



PREVALENCE OF DEPRESSION AND COGNITIVE IMPAIRMENT IN OLDER ADULTS OF NORTH AND SOUTH EUROPEAN COUNTRIES FROM 2019 TO 2022: A MINI SYSTEMATIC REVIEW

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ABSTRACT This systematic review aims to summarize the best-available evidence concerning the prevalence of cognitive impairment and depression in the northern and southern European countries from 2019 to 2022. A computerized literature research was executed, using a stepwise searching approach. PubMed, EBSCO and Scopus databases were searched for studies published from 2019 to 2022. Findings suggest that in the years 2019-2022 the prevalence of depression and cognitive impairment was higher in southern European countries than in northern European countries. However, northern European countries had faster annual cognitive decline. A result that could be explained by the prevention strategies that each country is using, the Mediterranean diet adherence, lifestyle and the COVID-19 impact. The findings presented here contribute to a better understanding of the prevalence of cognitive impairment and depression in older adults of north and south Europe from the year 2019 which signaled the impact of COVID-19 situation. This may be a starting point for further research.

KEYWORDS : cognitive impairment; depression; North and South Europe

INTRODUCTION

Depression and cognitive impairment are common mental health problems among older adults and often there is a co-occurrence (Aajami et al., 2020). Cognitive impairment has a severe impact in functioning and quality of life of older adults, thus increasing the risk of the development of depressive symptomatology (Perini et al., 2019).

Focusing on Europe, the prevalence of cognitive impairment in 2020 was between 5.1 and 24.5% (Pais et al., 2020). When it comes to the examination of the data regarding cognitive decline and dementia in Europe, the data of 2018 by the Alzheimer Europe Organisation (2018) suggest that the overall prevalence of dementia at the age range of 65-69 was 1.3%, of 70-74 was 3.3%, of 75-79 was 8% so on and so forth. Therefore, it is estimated that every 5 years the prevalence doubles. The top countries were Italy with 2.12% prevalence, Greece with 1.99%, Germany with 1.91%, Portugal with 1.88%, France and Spain with 1.83%. Thus, it is noticeable that in 2018 a high number of southern European countries were at the top of the list regarding the prevalence of cognitive impairment. This led us to investigate if there is indeed a disparity between north and south European countries.

Formanek et al (2019) suggested that the annual cognitive decline of the older adults in the Mediterranean countries by the year 2019 was 0.23%, in Scandinavia it was 0.59%, in Western Europe 0.28% and in Eastern and Central European countries it was 0.25%. Hence, taking into consideration the aforementioned information it seems that although the prevalence of dementia is higher in south Europe, north European countries seem to have a faster cognitive decline.

Depression on the other hand, is one of the most common mental disorders and according to the Eurostat (2021) 7.2% of people in Europe suffer from it. However, when it comes to the older adults in Europe, although self-reported depressive symptoms in 2021 were fewer in southern European countries (Maskileyson et al., 2021) according to Horackova et al (2019), by the year 2019 the prevalence of depression in the older adults was highest in Southern Europe (35%), in Central and Eastern Europe was 32%, in Western Europe was 26% and in Scandinavia it was 17%. There is a strong association between depression and chronic diseases, pain, cognitive impairment, and limitations in daily life activity (Horackova et al., 2019). Furthermore, statistical data of 2020 report that 36% of the older adults

have at least two chronic health conditions (OECD, 2020). Among the countries with the highest percentage of chronic diseases in the older adults were Hungary, Poland, Croatia, France, Luxembourg and Germany. On the other hand, lower percentages showed Malta, Denmark, Netherlands, Sweden, Slovak Republic and Italy (OECD, 2020). That said, it is crucial to stress at this point that, according to OECD (2020), long COVID will likely increase the prevalence of chronic diseases in older adults in the upcoming years.

Furthermore, the pandemic led to disruptions in the provision of health care, especially in the early months. About 30% of long-term health care patients reported forgotten or postponed care in 2020 (OECD, 2020). Atzendorf et al (2021) suggested that confirmed restrictions, due to the pandemic, had a negative impact on the mental health of the older adults and it was observed that feelings of loneliness and depression were increased.

