwood, 1997; Hennelly, 2018).

In the context of the nursing homes, a personhood approach takes shape through the individualized care project (ICP), a comprehensive and tailored approach to the care and treatment of the residents. This approach recognizes the unique and diverse needs of each resident and seeks to provide personalized care that takes into account their physical, psychological, and social well-being.

An important instrument for implementing the ICP is a social-health document which is referred to the acronym PAI (Progetto Assistenziale Individualizzato or Individualized Assistance Project) in

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[2] https://apps.who.int/gb/bd/pdf_files/BD_49th-en.pdf#page=6, p.1

Italy. ICP is achieved through the use of the Multidimensional Geriatric Assessment (MGA) (Rubenstein & Stuck, 2005). This assessment method enables a multidisciplinary team to evaluate bio-psycho-social aspects using validated instruments and scales, monitoring residents' condition over time. MGA allows the consideration of an individual's overall health status by gathering both remote and recent clinical history. It helps professional caregivers identify not only cognitive and/or functional limitations but also the person's resources. This assessment is fundamental for setting goals for intervention areas and establishing indicators to assess their achievement over time. Additionally, it promotes the development of a cohesive team where discussions and sharing diverse perspectives on the elderly person contribute to personalized care (Röcker et al., 2022). Healthcare workers are tasked with integrating two observation processes when creating the ICP. One is empirical-quantitative, involving the use of literature-based and validated tools to assess specific aspects of the functioning of the elderly individual. The other is observational-qualitative, which requires the ability to consider the environment, the person, and the interaction between them (Rubenstein & Stuck, 2005).

Usually, the multiprofessional team is composed of physicians, nurses, physiotherapists, psychologists, professional educators and healthcare assistant workers. All together, professionals collaborate in the assessment process referring to four main areas: biological and clinical, functional, psychological, and social (Röcker et al., 2022). The biological and clinical area includes the organic aspects linked to the simultaneous presence of different pathologies, the risk of malnutrition and the possible onset of pressure sores. The functional area includes the evaluation of the healthcare, motor and practical autonomy of the residents, which allows them to be able to self-determine in everyday life. The psychological and social area collects information about the cognitive, emotional- motivational and relational aspects.

For all these aspects, the team working at the nursing home, each according to their professional expertise, completes assessment scales.

Purposes and Characteristics of Assessment Scales of the MGA

In the following paragraph, we will describe the most important assessment scales that are administered to residents as part of the MGA. Some of the assessment scales described in this paragraph have been adopted and used in the study conducted during the doctoral project and described in chapters 4 and 6. Consistent with what was stated in the previous paragraph, the rating scales used for the MGA are aimed at creating a profile of the resident's bio-psycho-social functioning and are recompiled every six months with the exception of situations in which the sudden onset of symptoms due, for example, to strokes or falls, poses the need to redefine the resident's current functioning framework. We can therefore propose the following subdivision of the evaluation scales noting that there are areas of overlap that reflect the interconnections between various aspects of human functioning and interdisciplinary approach: as regards the biological and functional areas, we can find the Comorbidity Index Rating Scale (CIRS) for the number and severity of the pathologies present; Clinical Dementia Rating Scale (CDR) for the stadiation of dementia; Braden for pressure leisure risks; Mini Nutritional Assessment (MNA) for malnutrition risk; Barthel Index for assistance needs; Tinetti Scale for falls risk; Morse scale with the same proposal of Tinetti but, differently from the latter, it considers also the presence of cognitive decline and dementia as a factors that increase the risk of falling; Neuropsychiatric Inventory (NPI) for behavioral and psychological symptoms; Mini- Mental State Examination (MMS) for cognitive screening. As regard psycho-social areas, we can find the Index for Independence in Activities of Daily Living (ADL) to explore the ability in everyday tasks, such as doing bathroom or feeding; the Geriatric Depression Scale (GDS) and the Cornell Scale for depression in elderly with dementia; the Geriatric Anxiety Scale to assess the presence of anxiety symptoms in older adults. With the exception of these last three scales, all the others mentioned fall under the Individualized Plan Care (ICP) filled in both nursing homes involved in the doctoral project and they are described in detail in the following paragraphs.

Index of Activity of Daily Living – ADL (Katz, 1976)

The ADL is a tool that assesses the level of an individual's dependence in performing activities of daily living across two dimensions: mental and physical. Through observation and interviews, the examiner considers the subject's higher level of dependency over the two weeks preceding the scale's completion. Scoring is done using a 3-point scale: without assistance (implying full autonomy, where the individual completes the activity without assistance, supervision, or direction from others); partial assistance; complete assistance. The assessment is based on the current state of the individual, not their potential to perform the function. There are six observed areas: bathing in a tub or shower, dressing, using the toilet, mobility, continence, and feeding. The total score is given by the sum of the scores obtained in each of the six areas assessed. A score of 0 corresponds to total self-sufficiency, while a score of 6 indicates severe impairment in self-sufficiency, namely total dependency. If the individual refuses to perform the task, it is considered as if they are unable to complete it independently, thus not self-sufficient. Individual who requires partial assistance in items investigating washing, dressing, and feeding are considered self-sufficient; conversely, partial assistance is considered equivalent to non-autonomy in the other dimensions.

The ADL scale has demonstrated good inter-rater reliability, indicating that different healthcare professionals are likely to score the same patient consistently.

Developed based on a comprehensive understanding of essential activities for daily living, the scale covers fundamental self-care tasks. This supports its content validity. Studies have shown that the ADL scale correlates well with other measures of functional ability, providing evidence for its construct validity. The scale is sensitive to changes in an individual's ability to perform basic activities of daily living. It is not typically used to identify specific conditions but rather to assess functional independence.

Barthel Index (Mahoney & Barthel, 1965)

The Barthel Index is a widely used assessment tool that measures an individual's ability to perform daily activities independently. It was developed by Mahoney and Barthel in 1965 as a way to evaluate functional status and the degree of a person's dependence or independence in basic self- care tasks. The index consists of 10 items, ranging from feeding to climbing stairs, that are essential for maintaining one's personal well-being. Each activity is scored based on the individual's level of independence, with higher scores indicating greater autonomy. A score of 0, 5, 10 or 15 points is assigned in relation to the need for help. The total score is calculated by adding up the individual scores, and ranges from 0 (total dependence) to 100 (total independence).

The assessed activities encompass various aspects of daily life, including feeding, bathing, grooming, dressing, toileting, bowel and bladder control, transferring (e.g., getting in and out of bed or a chair), mobility, and climbing stairs. These activities cover a broad spectrum of functional abilities and reflect the individual's capacity to perform tasks necessary for self-care.

The index is often administered through observation and interviews with the individual or their caregivers. The scores for each activity are then totaled to provide an overall measure of the person's functional independence. The Barthel Index is commonly used in healthcare settings, particularly in geriatric care and rehabilitation, to assess the impact of illness, injury, or disability on an individual's ability to carry out essential daily tasks.

Overall, the Barthel Index offers valuable insights into an individual's functional capabilities and helps healthcare professionals tailor care plans, interventions, and support services to meet the specific needs of patients who may require assistance in various areas of daily living.

The Barthel Index has demonstrated good inter-rater reliability, crucial for the consistency and dependability of the tool in clinical practice.

The Barthel Index was designed based on a comprehensive understanding of activities essential for daily living, ensuring that it covers a broad range of functional abilities. This supports its content validity. The Barthel Index correlates well with other measures of functional ability, providing evidence for its construct validity.

While the Barthel Index is not typically used to identify specific conditions or detect changes in clinical status, it is sensitive to changes in functional ability over time. It also has demonstrated the ability of the index to accurately measure a person's level of independence in daily activities.

Tintetti Scale (Tinetti, 1986)

The Tinetti Scale, also known as the Performance-Oriented Mobility Assessment Tool, is a widely used clinical assessment tool designed to evaluate an individual's risk of falling, particularly among older adults. It was developed by Mary Tinetti in 1986 as a simple and practical tool to identify balance and gait impairments that could increase the risk of falls in older adults. The Tinetti Scale consists of two main components: the Balance Assessment and the Gait Assessment. The balance component of the Tinetti Scale assesses an individual's ability to maintain stability and prevent falls during various activities. It includes tasks such as sitting unsupported, arising from a chair, attempting to maintain balance with eyes closed, and standing on one leg. Each task is scored based on observed performance of residents, with points assigned for successful completion of each task. The scores for these tasks are then totaled to determine the balance component score. The gait component of the Tinetti Scale evaluates an individual's walking ability and the risk of falls while walking. This component includes tasks such as initiating walking, step length, step symmetry, path deviation, walking stance, and turning 360 degrees. Similar to the balance component, each gait task is scored based on observed performance, and the scores are added up to determine the gait component score.

The total Tinetti Score is the sum of the balance and gait component scores, providing a comprehensive assessment of an individual's overall risk of falling. The scoring system for each task is often based on a 0 to 2 scale, with 0 indicating inability to perform the task, 1 indicating partial or moderate performance, and 2 indicating successful completion without assistance. A score of up to 18 is considered to indicate a high risk of falling. A score between 19 and 24 points establishes an average fall risk rate. A score that exceeds 25 points, however, indicates that the patient has a low risk of falling.

The Tinetti Scale's simplicity and ease of administration make it a valuable tool for healthcare professionals in various settings, including nursing homes, hospitals, and rehabilitation facilities. It helps identify older adults who are at an increased risk of falling due to balance and gait impairments, allowing for timely interventions and targeted fall prevention strategies. Regular use of the Tinetti Scale can also track changes in an individual's functional mobility over time, assisting in care planning and monitoring progress.

Demonstrating commendable inter-rater reliability, the Tinetti Scale ensures consistency in scoring across diverse healthcare professionals, establishing its dependability in clinical scenarios.

The scale guarantees coverage of pertinent aspects of balance and gait linked to fall risk, validating its content. Correlating effectively with established measures of balance and gait, the Tinetti

Scale attests to its concurrent validity. The scale also allows to accurately identify those prone to falls. Specificity ensures the scale correctly discerns individuals without an escalated risk of falling.

Morse Fall Scale (Morse, 1989)

The Morse Fall Scale, also known as the Morse Fall Risk Assessment Tool, is a widely used clinical tool designed to assess an individual's risk of falling. It was developed by Marilyn Morse in 1989 as a comprehensive assessment tool that considers a range of risk factors associated with falls in healthcare settings, particularly among older adults. The Morse Fall Scale is used by healthcare professionals to identify individuals who are at risk of falling and to implement appropriate fall prevention strategies.

The Morse Fall Scale comprises six categories, each of which assesses specific risk factors related to falls:

1. History of Falls: This category evaluates whether the individual has experienced falls in the past. A history of falls increases the likelihood of future falls and is considered a significant risk factor.
2. Secondary Diagnoses: It assesses secondary medical conditions that contribute to the individual's fall risk, such as dizziness, impaired vision, or cognitive impairment.
3. Ambulatory Aid: This category considers the type of walking aids used by the individual. The use of walking aids like canes or walkers may affect stability and increase fall risk.
4. Intravenous Therapy: If the individual requires intravenous therapy, their mobility may be compromised due to the presence of IV lines, increasing the risk of falls.
5. Gait: Gait refers to the individual's walking pattern and stability. Impaired gait, unsteady walking, or poor balance can indicate an elevated fall risk.
6. Mental Status: This category assesses the individual's cognitive and mental status. Cognitive impairments or confusion may lead to disorientation and increase the likelihood of falls.

A numerical score is assigned to each category, based on the presence and severity of risk factors. The scores are then summed to calculate the individual's fall risk score. The higher the score, the greater the assessed risk of falling.

A resident who scores under 25 points is considered to be at low risk of falling, a resident who scores between 25–45 points is considered to be at moderate risk of falling, and a resident who scores higher than 45 points is considered to be at high risk of falling.

Healthcare professionals use the Morse Fall Scale as a guide to determine appropriate interventions and fall prevention strategies tailored to each individual's risk profile. The scale has demonstrated good inter-rater reliability, indicating that different healthcare professionals are likely to score the same patient similarly. This consistency is essential for the tool's reliability in clinical practice.

The development of the Morse Fall Scale involved a comprehensive review of the literature and expert input, ensuring that it covers relevant risk factors associated with falls. This supports its content validity.

The scale has shown predictive validity, meaning that higher scores on the Morse Fall Scale are associated with an increased risk of falling. This helps in identifying individuals who may benefit from fall prevention interventions.

The Morse Fall Scale is designed to be sensitive to the risk of falls, identifying individuals who are more likely to experience a fall. It has demonstrated also good specificity referring to the ability to correctly identify individuals without an elevated risk of falling.

Mini Nutritional Assessment - MNA (Rubenstein et al., 2001; Guigoz et al., 2006)

The Mini Nutritional Assessment (MNA) is a widely used and validated tool designed to assess the nutritional status of older adults. It was developed by Nestlé Clinical Nutrition in collaboration with healthcare professionals to identify individuals who may be at risk of malnutrition or are already malnourished. The MNA serves as a comprehensive assessment that evaluates various aspects of nutritional health, helping healthcare providers tailor appropriate interventions and dietary plans for individuals at risk.

The MNA consists of a series of questions and assessments that cover a range of factors related to nutritional status:

1. Anthropometric Measurements: This includes measurements such as body mass index (BMI), calf circumference, and weight loss. These measurements provide insights into changes in body composition and weight, which are indicators of nutritional health.
2. Global Assessment: This section evaluates an individual's overall self-perception of their nutritional and health status, as well as their dietary habits and food intake patterns.
3. Dietary Intake: This category assesses the quantity and quality of the individual's food intake, including the types of foods consumed, frequency of meals, and adequacy of nutrient intake.
4. Mobility: Mobility is evaluated to determine how well an individual can move and perform activities of daily living, as mobility can impact nutritional intake.
5. Psychological Stress or Acute Disease: This section considers factors such as stress, acute illnesses, or chronic diseases that may affect an individual's nutritional status.
6. Neuropsychological Problems: It assesses cognitive aspects that could influence dietary intake and nutritional health, including factors like depression or dementia.

The total MNA Score is the sum of scores from all categories. Based on the responses and assessments in these categories, the MNA generates a score that categorizes the individual into one of three nutritional status categories: Normal Nutritional Status: Total MNA score ≥ 24; At Risk of Malnutrition: Total MNA score 17 - 23.5; Malnourished: Total MNA score < 17.

The MNA score helps healthcare professionals identify individuals who may require nutritional interventions, such as dietary modifications, supplements, or other forms of support to maintain or improve their nutritional status. Regular use of the MNA allows healthcare providers to monitor changes in nutritional status over time and adjust interventions accordingly.

The MNA has demonstrated good internal consistency, indicating that the individual components of the assessment are correlated and contribute to a reliable overall measure of nutritional status. The scale correlates well with other established measures of nutritional status, providing evidence for its concurrent validity.

The MNA has been shown to be sensitive to changes in nutritional status, accurately identifying individuals at risk of malnutrition. Specificity refers to the ability of the MNA to correctly identify individuals without nutritional risk.

Braden Scale (Bergstrom et al., 1987)

The Braden Scale for Predicting Pressure Sore Risk, often referred to as the Braden Scale, is a widely used clinical tool for assessing the risk of pressure ulcers (also known as pressure sores or bedsores) in individuals, particularly those who are immobile or have limited mobility. Pressure ulcers can be a serious health concern, especially for patients who are bedridden or use a wheelchair, as they can lead to skin breakdown and infections.

The Braden Scale assesses several factors that contribute to the development of pressure ulcers, and it assigns scores to each of these factors. These scores are then totaled to determine the overall risk level. The scale consists of six subscales or categories:

1. Sensory Perception: This category assesses the patient's ability to perceive discomfort or pain.

   It evaluates whether the patient can respond to discomfort and rest differently to relieve pressure. Scores range from 1 (completely limited) to 4 (no impairment).
2. Moisture: Moisture on the skin can increase the risk of pressure ulcers. This category assesses the degree of moisture on the skin, such as from sweating or incontinence. Scores range from 1 (constantly moist) to 4 (rarely moist).
3. Activity: This category considers the patient's level of physical activity. Patients who are more active are less likely to develop pressure ulcers. Scores range from 1 (bedfast) to 4 (walks frequently).
4. Mobility: Mobility evaluates the patient's ability to change positions independently. Those who can shift their weight and change positions are at lower risk. Scores range from 1 (completely immobile) to 4 (walks frequently).
5. Nutrition: Adequate nutrition is vital for skin health. This category assesses the patient's nutritional status and weight. Scores range from 1 (very poor) to 4 (excellent).
6. Friction and Shear: This category considers the forces that can cause the skin to shear or rub against surfaces, increasing the risk of pressure ulcers. Scores range from 1 (problem) to 3 (no apparent problem).

Each category is scored from 1 to 4, with 1 indicating a higher risk and 4 indicating a lower risk. The scores from each category are summed, resulting in a total Braden Scale score. The total score can range from 6 to 23: 18-23: Low Risk;15-17: Moderate Risk; 13-14: High Risk; 12 or Less: Very High Risk. The lower the total score, the higher the risk of developing pressure ulcers.

Healthcare providers use the Braden Scale to identify patients at risk of developing pressure ulcers and implement preventive measures. These measures may include repositioning, using pressure-relieving devices, maintaining skin hygiene, and optimizing nutritional status. Regular Braden Scale assessments help in monitoring changes in risk over time and adjusting preventive strategies accordingly.

The Braden Scale has shown good inter-rater reliability, indicating consistent scoring between different healthcare professionals when assessing the same patient. This is crucial for the tool's consistency and dependability in clinical practice.

The scale was developed based on expert opinion and a comprehensive literature review, ensuring that it covers relevant risk factors associated with pressure ulcer development. The Braden Scale has demonstrated predictive validity and it is designed to be both sensitive to the early signs of pressure ulcer risk and specificity correctly identify individuals without pressure ulcer risk.

Mini-Mental State Examination - MMSE (Folstein et al., 1975)

The Mini-Mental State Examination (MMSE) is a widely used cognitive assessment tool designed to quickly and effectively assess various cognitive functions in individuals, particularly in the context of cognitive impairment or dementia. Developed by Folstein and colleagues in 1975, the MMSE is a brief and easily administered instrument that can provide valuable insights into a person's cognitive status.

The MMSE evaluates several cognitive domains, offering a snapshot of a person's cognitive abilities. These domains include orientation, registration, attention and calculation, recall, language, and visual- spatial skills. The MMSE is typically administered through a series of questions and tasks, each designed to assess a specific cognitive function:

1. Orientation: This domain assesses a person's awareness of time and place. It involves questions about the current date, day of the week, month, year, and location (e.g., city, state).
2. Registration: In this part, the examiner provides a list of three unrelated words and asks the individual to repeat them. This assesses the person's ability to encode and briefly store new information.
3. Attention and Calculation: The individual is asked to perform simple calculations or serial sevens (e.g., subtracting 7 from 100, then 7 from the result, and so on). This tests attention, concentration, and basic arithmetic skills.
4. Recall: After a short delay, the person is asked to recall the three words they were asked to repeat earlier. This evaluates short-term memory and recall.
5. Language: Language skills are assessed through tasks such as naming common objects, repeating a phrase, following a three-step command, and writing a sentence.
6. Visual-Spatial Skills: This domain involves tasks that assess visual-spatial perception and construction abilities, such as copying a simple drawing or intersecting pentagons.

Each item in the MMSE is assigned a specific score, and the total score is obtained by summing the scores across all items. The maximum possible score on the MMSE is 30 points. Higher scores indicate better cognitive function, while lower scores may suggest cognitive impairment.

It's important to note that the MMSE has been widely used as a screening tool for cognitive impairment, particularly in the early stages of conditions such as Alzheimer's disease. However, it has limitations, including sensitivity to educational and cultural differences and the relatively limited scope of cognitive domains assessed.

While the MMSE can provide a quick snapshot of cognitive function, it is often used in conjunction with other more comprehensive neuropsychological assessments to obtain a more thorough understanding of a person's cognitive abilities and potential cognitive deficits.

The MMSE has demonstrated good test-retest reliability, it covers a range of cognitive domains, providing comprehensive coverage of cognitive function. Content validity is supported by the inclusion of items that tap into memory, attention, language, and other relevant cognitive abilities.

The MMSE correlates well with other established measures of cognitive function, providing evidence for its concurrent validity. It is generally sensitive to detecting cognitive impairment, particularly in the areas of memory and orientation. However, it may have limitations in detecting mild cognitive impairment and certain types of cognitive deficits.

Neuropsychiatric Inventory - NPI (Cummings et al., 1994)

The Neuropsychiatric Inventory (NPI) is a widely used assessment tool designed to evaluate and quantify the presence and severity of neuropsychiatric symptoms in individuals with cognitive impairments, particularly those with dementia. The NPI aims to capture a range of behavioral and psychological symptoms in dementia (BPSD) that can often accompany cognitive decline, providing valuable insights into the overall well-being of the individual and assisting in treatment planning.

The NPI is typically administered through interviews with caregivers or family members who are familiar with the individual's behavior. It assesses a variety of neuropsychiatric symptoms, which are categorized into different domains. These domains include:

1. Delusions;
2. Hallucinations;
3. Agitation/aggression;
4. Dysphoria/depression;
5. Anxiety;
6. Euphoria;
7. Apathy/indifference;
8. Disinhibition;
9. Irritability/lability;
10. Sleep disturbances
11. Aberrant motor behavior;
12. Nighttime behaviors (e.g., sleep disturbances, wandering).

For each symptom, the caregiver is asked to rate its frequency (how often it occurs) on a scale of 1 to 4 and its severity (how distressing or problematic it is) on a scale of 1 to 3. For each symptom, a composite score is calculated by multiplying the frequency and severity ratings. The total NPI score is obtained by summing the composite scores for all symptoms. This total score provides an overall measure of the severity of neuropsychiatric symptoms, with higher scores indicating more severe symptoms.

The NPI can provide valuable information for clinicians, researchers, and caregivers in several ways:

- Assessment: It allows for a comprehensive assessment of neuropsychiatric symptoms beyond cognitive impairment, helping clinicians understand the holistic impact of dementia on the individual.
- Monitoring: By assessing changes in symptoms over time, the NPI can help track disease progression and treatment efficacy.
- Treatment Planning: The tool assists in tailoring interventions and treatment strategies to address specific symptoms and improve the individual's quality of life.
- Research: The NPI is widely used in research studies to study the prevalence and characteristics of neuropsychiatric symptoms, explore potential risk factors, and evaluate the impact of various interventions.

Studies have reported good inter-rater reliability for the NPI, it has demonstrated stability over time, and it was developed with input from experts in the field, ensuring that it includes a comprehensive range of neuropsychiatric symptoms commonly seen in dementia. Content validity is further supported by the inclusion of items covering a broad spectrum of behaviors.

The NPI has shown good concurrent validity by correlating with other established measures of neuropsychiatric symptoms, providing evidence that it measures the intended constructs accurately. It is also sensitive to the detection of various neuropsychiatric symptoms in individuals with dementia and it has been reported to have good specificity in distinguishing between different symptom clusters.

Geriatric Depression Scale Short Form - GDS-SF (Yesavage et al., 1982).

The Geriatric Depression Scale - Short Form (GDS-SF) is a condensed version of the original Geriatric Depression Scale (GDS), designed to efficiently screen for depressive symptoms in older adults. It is particularly useful in settings where a quick and straightforward assessment of depression is needed.

The GDS-SF is used to assess the presence and severity of depressive symptoms in older adults and it provides a rapid screening method to identify individuals who may be experiencing depressive symptoms. The GDS-SF consists of a short set of yes-or-no questions. Specifically, it includes 15 items, and respondents are asked to answer "yes" or "no" based on their experiences and feelings. Of the 15 items, 10 indicated the presence of depression when answered positively, while the rest (question numbers 1, 5, 7, 11, 13) indicated depression when answered negatively. Scores of 0-4 are considered normal, depending on age, education, and complaints; 5-8 indicate mild depression; 9-11 indicate moderate depression; and 12-15 indicate severe depression. These items are carefully selected to capture key depressive symptoms commonly seen in older adults.

