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A review of neuropsychological assessment and non-pharmacological interventions for Moroccan migrants with dementia

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ABSTRACT

Neuropsychological evaluations and non-pharmacological interventions have evloved significantly to adapt to the needs of individuals diagnosed with Alzheimer's Disease (AD) who come from Moroccan sociolinguistic and sociocultural backgrounds. This review article aims to address the challenges in neuropsychological assessment and care for this migrant population. The literature search for this review was conducted using keywords in different databases such as PubMed, Scopus and Web of Science. General and specific recommendations included cultural and linguistic adaptations in neuropsychological screening and assessments tools respecting the sociolinguistic backgrounds of patients and their families. In terms of therapeutic interventions, they should be tailored to their pereferences and accomodated according to the stage and course of the disease. This review seeks to highlight these challenges through a cross-neuropsychological lens, drawing on pertinent evidence.

Keywords: dementia; migrants; Moroccan; non-pharmacological

1. INTRODUCTION

The increasing global prevalence of Alzheimer's Disease (AD) implies a nuanced understanding of its impact on culturally and linguistically diverse populations, particularly among migrants from Moroccan sociolinguistic and sociocultural backgrounds. While significant progress has been made in neuropsychological evaluations and non-pharmacological interventions, challenges persist in addressing the unique needs of this population. This review aims to delve into these challenges and propose strategies for improving neuropsychological assessment and care for them.

Dementia, a progressive brain disorder leading to cognitive deterioration, is becoming an increasingly significant global issue. In Arab-Muslim cultures, it is commonly referred to as Kharaf, translating to "mind loss" (Antuono & Beyer, 1999; Daher-Nashif et al., 2021; Hammad et al., 2022; Taiebine et al., 2023). Furthermote, it is classified as an organic disease, with medical approaches guiding its diagnosis and management (Woods, 2017). Until the late 1990s, there was no well-established neuropsychological intervention supported by strong evidence (Safiri et al., 2023).

Broadly speaking, a comprehensive review or meta-analysis encompassing all European studies is lacking. Adelman, et al. (2009) systematic review revealed a higher incidence of dementia among African-Caribbeans in the UK, though the extent of this difference and related risk factors remained ambiguous. Selten et al. (2021) suggested that the disparity between healthcare record studies and population surveys indicates many migrants remain undiagnosed. Migrants from Asian and African countries seem to face a notably higher risk of dementia in Europe.

On the one hand, the global count of international migrants increased by over 105 million, or 69%, between 1990 and 2017. The majority of this growth occurred from 2005 to 2017, with an annual average increase of approximately 5.6 million migrants, compared to 2.5 million annually from 1990 to 2005 (Canavelli et al., 2019).

On the other hand, the Moroccan diaspora (Arabic: الجاليــة المغربيــة), a subset of the broader Arab diaspora, encompasses individuals who have emigrated from Morocco and their descendants. An estimated 5 million Moroccans reside outside their homeland, with the majority concentrated in European countries. France hosts the largest population at 1,146,000, followed by Spain with 766,000, Belgium with 700,000, Italy with 487,000, the Netherlands with 363,000, and Germany with 127,000 (Mahieu, 2020). Research has focused on the largest migrant groups in the Netherlands (those born in Surinam, Turkey, and Morocco), while studies on Moroccan migrants have been conducted in Belgium, Spain, Germany, and Italy (Cappa &

Canavelli, 2022; Monsees et al., 2022; Chaouni et al., 2024; Plaza del Pino et al., 2024). Recent data has emerged from the USA (Kindratt & Smith, 2024), but information from South America or Australia remains scarce.

The significance of studying cognitive aging and dementia in Moroccan migrants is highlighted by the substantial portion of elderly individuals at risk of developing dementia. With no current cure available, prevention and early detection are crucial (Singh-Manoux & Kivimäki, 2010). Furthermore, the importance of identifying those at risk of pathological cognitive decline through neurocognitive screening tools is emphasized (Mulligan et al., 2023; Taiebine, 2024).

Cultural factors play a crucial role in shaping the diagnosis and treatment of dementia among migrant populations. The psychological strain experienced both before and after migration, along with various social dynamics and adjustments to the host society, can contribute to the development of psychiatric conditions, including dementia, particularly in those who are already vulnerable (Schouler-Ocak et al., 2015). It is essential to take into account cultural variances in self-identity, adaptation processes, and social environments when evaluating personality disorders and cognitive deterioration in migrants (Calliess et al., 2007; Graef-Calliess et al., 2023). Although cultural competence has been advocated as a vital approach to mitigate healthcare disparities faced by migrants, its actual impact on transforming professional practices and healthcare organizations has been minimal (Garrido et al., 2019). This discrepancy underscores the necessity for more comprehensive and health-promoting strategies that acknowledge the interconnectedness of individual, organizational, and community factors.