According to Arias-de la Torre et al. (2021) the lifestyle of a person can be easily affected by a variety of reasons, one of them is the clinical symptoms of depression. Burke et al. (2016) suggest that there is an association between depression and development of MCI and later of AD. Their study examined the association of APOE and AD showing that the hazard of developing AD was 8 times higher for the patients with recent depression and $\epsilon 4$ homozygote (Burke et al. 2016). Tsolaki et al (2018) argued that prevalence of depression in Europe perhaps could be affected by the frequency levels of Apoe $\epsilon 4$. More specifically, southern European countries demonstrate lower levels of Apoe $\epsilon 4$ than northern European countries (Tsolaki et al., 2018). Thus, it is visible that a combination of genetic factors and depression caused by various reasons during the life course of a patient contributes to the development of cognitive impairment and its clinical symptomatology.

It is imperative to mention that according to Shin (2022) dementia has affected 55 million people worldwide in 2022 and this number is estimated to rise to 78 million by 2030. Also, scientific studies support that depression enhances cognitive impairment. According to Navnee and Abdijadid (2022), by 2030 depression will be the first cause of burden of disease. Additionally, reports of a comparative study showed that the proportion of older adults affected with depression was significantly higher in Europe (10.9%) (Barua et al., 2011). The data constitute the importance of this systematic review to the scientific

community.

This systematic review focuses on examining the prevalence of cognitive impairment and depression in the older adults of north and south Europe after the year 2019 which signaled the beginning of the COVID-19 situation. We chose to distinguish Europe in South and North due to differences in prevention strategies, lifestyle and Mediterranean diet Adherence. Furthermore, by analyzing scientific studies from 2019 until 2022, we are trying to determine which risk factors are different and how depression affects the progress of cognitive impairment.

METHODS

Search Strategy

A systematic search following the PRISMA 2020 flow diagram was conducted on Scopus, PubMed and EBSCO from 2019 to 2022. We chose the year 2019 due to COVID-19 situation that was spread across Europe. The aforementioned databases were chosen because they provide a variety of well-documented and scientific articles. The search terms that were used must have the following terms in their title, abstract or keywords: (Cognitive impairment) and (Depression) and (Europe). To include a study, it should meet the following criteria: (a) to be conducted in Europe and (b) to be written in English (c) the study had to examine the relationship between depression and cognitive impairment. Studies were excluded if the experiment was not focused on the above terms of interest. Systematic reviews and meta-analyses were excluded as well and it is important to mention that not all studies selected were cross-sectional.

Literature search located 166 articles in the Scopus database, 1,157 in the PubMed database and 11 in EBSCO database. In total, there were 1,334 potentially relevant references. After removing the duplicates and the studies that were conducted before 2019, 258 studies remained. Of these, we excluded 247 studies after the assessment of title, abstract, region/country, context language and participants' age limit and eleven (11) references finally met the inclusion criteria. Four of them were review studies.

Hence, applying all the above criteria, the systematic review was conducted based on 7 articles. The flowchart of included studies is presented in

Table 1. Characteristics Of The Reviewed Studies

Study	Country	Age range (y)	N	Results
Mantzorou et al. (2020)	Greece	>65	2,092	The degree of Mediterranean diet adherence was shown to be positively connected to cognitive status. Adherence to Mediterranean diet was linked to depression. Participants with very low cognitive status and low Mediterranean diet adherence scored higher on the GDS than those with moderate or high Mediterranean diet adherence.
Vlachos et al. (2019)	Greece	≥65	1,456	Lower cognitive performance and symptoms of depression/anxiety are associated with prevalent SCD. SCD is more common in people who are genetically susceptible to dementia and depressive or anxious moods are risk factors for this type of prevalence.
Welstead et al. (2021)	UK	Mean age 69.5	292	A higher number of depressive symptoms increased the risk of returning from MCI to healthy cognition, and a history of cardiovascular disease increased the likelihood of maintaining MCI stable during the course of the study.
Wiegand et al. (2019)	Switzerland	≥70	273	Senior trauma patients with depressive symptoms during acute care were more likely to have cognitive decline.
Zipprich and Prell (2021)	Germany	Mean age 68.3	303	People who do not know about the precise dosage and reason about their prescribed medication have lower cognitive performance and depressive mood compared to the patients who are aware about these.