The GDS-SF has demonstrated good internal consistency, indicating that the items on the scale are correlated with each other. This suggests that the scale is measuring a single underlying construct consistently. The scale has shown also good stability over time and it has been found to correlate well with other established measures of depression, providing evidence for its concurrent validity. The GDS-SF has demonstrated good sensitivity and specificity in detecting depression in older adults.

Cornell Scale for Depression in Dementia – CSDD (Alexopoulos et al., 1988)

The Cornell Scale for Depression in Dementia (CSDD) is a specially designed scale for assessing depressive symptoms in dementia patients. It employs a standardized set of items that are gathered through an interview with someone who knows the patient (a family member or caregiver) and a semi-structured interview with the patient. It is an observational tool, eliminating the need for direct responses from the patient to standardized questions.

The CSDD consists of 19 items that encompass a range of domains, including mood, behavior, physical symptoms, and other depressive indicators.

The responses are scored on a scale from 0 to 2 (a = unable to evaluate, 0=absent, 1=mild or intermittent, 2=severe). A higher score indicates a greater presence of depressive symptoms (a score >10 probably major depressive episode; a score >18 definite major depressive episode). The total score is obtained by summing the scores of all individual items. It is one of the few scales validated for populations of dementia patients, including those with moderate to severe dementia (Ballard et al., 1997).

In dementia populations, a score above 9 on the CSDD identifies individuals with depressive syndrome.

Geriatric Anxiety Scale - GAS (Segal et al., 2010)

The Geriatric Anxiety Scale (GAS) is a comprehensive self-report tool designed to evaluate and measure anxiety symptoms in older adults. This assessment tool is tailored to capture the unique anxiety-related concerns and experiences those older individuals may encounter. The GAS comprises 30 items, with each item evaluating the frequency of experiencing specific anxiety-related symptoms over the past week. Respondents rate their experiences on a 4-point Likert scale, ranging from "Not at all" (0) to "All the time" (3). The items included in the scale were derived from the DSM-IV-TR criteria for anxiety disorders.

The scale provides not only a total anxiety score but also three subscale scores, which help identify the specific domains of anxiety symptoms:

1. Somatic Symptoms: These items assess physical symptoms associated with anxiety, such as muscle tension or restlessness.
2. Cognitive Symptoms: This subscale explores cognitive aspects of anxiety, including excessive worry or fear of losing control.
3. Affective Symptoms: These items pertain to emotional experiences related to anxiety, such as feeling tense or irritable.

The GAS total score includes the first 25 items and ranges between 0 and 75, with higher scores indicating a greater presence of anxiety symptoms. Additionally, the scale give an extra set of five content items that assess specific concerns often reported by older adults, such as worries about finances, health, children, fear of dying, and fear of becoming a burden to others. However, it's important to note that these content items are primarily used for clinical purposes and do not contribute to the total score calculation.

Interpretation of GAS scores is facilitated by normative and interpretive guidelines. The subscale scores and total score can help clinicians assess the type and severity of anxiety symptoms in older adults, guiding appropriate interventions or treatments.

As with any self-report scale, the accuracy of responses may be influenced by factors such as cognitive impairment or the individual's willingness to report symptoms accurately. Clinicians should consider these factors when interpreting results.

A specialized version of the Geriatric Anxiety Scale, known as the GAS-LTC (Long-Term Care), has been developed to cater to the unique context of long-term care settings. The GAS-LTC consists of 10 items and employs a simplified yes/no response format. This modified measure has been designed to facilitate assessment in LTC environments and is open for further examination and validation (Pifer & Segal, 2020).

During the validation process of the GAS-LTC among a sample of LTC residents ($N = 66$), noteworthy findings were observed. The GAS-LTC demonstrated favorable internal consistency of its scale scores, with a calculated coefficient alpha (α) of .80. Moreover, the measure exhibited sound convergent validity when compared to other established assessment tools. Notably, the GAS-LTC displayed a strong positive correlation with the Geriatric Anxiety Inventory (GAI), with a correlation coefficient (r) of .70 at a significance level of $p < .01$. Similarly, the GAS-LTC demonstrated good alignment with the Geriatric Depression Scale-15 (GDS-15), where the correlation coefficient was found to be .67 ($p < .01$). Additionally, the Prospective and Retrospective Memory Questionnaire exhibited a positive correlation with the GAS-LTC, with a correlation coefficient of .54 ($p < .01$).

Interestingly, the internal consistency of the GAS-LTC was found to be consistent across different subgroups. Specifically, there was no significant variation in internal consistency between groups with high self-reported subjective memory impairment ($\alpha = .75$) and those with low self-reported subjective memory impairment ($\alpha = .77$). These findings suggest that the GAS-LTC maintains its robustness and consistency across varying levels of self-reported memory impairment.major neurocognitive disorder and depression.

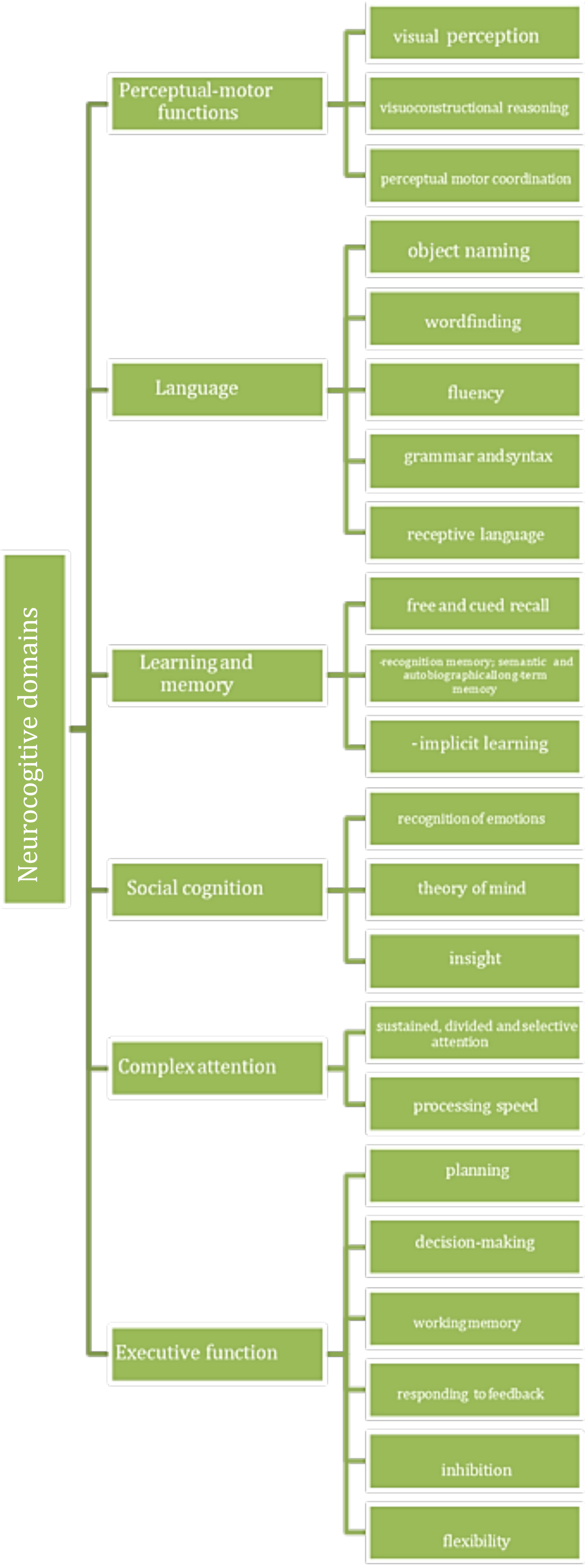
Neurocognitive disorders

The Diagnostic and Statistical Manual for Mental Disorders, fifth edition (DSM-5; APA, 2013) introduced the term *neurocognitive* disorders to refer to the disrupted neural substrates leading to symptoms. The disorders of the neurocognitive cluster are *acquired* deficits, which represent a change or a decline from a previously achieved level of functioning: They are not present from birth or early life (Sachdev et al., 2014). When referring to neurocognitive disorders, it is important to identify cognitive domains that may be affected by the impairment. Several attempts at classification of cognitive domains have been made with the result of a lack of consensus among researchers (Lezak et al., 2004; Mesulam, 2000). For classification purposes, the Neurocognitive working group has identified six main domains: complex attention, executive function, learning and memory, language, perceptual–motor function, and social cognition (Sachdev et al., 2014). Each domain has subdomains (Figure 1.1).

The new domain of social cognition in DSM 5 is particularly interesting (Samtani et al., 2022, 2023), as it recognizes the role of neurocognitive disorders for the manifestation of inappropriate social behavior (e.g., in terms of sexual behavior, conversational topics, hygiene etc.), that are typically found in older age. This sphere includes behaviors that can manifest with a decrease in inhibition skills, with a deficit in the recognition of social signals, in reading facial expressions, in the ability to express empathy or motivate oneself (Duclos et al., 2018).

The neurocognitive disorders cluster includes three syndromes (Sachdev et al., 2014): Delirium, Major Neurocognitive Disorder (usually knows as Dementia), and Mild Neurocognitive Disorder (mild cognitive impairment -MCI). The three syndromes can have different etiologies, that we will consider in detail in the following paragraphs.

Figure 1.1. Cognitive domains and its subtypes



Delirium

Delirium is characterized by deficits in directing, supporting and shifting the attentional focus, as well as by an alteration of awareness both towards oneself and towards the surrounding environment (DSM 5, 2013). This last symptom develops over a short time, usually a few hours or days, varying in severity throughout the day with a tendency to worsen in the evening. Delirium may be caused by an underlying medical condition, substance intoxication or substance withdrawal, or exposure to a toxin, or is due to multiple etiologies. Delirium can manifest itself in three different ways: hyperactive, hypoactive or a mix of the two.

The prevalence of delirium varies considerably by setting: the overall prevalence was 23% in a medical setting (Gibb et al., 2020), 35% in palliative care (Hosie et al., 2013), 1–2% in the community, and up to 70% in a long-term care setting (De Lange et al., 2013). The elderly population presents various risk factors such as functional impairment, cognitive decline, dementia, comorbidities, and polypharmacotherapy, which influence the development of delirium, increasing the risk of negative outcomes and the emotional distress of older people and healthcare providers (Komici et al., 2022). Delirium is a condition that has been established as having a detrimental impact on the outlook of individuals facing acute illnesses. A comprehensive meta-analysis exploring the connection between delirium and various outcomes, such as mortality, institutionalization, and dementia, was conducted among hospitalized or post-acute care patients aged 65 years or older. The findings from this analysis indicated that delirium serves as an independent predictor of unfavorable outcomes (Witlox et al., 2010). In addition to these clinical repercussions, delirium also has significant emotional consequences for healthcare providers and caregivers. Notably, one study revealed that nurses dealing with individuals suffering from delirium reported experiencing a substantial subjective burden, with the hyperactive/hyperalert subtype presenting the most significant challenges (Mc Donnell & Timmins, 2012). It is worth noting that the aforementioned studies generally did not center on individuals residing in nursing homes, and there remains a dearth of knowledge regarding delirium in such a specific care setting. In long-term care settings, delirium tends to be underdiagnosed and undermeasured due to the lack of training of operators on the topic as well as the lack of useful tools for its identification (Komici et al., 2022). Age, dementia, the use of physical restraints, and falls are prevalent and notable risk factors in nursing home environments. It's important to notice that not all studies conducted in nursing home residents (NHRs) have consistently identified age as a significant risk factor. Nevertheless, a substantial portion of project conducted in nursing homes has focused on populations of advanced age, which typically exhibit a more uniform age distribution when compared to other settings (Komici et al., 2022). Recognition of delirium may be difficult when it coexists with dementia because of the overlapping of clinical characteristics such as hypoactivity and fluctuations of symptoms. Dementia is mainly characterized by memory deficits and characteristics of delirium such as alternation of attention, language, motor function, and sleep/awake cycle may also be present in dementia. However, these alternations in dementia without delirium are less accentuated and are characterized by an insidious and progressive onset (Downing et al., 2013; Fong et al., 2015). Noteworthy is the fact that both ICD-10 and DSM-V do not provide specific indications when dementia coexists.

Mild and Major Neurocognitive disorders

The diagnosis of mild neurocognitive disorder is characterized by the presence of alterations in one or more of the cognitive domains, reported by the person himself or by a family member, which represent a change with respect to a previous functioning and emerge from the clinical and neuropsychological assessment. The alterations are not such as to determine an impairment in the performance of daily life activities unlike the major neurocognitive disorder (or dementia) where the person affected depends partially or totally on the other in everyday life (Table 1.1).

Table 1.1. Comparison between the main features of Mild and Major Neurocognitive Disorders

Major Neurocognitive disorder (dementia)	**Mild Neurocognitive disorder (MCI)**
Significant cognitive decline in one or more domains based on what was reported by the patient or family member or on what was observed by the clinician; substantial Impairment that emerges from neuropsychological assessment	Modest cognitive decline in one or more domains based on perception of mild decline described by patient or family caregiver or observed by clinician; modest impairment that emerges from Neuropsychological assessment.
The deficits are such that they interfere with the ability to perform in everyday tasks.	The deficits do not interfere with the ability to perform in everyday tasks
The disorder does not emerges exclusively during delirium and it's not better explained by another mental condition	The disorder does not emerges exclusively during delirium and it's not better explained by another mental condition

Alongside the cognitive alterations, it is essential to consider the behavioral aspects, the so-called behavioral and psychological symptoms of dementia (BPSD), as they represent a challenge in the home management of the person with dementia causing emotional stress on the family caregivers and therefore representing one of the first causes of institutionalization (Molteni et al., 2022). BPSD include hallucinations, delusions, irritability, agitation, depression, apathy, sleep disorders, eating disorders, motor behavior, disinhibition, anxiety, and euphoria. In a systematic review by Selbæk and colleagues

(2013), the presence of at least one BPSD emerges in 82% of the older adults in nursing homes with a prevalence of agitation and apathy. For a long time, most scientific studies have tended to view behavioral disturbances as separate, isolated behaviors, that for this reason could be eliminated through targeted interventions aimed at those specific behaviors (Laks & Engelhardt, 2008). However, today we understand that the behavioral symptoms of dementia are intertwined. They manifest in sequences, have a structure, and repeat over time. This realization has led formal caregivers to seek a deeper understanding of the meaning behind these disrupted actions and behaviors (van der Linde et al., 2016; Vaccaro et al., 2020).

It's important to notice that this shift in perspective highlights the need to approach BPSD with a more holistic and person-centered view (Warren, 2022). Understanding the underlying causes, triggers, and potential meanings behind these behaviors can lead to more effective and compassionate care for individuals living with dementia (Vaccaro et al., 2020; Molteni et al., 2022). To understand the problematic behaviors associated with dementia, as with human behaviors in general, we must assess what causes them, how they manifest, and what purpose they serve (Warren, 2022). From a biomedical perspective, we know that some behavioral expressions of dementia are linked to neurochemical and neuropathological changes. For instance, aggressive behavior is associated with amygdala atrophy (Poulin et al., 2011), aberrant motor behavior and anxiety with subcortical white matter hyperintensity (Berlow et al., 2010). Nowadays, we recognize that there are distinct cognitive- behavioral profiles in various etiologies, meaning different cognitive and behavioral difficulties commonly occur in specific types of dementia. For example, in Alzheimer's disease, memory problems are evident from the onset, along with some verbal communication uncertainties that become more pronounced, while the ability to solve complex problems and perform routine activities remains initially intact, especially when provided with clear instructions (such as in food preparation) (Jahn, 2013). Behaviorally, we often observe delusions, i.e., false beliefs resulting from cognitive deficits (e.g., refusing to wash, believing it has already been done) (El Haj et al., 2017). In vascular dementia, on the other hand, individuals typically retain discrete memory capacities, especially when provided with external prompts, but may appear confused when faced with complex problem-solving tasks (like sequencing the steps of food preparation). Behaviorally, there is a tendency to make inappropriate or tactless remarks due to difficulties in self-monitoring and controlling one's behavior (Cipriani et al., 2020).

Scientific literature has revealed that the behavioral disturbances associated with dementia follow different trajectories throughout the course of the disease. For instance, hallucinations and delusions tend to resolve over time, while apathy can be widespread at all stages of the disease and tends to persist (van der Linde et al., 2016). While these findings don't fully explain the behavioral manifestations of dementia, it is helpful for the caregiving team to know, record, and share this information, both internally and with family members, to manage expectations and better identify intervention goals. This perspective needs to be integrated into a broader view that considers the individual as a whole. Psycho-behavioral manifestations can be seen as expressions of unmet needs of a person with dementia, who is unable to communicate due to the disease (Zimmerman et al., 2014). For humans, every behavior has meaning; it is a form of communication. Similarly, the inability of a person with dementia to express or verbally communicate pain, loneliness, or boredom can lead to frustration and agitation, often communicated through body language, gestures, actions, and behaviors (Pezzati et al., 2020).

The experience of illness for individuals with dementia becomes even more complex when we consider that distressing behaviors can arise when external (e.g., overcrowding, loud noises, demands) and internal (pain, hunger) stimuli exceed the person's stress tolerance threshold (Cerejeira et al., 2012). Care management strategies must, therefore, focus on identifying and understanding which environments, situations, factors, or individuals intensify individual stress and keeping these factors under control, intervening before they cause discomfort to the person with dementia (Woods & Buckwalter, 2018).

Another dimension to consider is the importance of leisure interests and activities. Both mental and physical activity are fundamental human needs. Unfortunately, individuals with dementia have a low participation rate in activities because they often lack the physical and cognitive capacity to initiate engagement (Cerejeira et al., 2012). The resulting boredom and isolation lead to many of the behavioral symptoms associated with dementia. Therefore, the first step is to get to know the individual, identifying their leisure interests, abilities, and limitations. The level of awareness of the illness in individuals with dementia, not only in the early and moderate stages but throughout the course of the disease, is a crucial factor as it influences motivation and the desire to live while maintaining a sense of continuity with the past. Awareness is thus a key element to assess for a proper identification of needs (Cerejeira et al., 2012).

To provide personalized care, professional caregivers must assess the person's cognitive and functional resources, as well as the physical limitations that determine their ability levels. Based on these assessments, professional caregivers can tailor both care-related actions and interventions to meet the person's needs, implementing them appropriately considering their abilities (Rubenstein, 2015). The goal is to engage the individual in an activity that provides challenges corresponding to their level of ability. To do this, the outcomes of the activity itself should also be evaluated (Kolanowski et al., 2009)

Major neurocognitive disorders have an impact on the quality of life of the person who suffers from it, on their families, on the healthcare system and on the economy. The consequences can include, for example, hospitalizations, access to nursing homes, death (Hugo & Ganguli, 2014b), functional and cognitive alteration with preserved motor skills with higher fall risk (Beauchet et al., 2019; Rolland, 2017). Family caregivers often experience emotional exhaustion, depression and various feelings related to the possible choice of institutionalization (e.g. shame, guilt, failure, helplessness). The prevalence of dementia is increasing over time (Auer et al., 2018; Matthews et al., 2013) and in Italy it is characterized by higher clinical severity compared to other European countries (Honinx et al., 2019). The incidence of dementia increases steadily until age 85 or 90, and then continues to increase but less rapidly. It is similar in men and women although it appears slightly more frequently in women. Age-specific incidence rates range from 0.1% at age 60-64 to 8.6% at age 95 (Hugo & Ganguli, 2014b).

Considering the clinical characteristics of the disease and the prevalence data, long-term care settings need to develop around a care model that takes various aspects into consideration (Gaugler et al., 2014):

- the concept of optimal care that places the person at the center of the care process and supports quality of life;
- the presence of professional caregivers adequately trained and placed in the departments, able to pay attention to the technical aspects of care and relational methods;

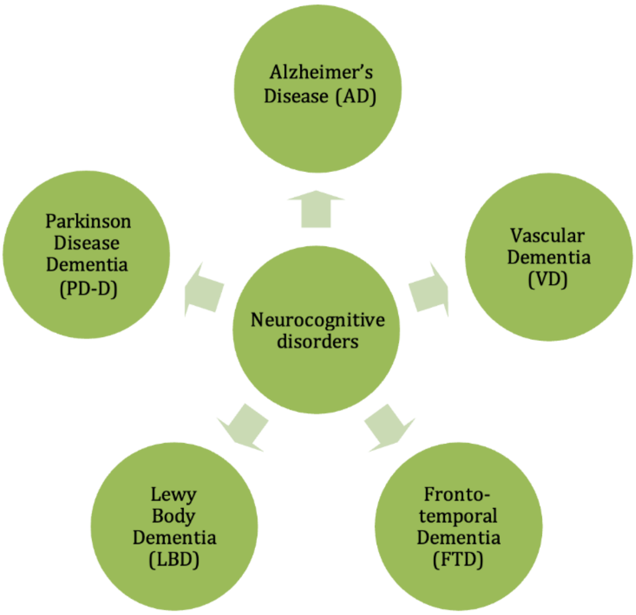
- the use of validated evaluation scales that allow precise and flexible assessment;
- sharing the treatment plan with the family through the evaluation of residual abilities and not just present deficits;
- appropriate management of psychological and behavioral symptoms that may occur and constitute an element of stress for the person and caregivers first of all through a non-pharmacological approach that considers the role of the physical environment and relationship, pleasure, interests and characteristics of the person in order to promote the construction of personalized intervention.

Etiology of neurocognitive disorders

The etiology of neurocognitive disorders is complex and multifactorial. These disorders are characterized by a decline in cognitive function, including memory, reasoning, language, and problem-solving skills (Jones, 2021). There are several different types of neurocognitive disorders, the most common are Alzheimer's Disease, Vascular Dementia, Frontotemporal Dementia, Lewy Body Dementia and Parkinson's Disease Dementia (Emmady et al., 2022).

In the following paragraphs we provide an overview of possible etiology of dementia (see Fig.1.2 for an overview), with the aim of emphasizing the importance of accurate differential diagnosis in elderly individuals in general, and particularly in those living in institutional settings. Precise diagnosis for nursing home residents is crucial for the healthcare team to understanding and manage the disease, offering the possibility to correctly interpret a symptom as a consequence of neurodegeneration of the neural substrate involved and its manifestation as an expression of the individual's subjectivity within the specific environmental and relational context in which they are placed (Wilkins et al., 2005).

Figure 1.2. Etiology of dementia



Alzheimer’s Disease (AD)

Alzheimer's disease (AD) is the most prevalent form of dementia (Ravaglia et al., 2005), accounting for approximately 70% of diagnosed cases. It is characterized by an insidious onset of cognitive decline in the absence of specific neurological findings (Reitz & Mayeux, 2014). In the early stages, both neurological examination and instrumental investigations are typically unremarkable, occasionally revealing nonspecific signs of diffuse atrophy. The predominant clinical manifestation is of a cognitive nature. AD follows a chronic and progressive course, leading to deteriorating cognitive function over time (Reitz & Mayeux, 2014). The natural course of the disease varies from person to person, reflecting the individuality of each patient. In the majority of cases, the initial presentation features deficits in anterograde memory, which may initially progress rapidly but tend to decelerate and stabilize the clinical picture, with a subsequent re-acceleration in the late stages of the disease (Joubert et al., 2016).

Depending on the mode of onset, AD can be classified into typical AD with memory alternations as a primary feature and atypical forms characterized by early language disturbances, dysexecutive syndrome, visuospatial deficits, or visuoperceptual impairments (Graff-Radford et al., 2021).