To date, there appears to be no concise and comprehensive review examining specific cognitive functions in Moroccan migrants with dementia from neuropsychological or epidemiological perspectives. This review article aims to address the challenges in neuropsychological assessment and care for this population.

2. METHOD

2.1 Search strategy

The articles were sourced from three databases: MEDLINE, Web of Science, and Scopus. This scoping review searched for published articles from inception to 2024. The keywords used were (Assessment OR Screening OR Evaluation OR Exploration OR Adaptation OR Standardization OR Validation OR

Normalization OR Translation OR Psychometric OR Battery OR Protocol OR Care OR Intervention) AND (Morocco OR Moroccan) AND (Attention OR Memory OR Language OR Cognition) AND (Migrants OR Migration) AND (Adult OR aging OR Dementia OR Alzheimer).

2.2 Inclusion and exclusion criteria

This narrative review included studies that met the following criteria: (a) the paper was published in English; (b) the article was a peer-reviewed, published paper that presented new data (excluding review and theoretical papers); (c) the article focused on neuropsycho-linguistic assessment, screening tools and care in Moroccan elderly population; (d) the focus on adults with dementia or caregivers is emphasized and (e) no publication year restrictions were applied, as this review seeks to provide an overview of neurocognitive testing and care for this population.

2.3 Study selection and extraction

A total of 139 articles were identified through database searches. 24 full-text studies were assessed for eligibility, and 11 articles were deemed eligible and included in this narrative review based on the inclusion and exclusion criteria. The data extraction process used PRISMA (Tricco et al., 2018) and focused on collecting precise information in the following categories: reference, country, study design, targeted domains, summary of main research aims, sample size of Moroccan participants (migrants and/or caregivers), outcomes and implications. (Figure 1).
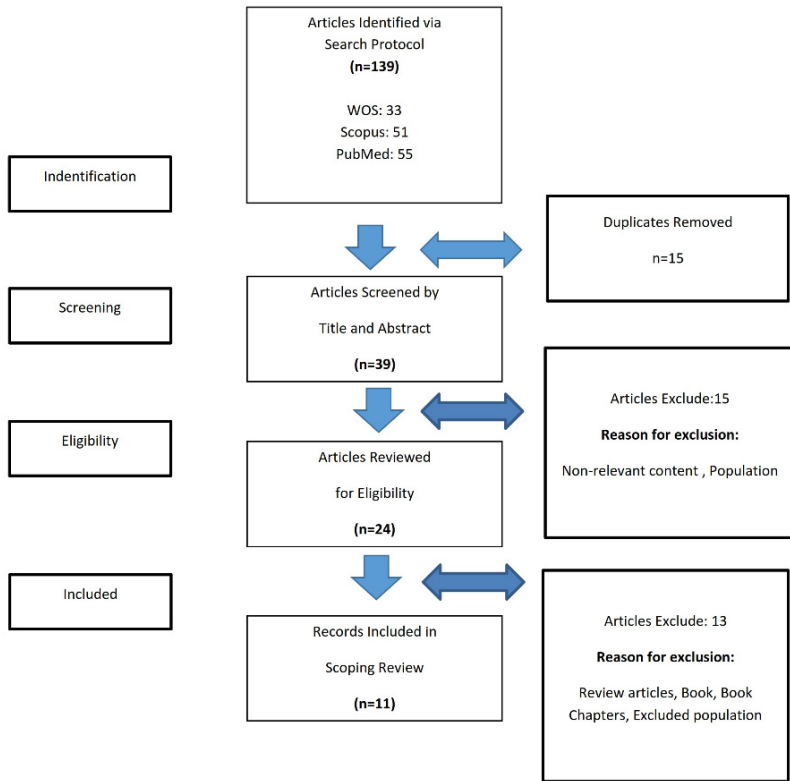
Figure 1. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews guidelines (PRISMA-ScR) flow diagram for the scoping review process

3. RESULTS

A total of eleven studies (Table 1) focused on the health and well-being of older migrant groups, specifically those of Moroccan descent living in Western European nations (Belgium and Netherlands). One prominent theme is the presence of cultural and linguistic obstacles, which many studies identify as significant barriers that hinder migrant populations from accessing healthcare

and effectively communicating with medical professionals. Additionally, there is a consistent emphasis on the disparities in both access to and quality of healthcare services available to these migrant communities, often leading to adverse health outcomes. Furthermore, the mental health challenges encountered by migrants, including issues such as depression, anxiety, and dementia. The influence of social and cultural elements, including family support, community ties, and cultural beliefs, is also highlighted as a critical factor in determining health outcomes. Lastly, the necessity for culturally sensitive interventions is emphasized, with a call for the development of healthcare services that are tailored to meet the unique needs of migrant populations.