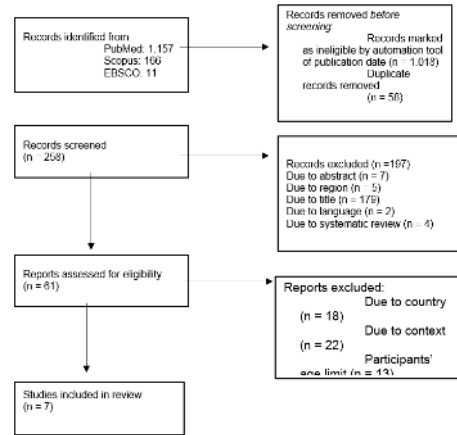


Figure 1. PRISMA 2020 Flow Diagram For New Systematic Reviews Which Includes Searches Of Databases And Registers Only

Study Characteristics

The selected articles were published from 2019 onwards, which means that these studies provide recent information. The 7 studies were conducted in five different countries, including Greece (n = 2), UK (n = 1), Germany (n = 1), Spain (n = 2), and Switzerland (n = 1). Adults ≥ 65 years old participated in the experiments.

Measurement Tools

A variety of tasks and materials were used in the different studies (n = 7) for assessing depressive symptoms and cognitive function. In particular, for depressive symptoms were used the following tasks: the Geriatric Depression Scale (GDS) (3/7), the Hospital Anxiety and Depression Scale (HADS) (2/7), the diagnosis of depression according to DSM-V (1/7), and a questionnaire with a single ordinal 9-point Likert scale (1/7).

As regards the evaluation of cognitive function, were used the following tests: the Mini-mental State Examination (MMSE) (3/7), the Montreal Cognitive Assessment (MoCA) (1/7) the Subjective Cognitive Functioning (SCF) questionnaire (1/5), and the global deterioration scale (GDS) (1/7).

Agüera-Ortiz et al. (2021)	Spain	-	37 expert physicians in neurodegenerative diseases (19 neurologists, 17 psychiatrists, and 1 geriatrician)	Depression in the older adults could be considered as an early sign of dementia, hence a risk factor.
Cantón-Habas et al. (2020)	Spain	≥65	219	Depression could increase the risk of dementia and if a treatment is provided this risk could be reduced.

RESULTS

About “results”, we decided to create two main sub-sections to make it clearer and easier to understand the differences between northern and southern European countries. Sub-sections have been divided with a view to include studies, whose results are related to the same geographical area.

Cognitive impairment and depression in southern European countries
When it comes to understanding the situation in the southern European countries, several scientific studies have taken place. The aim is to examine some of the imperative elements that constitute the relationship between depression and the effect of cognitive impairment. First, we need to conceptualize the importance of depression in the development of cognitive impairment and then to compare the studies that were conducted in the southern European countries with those that were conducted in the northern European countries, to determine if there are any significant differences that can explain the variance in the prevalence of depression and cognitive impairment in each European country.

That said we need to take into consideration other external factors that have considerably affected the levels of depression in the older adults since 2019. The first and most important one could be considered the ongoing pandemic of Covid-19. Josefine Atzendorf and Stefan Gruber (2021) report that countries that were hit very hard by the first wave of the pandemic regarding the mortality rates will have higher levels of depression, especially the older adults that were in the center of it. To that end, countries reporting the highest levels of depression in 2021 were Spain, Italy, Portugal, Belgium, Cyprus and Greece (Atzendorf & Gruber 2021). Thus, it is understandable that due to the pandemic, the levels of depression were higher in the southern European countries than in the northern ones. If we consider that before the pandemic the levels of depression were higher in the Northern European countries, this is a peculiar change of results.

Four studies have been conducted in the southern European countries. An interesting suggestion, from a scientific perspective, is the one that is offered to us by Vlachos et al. (2019). Their study was conducted in Greece and its title was the “Prevalence and determinants of subjective cognitive decline in a representative Greek persons 65 years and older. They focused on the understanding of subjective cognitive decline (SCD) and its determinants, for instance depression and anxiety. They found out that SCD regarding memory is more frequent than non-memory decline in the cognitively normal Greek older adults (Vlachos et al., 2019). Moreover, genetic predisposition to dementia, lower cognitive performance, affective symptoms, and increased cerebrovascular risk according to Vlachos et al. (2019) are associated with prevalent SCD. Therefore, when a patient starts to perceive his/her memory decline and he/she starts to have low levels of cognitive performance then the depression or anxiety can be considered as potential risk factors (Vlachos et al., 2019).