The natural evolution of Alzheimer's disease (AD) is related to the progression of anatomopathological changes involving different brain regions. Initially, changes are observed in the structures of the hippocampus, which play a crucial role in memory processes (Smith, 2002). These alterations contribute to the early symptoms of the disease, which often manifest as memory deficits. As the disease progresses, the alterations extend to the posterior brain regions responsible for instrumental functions such as spatial orientation and visual perception. These changes can lead to visuospatial disturbances and a reduction in the ability to perform daily activities. In the later stages of AD, the anterior brain regions, involved in executive and control functions, are affected. These alterations can manifest as difficulties in planning, organizing, and maintaining appropriate behaviors (Breijyeh & Karaman, 2020; Smith, 2002).

In summary, the progression of Alzheimer's disease is associated with the evolution of pathological changes in various brain regions, starting with those crucial for memory and extending to areas responsible for instrumental and executive functions. This pattern reflects the correlation between anatomical pathology and the clinical symptoms of AD.

We can differentiate between late-onset Alzheimer's disease (LOAD) and early-onset Alzheimer's disease (EOAD). The former is characterized by onset after the age of 65, while the latter manifests before that age threshold. EOAD differs from LOAD in clinical, diagnostic, therapeutic aspects, and the consequences on the psychosocial functioning of the affected individual. Despite limited epidemiological studies on early-onset forms, they are not as rare as one might think, affecting approximately 5% of all AD cases (Reitz et al., 2020).

Vascular Dementia (VD)

When we talk about cognitive deficits due to cerebral vascular lesions, it is possible to identify a spectrum of disorders that fall under the category of Vascular Cognitive Impairment (VCI; Bowler, 2002; van der Flier et al., 2018). This spectrum varies, ranging from Vascular Mild Cognitive Impairment to Vascular Dementia. Vascular Dementia (VaD) is caused by ischemic or hemorrhagic lesions, single or multiple, whose presence is confirmed through neuroradiological examinations. The challenge in these cases lies in identifying the causal relationship between vascular lesion and cognitive deficits, as sometimes such disorders can be due to a preexisting cortical degenerative disease. (Rockwood et al., 2000; van der Flier et al., 2018)

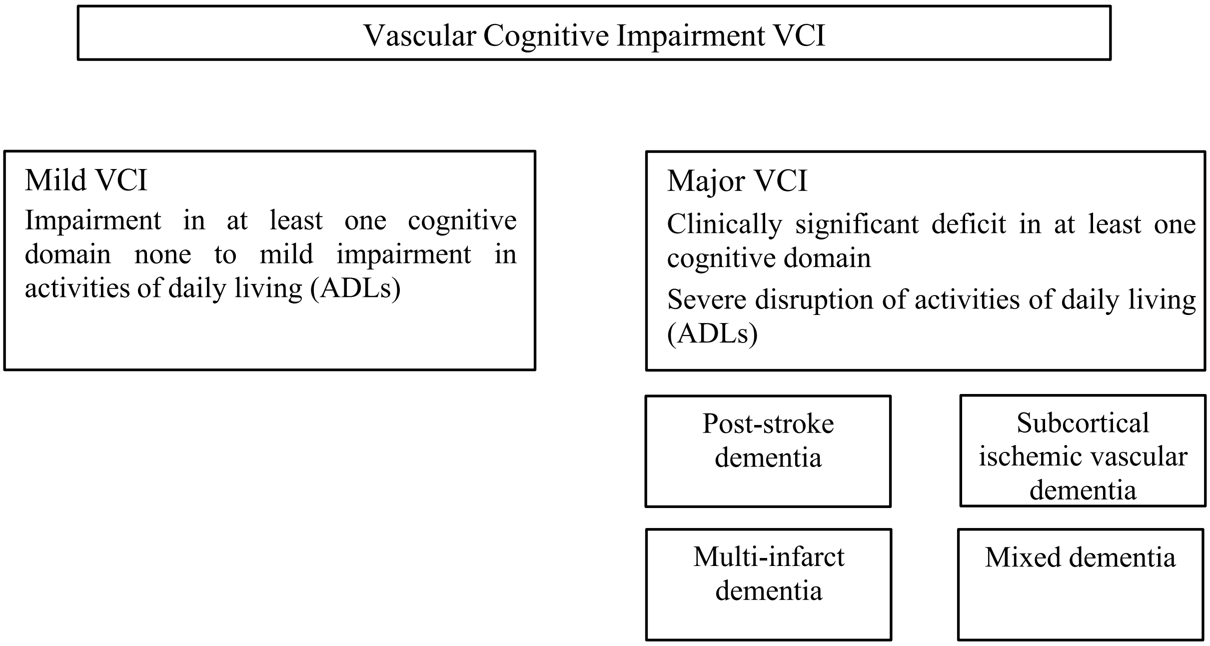
Age, genetic factors, as well as environmental and lifestyle influences collectively contribute to the development of vascular risk factors, subclinical arterial and brain conditions. These factors ultimately give rise to issues with cerebral blood flow (CBF) and disruptions in brain networks, which are characteristic features of Vascular Cognitive Impairment (VCI; Bowler, 2002; Popa-Wagner et al., 2015; Rockwood et al., 2000; Rundek et al., 2022; van der Flier et al., 2018).

Shared genetic and environmental risk factors can potentially hasten the progression of VCI alongside underlying neurodegenerative processes. However, the individual's cognitive and functional reserves, along with their resilience, can counteract this process.

The precise mechanisms through which vascular pathologies contribute to VCI are not yet fully elucidated. While chronic age-related dysregulation of CBF is the most common underlying mechanism in these scenarios, other contributing factors include hypoxia, increased permeability of the blood-brain barrier (BBB), endothelial dysfunction, systemic inflammation, and the inflammatory aging clock (iAge). These factors are often associated with conditions such as multimorbidity, immunosenescence, frailty, and cardiovascular aging, among others, and have been the subject of recent reviews (Zlokovic et al., 2020; Iadecola, 2013). Additionally, vascular pathology, frequently observed in postmortem studies of individuals with clinical Alzheimer's disease (AD), appears to manifest early in the AD continuum, along with biomarker changes (Rundek et al., 2022).

Cognitive decline of a vascular nature can arise from various pathogenetic mechanisms. According to several classifications (e.g., the American Heart Association/American Stroke Association -AHA/ASA, the International Society of Vascular Behavioral and Cognitive Disorders - VasCog Society, and the DSM-5), Vascular Cognitive Impairment (VCI) is defined by the presence of cognitive impairment with a vascular contribution, the extent of which is determined through a comprehensive assessment that includes a thorough medical history, neurological examination, neuroimaging studies, and in-depth neuropsychological evaluation to highlight the patient's cognitive profile (Rundek et al., 2022). More recently, the International Vascular Impairment of Cognition Classification Consensus Study (VICCCS-1 and 2; Skrobot et al., 2017; Skrobot et al., 2018) has worked to consolidate the conceptual framework, to establish a consensus, and to unify diagnostic criteria for mild and major Vascular Cognitive Impairment (VCI) and Vascular Dementia (VaD). In the major VCI category defined in VICCCS-1, four distinct subtypes of VCI have been identified: post-stroke dementia, subcortical ischemic vascular dementia, multi-infarct (cortical) dementia, and mixed dementias (Fig. 1.3). VICCCS-2 delves further into the discussion of neuroimaging markers for VCI, with MRI being recommended as the gold standard for diagnosing VCI (Rundek et al., 2022).

Figure 1.3. Different subtypes of VCI defined in VICCCS-1



Fronto-temporal Dementia (FTD)

Just as with Vascular Cognitive Impairment (VCI) discussed in the previous section, Fronto-temporal Dementias (FTD) are also considered a spectrum disorder, indicating a continuum along which there are diverse clinical manifestations and underlying pathological heterogeneity. The common element in FTD is the degenerative pathology that affects the prefrontal and/or temporal brain regions, albeit differently from what occurs in Alzheimer's Disease (AD).

The initial clinical presentation of FTD can vary significantly because it reflects the predominant site of neuronal damage and the cognitive functions associated with that area, particularly pertaining to behavioral, executive, and linguistic aspects.

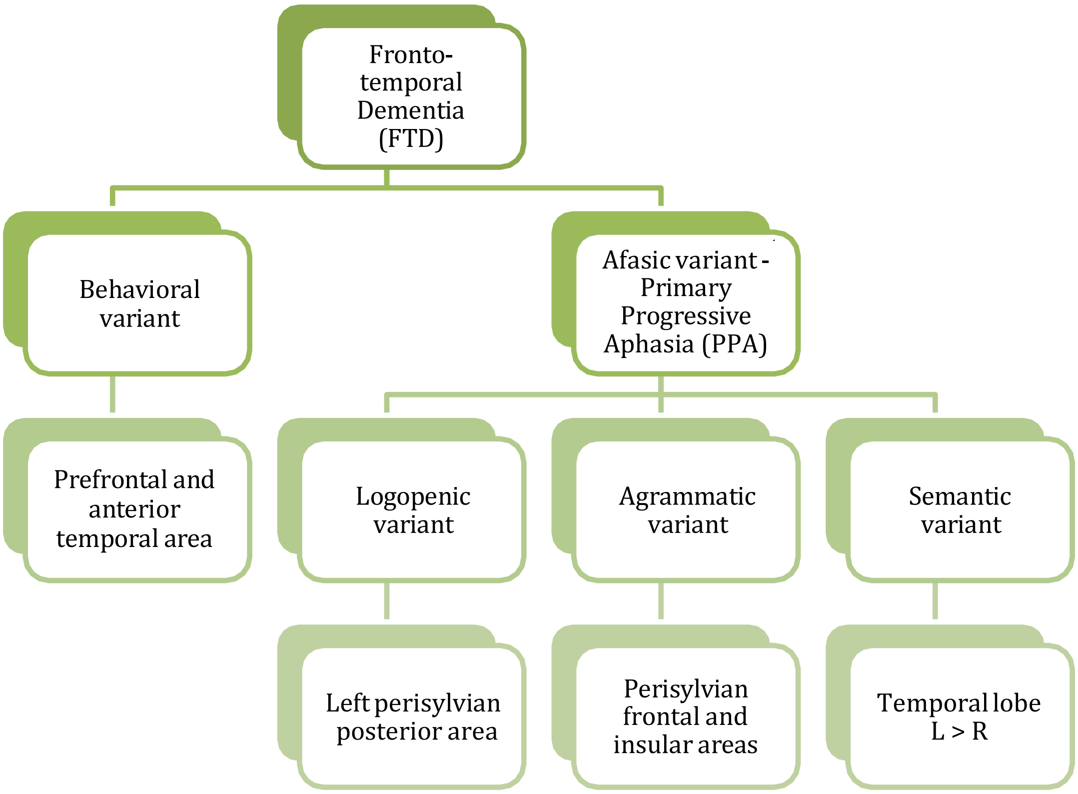
The care burden associated with older adults with FTD primarily revolves around behavioral symptoms, such as aggression, personality changes, addiction, irritability, apathy, lack of empathy, and depression (Diehl-Schmid et al., 2013; Caceres et al., 2016; Koyama et al., 2018). At a social level, these alterations in behavior can result in embarrassment, isolation, and stigma (Diehl-Schmid et al., 2013). According to Rosness and colleagues (Rosness et al., 2008), the primary symptoms linked to a patient's reduced inhibition and personality changes often don't lead to a dementia diagnosis but are more likely to be diagnosed as atypical depression or other psychiatric disorders.

In a review of 19 papers about the challenges faced by caregivers of individuals with FTD emerged that the burden and stress levels were higher compared to caregivers of patients with other types of dementia (Nunnemann et al., 2012). These heightened burdens were largely due to the behavioral disturbances exhibited by their family members. These disturbances could lead to decreased caregiver well-being, depression, and, in turn, neglect of the caregiver's personal needs and social isolation (Nunnemann et al., 2012).

In an interesting study on nursing care for individuals with FTD (Edberg & Edfors, 2008), researchers outlined the challenges related to behavioral disturbances, patients' impaired judgment, and instances of physical and verbal violations. Problems related to memory, orientation, and practical abilities occurred to a lesser extent but tended to become more pronounced as the disease progressed. Another element of challenge in nursing homes residents is the difference between the age of elderly with FTD diagnosis and the others with different causes of dementia: Those with FTD are younger and in a better physical conditions. These characteristics often lead caregivers to hypothesize different needs than the other older residents (Nunnemann et al., 2012).

Interestingly, by focusing on symptomatic characteristics, it is possible to identify two main variants: the Behavioral Variant (bvFTD) and the aphasic variant (i.e., Primary Progressive Aphasias), which encompass the agrammatic and semantic variants. Figure 1.4 summarizes clinical manifestations of FTD variants and their main neural correlates.

Figure 1.4. Clinical manifestations of FTD and its neuronal correlates



Behavioral variant of fronto-temporal dementia (bvFTD)

The behavioral variant of frontotemporal dementia is characterized by alterations in personality, mood disorders, and social behavioral disturbances (Ibañez & Manes, 2012; Pressman & Miller, 2014). It has a very high prevalence rate, with approximately 50% of individuals with FTD presenting with this variant (Johnson et al., 2005), typically beginning between the ages of 50 and 60. Often, the symptoms are not initially recognized as manifestations of the underlying dementia but are perceived by the affected individual or their accompanying family members, as signs of psychological or psychiatric distress. Due to the challenges in making a differential diagnosis, there can be a significant delay in diagnosis, sometimes up to 6 years from the onset of symptoms (Ducharme et al., 2015). Common symptoms include social disinhibition, apathy, loss of empathy, and impulsivity. Individuals with bvFTD often exhibit alterations in eating habits and may engage in repetitive or compulsive behaviors. Executive dysfunction is a prominent feature, leading to difficulties in planning, organization, and decision-making. Unlike some other forms of dementia, language abilities may be relatively preserved in the early stages of bvFTD, but as the disease progresses, individuals may experience language and communication challenges. Neuroimaging studies typically reveal atrophy in the frontal and/or anterior temporal lobes. Accurate diagnosis requires a thorough assessment that considers clinical observations, neuropsychological testing, and neuroimaging findings. It's important to note that the specific diagnostic criteria may vary based on the guidelines utilized, and clinicians often refer to established criteria such as those outlined by international consensus groups for a comprehensive evaluation of bvFTD. It is possible to refer to the study conducted by Rascovsky and collaborators (Rascovsky et al., 2011) in which the diagnostic criteria for bvFTD are identified and proposed.

Primary Progressive Aphasia (PPA)

Primary Progressive Aphasias (PPA) are considered "system" disorders because they result from neurodegenerative brain damage involving neural systems responsible for specific linguistic functions in the dominant hemisphere. They are termed "primary" because the damage to linguistic components primarily affects cerebral areas that are not typically impacted by vascular lesions (Matías-Guiu & García-Ramos, 2013; Tee & Gorno-Tempini, 2019).

PPAs are typically not focal disorders, even though they affect areas primarily involved in language functions. However, when a patient undergoes a battery of neuropsychological assessments, in addition to language function impairment, cognitive deficits of other natures will emerge, supported by neural substrates contiguous to or functionally connected with language areas (Battista et al., 2017; Harris et al., 2019). It's important to consider that the neurodegenerative process, although primarily involving the dominant hemisphere for language functions, tends to bilaterally affect the cerebral hemispheres.

It's interesting to note that the progressive nature of the disease leads to a gradual deterioration of linguistic performance over time, with an attempt at compensating for the deficit through neural plasticity processes. This results in an interaction between the progression of damage and attempts at repair (Thompson et al., 2021). As the disease progresses, cognitive deficits become associated with behavioral disturbances and social conduct issues due to the involvement of the fronto-orbital regions (Neary et al., 1998). Three clinical manifestations of PPA have been identified (Tippett, 2020):

1- the non-fluent/agrammatic variant: it is characterized by hypo-fluent, hesitant speech with frequent pauses, phonetic distortions, and a possible alteration in prosody. Articulatory disturbances are due to impaired planning of movements in the speech articulatory system;

2- the semantic variant: it is characterized by a progressive depletion of the knowledge store, reflecting in the language deficit the impairment of conceptual knowledge. When atrophy predominantly affects the left hemisphere, it manifests with anomia and deficits in semantic-lexical comprehension;

3- the logopenic variant: it is characterized by reduced spontaneous speech with frequent pauses, mainly due to anomia (difficulty in finding the right words). Sentences are often short and simplified, but aspects of syntax and grammar typically remain intact in the absence of articulatory disturbances.

The significance of a language disorder's influence on an individual's psychological well-being should not be understated. As highlighted by O'Connor and colleagues (O’Connor et al., 2014), individuals with PPA encounter numerous limitations in their capacity to carry out everyday activities and access social support due to the language-related challenges they face. For instance, using the telephone is frequently avoided, social gatherings become less enjoyable, and coordinating visits to healthcare professionals becomes increasingly challenging.

Lewy Body Dementia (LBD)

Lewy Body Dementia (LBD) is a complex and progressive neurodegenerative disorder characterized by the abnormal accumulation of alpha-synuclein protein in the brain. These protein accumulations form inclusions called "Lewy bodies" visible in the cytoplasm of glial cells. More frequent in men than in women, with an onset age ranging from 60 to 90 years, the LBD is the second most common cause of dementia after Alzheimer's disease (Walker et al., 2017).

LBD encompasses a blend of cognitive, motor, autonomic, and behavioral characteristics. When these features manifest either individually or in concert, they frequently result in delays in arriving at a precise diagnosis and the administration of medications that may carry the risk of severe adverse effects. LBD can also contribute to a decreased quality of life (QoL), heightened caregiver burden, and distinctive care complexities for patients, caregivers, and healthcare providers, setting it apart from other types of dementia (Zweig & Galvin, 2014). Among the features that define the condition we may find (Oda et al., 2009):

1. Fluctuating Cognition: Individuals with LBD often experience unpredictable changes in cognitive abilities and alertness. These fluctuations can occur over the course of hours or days.
2. Visual Hallucinations: Vivid and recurrent visual hallucinations are a common feature of LBD. These hallucinations often involve seeing people, animals, or objects that aren't present.

3. Parkinsonism: Many LBD patients develop symptoms that resemble Parkinson's disease, such as tremors, stiffness, and slowed movements.
4. REM Sleep Behavior Disorder (RBD): LBD is associated with a loss of muscle atonia during REM sleep, leading to vivid and sometimes violent dream enactment behaviors.
5. Autonomic Dysfunction: LBD can affect the autonomic nervous system, leading to issues like blood pressure drops upon standing (orthostatic hypotension), constipation, and urinary difficulties.

Interestingly, as mentioned above, LBD shares both clinical and neuropathological aspects with Parkinson's disease dementia (PD-D), leading to the belief that they may lie along a continuum of the same underlying pathological process. Both disorders exhibit symmetric parkinsonism, frequent falls, and visual hallucinations; they differ in the timing of cognitive deficits. In LBD, cognitive deficits accompany the onset of the disease, while in PD-D, they typically appear approximately one year after the onset of motor symptoms (Walker et al., 2017).

It’s well known that Quality of life (QOL) among dementia patients have been found to be linked to their inner strength, with those who can complete instrumental activities of daily living (IADL) more likely to report higher QOL levels (Dawson et al., 2013). While there is limited knowledge on QOL in patients with LBD, by exploring this area one study discovered that individuals with LBD had more difficulty self-reporting their QOL compared to Alzheimer's disease (AD) patients with similar cognitive abilities (Boström et al., 207). Caregivers, on the other hand, rated patient QOL lower than what patients reported themselves. However, regardless of whether the assessment was made by the patient or the caregiver, LBD patients consistently scored lower on QOL measures when compared to AD patients. This discrepancy might be partially explained by the higher prevalence of apathy observed in LBD patients (Zweig & Galvin, 2014). Determinants of QOL in LBD older adults included the Neuropsychiatric Inventory (NPI) score, the presence of apathy, delusions, dependency in IADL, and whether the patient resided with a caregiver (Boström et al 2007). Older adults with LBD could experience early misperceptions and could identify family members as someone else. In cases of mixed pathology involving Alzheimer's disease (AD), these misperceptions might develop later in the disease progression (Ferman et al., 2013). Capgras syndrome, a delusion where individuals believe someone resembling a loved one is an imposter, is frequently observed in LBD patients (Thaipisuttikul et al., 2013), and can be profoundly distressing for them and for their caregivers. Those with LBD and Capgras syndrome are also more likely to also experience visual hallucinations and anxiety (Thaipisuttikul et al., 2013).

Interestingly and noteworthy, older adults with LBD may retain more insight into their cognitive deficits as compared to patients with Alzheimer's disease. When patients maintain awareness during hallucinations, they may better comprehend that these hallucinations aren't real, making them less distressing. Furthermore, since episodic memory deficits can be alleviated with cues, patients can employ strategies like appointment books and calendars to assist in remembering important information (Zweig & Galvin, 2014). From a clinical perspective, caregivers often contemplate the option of nursing home placement when they face challenging aspects of care, particularly concerning behavioral symptoms and incontinence. These challenges can be especially worrisome in the context of Lewy body dementia (LBD). Opting for nursing home care is a complex decision for individuals within the LBD community because, in many cases, both patients and caregivers have already encountered a lack of healthcare provider awareness regarding the disease: There is a legitimate concern that patients might receive excessive or inappropriate medication. To address these concerns, it can be beneficial to provide continuous education of nursing homes staff (Zweig & Galvin, 2014).

Parkinson Disease Dementia (PDD)

The term "parkinsonism" is used when an individual exhibits bradykinesia (slowness of movement) and at least two of the following symptoms: resting tremor, postural rigidity, and instability (Goetz et al., 2009). Once the criteria for the presence of parkinsonism are met, it is crucial to determine whether it is caused by Parkinson's disease or an atypical condition. Atypical parkinsonisms are less common conditions than Parkinson's disease and have a different neuropathological basis. While Parkinson's disease primarily involves the loss of dopaminergic neurons in the substantia nigra of the brain, atypical parkinsonism conditions have more complex and varied neuropathological substrates (Stamelou & Hoeglinger, 2013).

Among the atypical conditions, we include (Stamelou & Hoeglinger, 2013):

1- Progressive supranuclear palsy (PSP): PSP is characterized by problems with balance, frequent falls, difficulty in controlling eye movement (resulting in gaze palsy), and cognitive impairment. The hallmark pathological feature is the accumulation of abnormal tau protein in the brain (Williams & Lees, 2009);
2- Cortico-basal degeneration (CBD): CBD presents with asymmetric motor symptoms, including limb stiffness and clumsiness. It can also affect cognition and result in language difficulties. The primary neuropathological feature is the deposition of abnormal tau protein in the brain (Armstrong et al., 2013);
3- Multiple system atrophy (MSA): MSA is a group of disorders that can cause a combination of parkinsonism, cerebellar ataxia, autonomic dysfunction, and more. Unlike Parkinson's disease, MSA primarily affects the autonomic nervous system. It is associated with the buildup of alpha-synuclein protein (Fanciulli & Wenning, 2015).

Parkinson's disease dementia (PD-D) is diagnosed when cognitive deficits are significant enough to interfere with the patient's ability to perform daily activities. The diagnosis of PD-D depends on five criteria (Emre et al., 2007) listed in the following table (Table 1.3) (Vasconcellos & Pereira, 2015).

Table 1.3. Diagnostic criteria for PD-D

Criteria	
A	The patient must meet the criteria for Parkinson's disease
B	Parkinson's disease should precede the dementia
C	Parkinson's disease is associated with a global decline in cognitive abilities
D	The cognitive deficit is significant enough to interfere with daily activities
E	Impairment should involve more than one cognitive domain and have a typical profile for PD-D, including deficits in attention, executive functions, visuo-constructional skills, and memory.

Depression in older adults Late Life Depression

Depression in older adults is a pathological process that can lead to morbidity and death (Pracheth et al., 2012) and it's not a normal reaction to growing older (Evan & Mottram, 2000). Minor and major depression are frequent in nursing homes residents (Abrams et al 1992) often associated with the experience of institutionalization such as loss of autonomies, inactivity and confrontation with death and separation to home. It is important that depression is not considered merely in categorical terms but can be explored along a spectrum of symptoms and severity ranging from the absence of the disorder, to minor or subthreshold depression, to major depression (Evans & Mottram, 2000). The concept of the spectrum of depression has been widely accepted and explored by longitudinal studies which have revealed a movement of patients along the spectrum over time (Angst & Merkangas, 1997).