On the one hand, the selected articles emphasized the necessity of culturally tailored neuropsychological evaluations, such as the adapted version of Montreal Cognitive Assessment (MoCA) and Rowland Universal Dementia Assessment Scale (RUDAS), to facilitate precise diagnosis and effective intervention. Furthermore, it notes that non-European immigrants frequently face delays in diagnosis, attributed to challenges like language barriers and cultural stigma. Sociodemographic elements, including lower educational attainment, female gender, and particular ethnic backgrounds, are identified as factors that can affect both the risk of developing dementia and the quality of care received.

On the other hand, the role of social support, especially from family and community networks, is underscored as vital for improving the quality of life for those affected by dementia. Resilience is also highlighted, with religious beliefs serving as important contributors to better coping mechanisms among individuals facing dementia from Moroccan background. Ethical considerations in dementia care are paramount, with a strong emphasis on maintaining the dignity of individuals, ensuring compassionate treatment, and the necessity for clear, culturally sensitive communication to secure informed consent.

Table 1. Summary of selected studies in this review

Reference	Country	Study design	Targeted domains	Summary of main research aims	Sample size of Moroccan migrants	Sample size of caregivers of Moroccan migrants	Outcomes and implications
Demirkapu et al., 2024	Belgium	Qualitative thematic analysis of semi-structured interview data	Advance care planning Effective communication with family members	To examine the understanding, experiences, perspectives, facilitators, and obstacles related to advance care planning among the relatives of older Turkish and Moroccan adults residing in Belgium.	NA	8 relatives of older Moroccan migrants	The participants exhibited a limited understanding of advance care planning and had not engaged in discussions about it with healthcare professionals. While some individuals found it advantageous to converse about end-of-life preferences with their relatives, others were resistant to discussing certain topics or deemed such discussions unnecessary, believing they were entrusted with caregiving responsibilities and that their relatives relied on them to make future decisions. The barriers identified included personal and relational factors, emotional challenges, and a perceived lack of urgency.

							Conversely, facilitators encompassed the provision of information in the native languages of older adults, the careful initiation of discussions by general practitioners, and the active participation of multiple family members.
Sialino et al., 2024	Netherlands	Cross-sectional study	The sex difference in self-rated health among older Turkish and Moroccan migrants in the Netherlands	To examine the factors influencing self-rated health and to understand the role of various determinants in this context.	148	NA	Women tend to report lower levels of education, are more likely to live alone, and exhibit a higher incidence of depressive symptoms, chronic illnesses, and particularly functional limitations, all of which contribute to their diminished self-rated health. Conversely, men appear to be more affected by issues related to memory, depressive symptoms, visual impairments, and functional limitations. Notably, older Moroccan-Dutch women report significantly poorer self-rated health compared to their

							male counterparts. The findings suggest that women experience greater exposure to both socio-demographic and health-related factors that influence self-rated health, thereby highlighting the underlying gender disparities.
Oerlemans et al., 2023	Netherlands	Qualitative thematic analysis of semi-structured interview data	Metaphor analysis of people with dementia and their informal caregivers	To uncover the metaphors employed by informal caregivers from various cultural and linguistic backgrounds to comprehend and articulate their experiences with dementia.	9	9 Moroccan caregivers	The findings indicate a significant deficiency in the availability of nuanced metaphorical language that can effectively encapsulate the daily realities faced by individuals living with dementia. It is evident that there is an urgent necessity to confront the stigma and the insufficient medical understanding of dementia prevalent within these migrant communities. Furthermore, there is a pressing need for enhanced cross-linguistic and cross-cultural research to identify metaphors that facilitate comprehension and contribute to

							the empowerment and restoration of dignity for those affected by dementia.
van Wezel et al., 2022	Netherlands	Cross-sectional study	The feasibility, comprehensibility and appropriateness of the 2 language versions of DKS were examined.	To describe the process of developing and validating the Dementia Knowledge Scale (DKS) was conducted specifically for family caregivers from Turkish or Moroccan immigrant backgrounds.	NA	110 Moroccan caregivers	Analysis revealed no significant differences in mean scores when comparing individuals with lower educational attainment to those with higher education, caregivers who provided frequent assistance to those who offered care less often, and individuals cohabitating with a person diagnosed with dementia to those who did not share a residence with such individuals.
Hoogendijk et al., 2022	Netherlands	Cross-sectional study	Inequalities in Frailty Among Older Turkish and Moroccan Immigrants	To explore disparities in frailty among younger older adults in relation to gender, educational	205 Moroccan migrants	NA	Frailty was observed to be more prevalent among women, individuals with lower educational attainment, and those with a migration background. Among the various groups analyzed, Turkish immigrants