In 2020 a case control study was conducted investigating depression as a risk factor for dementia and Alzheimer's Disease (AD) in the older adults of Spain, a southern European country. More specifically, Cantón-Habas et al (2020) after having identified possible relationships between these pathologies stated that predictor factors for dementia and AD could be the depressive symptomatology of the patient, dyslipidemia, type 2 diabetes mellitus and hypertension. Their results confirmed the aforementioned hypothesis (Cantón-Habas et al., 2020). Thus, depression could increase the risk of dementia and if a treatment is provided this risk could be reduced (Cantón-Habas et al., 2020).

Additionally, a study which could serve as further proof that there is a relationship between depression and dementia in southern European countries and that was conducted in 2021, was the second study of Spain. Agüera-Ortiz et al (2021) examined the risk factors and the clinical management of the aforementioned pathologies and they argued that there is indeed a relationship between dementia and depression. Furthermore, they propose that more scientific research

should be conducted so as to understand in depth diagnostic criteria and treatment approaches (Agüera-Ortiz et al., 2021). That said, the study of Agüera-Ortiz et al (2021) suggested that depression in the older adults could be considered an early sign of dementia, hence a risk factor. Routine cognitive check ups in depressed patients should be adopted (Agüera-Ortiz et al., 2021).

Finally, another study that we considered crucial for this systematic review and that was also conducted in Greece was the one which proposed a method to lower the risk of cognitive decline and depression. Mantzourou et al. (2020) argued that if a patient follows a balanced Mediterranean diet (MeDi) then their cognitive status will be strengthened, and their depressive symptoms will be lowered. Thus, from this study we understand two important things regarding cognitive impairment and depression. According to Mantzourou et al (2020), MeDi serves as a protective factor against depressive symptomatology and against cognitive decline. Hence, high adherence to MeDi is associated with lower levels of depressive symptoms and lower levels of cognitive impairment (Mantzourou et al., 2020).

Cognitive impairment and depression in northern European countries
Welstead et al. (2021) found that in the UK, the presence of a greater number of depressive symptoms may decrease the chance of returning from MCI to healthy cognition, whereas a history of cardiovascular illness raises the likelihood of remaining MCI stable.

Another study which was conducted in Switzerland found that senior trauma patients with depressive symptoms had lower scores on the MMSE during acute care. So, they concluded that cognition and depression are correlated (Wiegand et al., 2019). Notably, Zipprich and Prell (2021) observing patients who were not aware about the exact dosage and purpose of their prescribed medication supported that they had low cognitive performance and low depressive mood.

DISCUSSION

The above studies that focused on the investigation of the link between depression and cognitive impairment in the older adults show that indeed there is a statistical positive correlation regarding these two factors. However, in order to explain and understand the reason why there is a relationship between these two variables and the geographical position of the populations, we need to adopt a multifactorial perspective. In other words, it is crucial to understand that depression which is positively correlated with cognitive impairment is affected by many factors such as: diet, physical exercise, mental exercise and social isolation (Ljungberg et al., 2020).

According to Freberg and Taglialatela (2022) brain pathology in depression and Alzheimer's disease, which starts after mild cognitive impairment, demonstrates decreased hippocampal volume. Moreover, severe disease is associated with smaller hippocampal volumes in both disorders and a way to delay this process is physical exercise (Freberg and Taglialatela, 2022).

Nikitara et al. (2021) after having conducted a statistical analysis to examine the prevalence of physical activity across Europe came to the conclusion that a significant percentage of adults in Europe were physically inactive. More specifically, the highest proportion of physical inactivity was in the countries of southern Europe (Nikitara et al, 2021), something that could explain the high percentage of depression in the Mediterranean countries according to Horackova et al (2019).

In this systematic review we also mentioned the importance of the Mediterranean Diet (MeDi) on depression. There are numerous diets that were created to promote a healthy lifestyle. One of the most effective ones is the MeDi (Davis et al., 2015). Notably, the study by Ballarini et al. (2021) indicated that the MeDi may improve memory, cognition, and brain volume. In detail, researchers found that higher levels of MeDi are positively correlated with larger medial temporal gray matter volume, less amyloid and less pTau pathology. Hence, it could be suggested that MeDi is a protective factor against cognitive

impairment and AD (Ballarini et al., 2021). Coupled with that, Yin et al (2021) suggest that higher adherence to MeDi at middle age is associated with a lower risk of depression later in life. Therefore, the beneficial factors of MeDi against cognitive impairment and depressive symptomatology are visible.