There are several ways through depression can manifest in older adults: as a recurring disorder in adulthood (Early Onset Depression-EON), as a depression of new onset after 60-65 years old (Late Onset Depression-LOD), as a disorder secondary to a general medical condition, as a disorder secondary to use of substances or medical drugs, as a disorders during the course of dementia.

Approached through a bio-psycho-social perspective, depression in the elderly is affected by a number of factors. Among those of a psychosocial nature, especially in the elderly in a nursing home, we find the level of autonomy, the presence of goals in life and the so-called environmental mastery, that is the ability to choose or change the environmental context using physical or mental actions as well as being able to control events (Davison et al., 2012). All these three aspects allow discrimination between older adults with and without major depression l'80% of time (Davison et al., 2012). From a literature review some personality characteristics such as neuroticism (Lahey, 2009), perceived self-efficacy (Steunberg et al., 2006), obsessive-compulsive traits (Hawton et al., 2009), and attachment style are related to depressive symptoms in later life. In particular, neuroticism predicts an onset of depressive symptoms in late life while obsessive-compulsive traits appear to influence the risk of suicide, probably because they could undermine the older person's ability to cope with the challenges that aging brings. Interestingly, insecure attachment represents a risk factor for the development of a new depression. In a study conducted by Paradiso and colleagues in 2010, it emerged that in the elderly and in the oldest one, regardless of the age of onset of depressive symptoms (both in EOD and LOD), a greater insecure attachment and a poorer social adaptation capacity emerged compared to never depressed controls (Paradiso et al., 2010). Among psychosocial factors the role of behavior and cognition emerges. For what concern the first aspect, the learned helplessness or the expectation according to which desirable events are unlikely as opposed to adverse ones deemed more probable leads to the perception of the futility of acting in the surrounding environment and to feeling helpless (Abramson et al., 1978), seems to bring to depression; for what concern cognition, it is important to emphasize the role of coping strategies: older adults with depressive symptoms tended to use rumination and catastrophizing significantly more and positive reappraisal significantly less than older adults with lower depression test scores (Kraaij et al., 2002). Also stressful life events and their consequences seems to be related to depression, in particular, the death of a spouse, the death of a loved one such as a friend or relative, physical disability and functional decline, the presence of pathologies especially of a cardiac nature, and reduced access to physical and mental health services (Bruce, 2002; Arean et al., 2005). Also medical comorbidities have an impact on depression in elderly, in particular neurological, as cerebrovascular diseases, and cardiac pathologies, as myocardial infarction, ischemic heart disease, diabetes, obesity (Reahn et al., 2013; Alexopoulos, 2003). In fact, it is estimated that 20-25% of elderly people with heart disease have depression or report depressive symptoms; the use of benzodiazepines, steroids, anti-Parkinson agents, and beta-blockers are linked to late life depression (LLD); new onset medical conditions and the persistence of a poor state of health increase the risk of depression in the elderly. According to the DSM it is not possible to diagnose major depression when the symptoms are the direct result of a general medical condition. This may be reflected in the tendency to over- or underdiagnose depression when are present pathologies whose signs or symptoms may mimic those of a depressive picture. An example is provided by tumor diseases, where there is weight loss, anhedonia, decreased appetite and sleep disturbances.

Among biological factors, Alexopoulos and colleagues (Alexopoulos et al., 1997) have stressed the role of vascular pathologies in the onset of the so-called vascular depression characterized by single or multiple lesions affecting the prefrontal systems or their modulation pathways. Older adults with vascular depression show greater psychomotor retardation, less guilt, poor insight and limited depressive symptoms than healthy controls; compared to subjects with non-vascular depression, at the cognitive level emerges a greater general cognitive impairment, a greater deficit in the load of verbal fluency and a greater impairment in the ability to name. Thanks to the contribution of neuroimaging, Rehan and collaborators have identified a smaller volume of the anterior cingulate cortex, orbitofrontal cortex and hippocampus in subjects with depression (Rehan et al., 2013). Interestingly, the age of onset was correlated negatively with the hippocampal volume: subjects with LOD have less volume when compared with EOD and controls without depression.

Depression in Nursing Homes

Depression is a psychiatric disorder common in older adults (Adamek & Slater, 2008; Momeni et al., 2011) and very frequent in those who live in nursing homes (Seitz et al., 2010). In a systematic review, on a total of 26 studies on a prevalence of major depression or depressive symptoms in long term care (LTC), emerges a median prevalence of 10% for the first one, and of 29% for the second one (Seitz et al., 2010). In a meta-analysis of Fornaro and colleagues (Fornaro et al., 2020) the prevalence of depression in 13.394 nursing homes residents was about 18.9%. It is interesting to note that mental disorders in old age do not meet the diagnostic criteria of the DSM 5 as they are poorly suited to capturing the symptomatic manifestations of the elderly (Blay et al., 2007). Furthermore, the use of tests that explore the emotional experience of the elderly person often contain items that refer to home experiences and are poorly suited to capturing the experience in LTCFs. An example could be the Geriatric Depression Scale (GDS) a validated scale to identify depression in the elderly but which presents items such as "do you prefer to stay at home rather than go out?" or "do you think you have more memory problems than most people?" that do not reflect the choices and personal or environmental characteristics of older adults in long term care facilities.

One of the problems related to the non-recognition of depression in older adults (Andreoli et al., 2007) is the delay of pharmacological and psychotherapeutic treatment over time. In other cases, the lack of knowledge of the symptomatologic manifestation of the disease leads to misdiagnosis. In the case of depression, for example, differently from young adults, it can manifest with somatic symptoms, presence of cognitive impairment, lack of expectations with respect to treatment (Davison et al., 2007) and often the stereotypes or expectations associated with the aging process, such as the fact that the elderly are in themselves sad or isolated, or the little exploration by the doctor of the subjective experience of the disease and how it manifests itself in the somatic component, do not allow adequate care of the person.

Depression represents a risk factor for admission in nursing homes (Harris, 2007) and this association increase with severity of the disease (Onder et al., 2007). In a systematic review of longitudinal study, researchers have identified 20 risk factors for depression in older adults in nursing homes, each of them emerging only one time without replication in the other studies considered (Chau et al., 2018; 2019). Interestingly, most of the factors were not editable through clinical or psychotherapeutic interventions such as cognitive deterioration. Studies on editable risk factors for depression in nursing homes indicate pain (Erdal et al., 2017; McCusker et al., 2014), sleep disturbances, in particular insomnia (Livingston et al., 1993; Yu et al., 2016), marital status, social support (Jongenelis et al., 2004), and the individual relationship with the long term care environment as significant aspects to intervene on in order to decrease levels of depression in institutionalized elderly people.

Late Life Depression (LLD) and major cognitive disorder (Dementia)

The relation between LLD and dementia is complex and when these two identities show up together it can be difficult to differentiate and to understand the relationship between them because they have some common features such as attention and working memory impairments, sleep disturbances, less social abilities and less occupational activities (Kobayashi & Kato, 2011). There are several ways in which LLD and dementia can be associated: depressive symptoms during the course of dementia (Behavioral and Psychological Symptoms of Dementia - BPSD); depressive symptoms as reaction to first cognitive deficit; alterations of cognitive functions as a consequence of depressive symptoms (pseudodementia). One aspect that has aroused much interest and debate in the scientific field concerns the consideration of LLD as a risk factor or as a prodromal symptom for dementia (Sinclair et al., 2023). Interestingly, the age of onset of the first depressive episode and the recurrence over time it's associated with the exposure to depression itself and may lead to a greater risk of dementia than a single depressive episode (Kessing et al., 2004). From the literature it emerges that, on average, the percentage of dementia increases by 13% for each symptomatic manifestation that leads to admission to a hospital ward for depression (Kessing et al., 2004).

One potential way to reduce the complexity in differentiating the different manifestations of late life depression (LLD) and their relationship to dementia is to make a phenotypic distinction between early and late onset depression (EOD vs LOD) (Brodaty et al., 2001). In the first one there is a genetic predisposition coupled with adverse life events leading, over time, to cognitive impairment as a consequence of hippocampal atrophy and decreased brain reserve; in the last one there is an accumulation of vascular load and the presence of other age-related disease processes, in the absence of a family history of depression. Cognitive impairment would therefore be determined by vascular and neurodegenerative risk factors (Ballmaier et al., 2008).

In a recent 6-years longitudinal study by Allen and colleagues (Allen et al., 2021), it was explored whether the risk of dementia varies according to the age of onset and the clinical course of depression. They concluded that persistent or recurrent depression could be a risk factor rather than a prodromal symptom of dementia while LLD would not be associated with high risk of dementia since the higher incidence of cognitive decline appears to be explained by longitudinal changes in depressive symptoms before onset of dementia rather than baseline depression. In this sense it would represent more a marker for dementia than a risk factor (Allen et al., 2021). Ly and colleagues (Ly et al., 2021) conducted a longitudinal study comparing older people with LLD and controls who never had depression (NDC) to investigate the trajectory of cognitive decline and explore any differences in domain-specific expressions of cognitive decline between EOD and LOD. What emerged is that LLDs do not decline faster than NDCs but the former show greater cognitive impairment at baseline which could explain the association between LLD and dementia. Regarding the phenotypic manifestations of LLD, EOD and LOD have different trajectories over time probably due to a difference in neural substrates involved, where depression is the common symptom (Ly et al., 2021).

Depressive symptoms during the course of dementia

Behavioral and psychological symptoms of dementia (BPSD) are very common manifestations among people with dementia, present in over 90% of the elderly during the course of the disease (Tariot et al., 1995; Aalten et al., 2005). These include affective symptoms such as depression, anxiety, euphoria and irritability, psychotic symptoms such as delusions and hallucinations, conduct disorders such as disinhibition, sleep disturbances and appetite and eating disorders, and specific behavior such as aberrant motor behavior, agitation/aggressivity (Finkel & Burns, 2000). BPSD represents a risk factor for admission in nursing homes (Liken et al., 2001; Gaugler at al., 2009), worse prognosis, drug prescription, medical intervention, increased disability, caregiver stress, decreased quality of life of the elderly and caregiver, increased economic costs of the disease (Finkel & Burns, 2000). Several factors which need to be considered for understanding the etiology of such behavioral manifestations, including the direct impact of dementia at neurochemical and neuropathological level; the presence of unmet needs due to reduced capacity to communicate pain, needs, desires; the difficulty of understanding the needs and requirements of family and professional caregivers; the effect of drugs; the presence of environmental factors of hyperstimulation (such as noise, stress, light, sound) and hypostimulation (Finkel & Burns, 2000).

Depression is one of the most common BPSD, it can manifest in every stage of dementia (Alexopoulos et al., 1988; Doody et al., 2001; Lyketsos & Olin, 2002) without association between dementia severity and the prevalence of depressive symptoms (Verkaik et al., 2007). Prado-Jean and colleagues (Prado-Jean et al., 2010) explored psychological and behavioral symptoms characterizing depression in dementia in nursing home residents. They found that about half of the subjects were depressed and three quarters showed BPSD. It's known that depression can manifest during the course of dementia or it can be present earlier, for example with onset during the course of adulthood. In the previous paragraphs we have discussed the topic of the age of onset of depressive symptoms and the possible relationship with dementia. With respect to the presence of BPSD during dementia, the literature shows that in elderly people with depressive status, they tend to be more frequent, without differences in gender and age (Prado-Jean et al., 2010).

Interestingly from a clinical and intervention point of view, depression in patients with dementia were significantly associated with other BPSD, such as disinhibition, agitation, irritability and anxiety. It’s possible to conclude that before approaching BPSD as an isolated symptom, it is important to consider the comorbidity with depression, with the aim of optimizing the therapeutic approach (Prado-Jean et al., 2010), hence confirming the centrality of depression among BPSD.

Pseudodementia

The term “*pseudodementia*” refers to a clinical condition characterized by symptoms similar to those of organic dementia, which are thus often associated with difficulties in terms of differential diagnosis with dementia itself, and is considered as the expression of a depressive episode through a purely cognitive modality. Usually, pseudodementia manifests itself as an impairment of higher psychic functions, such as cognitive deficits in terms of memory and attention, ideational slowdown, and emotional flattening A correct differential diagnosis between dementia and pseudodementia is crucial from a prognostic standpoint: In the case of dementia, the disease is progressive and worsening; in the second case, pharmacological and psychotherapeutic treatments allow the symptoms to remit, with a generally better prognosis (Kang et al., 2014).

What makes the diagnosis of pseudodementia particularly difficult is also the absence in the DSM 5 of diagnostic criteria for its classification. However, it is possible to identify some aspects that help the clinician to orientate between these two diagnostic entities (Table 1.4) (Sancesario & Caltagirone, pp. 177-181).

Table 1.4. Differences between Major Neurocognitive Disorder and Pseudodementia

Major Neurocognitive Disorder (Dementia)	***Pseudodementia***
Absent or poor awareness by family caregivers of the disorder and its severity	Awareness by family caregivers of the disorder and its severity
Insidious and aggravating onset	Sudden onset
Slow progression	Rapid progression
The presence of psychiatric disorders prior to the current mood disorder does not emerge from the person's clinical history	The presence of psychiatric disorders prior to the current mood disorder emerges from the person's clinical history
The presence of psychiatric disorders prior to the current mood disorder does not emerge from the person's clinical history	The elderly person is aware of his deficits, underlines his difficulty, focusing on his mistakes
Labile affectivity, uninhibited emotionality. Social abilities are preserve	Impairment of social abilities
Often it emerges a major severity of symptoms during the night	Symptoms remain stable during night
Impaired memory and attention, erratic responses, memory deficits for more recent events while remote ones appear retained	Memory deficits, responses like “I don’t know”, depressed mood, vegetative symptoms, suicidal risk

Conclusion

To sum up, the approach to the complexity of the older adults in nursing homes requires solid theoretical and methodological foundations which can guide and orient the taking care process in a strategic and flexible way, allowing the formulation of hypotheses regarding the way in which the resident is experiencing the situation characterizing that specific moment of his life. This is determined by the interaction between factors of different nature: clinical, such as the different pathological pictures which with different degrees of severity can be co-present in the same person; functional, such as residual capacities, resources and limits linked to praxis, motor and cognitive aspects; psycho- social (or emotional-relational), such as the affections, relationships and motivations that led the elderly person to choose (or refuse) or be accompanied in the decision to be admitted to nursing homes. Around all these aspects, we can find family caregivers, with their emotions that often taking the form of anger, guilt, fear, impotence and frustration, sometimes even relief from a lesser psychological and care load at home, and professional caregivers, with their technical skills that find concreteness in the professional and relational gesture of care. Among the tools that professional caregivers can use to approach the situations there is the multidimensional assessment which, starting from the observation of the problematic situation by means of rating scales and the biographical knowledge of the person, allows the establishment of intervention objectives and indicators of effectiveness.

As addressed in the previous paragraphs, among the situations that can mostly put the care team in difficulty there are those in which the resident shows symptoms of depression or impairment of cognitive abilities and, even more so, when the depression overlaps with major neurocognitive disorder and the presence of behavioral and psychological symptoms of dementia (BPSD). In these symptomatologic and behavioral frameworks, the rating scales are a key tool for improving the knowledge of the person, providing caregivers with the possibility of sharing a common gaze towards the subjectivity of the older adult. In doing this, we have to consider that there are areas of overlap that reflect the interconnections of human functioning, for example cognitive aspects are in relation with the ability of a person to participate in social context. In the same way neuropsychiatric symptoms are relevant for mental health of older adults but also for psychological well-being of family caregiver and other residents that cohabit with them. In this regard, it would be useful to expand the battery of evaluation tools that are usually administered by including specific scales to capture the experience of the elderly in the specific context of the nursing home. An example of this is the QUALITY_VIA scale (Cantarella et al., 2019) specifically defined to evaluate the quality of life of residents in nursing homes.

Beyond these aspects, we must consider the container in which the dimensions described above take shape. The role of organization and bureaucratic features within nursing homes, and in our context in the specific region of Lombardy, plays a critical role in ensuring the effective delivery of care and services to the elderly population. Lombardy, like many other regions, faces the challenge of an aging demographic, and nursing homes are at the forefront of providing long-term care. Managing these facilities requires meticulous planning and allocation of resources to guarantee residents' well-being, including medical care, rehabilitation, and social activities. Bureaucratic procedures such as regulatory compliance, licensing, and documentation are essential for maintaining quality standards and safety. The intricate bureaucratic framework ensures that nursing homes adhere to stringent regulations, thus safeguarding the rights and dignity of the residents and promoting transparency in the provision of care. Consequently, nursing homes in Lombardy must strike a delicate balance between organization and bureaucracy to deliver compassionate and efficient care to their aging population.

The COVID-19 pandemic has brought about significant changes in the organizational aspects of nursing homes in Italy. In response to the unprecedented challenges posed by the virus, nursing homes across the country have had to adapt rapidly. They have implemented stringent infection control protocols, introduced new policies for resident and staff safety, and reconfigured their physical layouts to minimize the risk of transmission. Additionally, the pandemic has accelerated the adoption of telemedicine and digital health solutions, enabling nursing homes to provide remote medical consultations and monitor residents more effectively. The pandemic has underscored the need for improved communication and collaboration with public health agencies, hospitals, and local communities. Nursing homes in Italy have undergone a transformation in their organizational structures to ensure the health and well-being of residents while navigating the ongoing challenges posed by COVID-19. In the following chapter, we present a three-year longitudinal study in which we investigated the impact of the pandemic, considering all the changing that it has imposed in organizational aspects, such as the limitations of the contact with family caregivers or the isolation of positive residents in their bedroom, on their bio-psycho-social functioning through the comparison of the evaluation scale included in the Individualized Care Plan (ICP).

Chapter 2. The Impact of the COVID-19 Pandemic on Nursing Homes

Highlights

- Background about Covid-19 pandemic and its effect on global population.
- Impact of Covid-19 on bio-psycho-social functioning of older adults in two Italian nursing homes.

Abstract

The COVID-19 pandemic was not only a biological challenge, but it also took a toll on the psychological and social well-being of older adults, especially those in nursing homes. This study aims to uncover the impact of the pandemic on the bio-psycho-social well-being of nursing home residents, including the role of COVID-19 positivity and social contacts.

Using a sample of 247 individuals in two Northern-Italian nursing homes over three years (2018-2021), the study analyzed a broad range of bio-psycho-social variables and traced the frequency of social contacts during the lockdown. The results showed a concerning trend of worsening well-being over time during the pandemic, irrespective of COVID-19 positivity. Surprisingly, the frequency of contacts with family caregivers did not seem to have a protective role, and worsening conditions were associated with an increase in subsequent social contacts.

These findings shed light on the dynamics of the bio-psycho-social well-being of institutionalized individuals, and they have significant public health implications. By disentangling the roles of the pandemic period, COVID-19 positivity, and social contacts, this study provides insights into the worsening of neuropsychiatric symptoms, as well as functional and clinical indicators, in nursing home residents.

The Impact of the COVID-19 Pandemic on Nursing Homes

The aging process can lead to physical and psychological changes affecting, for instance, cognitive abilities and social relationships (Andrade et al., 2017). Environmental and personal factors, such as socioeconomic level and health-related issues (Di Ciaula & Portincasa, 2020), however, may significantly affect the wellbeing during aging. Such inter-individual differences can reflect on the older adults' quality of life, in some cases resulting in a progressive decrease in functional autonomy, which in turn represents an important risk factor for institutionalization and mortality (Andrade et al., 2017).

Old age represented a risk factor also for Coronavirus disease 2019 (COVID-19). After the first wave of the pandemic, over 95% of the deaths from this virus in Europe and over 80% in the United States and China have occurred in people aged 60 years or older (Sepúlveda-Loyola et al., 2020). The risk of death increased even more for those residing in nursing homes. The higher rates of comorbidity, disability, and frailty characterizing institutionalized residents (Amblàs-Novellas et al., 2021; Pérez-Rodríguez et al., 2021) have been shown to negatively affect the prognosis of COVID-19 (Hägg et al., 2020; Morley & Vellas, 2020). In particular, comorbidity and autoimmune diseases have been shown to increase the risk of contracting the virus and experiencing adverse consequences, including death (Cortés Zamora et al., 2022; Fallon et al., 2020). To contain the spread of COVID-19, social distancing and hygienic measures have been implemented: people were asked to wear masks, wash hands frequently, and restrict family visits and social interactions in general. However, community life and the need for assistance in daily life activities (e.g., personal cleaning, dressing, etc.) have not always allowed fulfilling social distancing measures (Fitzpatrick et al., 2021). Furthermore, older people with moderate or advanced dementia were less likely to tolerate the use of masks or to collaborate in maintaining social distancing (Canevelli et al., 2020).

COVID-19 represented a challenge for individuals, and in particular for older adults, not only from a biological perspective but also from psychological and social ones (Armitage & Nellums, 2020; Bonanad et al., 2020; Levere et al., 2021; Segerstrom et al., 2023; Trabucchi & de Leo, 2020; Vahia et al., 2020). Whereas social distancing measures have been a way to interfere with the spread of the virus, they exposed older adults to stressful situations of isolation and loneliness (Gardner et al., 2020; Smith et al., 2020). These challenges were even worse for institutionalized older adults, who suffered from the fear of getting sick, being hospitalized, not seeing their family, and being abandoned or dying alone (Goveas & Shear, 2020), not unlike non-institutionalized ones. In addition, however, group activities (e.g., educational initiatives) as well as occasions for assisted physical activity and physical rehabilitation were strongly limited or canceled in institutions (Sepúlveda-Loyola et al., 2020). The lack of such activities had the potential to worsen both the physical and mental health of residents. Among the negative psychological and health consequences of such a situation, studies have shown increasing levels of depressive symptoms (Brooks et al., 2020; Qualter et al., 2013), functional and cognitive decline, and increased mortality (Flatharta & Mulkerrin, 2020; Morley & Vellas, 2020). The COVID-19 pandemic has starkly revealed the uneven territorial distribution of such facilities, with resources being disproportionately concentrated in wealthier regions, a distribution pattern that does not align with the geographical presence of vulnerable populations. These disparities, as well as variations in factors like bed availability (with Lombardy having an average of about 35 beds per facility, a higher concentration than neighboring regions; de Girolamo et al., 2020), had a profound impact on the pandemic's spread and severity and may have contributed to differences in infection impact and mortality rates (see Cepparulo & Giuriato, 2022).

Assessing the bio-psycho-social status of nursing home residents is essential to provide optimal care and promoting the adoption of data-informed policies in nursing homes (Bravetti et al., 2017, 2018; Linn et al., 2011), even more so during pandemic periods. Residents' bio-psycho-social status in nursing homes is thus typically monitored over time using measures of cognitive and motor functionality, clinical risk factors (e.g., body leisure or comorbidities), functional autonomy, mental health, and behavioral status (Bravetti et al., 2018). This study aimed at examining both the short and long-term impacts of the COVID-19 pandemic on the bio-psycho-social functioning of institutionalized people, using data that are routinely collected in nursing homes. In particular, we explored the patterns of stability and change in several bio-psycho-social dimensions before, during, and after the first wave of COVID-19 (March 2020- September 2020) in residents of two Italian nursing homes. We hypothesized that the COVID-19 period would result in an accentuated worsening of most indicators of the residents' bio-psycho-social status (H1). We also examined the role of positivity to COVID-19 in affecting the bio-psycho-social status of older adults. In particular, we expected that COVID-19 positivity would result in a more accentuated bio-psycho-social deterioration of residents, as compared to negative residents (H2). As an additional goal, we examined the effects of the frequency of social contacts (e.g., video calls with relatives and protected in-presence encounters) on the same dimensions. We hypothesized that the frequency of social contacts would result in an improvement in the residents' status (H3).