Limited research has been conducted that investigates the adherence of the MeDi in Europe. Nevertheless, a study which examined the subject was the one by Vilarnau et al. (2019). Their results showed that the top countries showing adherence to the MeDi from 1960 to 2011 in Europe were Greece, Albania, Turkey, Spain and Italy (Vilarnau, 2019). Whereas the countries that showed the lowest adherence were Denmark, Sweden, Norway, Ireland, Germany and Finland (Vilarnau et al., 2019).

Another key factor that research has been focusing on is social isolation. According to Ge et al. (2017) social isolation and loneliness are positively correlated with depressive symptomatology. This is also confirmed by Evans and Fisher (2022). However, we need to take into consideration that the reasons for social isolation may vary. For instance, the levels of social isolation, hence depressive symptoms arose in 2019 due to the COVID-19 pandemic (Atzendorf & Gruber, 2021). Baarck et al. (2022) argue that during the pandemic, loneliness increased by more than 15% in France, Germany, Poland, Portugal and Sweden. Whereas, Croatia, Czech Republic, Greece and Spain experienced a small increase, no more than 10%. That said, before the pandemic the prevalence of loneliness was lower in northern Europe (Baarck et al., 2022). This was also confirmed by the study of Surkalim et al. (2022).

Nevertheless, it is worth mentioning at this point that if we look at the bigger picture, an important risk factor of depression in the older adults is institutionalization (Runcan, 2012). This is because institutionalization leads to loneliness (Runcan, 2012). Steen et al. (2022) argues that there is a direct link between loneliness and depression.

Based on the aforementioned information, it could be assumed that the reason for the prevalence of depression and cognitive impairment being higher in southern European countries and northern European countries having faster annual cognitive decline lies in the prevention strategies that each country uses.

Clinical Implications

- Prevalence of depression and cognitive impairment is higher in the southern European countries in comparison to the northern European countries since 2019.
- Northern European countries have had a faster cognitive decline than southern European countries since 201.

Limitations

Some of the limitations in this systematic review may have introduced potential biases since systematic review is a type of observational research. A thorough search of literature outside of the computerized databases and other languages besides English was not performed. As a result, our systematic review may suffer from publication and language bias. A systematic review is a complex undertaking that may involve hundreds and possibly several thousand articles, depending on the choice of the researchers, which is often based on their professional background. Moreover, there is a possibility of inconsistency that includes clinical or statistical heterogeneity.

CONCLUSION

Having taken into consideration the studies mentioned in this mini systematic review, south Europe has a higher prevalence of depression and cognitive impairment than north Europe (Horackova et al., 2019; Alzheimer Europe Organization, 2018). However, the self-reported depressive symptomatology seems to be lower in southern Europe (Maskileysen et al., 2021). On the other hand, north Europe has lower prevalence of depression and cognitive impairment, but individuals living there seem to have faster annual cognitive decline (Horackova et al., 2019; Alzheimer Europe Organisation, 2018; Formanek et al., 2019).

It could be assumed that there is indeed a disparity between northern and southern European countries. However, this disparity is based on factors that affect depression such as, MeDi, social activity, physical and mental exercise, senior trauma and chronic diseases (Ljungberg et al., 2020; National Institute of Health, 2020; Ballarini et al., 2021; Welstead et al., 2021; Wiegand et al., 2019). To give an illustration,

Northern European countries have higher levels of physical activity than Southern European countries but, they have lower levels of MeDi adherence in which Southern European countries excel (Nikitara et al., 2021).

However, it is important to consider the fact that due to the COVID-19 pandemic the levels of depression were increased (Atzendorf & Gruber, 2021). Coupled with that, due to the confinement measures, physical activity and social isolation was also increased (Baarck et al., 2022). Therefore, it could be hypothesized that these factors affected the levels of cognitive impairment and depressive symptomatology in the years 2019-2022.

In conclusion, every factor which contributes to the development of depressive symptomatology in the older adults may not have the same weightiness as others do. Thus, it could be considered undisputed that more studies need to focus on the aforementioned research gap so as to understand what prevention strategies affect more the levels of depression and the levels of cognitive impairment. Lastly, we encourage further research so as to shed light on the relationship between depression and cognitive impairment in the older adults in the northern and southern European countries and enhance scientific literature.

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