Materials and methods

Transparency and Openness

The study conclusions are based on data that are not publicly accessible given their highly sensitive nature. The risk of personally identifying residents would not be negligible, because only two nursing homes were involved and because, whereas sharing temporal data would be essential for reproducing our findings, these could be easily used to infer when a person became a resident of the nursing homes and when a person either passed away or left the facility. Once a resident's identity is established, the data would involve deeply sensitive information related to their mental and physical health. Access to the data is thus possible through the corresponding author upon a reasonable request. The analytical code reproducing the analyses is available, and a link to access this information is provided in the Author Note

We have transparently outlined our approach for determining the sample size, any exclusions of data, all manipulations performed, and all measures utilized in the study. However, it is important to note that the study design, hypotheses, and analytical plan were not preregistered: The original purpose of the study was in fact to investigate how general health and bio-psycho-social factors were associated with the experience of depression and anxiety symptoms. After the COVID-19 outbreak, we deviated from the original purpose of the study to examine how the pandemic and the social restrictions affected the variables that we had been monitoring.

Participants

All residents of two nursing homes were invited to take part in the study. One nursing home is a special agency with a capacity of 120 beds, whereas the second one is handled by a private foundation and hosts 60 residents. Two hundred and forty-seven older adults (198 women, 49 men, age at first data collection *M* = 86.5, range = 61.2-102, *SD* = 7.45) volunteered in the study. Since our main interest was in temporal changes of bio-psycho-social status, we considered only residents for which data from at least two-time windows were available. This and agreeing to participate in the study were the only inclusion criteria. The final sample sizes at each time window are reported in Table 1.

The study was run after review and approval from our University's ethics committee (University of Milan-Bicocca, as a part of "Dynamics of anxious-depressive signs in elderly people with dementia living in long-term care facilities" study, protocol number: 0136316/21). Participants with adequate cognitive and language capabilities read the information sheet and gave their written informed consent to participate before study commencement. For participants with cognitive impairment, the informed consent was provided by the family caregiver or by the legal administrator, if appointed. The nature of the consent concerned the possibility of accessing the bio-psycho-social data usually collected every six months in nursing homes and use it with clinical and statistical aims. All participants with adequate cognitive functionality gave consent to participation. For those with cognitive or clinical impairments five family caregivers didn't give consent.

Procedure

In September 2018, the two nursing homes involved started collecting data systematically using an online system (The0 - *www.the0.it*). These data, together with the remote and proximate clinical history and the observations of the nursing home care team, made up the health file called Individualized Care Project (ICP). The ICP was used for monitoring the residents' bio-psycho-social status over time. The time between two ICP windows was approximately six months, unless acute events or hospital relapses occurred, which required an additional completion of the ICP even if six months had not elapsed. From the beginning of the ICP time window, professional caregivers had about one month to complete the evaluation of each resident.

The primary aim of the study was to investigate changes in bio-psycho-social status before, during, and after the first wave of the COVID-19 pandemic. Consistently, we analyzed data collected from September 2018 to September 2021. We defined six-month temporal windows (labeled T1-T6, see Table 1). The choice of six-month windows maximized the possibility to have data available for each participant in each window, being consistent with the renewal of the ICPs scheduled every 6 months. Since the COVID pandemic was declared on March 11th, 2020, we could use changes between T1 and T3 to monitor the pre-pandemic longitudinal evolution of residents (e.g., effects simply due to aging), and changes between T3 and T5 as reflecting in addition the short-term effects of the pandemic period. Notably, the vaccination campaigns for residents and staff commenced in early 2021 (T5).

Despite the official end of the state of emergency in Italy being established on March 31, 2022, we considered T6 as a post-acute phase in which further easing of the restrictions imposed by the pandemic occurred. Albeit during T6 the pandemic was characterized by the rise of the Delta variant of the virus (which was active in December 2021-January 2022 in Northern Italy; see e.g., Rovida et al., 2022), since the beginning of 2021, the municipal areas in which the two participating nursing homes are located showed a marked return to normality in terms of overall mortality (see Figure S2.1). This period was accompanied by a decrease in social restrictions in the facilities: vaccinated family members were allowed to visit their relatives inside or in the appropriate external spaces of the structure, and residents were allowed to leave the structure, if authorized by the treating doctor.

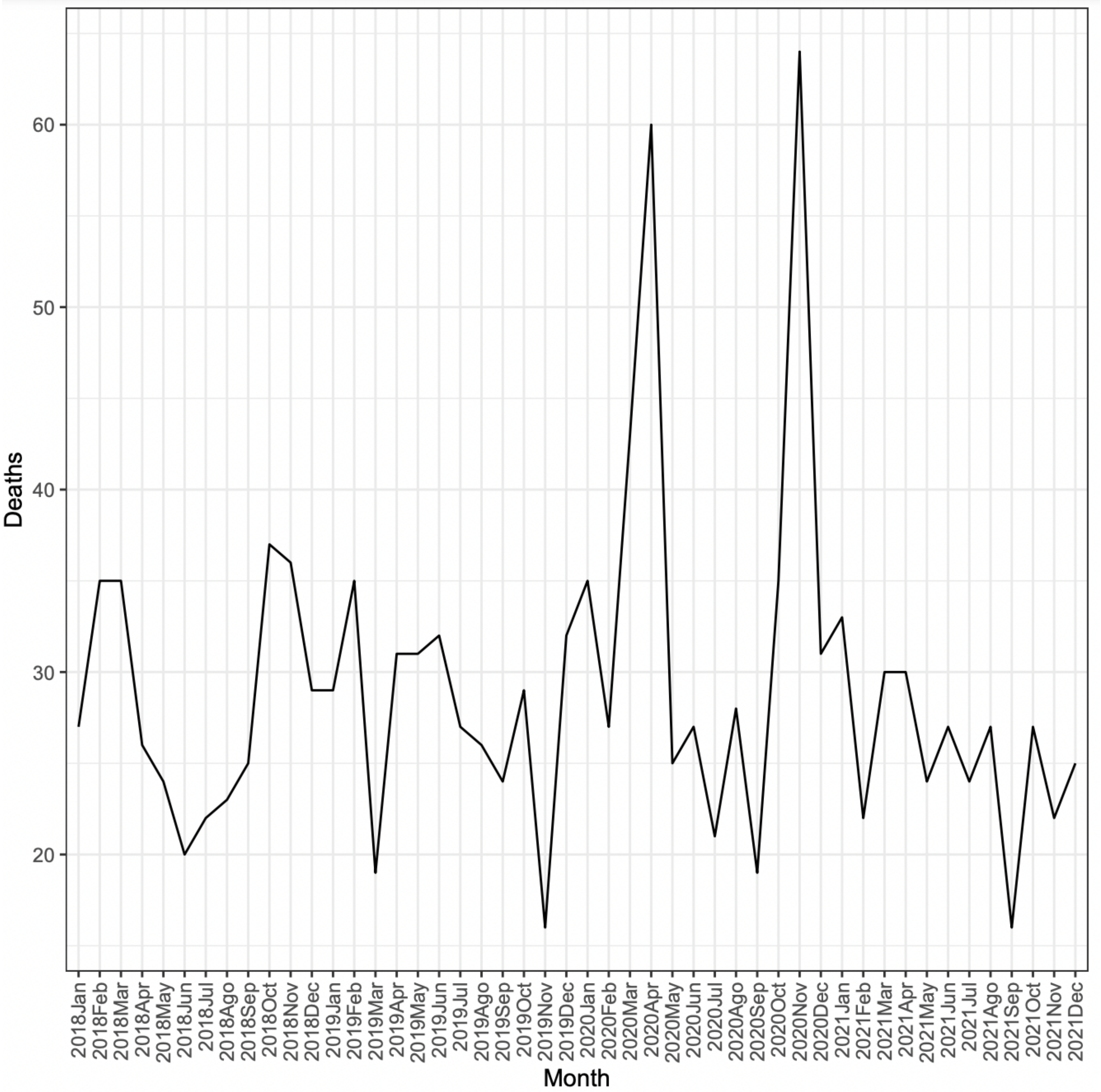
Not all participants' data were available for the whole period considered (see Table 2.1). For example, some individuals who were in the nursing homes in 2019 left the facility or died in 2020 or 2021, whereas other individuals entered the facilities at a later point in time. One resident left the nursing home in June 2020. During the first three-time windows, each death corresponded to the entry of a new resident, while from March 9th, 2020 until August 6th, 2020 the nursing homes were "closed" to new patients due to the high risk of infection, hence resulting in a reduction of the sample size in T4 (see Table 2.1).

Table 2.1. Features of the six temporal windows

Label	**From**	**To**	**N (T)**	**N (T+1)**	**N. positive**	**N. deaths**
T1	Sept. 6th 2018	March 5th 2019	158	156	0	13
T2	March 6th 2019	Sept. 5th 2019	191	161	0	12
T3	Sept. 6th 2019	March 5th 2020	177	141	0	12
T4	March 6th 2020	Sept. 5th 2020	151	124	42	34
T5	Sept. 6th 2020	March 5th 2021	160	167	30	31
T6	March 6th 2021	Sept. 5th 2021	140	-	12	6

Note:
N (T)= number of individualized care plans collected within each temporal window;
N (T+1)= number of individualized care plans collected at the subsequent temporal window on the same participants;
N. positive = number of participants who contracted COVID in each time interval.

Figure 2.1



Note:

Monthly deaths occurred in the two municipalities of the nursing homes involved in the study, Arese and Busto-Garolfo. Data were made publicly available by Italian National Institute for Statistics (ISTAT - https://www.istat.it/en/archivio/268504).

Measures

The main areas of investigation concerned: assistance needs; clinical, psychological, and relational needs; motor needs. For each area, we analyzed several rating scales validated for use in this type of population (Chadborn et al., 2019; Elsawy & Higgins, 2011)

Assistance Needs

The *Barthel Index* (Mahoney & Bartel, 1965) is a 10-item scale collected by professional caregivers to evaluate the ability to perform everyday life tasks (e.g., feeding, dressing, toilet use). The scale score ranges from 0 to 100, with the maximum score indicating a patient who can perform all tasks independently, without the help of a professional caregiver.

The *Basic Activities of Daily Living* scale (BADL; Morris et al., 1999) is collected by professional educators to evaluate the autonomies in daily living. Educators are professional staff who deal with cognitive and sensory stimulation in nursing homes by implementing individual and group activities on the basis of the bio-psycho-social characteristics and individual needs of older adults. The scale encompasses six basic human functions: bathing, dressing, toileting, transfer, continence, and feeding. A dichotomous score was attributed to each of the items: 0 for dependence from the caregiver; 1 for independence from the caregiver. The total score is the sum of the points obtained for the individual items where 0 indicates complete dependence and 6 total basic functional autonomy.

Clinical, psychological, and relational needs

Body Weight data are collected by the physiotherapist if the residents can walk or collaborate in movements, by the operator dedicated to assistance otherwise.

The *Washington University Clinical Dementia Rating* (CDR; O'Bryant et al., 2008) is collected by physicians to evaluate the clinical staging of dementia. The CDR is derived from a semi-structured interview with the patient and assessed impairment in each of six cognitive categories (memory, orientation, judgment, and problem-solving, community affairs, home and hobbies, and personal care). The CDR score varies from 0 (no dementia) to 5 (terminal dementia).

The Nursing Home version of the *Neuropsychiatric Inventory* (NPI; Wood et al., 2000) is collected by physicians involved in the daily care of residents. The NPI investigates the frequency and severity of psychopathological symptoms such as delusions, hallucinations, depressive mood, anxiety, euphoria, agitation, apathy, disinhibition, irritability, motor activity, sleep disturbances, and eating disorders. The NPI score combines, for each item, symptom frequency, and severity, and varies between 0 (absence of psychopathological symptoms) and 12 (severe and frequent psychopathological symptoms). The total score is the sum of the scores obtained for the individual items.

The *Cumulative Illness Rating Scale* (CIRS; Linn et al., 1968) is collected by physicians to assess physical impairment. The scale format provides for 14 relatively independent areas grouped under body systems: cardiac; vascular; hematological; respiratory; eye, ear, nose, throat, and larynx (EENT); upper gastrointestinal (GI); lower GI; hepatic and pancreatic; renal; genitourinary; musculoskeletal; neurological; endocrine-metabolic; psychiatric/behavioral. Each area is evaluated on a scale that expresses the level of severity of the pathology from 1, absent, to 5, very serious. The scale provides two indexes: the severity index, which results from the average of the scores of the first 13 categories excluding the psychiatric/behavioral pathologies category, and the comorbidity index, which represents the number of categories in which a score greater than or equal to 3 is obtained excluding the psychiatric/behavioral pathologies category.

The *Braden scale* (Bergstrom et al., 1987) is collected by nurses to evaluate the bedsores risk. It assesses a patient's risk of developing a pressure ulcer by examining six criteria: sensory perception, moisture, activity, mobility, nutrition, friction, and shear. The score ranges between 6 and 23, with a higher score meaning a lower risk of developing a pressure ulcer.

The *Mini Nutritional Assessment* (MNA; Rubenstein et al., 2001) is collected by nurses to assess nutritional status. The total score ranges between 0 and 30, with scores < 17 indicating protein-calorie malnutrition, scores between ≥ 17 and < 24 indicating risk of malnutrition, and scores ≥ 24 indicating adequate nutritional status.

The *Mini-Mental State Examination* (MMSE; Folstein et al., 1975) is collected by psychologists and includes 30 questions evaluating general cognitive ability. The total score ranges between 0 (severe general cognitive impairment) and 30 (normal general cognitive functioning).

Motor needs

The *Tinetti scale* (Tinetti, 1986), also known as *Performance Oriented Mobility Assessment* (POMA), is collected by physiotherapists to assess balance skills, including walking abilities and the risk of falls in older adults participants. The scale consists of 16 items. The total score ranges between 0 (non-ambulatory person) and 28 (able to walk with a low risk of falls).

Social contacts and COVID positivity

Strict restrictions to social contacts in the two nursing homes began in March 2020. Initially, only calls and video calls contacts were allowed. Since July 2020, the so-called *hug rooms* were set up, where the family caregivers outside the structure could touch or hug their loved ones, thanks to the presence of a flexible plexiglass sheet that served as a barrier, with cutout holes that included protective sleeves for arms. When in-person visits outside hug-rooms were strictly forbidden, the personnel of the nursing homes annotated for each resident the dates in which each contact took place (irrespective of the type of contact, whether online or in the hug room). Visits were annotated between March 2020 and the end of 2020, which corresponded to T4 and the initial portion of T5. Since visits were only partially annotated for T5, we decided to only take into account the number of social contacts involving each resident during T4.

Positivity to COVID-19 was monitored during T4, T5, and T6 (see Table 1) by healthcare personnel through the administration of antigen nasal swabs.

Statistical analyses

We considered 11 variables representing the bio-psycho-social status of residents: The Barthel index, BADL, Body Weight, CDR, NPI, CIRS severity and comorbidity scores, Braden scale, MNA, MMSE, and Tinetti scale. Additional follow-up analyses were performed considering the 12 NPI subscales individually. We tested hypothesis H1 using linear mixed models (e.g., Singmann & Kellen, 2019), which allow for exploiting the information in all data points available in the presence of missing data (Dean & Nielsen, 2007; Gilmour et al., 1985). Each of the 11 variables was predicted by Time (within-person predictor). A random intercept by participant was also included[3]. The effect of Time (T1-T6) was examined using successive differences contrasts (as implemented in the R function *contr.sdif* in the R package MASS; Venables & Ripley, 2002). These contrast coefficients are chosen so that the differences between the means of successive time windows (of T2 and T1, T3 and T2, T4 and T3, and so on), are compared directly in the model. This modeling strategy allows understanding when the most significant changes occurred, with changes between T1 and T3 indicating pre-COVID trends, changes between T3 and T5 indicating changes occurred during the first COVID wave, and changes between T5 and T6 indicating changes occurred after the first wave had ended. Given that five time contrasts were entered in each model, Holm's (1979) correction was applied to p-values. Cohen's (1988) *dz* was reported as a measure of effect size. Missing data were handled within the mixed model (Twisk et al., 2023). Notably, since our main interest was modeling change over time, we centered each dependent variable within participants: This prevented potential biases due to interindividual differences in the bio-psycho-social status of participants who entered or left the study (because death occurred or because they left the nursing home; see Table 1). For each time window, Table 1 reports the number of ICPs available for each time window and for the subsequent one. Only ICPs collected in consecutive time windows effectively contributed to estimating successive differences in the mixed model analysis.

We then focused only on the COVID period (i.e., T3-T5), and performed a series of linear regressions examining whether having been positive to COVID as well as the number of social contacts predicted a change of each dependent variable at T5, while controlling for the corresponding variable at T3. Since we controlled for the previous status of each participant at T3, we did not center the variables within-subject. These analyses were performed considering participants who provided data for both T3 and T5 (N = 115), 61 of whom had COVID in the time span considered. The mean number of visits was 12.51 (SD = 9.35, min = 0, max = 41).

All analyses were carried out in the R statistical language (R Core Team, 2021). Packages *lme4* (Bates et al., 2015) and *lmerTest* (Kuznetsova et al., 2017) were used to fit linear mixed models, package

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[3] Considering that each participant provided a single observation per timepoint, random slopes could not be estimated (Singmann & Kellen, 2019).

MASS (Venables & Ripley, 2002) was used to implement successive differences contrasts, and *MuMIn* (Bartoń, 2022) was used to compute marginal R-squared for mixed models (Nakagawa & Schielzeth, 2013).

Results

The analysis of the temporal variation of the evaluation scales (reported in Table 2.2) indicates, in general, a trend of maintenance or progressive worsening of the bio-psycho-social conditions of residents. If we shift the focus to the pandemic period, our results show significant worsening on some scales examined in different time windows. It is possible to observe, in fact, how passing from T3 (from September 6th, 2019 to March 5th, 2020) to T4 (from March 6th, 2020 to September 5th, 2020) there was a significant decrease in the scores in MMSE, Tinetti scale, an Increased risk of pressure injury in Braden scale, and a significant decrease in body weight. Passing from T4 (from March 6th, 2020 to September 5th, 2020) to T5 (from September 6th, 2020 to March 5th, 2020) there was a significant worsening in CDR, CIRS severity index, MNA, BADL, and NPI. In the case of NPI, the worsening was also visible in most of the specific symptoms on the scale itself. In particular, there was an increase in depressive symptoms, anxiety, sleep disturbances, hallucinations, apathy, agitation, euphoria, disinhibition, motor activity, and eating disorders. On the contrary, passing from T5 to T6 (from March 6th, 2021 to September 5th, 2021) there was a significant improvement in NPI, both in the total score and in the items that investigate the presence of depression, euphoria, eating and sleep disorders, and motor activity. It is interesting to note that for some evaluation scales, there was a significant worsening between the time windows preceding the arrival of COVID-19. In the period from September 6th, 2018 to March 5th, 2019 (T1), the older adults living in the structures analyzed showed a significant worsening in Barthel Index, in BADL, and in the Braden scale. In the period from March 6th, 2019 to September 5th, 2019 (T2), they showed a significant worsening in CDR.

Table 2.2. Linear mixed models examining the evolution of the bio-psycho-social status of residents over time.

Dependent variable	Intercept	Time2-1	Time3-2	Time4-3	Time5-4	Time6-5	Marginal R^2
Barthel Index	-0.119	-2.965* (-0.31)	-0.387 (-0.13)	-2.503. (-0.29)	-1.111 (-0.14)	-0.297 (-0.10)	0.060
BADL	-0.001	-0.300** (-0.33)	0.098 (0.05)	0.045 (0.01)	-0.311** (-0.27)	0.099 (0.06)	0.037
Body weight	0.003	-0.373 (-0.20)	0.327 (-0.08)	-1.103** (-0.30)	-0.096 (-0.14)	-0.345 (-0.14)	0.043
CDR	0.007	0.132* (0.23)	0.133* (0.30)	0.035 (0.22)	0.168* (0.37)	-0.051 (-0.02)	0.093
NPI	0.066	0.279 (0.02)	-0.612 (-0.08)	-0.195 (0.04)	5.649*** (0.37)	-2.526* (-0.13)	0.056
CIRS severity	0.003	-0.012 (-0.06)	0.012 (0.14)	-0.001 (0.16)	0.099*** (0.34)	0.024 (0.21)	0.068
CIRS comorbidity	0.002	0.008 (0.00)	0.070 (0.14)	-0.097 (-0.06)	0.102 (0.15)	0.081 (0.17)	0.005
Braden scale	-0.022	-0.543*** (-0.34)	-0.040 (-0.13)	-0.360* (-0.35)	-0.194 (-0.29)	-0.192 (-0.28)	0.103
MNA	-0.038	-0.258 (-0.09)	0.408 (0.01)	-0.739 (-0.21)	-1.591** (-0.31)	0.908 (0.09)	0.039
MMSE	-0.065	-0.344 (-0.11)	0.107 (-0.07)	-1.547*** (-0.54)	-0.144 (-0.27)	-0.261 (-0.11)	0.11
Tinetti scale	-0.071	-0.243 (-0.13)	-0.017 (-0.06)	-1.569*** (-0.38)	-0.515 (-0.13)	0.151 (-0.02)	0.068
NPI Depressive mood	0.009	-0.005 (0.00)	0.040 (0.06)	-0.098 (-0.03)	0.808*** (0.36)	-0.424* (-0.15)	0.038
NPI Anxiety	<0.001	0.121 (0.07)	-0.109 (-0.06)	-0.170 (-0.12)	0.366. (0.24)	0.020 (0.05)	0.01
NPI Sleep disturbances	0.006	-0.152 (-0.14)	0.035 (-0.02)	0.029 (0.02)	0.415** (0.28)	-0.325* (-0.15)	0.024
NPI Apathy	0.024	0.157 (0.10)	-0.073 (-0.01)	0.051 (0.04)	0.781*** (0.33)	0.168 (0.10)	0.06
NPI Delusions	<0.001	0.058 (0.01)	0.053 (0.04)	0.009 (0.05)	0.139 (0.11)	-0.197 (-0.09)	0.007
NPI Hallucinations	-0.001	-0.051 (-0.08)	0.005 (-0.01)	-0.110 (-0.10)	0.252* (0.19)	-0.177 (-0.11)	0.008
NPI Agitation	-0.001	0.023 (0.02)	-0.156 (-0.11)	-0.200 (-0.09)	0.482** (0.27)	-0.101 (-0.04)	0.013
NPI Euphoria	0.001	0.024 (0.11)	-0.032 (-0.06)	-0.035 (-0.04)	0.318*** (0.27)	-0.202** (-0.15)	0.032

NPI Disinhibition	0.004	-0.045 (-0.05)	0.067 (0.12)	-0.120 (-0.17)	0.433*** (0.28)	-0.210 (-0.10)	0.022
NPI Irritability	-0.001	0.108 (0.06)	-0.136 (-0.11)	0.049 (0.06)	0.190 (0.15)	-0.163 (-0.08)	0.005
NPI Motor activity	0.007	0.048 (-0.02)	-0.166 (-0.15)	0.235 (0.20)	0.438* (0.19)	-0.381. (-0.15)	0.022
NPI Eating disorders	0.017	0.025 (0.00)	-0.096 (0.00)	0.174 (0.20)	0.938*** (0.36)	-0.513* (-0.14)	0.061

Note:

Each row represents a linear mixed model, in which the dependent variable was predicted by the time and a random-intercept by participant. Each coefficient represents a difference between successive time intervals, estimated through successive-difference contrasts. A Holm (1979) correction was applied to the p-values of each model. Cohen’s (1988) *dz* coefficients are reported in parentheses as a measure of effect size. For each model, the value of Marginal R^2 is reported (Nakagawa & Schielzeth, 2013). For the NPI, CDR, and CIRS scales, higher scores indicate a more pathological condition, hence positive contrast values indicate a worsening of the condition.

*p < .05. **p < .01. ***p < .001.

We analyzed the role of positivity to COVID-19 (H3) and of social contacts (H4) as possible factors that could influence the worsening of the bio-psycho-social status of residents. The results (Table 2.3) showed that COVID-19 was not significantly associated with changes in any of the bio-psycho-social variables analyzed. Examining the effects of the frequency of social contacts on the same dimensions, they were associated with a worsening in the need for assistance, as indicated by the Barthel index, in general illness, as indicated by the CIRS, and in the neuropsychiatric condition, and indicated by the NPI. Regarding the specific NPI symptoms, social contacts were associated with a worsening in apathy and disinhibition.

Table 2.3. Linear regressions examining the effects of COVID positivity and Social Contacts on the bio-psycho-social status of residents at T5, controlling for the same variables at T3.

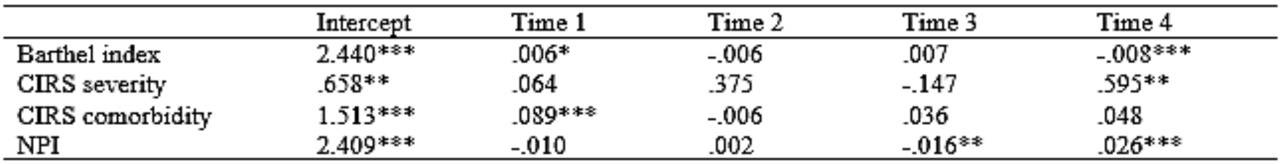
	Intercept	T3	COVID	Social Contacts	R^2
Barthel index	3.592	0.821***	1.534	-0.347*	0.693
BADL	0.504*	0.680***	-0.143	-0.016	0.528
Body weight	3.780	0.933***	-0.033	-0.102	0.825
CDR	0.420	0.955***	0.096	0.001	0.678
NPI	4.478	0.505*	3.314	0.465*	0.120
CIRS severity	0.257	0.876***	-0.064	0.014**	0.385
CIRS comorbidity	1.127*	0.767***	-0.291	0.032*	0.472
Braden scale	2.310*	0.836***	-0.361	-0.018	0.736
MNA	10.181**	0.434***	-0.936	0.001	0.104
MMSE	-2.020*	0.926***	-0.322	0.030	0.851
Tinetti scale	0.759	0.786***	-1.281	-0.029	0.653
NPI Depressive mood	0.649	0.273	0.673	0.061	0.081
NPI Anxiety	0.629	0.457***	0.071	0.028	0.191
NPI Sleep disturbances	0.571	0.259	0.200	0.020	0.043
NPI Apathy	0.419	0.705***	-0.236	0.100**	0.204
NPI Delusions	-0.085	0.567***	0.234	0.031	0.210
NPI Hallucinations	0.165	0.923***	0.223	0.002	0.436
NPI Agitation	0.132	0.544***	0.411	0.045	0.198
NPI Euphoria	-0.069	-0.229	0.395	0.021	0.042
NPI Disinhibition	0.020	0.576***	0.039	0.044*	0.135
NPI Irritability	0.485	0.615***	0.019	0.033	0.273
NPI Motor activity	0.464	0.587*	0.456	0.034	0.070
NPI Eating disorders	1.050	0.523*	0.459	0.040	0.052

Note:

Each line represents a multiple linear regression, in which a dependent variable at Time 5 was predicted by the same variable at Time 3 (T3), the positivity to COVID and the number of visits. For the NPI, CDR, and CIRS scales, higher scores indicate a more pathological condition, hence positive contrast values indicate a worsening of the condition.*p < .05. **p < .01. ***p < .001.

Supplementary analysis. We performed a follow-up regression to follow-up the effect of social contacts, which, surprisingly, appeared to be detrimental. In particular, we investigated whether individuals who exhibited significant deterioration in terms of their need for assistance (Barthel index), the presence of comorbidities (CIRS severity and comorbidity), and psychological or behavioral challenges (according to the NPI) were more frequently engaged with loved ones outside the facility. The results showed that those who had worse conditions in terms of need for assistance, severity of comorbidities, and psychological and behavioral symptoms at Time 4, controlling for their status at Times 1, 2, and 3, were more frequently involved in social contacts (see Supplementary Table S2.2)

Table S2.2. Poisson regressions examining the effects of Barthel index, CIRS severity, CIRS comorbidity, and NPI on the frequency of Social Contacts.



	Intercept	Time 1	Time 2	Time 3	Time 4
Barthel index	2.440***	.006*	-.006	.007	-.008***
CIRS severity	.658**	.064	.375	-.147	.595**
CIRS comorbidity	1.513***	.089***	-.006	.036	.048
NPI	2.409***	-.010	.002	-.016**	.026***

Note:

Each row represents a separate Poisson regression, the dependent variable being the frequency of social contacts. The independent variables are the Barthel Index, CIRS severity, CIRS comorbidity, and NPI assessed at Times 1, 2, 3, and 4.

Discussion

The COVID-19 pandemic has had a significant impact on health, economic and social aspects of life. People in the older age are a vulnerable group at risk of contracting the disease with more severe forms and worse outcomes, including mortality. In this regard, long-term care facilities have been particularly affected by the pandemic, showing high rates of infection and mortality (Alonso-Lana et al., 2020). The purpose of this study was to explore the bio-psycho-social trend of the residents living in institutionalized contexts by paying attention to the differences over time (2018-2021), considering the impact of the pandemic period, the role of positivity to COVID-19 and the effect of frequency of the relation with family caregiver outside the nursing homes.

Considering the three years 2018-2021, we found a trend of progressive worsening of the bio-psycho-social functioning of the institutionalized older adults. We found evidence of a significant deterioration in many of the variables analyzed starting from the proclamation of the pandemic and the activation of the restrictive measures in nursing homes (T4) for the prevention and limitation of infections. Barthel index, Braden scale, BADL, and CDR had shown a significant difference over time, in pejorative terms, in the pre-pandemic periods considered in the study (T2 for Barthel index, Braden scales, BADL and CDR, and T3 only for CDR). A significant deterioration emerges in the scores starting from T4 not determined by having been positive for COVID-19, regarding the role of the pandemic period and its socio-relational and organizational characteristics on bio-psycho-social development. Noteworthy, the first semester of the pandemic (T4) was associated with a worsening in general cognitive functioning (MMSE), motor skills (Tinetti), ulcer risk (Braden scale), and the loss of body weight. The persistence of the pandemic in the following six months (T5) was associated with a worsening of basic autonomies (BADL), risk of malnutrition (MNA), severity of comorbidities (CIRS severity), and severity of dementia (CDR). Furthermore, we observed a worsening of the residents' neuropsychiatric condition (NPI) at T5. Interestingly, the same neuropsychiatric symptoms tended to recover in the following time window (T6). This could reflect the progressive reduction of COVID-related restrictions on residents, which could have led to beneficial effects. However, we cannot exclude that this might also reflect changes in the assessors' mood, as healthcare workers might have been also affected in terms of their own well-being (Song et al., 2023), something that might have oriented their ratings more positively.

Contrary to what was assumed (H2), the positivity to COVID-19 had no impact on the bio-psycho-social variables analyzed, bringing to light the effect of the pandemic period characterized by significant immediate functional decline and a later effect on psychological well-being, probably due to social and relational limitations. This interpretation is in line with previous works showing that social and relational restrictions imposed on people to slow down the COVID-19 spread had adverse effects on psychological well-being, especially among the older adults (Armitage & Nellums, 2020) and those living in retirement homes. In this regard, it emerges that isolation plays a role in decreasing the well-being of residents. For example, in line with our results, an increase in depressive symptoms, weight loss, cognitive impairments, and incontinence has been shown even in those who have not contracted the virus (Levere et al., 2021).

These aspects bring attention to the intricate and bidirectional relationship between psychological problems and social disconnection (Klinenberg; 2016). For instance, Santini and colleagues (Santini et al., 2020) investigated the reciprocal connections between the severity of depressive symptoms, anxiety symptoms, and social disconnection, considering the mediating role of perceived isolation. Their study revealed that the experience of being socially disconnected predicted an individual's perceived isolation, which in turn had consequences for depressive and anxiety symptoms (Santini et al., 2020). Amidst the COVID-19 pandemic, nursing homes in northern Italy transformed into isolated entities, with minimal contact with the outside world: No resident or family member could enter or leave. This approach was of crucial importance to protect those inside from the risk of contagion and those outside from the possibility of infecting their relatives (Trabucchi & de Leo, 2020). Nevertheless, the measures implemented in many countries to control the spread of COVID-19 also had a disruptive effect on interpersonal relationships, which hold significant importance in the lives of nursing home residents (Levere et al., 2021). Efforts such as using technology for video calls and setting up *hug rooms* aimed to alleviate the resulting relational void. However, these attempts brought along inherent challenges in terms of the internal organization of the facilities and the effective use of technological devices by both residents and their families (Ickert et al., 2020).

The role of healthcare professionals has notably evolved in recent years, transitioning from standardized and task-oriented care to a more personalized and relationship-focused approach (van Stenis et al., 2017). With this context in mind, we initially anticipated that the frequency of social contacts would play a protective role in the bio-psycho-social well-being of the residents, encapsulated by the idea that more communication leads to better outcomes. Surprisingly, our findings did not align with this expectation (H3). Instead, we observed that the frequency of social contacts was associated with a decline in certain bio-psycho-social aspects among older adults. Consequently, these results align more closely with the notion that increased communication is linked with worse conditions. This conclusion does not contradict the shift in the caring paradigm; rather, it is likely to highlight a relationship that reflects the attentiveness of professional caregivers to frailty and health status. As shown by the supplementary analysis, those who had a significant worsening in terms of the need for assistance, comorbidities, psychological or behavioral dysfunctional aspects (more apathetic, more disinhibited) were put in contact more frequently with loved ones outside the structures.

One limitation of this study was the low temporal resolution, which was limited by the biannual frequency of the ICPs. This temporal resolution proved to be adequate to inspect the effects of the COVID-19 restrictions, which took place on a similar timescale. However, it might have been insufficient to unveil the complex interplay between social contacts and the residents' well-being. Future studies using finer-grained temporal resolutions (e.g., daily monitoring of social contacts and well-being) might offer a more detailed picture, allowing an examination of how social contacts and bio-psycho-social variables are related at different temporal levels (e.g., Costantini et al., 2019). Our study involved a relatively large sample of older adults for three years. Nonetheless, our data were collected only in two nursing homes, which were located in the same region. This limited the possibility to take into account broader effects concerning, for example, the differential effects of COVID across regions during different phases of the pandemic. A further limitation was the use of antigen tests to diagnose COVID, which are less sensitive than alternative methods (Peeling et al., 2021). Additionally, it is important to note that the original aim of the data collection was not investigating the effects of COVID-19, and the rating scales used in our analyses were not specifically chosen to investigate the impact of virus positivity and the pandemic period. To address geographical limitations and those related to the type of facility, future research endeavors could encompass a more diverse range of nursing homes, spanning different regions across Italy.

In conclusion, our study contributes to a better understanding of the longitudinal effects of the pandemic, the positivity to COVID-19, and social contacts during that period. We studied the bio-psycho-social well-being of institutionalized people, considering variables that could play a role in increasing the vulnerability and fragility of the residents. Our results provide important indications of the effects that prolonged social isolation measures may have, over time, on the bio-psycho-social status of individuals. These indications will be particularly useful for health professionals not only to deal with similar pandemic situations, but also any other situation that requires social distancing measures, such as in the case of infectious diseases caused by *Clostridium difficile* or *Salmonella*, or in all those clinical conditions where the older adults have limited joint or muscle mobility which leads him to spend a lot of time bedridden, increasing the risk of social isolation or reduced relationships with the other residents of the facility.

In general, our results demonstrate the important impact that public policies can have on the bio-psycho-social status of healthcare residents, identifying variables (autonomies, neuropsychiatric symptoms, general cognitive status, severity of comorbidities, walking abilities and the risk of falls, risk of malnutrition and body weight) that might be particularly impaired at different points in time.

The COVID-19 pandemic has been an unprecedented reminder of the importance of addressing issues related to death and end-of-life care, especially within nursing homes. This global event has exposed vulnerabilities in the healthcare system and underscored the urgent need for more open discussions about death and the end of life within these long-term care facilities (LTCFs). In the post-pandemic world, it has become increasingly evident that nursing homes must place a renewed emphasis on embracing these topics.

First and foremost, the pandemic served as a wake-up call, revealing the often-overlooked emotional, psychological, and physical toll that silence around end-of-life issues can take on residents, their families, and healthcare professionals. Nursing homes, traditionally seen as places of care and support for the elderly, suddenly found themselves on the front lines of the battle against Covid-19.

These facilities became hotspots for infections, and residents faced not only the physical threat of the virus but also the emotional and psychological turmoil of isolation, fear, and uncertainty. The experiences of countless nursing home residents during the pandemic highlighted the necessity of incorporating end-of-life discussions into the standard of care.

Breaking the taboo surrounding death and end-of-life conversations is imperative. Historically, these discussions have been stigmatized, often considered uncomfortable, and even taboo in many cultures. However, it is essential to recognize that discussing end-of-life care and preferences is not about surrendering hope but about empowering individuals to make choices that align with their values and desires. By addressing death proactively, we can ensure that care is personalized and respectful of individual wishes. Moreover, these discussions are fundamental in upholding residents' dignity and autonomy, promoting a sense of control over their own lives even as they near the end. Nursing homes must assume a central role in facilitating these conversations. To provide comprehensive care, nursing homes should aim to create an environment where open conversations about end-of-life preferences are encouraged. This extends beyond healthcare providers to include administrators, social workers, and family liaison personnel. Education is key, and ongoing training is necessary to help staff initiate and engage in these conversations with empathy and cultural sensitivity. Building a culture that values these discussions and fosters a supportive atmosphere is essential for residents and their families to feel comfortable sharing their thoughts and preferences. To bring this need to life, practical changes within nursing homes are essential. First and foremost, staff must receive adequate training in how to approach end-of-life discussions and provide emotional support. These are conversations that require a deep understanding of the residents' needs and concerns that can vary during the course of their permanence in nursing homes. It is also crucial to encourage the involvement of families: they often play an integral role in residents' lives and decision- making, and their insights and concerns should be taken into account.

Furthermore, nursing homes should offer comprehensive palliative and hospice care services within their facilities. This allows residents to receive the appropriate care in familiar surroundings, surrounded by the support of their chosen community. Beyond end-of-life planning, psychological and emotional support services, including grief counseling and bereavement support, should be readily available for residents and their families. This holistic approach to care ensures that residents not only receive the medical attention they need but also the emotional and psychological support required to navigate this challenging phase of life with dignity and grace.

In conclusion, we can affirm that COVID-19 pandemic has made clear that discussing death and end-of-life care is not just a matter of medical necessity but it regards different spheres of human functioning, involving all professional and family caregivers. Nursing homes, as essential environments of long-term care, must embrace these conversations. By doing so, they can enhance the quality of life for residents, provide dignity and respect in the face of death, and foster a culture of compassionate, person-centered care. The pandemic has been a catalyst for change, pushing nursing homes to reimagine their roles and responsibilities in ensuring the best possible end-of-life experience for their residents in a post-COVID-19 world. In the following chapter we get into the topic of the process of death and end of life in nursing homes.

Chapter 3. The process of death and the end of life in nursing homes

Highlights

- Background on the process of death and the possible meanings linked to it in the elderly in nursing homes.
- focus on the approach of professional caregivers to the dying patient in institutionalization contexts.

Abstract

In continuity with what is reported at the end of the previous chapter, an in-depth analysis is proposed on the topic of death and support at the end of life in nursing homes. This chapter delves into the intricate process of life construction and the impact of significant relationships on identity development, drawing on theories by Erikson, Bowlby, and Kübler-Ross. Emphasizing life's finite nature, particularly death's permanent separation, the chapter explores evolving identity from childhood to old age. As the global population ages, implications for healthcare systems, especially in nursing homes, are discussed, highlighting the role of family members in accompanying pre-terminal patients. Professional caregivers, including nursing home staff, are explored in terms of their emotional toll and the distinction between the quality of death care and end-of-life care. The chapter concludes by discussing the role of psychotherapy in nursing homes, emphasizing the need for a secure space for patients to articulate their experiences. Recognizing patients' emotional, perceptual, and cognitive responses to death, considering their values, motivations, and spirituality, is crucial for comprehensive end-of-life care.

The process of death and the end of life in nursing homes

The process of constructing our life represents one of the most intriguing experiences we encounter directly (Erikson, 1950). Over the course of our existence, from the inception to the culmination of this journey, we accumulate self-knowledge and insights about the world, often guided and comforted by individuals we hold in high regard - those within our emotional circle, including parents, partners, spouses, and friends (Bowlby, 1969; Ainsworth et al., 1978). These significant relationships provide us with essential support during challenging periods, encouraging and bolstering us (Bowlby, 1980). We may transition in and out of these relationships, experiencing growth and learning to adapt to life with or without some of these pivotal figures (Bowlby, 1982). However, given life's finite nature, there inevitably comes a moment when separation ceases to be temporary and becomes permanent. Death stands as the ultimate boundary, signifying the separation from a daily, physically present presence that is now forever lost (Kübler-Ross, 1969). While post-mortem connections may persist, they are the result of the grieving process (Bowlby, 1980).

As embodied individuals, our sense of identity evolves as we continually reorganize our self-perception within the ongoing flow of existence (Erikson, 1959). The ability to change over the course of life while remaining true to oneself represents the existential task that accompanies maturation from childhood to adulthood and, eventually, to old age (Erikson, 1963). This transformation requires individuals to adapt their approach to the world while preserving internal coherence (Erikson, 1980). Life's challenges, including adversities, losses, illnesses, housing or financial setbacks, and changes in occupational roles, can disrupt this process of identity construction, but their impact is highly subjective (Antonovsky, 1987). It is not solely the magnitude of these events but rather the individual's flexibility in mobilizing available resources at that specific life juncture to attribute meaning to these experiences, demonstrate adaptability, seek and accept assistance, and engage in a novel self- reflection within the context of the changes imposed by the situation (Bonanno, 2004). The onset of severe illness and/or the revelation of a terminal prognosis are undoubtedly disruptive for those receiving and attempting to integrate such news (Kübler-Ross, 1969).

The aging of the world's population is indeed a significant demographic trend that has important implications for healthcare systems and end-of-life care. As more people live longer lives, there is an increased likelihood that they will experience chronic progressive illnesses and require complex care needs as they approach the end of their lives (Van den Block et al., 2015). Nursing homes and care homes often play a crucial role in providing care for elderly individuals with chronic progressive illnesses. Many older people are admitted to these facilities when they require assistance with daily activities, medical care, and palliative care (Hall et al., 2011). Within the walls of nursing homes, residents often find themselves in the twilight of their lives, aware of the imminent transition that awaits them. Study by Zimmermann and colleagues (Zimmerman et al., 2020) highlights that residents' perceptions of death in nursing homes can be marked by complex emotions. Some may grapple with existential questions and reminisce about their life's journey. For others, it's an acceptance of the natural progression of life, greeted with tranquility. However, the passing of fellow residents can serve as a poignant reminder of their own mortality, evoking feelings of sadness and nostalgia. Frequently, the period preceding death is marked by the loss of self-sufficiency, the inability to perform basic tasks independently, such as bathing, continence, and dressing (Baltes & Smith, 2003). However, true autonomy implies not only the abilities described above, but also the possibility of determining one's own will, even if only to a limited extent (Deci & Ryan, 1985). The sensation of losing control, self-sufficiency, and autonomy in the face of life events that were never chosen, such as chronic illness and dying, universally elicits a need for closeness and reassurance from a significant figure (Bowlby, 1969). How individuals express and act upon this need depends on their attachment state of mind (Bowlby, 1973). Typically, family members and friends recognize and respond to this unique subjective need (Ainsworth et al., 1978). Therefore, in accompanying the pre-terminal patient one must consider the relational framework that has contributed to their identity over the course of their life, as this framework is vital for reshaping and providing existential coherence in the face of despair and the immeasurable pain of permanent separation (Bowlby, 1980). Families thus play an integral role in the experience of death in nursing homes. As loved ones approach the end of life, family members often bear the emotional burden of watching their journey. Several studies (Henriksson & Årestedt, 2013; Holland et al., 2020; van Ryn et al., 2011; Walsh et al., 2020) underscore the profound impact on families, who must navigate the emotional challenges of saying goodbye, making difficult decisions about care, and ultimately coping with grief. This phase can be emotionally taxing, yet it also presents an opportunity for closure and a chance to provide comfort and companionship to the resident in their final moments.

From the perspective of professional caregivers, the history of medicine has witnessed a shift from the biomedical model to a bio-psycho-social approach, moving from a focus on disease to a mode of care where the ultimate goal is the patient's well-being, ideally achieved through heightened awareness of one's health, in a more effective and functional manner (Engel, 1977). Throughout history, we have understood that care doesn't solely entail healing, restoring good health, or managing illness. It also involves helping patients find personal meaning in their bodily, physical, social, emotional, and identity-related situations. This means accompanying them to facilitate change while maintaining self-esteem (Cassell, 1991). By shifting the focus from the disease itself to the quality of life, patients become more involved in self-care and in recognizing and monitoring their physical and mental symptoms and/or changes. Attention is also directed towards harmonizing both individual factors and the social and cultural environment (Ware & Sherbourne, 1992). However, when faced with death, the challenge of illness seems to reassert itself as the central element of care and concern for both healthcare providers and those at risk of dying (Kübler-Ross, 1969). This can result in a reduced attention to the willingness to share the emotional world, the perceptual experience, and the sense that this specific situation is offering to the patient. Such a situation also leaves little or no space for accompanying or building an emotional climate by the clinician that facilitates the expression of existential questions, such as the value to be attributed to this time of life before death, which could emerge from someone facing death. Although a sense of urgency for a happy resolution of the situation is humanly understandable, if these questions do not find a relational space to be heard, they are often acted out unconsciously, reactivated by the tacit emotional situation, and can lead to perceptions and manifestations of suffering that are unguided, sometimes confusing, and confounding (Stroebe & Schut, 1999).

Nursing home staff, including nurses, certified nursing assistants, psychologists, and administrators, are intimately involved in the experience of death. Their roles encompass not only clinical care but also the provision of emotional support to residents and their families. Study in this field (Boerner et al., 2015; Wilson & Kirshbaum, 2011) emphasizes the emotional toll that staff members may experience, witnessing multiple deaths and offering support during this challenging time. However, it is also a source of professional satisfaction, knowing that they've provided comfort and care during a crucial phase of life.

From the perspective of professional caregivers, it is important to distinguish between *quality of death care* and *quality of end-of-life care* (Pivodic et al., 2013, 2018). The quality of death refers to the conditions, symptoms, emotions, and spiritual aspects that a person experiences in the period leading up to their death. In other words, it focuses on the subjective perception of the dying person and their physical, emotional, and spiritual comfort during this period. Quality of death indicators may include pain control, open communication with doctors, psychological and spiritual support, dignity, and respect for the patient's wishes. On the other hand, the quality of end-of-life care refers to the characteristics of medical care and the context in which death occurs. This can include access to high-quality palliative services, the availability of resources for patient comfort, healthcare staff training in palliative care, and the organization of facilities such as nursing homes or hospitals to facilitate compassionate and effective end-of-life care (Pivodic et al., 2018; van Soest-Poortvliet et al., 2011). Access to palliative care in nursing homes is generally more challenging and complex compared to what happens in dedicated facilities designed to support people nearing the end of life, such as hospices. Furthermore, despite recommendations to integrate palliative care into nursing homes, there is still limited knowledge about the most effective ways to achieve this goal (Carpenter et al., 2020).

End-of-Life Care is a specialized form of healthcare aimed at addressing the unique needs of individuals who find themselves in these challenging circumstances and is provided when there is a likelihood that an individual may pass away within the next 12 months. This category includes individuals whose death is imminent, expected within a few hours or days, as well as those facing:

- Advanced, incurable, and progressive medical conditions.

- General frailty and the presence of coexisting conditions that predict a life expectancy of less than 12 months.
- Real risks of sudden death due to acute crises.
- Life-threatening acute conditions resulting from unexpected catastrophic events.

In presence of dementia, it is important to consider the need to open a dialogue with the resident to share the related desires and needs related to the process of dying and death, before the dementia compromises cognitive abilities and the possibility of making conscious choices (Mitchell et al., 2009; Sampson et al., 2006).

Those in proximity to the final limit, grappling with uncertainty and the perception of irreversibility, are presented with an opportunity for profound personal change in terms of the meaning of life, values, plans, relationships, and practical choices (Neimeyer, 2000). In most cases, this experience doesn't lead to discrepancies in identity significant enough to require external support. However, when the pain and suffering of separation induce feelings that are subjectively experienced as intolerable, uncontrollable, and incommunicable, being accompanied by professionals can help opening a path to understanding death as something thinkable in its meaning, to be integrated into life. This experience allows individuals to be present, first and foremost, in their fear and uncertainty. In institutionalized settings the figure of the psychologist is activated by the treatment team to open spaces for self-narrative in a professional and empathetic relationship. The focus of psychotherapy in nursing homes is not solely on death but on the individual directly or indirectly experiencing such suffering that they require help in navigating this experience and the meaning they attribute to it at that particular moment in their life story (Neimeyer, 2006). In this context, the therapist's aim is to facilitate the ability to think, communicate, and share an experience that requires embodiment within the secure relational space of therapy (Geller & Greenberg, 2002). Sensory experiences play a crucial role in addressing such a delicate topic with patients. In this context, recognizing and understanding one's personal sensory experience of the emotional world becomes central (Levine, 1997). The body serves as the canvas where each of us makes daily choices and makes perceptible the sensations and stimuli experienced continuously in the flow of events (Ogden & Fisher, 2015).

The emotional world of someone facing death can sometimes be characterized by fear, anger, and hope, or by the disorientation of not recognizing oneself in their own body, identity, social relationships, and affection that one has experienced until that point. This lack of recognition is at times rooted in immediate sensations, which become noticeable through how one feels observed, such as through the expressions that the resident can read on the faces of those around (e.g., sadness, grief). This, in turn, serves as a mirror, as well as a shift in priorities. The body's fatigue gradually takes precedence over attention to the external world. The lack of recognition can also apply to the future, where individuals seek hopes and assurances while awaiting the future, living in the realm of becoming, where certainties desired through expectations may give way to resignation and rebellion (Lichtenthal et al., 2015).

For those in a pre-terminal state, near the end of their life, when there is an opportunity to consciously experience this separation, bodily sensations often signal the physiological changes occurring as they prepare for the end (Block, 2006). These sensations may include drowsiness, increasing fatigue, and difficulty regulating breathing. The awareness of limited time remaining compels patients to reinterpret events in their life story within their current moment. This reinterpretation aims to create a more coherent and acceptable narrative, generating self- representation and a sense of their life story that aligns with their perspective and is validated by their therapist (Block, 2006; Hoelter, 1979). Historically, final words, wishes, decisions, or requests before death have held particular significance, often serving as a summary of one's life or a spiritual testament to pass on to future generations. The last minutes, hours, or days of life hold a special place in the hearts of family members and loved ones, offering a unique opportunity for farewells, goodbyes, and the sharing of wishes, testimonials, and lessons (Morris & Thomas, 2007). This ritual of closure still occurs today, allowing the transition from life to death to be anticipated and marking the beginning of the grieving process for those left behind.

It is not uncommon to encounter two scenarios. In the first, the patient's mind is unprepared while their body signals the imminence of death. This can often lead to feelings of anger or rage, a natural response that, thanks to the release of adrenaline, allows individuals to experience a sense of active presence rather than passive resignation. In the second scenario, patients may have come to terms with their own history and the experience of the present moment. Their minds are prepared to accept the end before their bodies are ready to cease functioning (Neimeyer et al., 2004).

In the temporal space of these final hours or days, a supportive relationship, whether with a family member, friend, or significant person, not only helps manage present anxieties but also facilitates a recapitulation of the patient's life story and significant moments. In sharing these experiences, the act of being listened to allows the patient to rediscover themselves and transmit their legacy (Feifel, 1990).

In understanding the complexity of perceptions, sensations, and thoughts surrounding death, clinicians must also consider the underlying values, motivations, and spirituality that have shaped the patient's life. These foundational aspects can continue to play a significant role in giving meaning to the ongoing process or become a source of disappointment and confusion as the patient's previous attributions of meaning and security are perceived as erroneous, disappointing, or futile (Feifel, 1990; Neimeyer et al., 2004). In the present moment, patients no longer supported by their previous life narratives may feel isolated and ill-equipped to cope with the increasingly pressing nature of time. The primary objective is to enable the departing individual to find their own path to self-acceptance, reconciliation with their life history, and the ability to let go of their final attachment.

Chapter 4. Bio-Psycho-Social Variables and Late Life Depression in Nursing Homes: A Temporal and Contemporaneous Network Analysis Exploration.

Highlights

- Background about the importance of multidimensional geriatric assessment (MGA) in nursing homes.
- Temporal and contemporaneous network analysis of bio-psycho-social variables in older adults in nursing homes.

Abstract

Entering nursing homes could represent a significant change for the older person and his family caregivers often due to cognitive deficit or impairments of daily autonomy. During institutionalization professional caregivers collect bio-psycho-social data through multidimensional geriatric assessment (MGA) every six months. The aim of the study is to analyze the temporal network (encoding the relationships among phenomena over time) and the contemporaneous network (encoding the relationships among the same phenomena at the same point in time) between seven main bio-psycho-social variables in two Italian nursing homes with a twofold objective: to explore correlations in the same time windows of assessment; to detect predictive relations between two subsequent evaluations.

We analyzed data from N=180 older people in two Italian nursing homes for a period of one and a half years (February 2021-August 2022) through contemporaneous and temporal Network Analysis.

Our results show significant positive contemporaneous relationship between functional, motor and pressure injuries scales, between functional and malnutrition risk and between dementia staging and Late Life Depression (LLD). Negative relations emerged between the severity of the comorbidities and both motor and functional ability. We also found a negative correlation between severity of dementia and motor functionality. For what concerns the temporal networks, interestingly, we found several significant positive and negative predictive relations between nodes. In particular, the severity of depressive symptoms predicted greater severity of both comorbidities and dementia in the next temporal window of assessment. Likewise, motor ability predicted better functional autonomies and lower pressure ulcers risk in the following six months. Motor ability also seemed to act as a protective factor for lower severity of comorbidities over time.

Our study allows us to highlight the predictive relationships between bio-psycho-social aspects that define the functioning of older people in nursing homes within the same assessment time window and over time, in the following assessment semester. This allows, on the one hand, to identify the links between protective and risk factors and to define their trend over time; on the other hand, it provides insights from an organizational and a social-health perspective to implement not only intervention, but also prevention policies.

Bio-Psycho-Social Variables and Late Life Depression in Nursing Homes: a Temporal and Contemporaneous Network Analysis Exploration.

During the aging process, people can face changes concerning the working and social sphere, such as retirement and the change of roles, the relational sphere, such as the loss of loved ones, functional aspects, such as the need for assistance and medical comorbidities (Fessman & Lester, 2000). Among the predictors of this change factors emerge such as previous entry in long-term care, age, impairment of basic autonomy of daily life, limited external motor skills (Jette et al 1992), being female (Shapiro and Tate , 1985), being widowed (Greenberg and Ginn, 1979), living alone (Vincente, Wiley, and Carrington, 1979), living with a spouse (Shapiro and Tate, 1985), living with an unfamiliar person (McCoy and Edwards, 1981), lack of a social support network (Brock and O'Sullivan, 1985), have few social connections (Shapiro and Tate, 1985), have mental impairment (Shapiro and Tate, 1985), or be physically dependent (Greenberg and Ginn, 1979), medical diagnoses such as cancer, stroke, or dementia (Greenberg and Ginn, 1979), self-perceived poor health (Shapiro and Tate, 1985), hospitalization, not seeing a doctor regularly, polypharmacy (Shapiro and Tate, 1985; Greenberg and Ginn, 1979), and neuropsychiatric symptoms, such as Late Life Depression (LLD), anxiety, motor behavior, irritability or agitation (Fessman & Lester, 2000). Entering a nursing home can be a challenge often due to the presence of physical or mental illness and it requires the creation of new balances (Wolff et al., 2002).

Given the complexity of the geriatric patient, the multidimensional geriatric assessment (MGA) illustrated in Chapter 1 is a fundamental tool to capture comorbidities and to evaluate the clinical-functional and psychological-social situation of the resident. The MGA provides a current picture of the person and allows changes to be monitored over time, thus supplementing the standard medical evaluation: This tool helps to address the complexity due to multimorbidity in a systematic way and by defining priorities and it also allows identifying with precision problems that are sometimes neglected because they are considered normal in the aging process, and in particular mental disorders such as depressive symptoms. Furthermore, elderly people tend to show symptoms that do not meet the criteria for a diagnosis (Andreoli et al., 2007), and this leads to delaying pharmacological and psychotherapeutic treatments. In other cases, the lack of knowledge of the symptomatologic manifestation of LLD leads to misdiagnosis. LLD in older age, unlike in youth, can manifest with somatic symptoms, presence of cognitive impairment, lack of expectations with respect to treatment (Davison et al., 2007). Stereotypes or expectations associated with the aging process, such as the fact that the elderlies are in themselves sad or isolated, or the scarce exploration of the subjective experience of the disease and of its somatic manifestations, do not allow adequate care of the person (Rubenstein et al., 2006).

Enormous study efforts have been devoted to identify the neurobiological underpinnings of clinical syndromes, as in the case of LLD. However, the attempt to explain psychopathological syndromes solely as expressions of neurobiological alterations failed to satisfactorily account for the wide spectrum of their clinical manifestations (Borsboom et al. 2019, 2021). In recent years, the structure and the dynamics of psychopathological disorders have been studied adopting a network approach (e.g., Costantini et al., 2015, 2019; Epskamp et al., 2018; Epskamp, 2020; Fried et al., 2018; Isvoranu et al., 2019). This approach resonates well with the biopsychosocial framework proposed by the World Health Organization: Diseases are defined in terms of multidimensional alterations that are closely interrelated with each other, encompassing the biological, psychological and social domains. In this view, disorders such as depression emerge from patterns of direct connections among biological factors, psychological factors, and relevant social environments.

From a data-analysis standpoint, the network approach offers tools for examining information regarding the structural organization of a phenomenon within the context provided by other phenomena (Borsboom et al., 2021). Psychometric network analysis is a cutting-edge methodology in the field of psychology that goes beyond traditional statistical techniques by examining the relationships between bio-psycho-social variables as networks. Instead of considering the associations among symptoms and bio-psycho-social factors as isolated constructs or as reflecting the effect of unobservable latent variables, this approach treats them as interconnected nodes in a network, where edges represent statistical associations or dependencies (Costantini et al., 2015, 2019; Epskamp et al., 2018; Epskamp, 2020). When longitudinal data are available, such associations can be modeled at different levels, each one conveying specific information. A within-subject cross-lagged level of analysis provides a temporal network, which encodes information about how features that vary within subjects might affect other features at a subsequent time-point. Edges in this network are directed, i.e., point from a node to another. For example, a negative edge from motor abilities to LLD would indicate that if one's motor abilities drop under one's typical level, one is more likely to experience more depressive symptoms later on. A within-subject contemporaneous level of analysis provides a contemporaneous network, which encodes how features that vary within subjects are related to each other within the same time-frame. Edges in this network are undirected, i.e., connect two nodes without specifying a direction. For example, a negative edge between motor abilities and LLD would indicate that if one's motor abilities drop under one's typical level, one is more likely to experience more depressive symptoms at the same time point, and vice versa. A between-subject level of analysis provides a between-subject network, an undirected network which captures processes that involve relatively stable individual differences. The same edge would indicate that those who have in general fewer motor abilities than others are also generally more depressed. A drawback of the between- subject network is that, unlike the contemporaneous and temporal network, its estimates mainly depend on the number of individuals involved, and not on the number of observations, hence it is sometimes not estimated in longitudinal designs with relatively small samples (e.g., Borsboom et al., 2021). At a representative level, the variables of interest appear as nodes connected to each other by lines whose strength is represented by the thickness of the line itself, the color representing the sign of the connection (conventionally, blue or green for positive, and red for negative).

Whereas the possibility of estimating networks on intensive longitudinal data has been available since 2013 (Bringmann et al., 2013), the estimation of networks on panel data, datasets collected on relatively few (i.e., at least three), has been implemented only relatively recently in the R package psychonetrics (Epskamp, 2020). The network approach thus represents an innovative method that can help to better understand the relationships among different clinical manifestations of residents in nursing homes. The main goal of the present study is thus to identify the network of temporal and contemporaneous relationships involving a subset of the bio-psycho-social variables included in the MGA In particular, we focused on a subset of variables that we considered the most interesting for characterizing the residents' general wellbeing: LLD, motor skills, degree of dementia, need for assistance in everyday life, the general severity of comorbidities, the risk of malnutrition, and the risk of pressure injuries. Given the limited sample size, both in terms of number of participants involved and of number of observations by participant, we will not discuss the results of a between- subject network.

Materials and methods: Participants and Procedure

One hundred and eighty elderly people in two different north Italian nursing homes (149 women, 31 men, age at first data collection M = 86.27, range = 64-100, SD = 7.63) participated voluntarily in the study.

All participants involved received detailed information about the study and shared written informed consent before its start. This document was shared with legal administrators or with family caregiver for those with cognitive impairment or other pathologies that could interfere with the possibility of affixing the signature (for example hemiplegia or hemiparesis). The study was run after review and approval from our university's ethics committee. The overall data collection procedure is identical to the one illustrated in Chapter 2. There is a limited overlap between this sample and the one examined in the previous chapter: For this study, additional measures were collected since 2021, which were not available in the ICPs before and that were thus not considered in that chapter. For this reason, we analyzed data collected from February 2021 to January 2023 defining four six- month temporal windows (labeled T1-T4, see Table 4.1). Not all participants' data were available for the whole period considered (see Table 4.1). For example, some individuals who were in the nursing homes in the first temporal window in 2021 left the facility or died in subsequent periods, whereas other individuals entered the facilities at a later point in time. The size of the sample available at each timepoint is reported in Table 4.1.

Table 4.1. Features of the four temporal windows

Label	From	To	N. of obs by subjects
T1	Feb. 1st 2021	July 31 2021	44 (38 female)
T2	August 1st 2021	January 31 2022	147 (125 female)
T3	Feb. 1st 2022	July 31 2022	148 (127 female)
T4	August 1st 2022	January 31 2023	112 (96 female)

Note:

N. of obs by subjects indicates the number of subjects who have completed the evaluation of the time window to which it refers.

Measures

The main areas of investigation concerned: assistance needs; motor skills; and clinical, psychological, and relational needs. We assessed assistant needs through the Barthel Index (higher values indicate more autonomy; Mahoney & Bartel, 1965). We assessed motor skills through the Tinetti scale (higher scores indicate better motor skills; Tinetti, 1986). We assessed clinical, psychological and relational needs through the following scales: severity of dementia was assessed through the CDR (higher scores indicate worse dementia; O'Bryant et al., 2008); severity of comorbidities was assessed through the CIRS (higher scores indicate more severity; Linn et al., 1968); pressure ulcer risk was assessed through the Braden scale (higher score meaning a lower risk of developing a pressure ulcer; Bergstrom et al., 1987); risk of malnutrition was assessed through the MNA (higher scores indicate lower risk; Rubenstein et al., 2001); late life depression was assessed through the CDS (higher scores indicate more severe LLD; Alexopoulos et al., 1988). For a detailed description of the scales, see Chapter 1. Other measures were included in the MGA, but were not considered for this study.

Statistical analyses

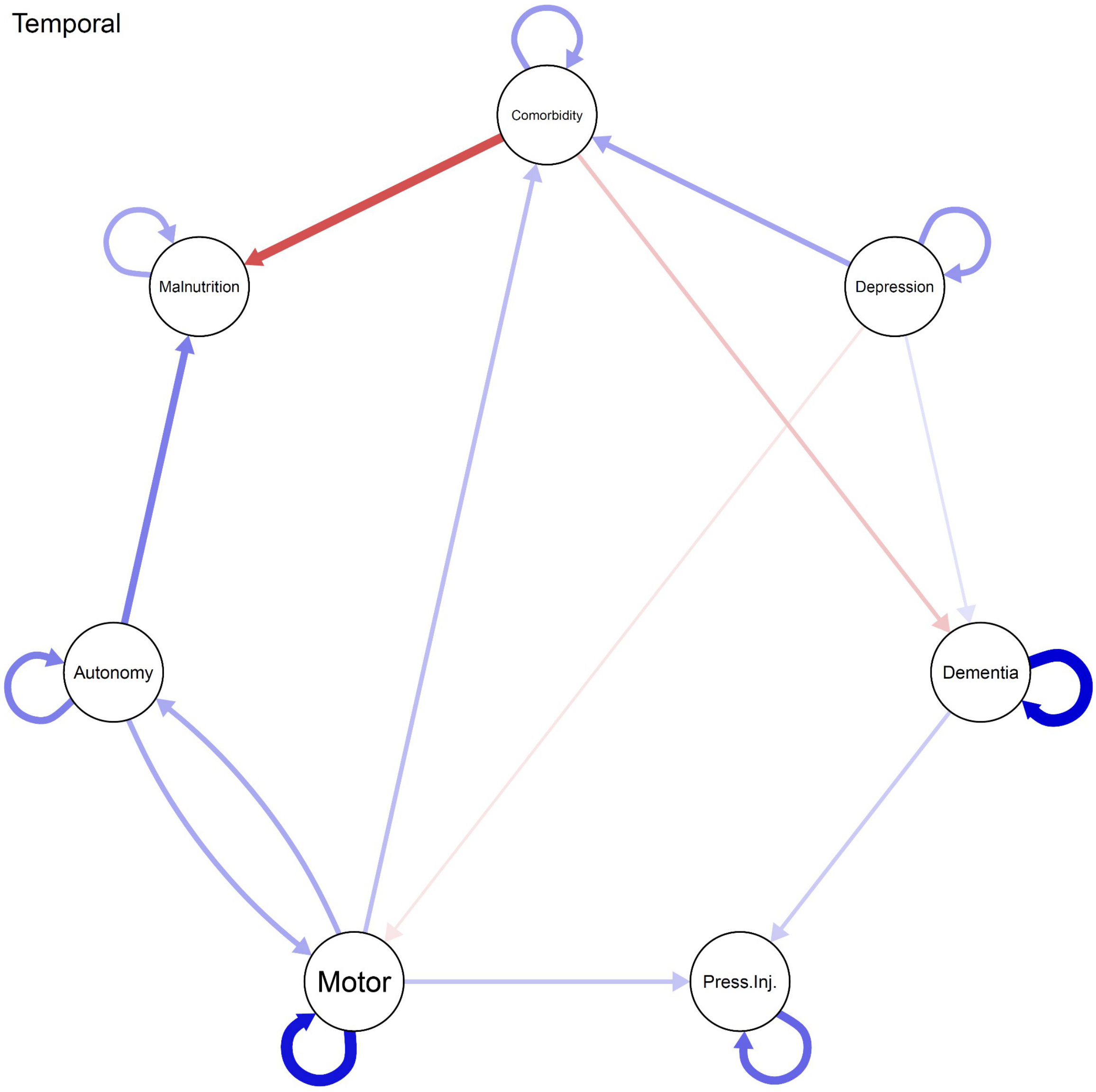
For ease of interpretation, the Barthel, Tinetti, Braden and MNA scale scores were recoded multiplying them by -1. This way, before fitting the network models, all variables were recoded to indicate a worse level of symptoms or diseases. We obtained two types of networks: the temporal one, encoding the predictive relationships between the nodes of the system in subsequent assessment time windows. The direction of relation is expressed through a link with an arrowhead pointing from one node to the other. The temporal network shows autoregressive relationships (an arrow pointing at the same node) which indicates a stability of the symptom in the next time window (for example, if an elderly has depressive symptoms, s/he is more likely to feel depressed at the following time window); as well as cross-lagged relationships, indicating temporal networks between among nodes (see e.g., Bringmann et al., 2013; Epskamp et al., 2018; Epskamp. 2020). Relationships represent standardized regression coefficients (betas). The contemporaneous network, encoding the relationships between nodes at the same timepoint, visualized without an arrowhead to indicate that such relationships are always symmetric, being impossible to determine any sort of directionality using data at the same timepoint, and thus without a temporal direction. Contemporaneous relationships represent partial correlations.

All analyses were carried out in the R statistical language, version 4.3.1 (R Core Team, 2023). Package psychonetrics (version 0.11.5; Epskamp, 2020) was used to run network analysis, package qgraph was used to plot networks (Epskamp et al., 2012).

Results

The temporal and contemporaneous networks are reported in Figures 4.1 and 4.2 respectively. The exact values of all edges of the temporal and contemporaneous networks are reported in Tables 4.3 and 4.4, respectively.

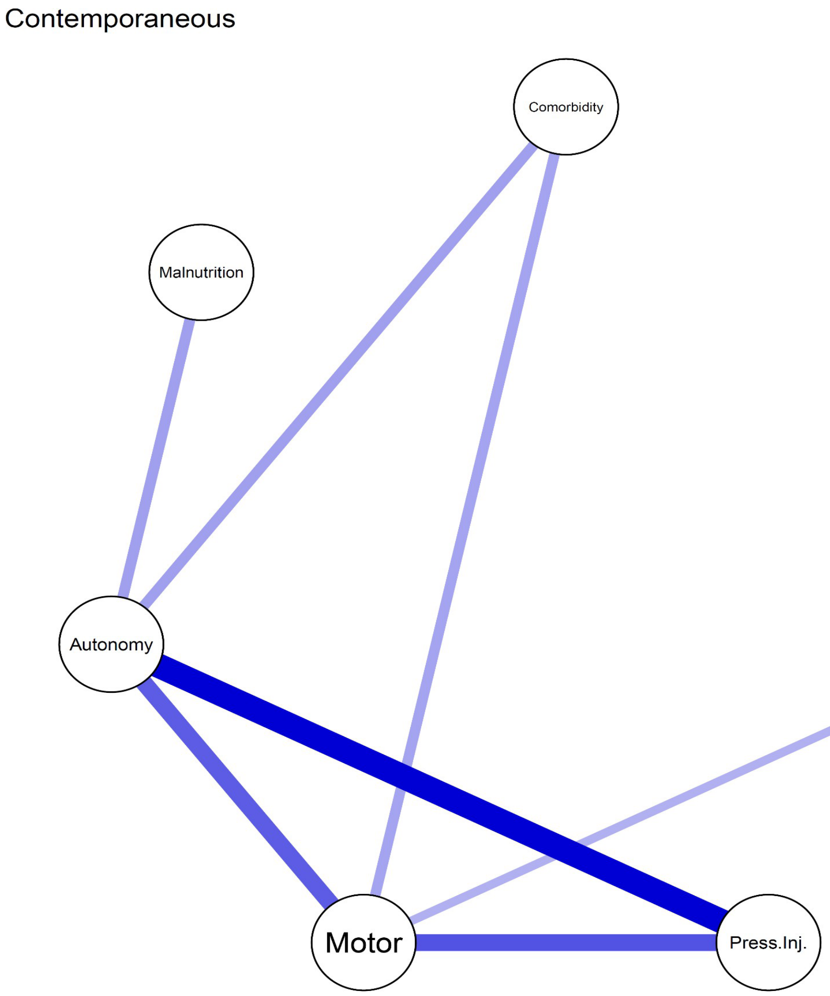
Figure 4.1. Temporal Network



Note:

Temporal network. Blue edges indicate positive relationships, red edges indicate negative relationships. All nodes/variables are coded to indicate a worse level of symptoms or diseases, hence blue edges indicate reinforcing connections among diseases, whereas red edges indicate mitigating connections.

Figure 4.2. Contemporaneous Network

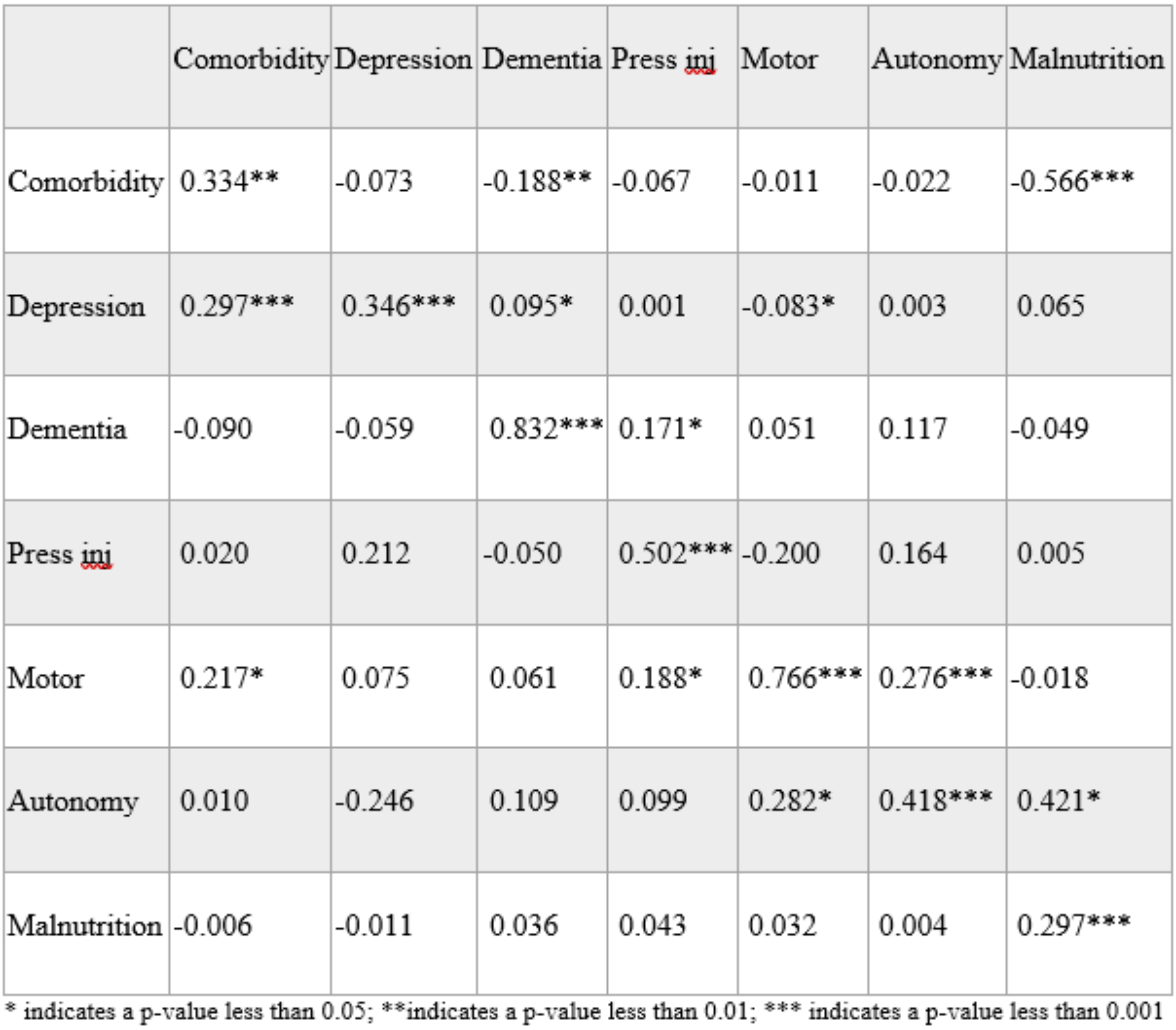


Note:

Contemporaneous network. Blue edges indicate positive relationships, red edges indicate negative relationships. All nodes/variables are coded to indicate a worse level of symptoms or diseases, hence blue edges indicate reinforcing connections among diseases, whereas red edges indicate mitigating connections. No negative edge is present in the contemporaneous network.

The temporal network in Figure 4.1 shows positive autoregression (an arrow pointing at the same nodes from which it emanates) of all variables. This indicates a certain stability of the symptoms over time so, for example, if a person is depressed s/he is likely still depressed the next time window of assessment. Several significant cross-lagged relationships also emerged. Higher LLD scores predict the severity of comorbidity in the next measurement occasion. In turn, somehow unexpectedly, more severe comorbidities predict lower malnutrition risk and a slightly lower staging of dementia. Conversely, higher motor ability predicts less severity of comorbidity, less malnutrition risk and less dependence in daily autonomies. For what concerns staging of dementia, it predicts higher risk of pressure injuries and is predicted by higher depressive symptom scores. LLD also predicts lower scores on the motor scale in the next time window of measurement. Higher scores in autonomy seem to predict motor ability and a lower risk of malnutrition in the subsequent six months.

Table 4.3. The exact values of all edges of the temporal network.

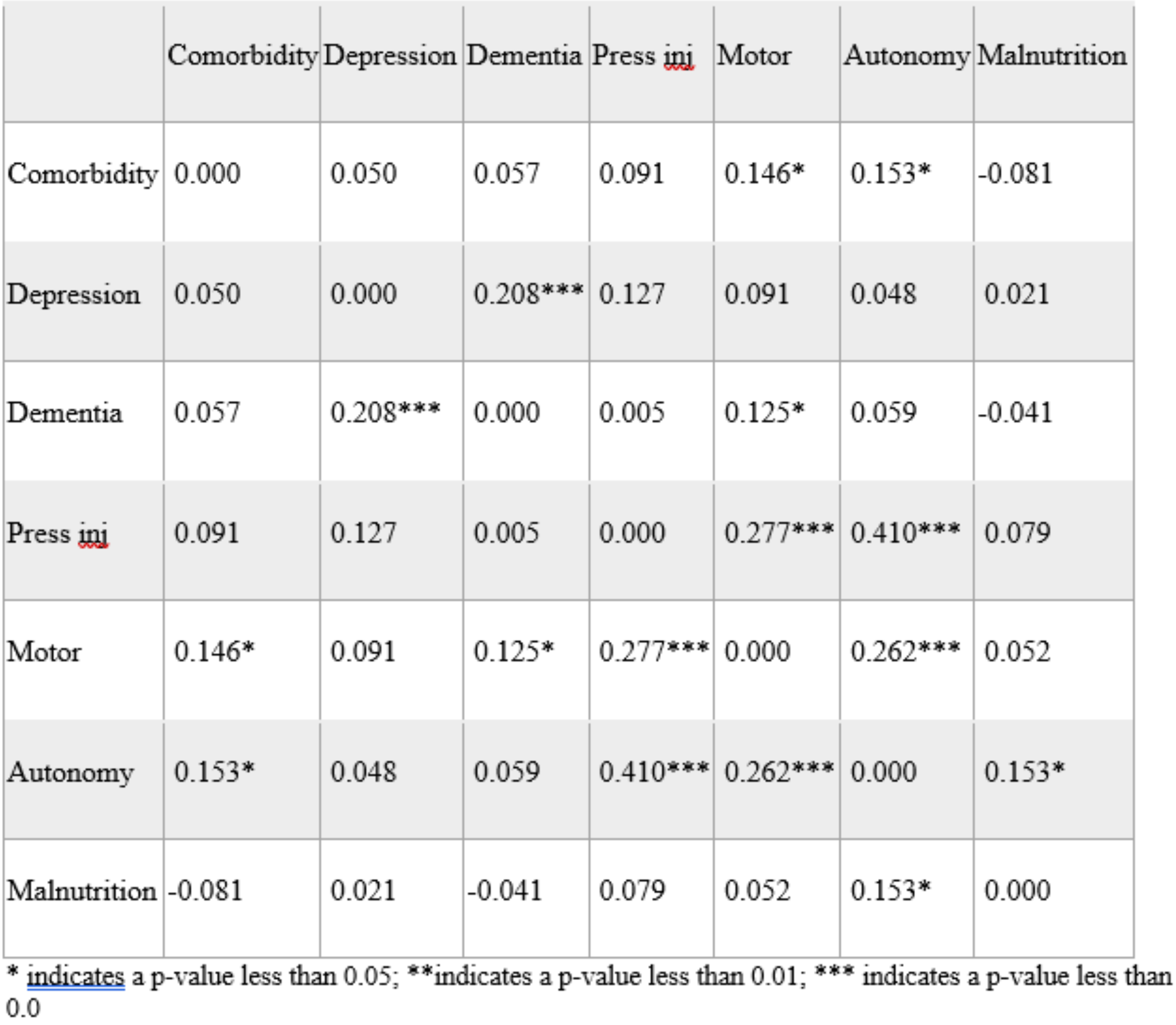


	Comorbidity	Depression	Dementia	Press inj	Motor	Autonomy	Malnutrition
Comorbidity	0.334**	-0.073	-0.188**	-0.067	-0.011	-0.022	-0.566***
Depression	0.297***	0.346***	0.095*	0.001	-0.083*	0.003	0.065
Dementia	-0.090	-0.059	0.832***	0.171*	0.051	0.117	-0.049
Press inj	0.020	0.212	-0.050	0.502***	-0.200	0.164	0.005
Motor	0.217*	0.075	0.061	0.188*	0.766***	0.276***	-0.018
Autonomy	0.010	-0.246	0.109	0.099	0.282*	0.418***	0.421*
Malnutrition	-0.006	-0.011	0.036	0.043	0.032	0.004	0.297***

* indicates a p-value less than 0.05; **indicates a p-value less than 0.01; *** indicates a p-value less than 0.001

The contemporaneous network (Figure 4.2) shows a positive relationship between severity of comorbidity and both motor and autonomy scale: when residents have greater severity of comorbidity they have greater impairment in motor ability and in daily autonomy. There are also positive relations between dementia and motor ability: the more the severity of dementia progresses, the more evidence of impaired motor skills is shown. A positive relationship emerges between dementia and depression, between motor scale, pressure injuries risk and autonomy in daily activity, and between this latter and malnutrition risk.

Table 4.4. The exact values of all edges of the contemporaneous network.



	Comorbidity	Depression	Dementia	Press inj	Motor	Autonomy	Malnutrition
Comorbidity	0.000	0.050	0.057	0.091	0.146*	0.153*	-0.081
Depression	0.050	0.000	0.208***	0.127	0.091	0.048	0.021
Dementia	0.057	0.208***	0.000	0.005	0.125*	0.059	-0.041
Press inj	0.091	0.127	0.005	0.000	0.277***	0.410***	0.079
Motor	0.146*	0.091	0.125*	0.277***	0.000	0.262***	0.052
Autonomy	0.153*	0.048	0.059	0.410***	0.262***	0.000	0.153*
Malnutrition	-0.081	0.021	-0.041	0.079	0.052	0.153*	0.000

* indicates a p-value less than 0.05; **indicates a p-value less than 0.01; *** indicates a p-value less than 0.0

Discussion

The process of aging brings with it a series of organic, physical-body, psychological, social-relational changes. Entry into the nursing home is often dictated by cognitive and/or functional impairments (Shapiro and Tate, 1985; Greenberg and Ginn, 1979) that result in a decrease in the person's autonomy and a need for daily care, stress of family caregivers and mental and physical burden of professional caregivers. The present study has a twofold purpose: to identify the relationship between the bio-psycho-social variables measured at nursing home entry and every six months to explore which aspects predict the elderly person's functioning in the subsequent assessment time window and the direction of that predictive relationship; to analyze whether and which variables predict each other in the same time window. Working in terms of prevention and intervention on risk factors is a resource for the quality of life of the older person and all those involved in the care process.

We performed a contemporaneous and temporal network analysis considering the variables related to severity of medical comorbidities, depressive symptomatology, dementia staging, risk of pressure injury, motor skills (and thus fall risk), level of autonomy/dependence in performing daily activities (and the relative need for assistance from professional caregivers), and malnutrition risk.

Interestingly, several studies conducted in nursing homes have highlighted the prognostic role of comorbidities. Specifically, in addition to age and male gender, the presence of neurodegenerative diseases, such as dementia, or cardiovascular diseases, such as stroke or heart problems, or even the presence of diabetes mellitus and low hemoglobin levels are considered negative prognostic factors (Van Dijk et al., 2005). With respect to the bio-psycho-social variables considered in our study, the severity of the comorbidity in the subsequent assessment time window is predicted solely by the severity of the depressive symptoms. Late Life Depression (LLD) therefore appears to represent a risk factor for a worsening of the severity of the pathologies present in the residents in the following six months, while within the same evaluation time window a relationship between these two variables does not emerge. This is partially in line with what emerges from previous research. On the one hand LLD is a risk factor for pathologies such as diabetes, cancer, cardiovascular disorders and major neurocognitive disorder but, on the other hand, LLD can precipitate and persist due to medical conditions that may arise during aging, such as the presence of a minor neurocognitive disorder, mobility, vision disorders, and subjective memory impairments (Devita et al., 2022). In our sample in nursing homes, we didn't find this kind of bidirectional relation.

Motor ability appears to be a protective factor for the severity of clinical comorbidities at the temporal level. Even at the contemporary level these two variables show a negative relationship: high scores on the motor scale are related to lower scores in severity of the comorbidity, regardless of the direction of this relationship. An intriguing and counterintuitive result is that a greater severity of the pathologies predicted a lower risk of malnutrition and a lower clinical staging of dementia in the following six months. For what concern malnutrition, after discussing this result with the health director[4] of both nursing homes, we concluded that it could reflect two aspects of the institutionalization factor (Carrier et al., 2007; Abbey et al., 2015): Interventions are administered by professional caregivers to prevent malnutrition, which tend to be stronger for those in poorer health conditions. For example, menus are planned and chosen on the basis of the nutritional needs of the elderly person, for whom they are acquired and structured over time in preventive terms. A particular care is given to those with poorer general health. In addition, operators tend to intervene directly to nourish residents with more severe coexisting pathologies, for example by administering food for dysphagia, by feeding the resident directly, or, in extreme situations, by positioning a PEG (Percutaneous Endoscopic Gastrostomy), which consists in the surgical application of a probe connecting the stomach to the outside. In all these cases, the risk of malnutrition decreases due to the external intervention of the operator.

With higher comorbidities, this might explain the paradoxical negative relationship between comorbidities and malnutrition risk. We do not have access to data regarding daily interventions administered to residents to assuage malnutrition risk, hence this should be considered a speculative explanation of this result, that could be tested in future targeted studies.

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[4] We wish to thank Dr. Marina Olivieri, the health director of both nursing homes, for offering important insights that allowed clarification of this relationship

For the case of dementia, the direction of relation with comorbidity could be due to the low sensitivity of the CIRS towards dementia symptoms. In fact, item 14 which considers the psychiatric and behavioral problems, which include dementia, is excluded from the calculation of the comorbidity considering only the organic neurological aspects. Within the same evaluation time window, these variables (comorbidity and malnutrition, comorbidity and dementia) are not related to each other. For what concerns depressive symptoms, it is interesting to note that higher scores, and therefore the presence of symptoms that define or aggravate the depressive picture, predict a greater severity of dementia in the following six months. In our sample, the number of elderly people whose score in depressive disorder was greater than 9 (cut-off for depression) at least once over the data collection window is 89/180, indicating that approximately half study participants experienced important depressive symptoms during their institutionalization. What emerged is in line with prevalence data of LLD: in 60 years old population is about 5.7%; it increases until reaching the peak of 27% in over- 85; interestingly, the prevalence of LLD is even worse (reaching 49%) for those living in nursing homes (Devita et al., 2022). The complex relationship between LLD and dementia is known in the literature (Byers et al., 2021). Studies on this topic propose looking at LLD as a risk factor for dementia when symptoms emerge in adulthood and do not go into remission. On the other hand, when the onset of symptoms occurs in old age, this is considered a prodromal factor that means one of the symptoms through which dementia manifests itself (Lee at., 2011). Our data confirm, both at a contemporary and temporal level, the presence of a significant relation between these two variables. The severity of LLD symptoms at the time of the multidimensional assessment therefore appears to be a risk factor for a greater severity of dementia in the following six months.

Pressure injuries represent another severe medical condition that impacts the quality of life of the elderly in nursing homes (Agostini et al., 2001). The analysis of the temporal network reveals how the severity of the staging of dementia constitutes a risk factor for ulcers by predicting a greater risk of pressure injuries in the following time window, while motor capacity (including balance and lower risk of falling) represents a protective factor. In the contemporaneous network analysis, the predictability between dementia and pressure injuries does not emerge while the one between this latter and motor scale is maintained. At this level of analysis, higher scores on both of the precedent scales predict higher scores in functional autonomy. Therefore, in the same evaluation window, those with greater motor capacity have a lower risk of pressure ulcers and greater functional autonomy. At the temporal level, pressure injuries and autonomy in daily activities lose their predictive ability which is mutually maintained between motor ability and functional autonomy. Interestingly and noteworthy, the risk of malnutrition in the following six months is predicted by the functional capacity of the elderly person. It follows that those who are more autonomous in carrying out daily activities and are less dependent on caregivers to complete the day's tasks are less at risk of being malnourished in the subsequent time of assessment. This predictive relationship is also maintained in the same time window of assessment.

Some limitations of this study need to be mentioned. First, the sample size was relatively limited in terms of number of participants and number of observations per participant to estimate relationships among a large number of variables both at the temporal and at the contemporaneous levels. This has led to the decision of limiting the scope of the study, by reducing the set of variables considered. In addition, the involvement of two nursing homes limited the possibility to examine variation due to specific features of each home. Furthermore, a six-month temporal resolution might not be adequate to observe phenomena who happen on a faster temporal scale. Collecting data over a long time on nursing home residents is particularly difficult, because these patients often remain in the facility for a limited period of time. However, future studies might consider implementing more frequent assessments, to improve the temporal resolution of the temporal networks (e.g., Hamaker et al., 2015). Despite such limitations, our study contributes to bring to light the importance of the analysis of the relations between bio-psycho-social data in nursing homes to shift the attention of social-health workers and institutions to risk and protective factors which play a key role in the maintaining the psycho-physical balance of the elderly person. In particular and noteworthy, it helps to better clarify the direction of relation between LLD and severity of dementia in the context of nursing homes. In addition, the added value of this study lies in the use of network analysis, that allows identifying with more clarity predictive factors over time of the deterioration or maintenance/improvement of the aspects concerning the functioning of residents in their complexity.

Chapter 5. Conclusions and future developments

Conclusions

In this work we showed how the bio-psycho-social variables collected through multidimensional geriatric assessment can be used by organizations for knowledge, preventive and intervention purposes. In the first chapter we present an introduction to the main topic of aging and life in nursing homes, we address the aspects inherent to multidimensional assessment, going into detail about the rating scales, we explore neurocognitive disorder, Late Life Depression (LLD) and end- of-life and death.

In the second and third chapter we explore, through longitudinal studies, the impact of Covid-19 pandemic on residents' well-being and the predictive relations between bio-psycho-social variables, respectively. In particular, In the first study (Chapter 2), we identified six semestral time windows (labeled T1-T6) during a three-year period starting from September 2018 to March 2021. Since the COVID pandemic was declared on March 11th, 2020, we could use changes between T1 and T3 to monitor the pre-pandemic longitudinal evolution of residents and changes between T3 and T5 as reflecting the short-term effects of the pandemic period. From the comparison of the scores obtained on the rating scales during the period of time considered by the study, we identified a consistent pattern of declining bio-psycho-social functioning among older adults residing in institutions. This deterioration became notably apparent with the onset of the COVID-19 pandemic and the subsequent implementation of restrictive measures in nursing homes aimed at infection prevention and control.

Interestingly, a marked decline in these scores emerged from T4 onwards, and this decline was not exclusive to individuals who had tested positive for COVID-19. This underscores the substantial influence of the pandemic, its social and organizational ramifications, on the bio-psycho- social well-being of older adults. During the initial six months of the pandemic (T4), we observed worsening in general cognitive function (MMSE), motor skills (Tinetti), ulcer risk (Braden scale), and a noticeable loss of body weight. As the pandemic persisted into the subsequent six months (T5), we noted further deterioration in basic self-care abilities (BADL), malnutrition risk (MNA), severity of comorbid conditions (CIRS severity), and dementia severity (CDR). Additionally, the residents' neuropsychiatric well-being, as measured by the NPI (Neuropsychiatric Inventory), declined during T5.

Interestingly, these same neuropsychiatric symptoms exhibited a tendency to recover in the subsequent time period (T6). Contrary to the hypothesis, COVID-19 positivity did not appear to exert a direct impact on the bio-psycho-social variables examined. Instead, the study highlighted the overarching influence of the pandemic period, which manifested as an immediate functional decline followed by subsequent effects on psychological well-being. These latter effects were likely attributable to the constraints on social and relational interactions imposed during the pandemic.

In the second study we used Network Analysis to study contemporaneous and temporal relations between seven main variables that encompassed various aspects of Individualized Care Plans (ICP) evaluation. These variables include the severity of medical comorbidities, depressive symptomatology, dementia staging, risk of pressure injuries, motor skills (indicative of fall risk), levels of autonomy/dependence in performing daily activities, and the associated need for professional caregiver assistance, as well as the risk of malnutrition. The temporal network reveals autoregression, indicating a general persistence of symptoms over time. For instance, if an individual experiences LLD, they are likely to remain depressed in the subsequent assessment period. For instance, connections between depressive symptomatology and autonomy/dependence in daily activities shed light on the psychological impact of physical limitations. Understanding these relationships is pivotal in crafting tailored interventions that address the multifaceted nature of elderly individuals' health. This insight underscores the importance of longitudinal assessments and targeted interventions, emphasizing the need for sustained attention to mental health and other key indicators. Notably, several temporal and contemporaneous relationships emerged among several variables of interest, shedding light on the complex interplay of bio-psycho-social factors in determining residents' wellbeing in nursing homes. This study underscored the significance of examining the connections between bio-psycho- social data in nursing homes at different levels over time. This approach aims to refocus the attention of healthcare professionals on the factors that pose risks and offer protection, which are crucial in preserving the overall well-being of elderly individuals. In essence, the value added by this study is in its application of network analysis to identify the factors that predict the deterioration or preservation/improvement of various facets of an elderly person's overall functioning, taking into account its multifaceted and multivariate nature. In conclusion, this research marks a significant step towards a more nuanced understanding of the factors influencing the well-being of residents in nursing homes. By employing Network Analysis, the study not only uncovers hidden connections between variables but also provides a valuable framework for healthcare professionals to develop targeted interventions. As the aging population continues to grow, the implications of this research are paramount in shaping the future of healthcare in nursing homes, fostering a holistic and person-centered approach that prioritizes the overall well-being of the elderly.

Further studies should improve the analysis involving more than two nursing homes and including structures in different regions of Italy, from North to South. This would allow exploring the role of territorial differences in the bio-psycho-social performance of residents, longitudinally over time.

In conclusion, this comprehensive study has illuminated the multifaceted challenges faced by elderly individuals in nursing homes, emphasizing the critical need for holistic care that extends beyond the confines of specific health issues. It has underscored the significance of addressing the whole person, considering their history, clinical, social, and relational dimensions, in providing the best possible care. As we navigate the complexities of major neurocognitive disorders, LLD, end-of-life care, and adapt to the transformative impact of events like the COVID-19 pandemic, it becomes increasingly clear that a person-centered approach, multidimensional assessment, and professional support are essential in ensuring the psychophysical well-being of our elderly residents. This study offers valuable insights and recommendations for healthcare and social organizations, shedding light on the interplay of factors that influence their well-being. By recognizing and acting upon these findings, we can better serve our aging population, fostering a brighter and more fulfilling journey for our elderly loved ones in nursing homes.

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