			and Native Dutch.	background, and country of origin, while also examining the intersections of these factors.			exhibited the highest levels of frailty. Furthermore, no statistically significant interaction effects were identified between gender, educational level, and country of origin.
de Voogd et al., 2020	Netherlands	Qualitative thematic analysis of semi-structured interview data	Preserving personal dignity during palliative care amongst migrants	To explore (1) the significant aspects of dignity as perceived by patients and their relatives from Turkish, Moroccan, or Surinamese backgrounds residing in the Netherlands during the final stages of life, and (2) the ways in which healthcare	10	NA	A meaningful relationship is characterized by the support and care provided by family members, as well as the maintenance of a social role. Healthcare professionals can uphold dignity by demonstrating respect and attentiveness, ensuring physical integrity, hygiene, and self-determination, and engaging in indirect communication regarding diagnoses and prognoses. Additionally, elements such as religion and the appropriate involvement of family members play a crucial role in preserving dignity during the end-of-life phase,

				professionals can uphold and enhance the dignity of these individuals.			alongside the principles of autonomy and independence. It is essential for care professionals to consider these factors to deliver care that is centered around the individual.
Klokgieters et al., 2020	Netherlands	Qualitative thematic analysis of semi-structured interview data	link between conditions across life stages, migration, and resilience	To understand resilience in older immigrants, it is essential to explore the various resources they utilize to confront the challenges they encounter throughout their lives.	NA	13 relatives of older Moroccan migrants	The factors that contribute to the development of resilience among individuals align with four distinct stages of post-migration life: integration into the host community, sustaining that integration, navigating life after retirement, and facing increased dependency. Key resources that enhance resilience encompass education acquired in the country of origin, strategies for overcoming language obstacles, dual income sources, the pursuit of meaningful activities, robust social and community connections, and the capacity to maintain a

transnational lifestyle through regular travel to their homeland. Individuals who exhibit greater resilience tend to actively seek ways to enhance their living conditions while also demonstrating an ability to accept circumstances that are beyond their control

| Szabó et al., 2020 | Netherlands | Longitudinal and cohort study | Cultural resources and psychological resilience to disabilities, beyond sociodemographic and psychosocial factors, in older migrants. | To explore the degree to which sociodemographic, psychosocial, and cultural factors influenced psychological resilience to disabilities among immigrants of Turkish and Moroccan heritage | 209 Moroccan migrants | NA | Resilient functioning, serving as the reference category, was linked to lower proficiency in the Dutch language, reduced feelings of loneliness, enhanced mastery, and increased reliance on religious coping mechanisms. These findings lend credence to the disability paradox and underscore the significance of social support, personal mastery, and religiosity/spirituality as vital resources for fostering psychological resilience among older labor migrants. The discussion includes poor proficiency in the Dutch language as a |

				residing in the Netherlands.		potential contributor to significant functional limitations within the resilient group.
Goudsmit et al., 2017	Netherlands	Cross-sectional study	CCD is a culture-fair test that could discriminate between demented patients and cognitively healthy controls.	To validate the newly created Cross-Cultural Dementia Screening (CCD), which can be conducted without the need for an interpreter.	232 (173 Moroccan Arabic + 59 Berber)	NA	Initial performance disparities were observed among different ethnic groups; however, these differences were eliminated once adjustments were made for variations in age and education levels across the groups. This finding reinforces our primary hypothesis that the CCD functions as a culture-fair assessment tool. Analyses utilizing receiver-operating characteristic (ROC) curves and logistic regression indicated that the CCD possesses strong predictive validity for dementia, with a sensitivity of 85% and a specificity of 89%. In conclusion, the CCD serves as a sensitive and culturally equitable neuropsychological tool for dementia screening, particularly within low-educated immigrant populations.

| Segers et al., 2013 | Belgium | Longitudinal study | Migration, dementia and mental health | To record the demographic and clinical features of first-generation immigrants from both European and non-European backgrounds | 8.6% of patients frequented the Memory Clinic, who came from 23 non-European countries, especially from Morocco. | NA | It was observed that immigrants suffering from Alzheimer's disease were generally younger, with a notable predominance of males within non-European ethnic groups. In contrast, European immigrants exhibited a higher incidence of cognitive disorders associated with Parkinson's disease and Lewy Body dementia, while non-European immigrants were more frequently diagnosed with psychiatric conditions. Even after adjusting for educational background, non-European immigrants demonstrated lower scores on the Mini-Mental State Examination (MMSE) and reported longer intervals between the onset of symptoms and receiving a diagnosis, although this latter finding did not reach statistical significance. These findings indicate that non-European immigrants experiencing cognitive issues tend to seek medical consultation at a later stage. |

| Nielsen et al., 2011 | Denmark | Nation-wide study | Quality of Dementia Diagnostic Evaluation for Ethnic Minority Patients | To assess the quality of dementia diagnostic evaluations for patients belonging to ethnic minority groups in Denmark | NA | NA | It was determined that dementia diagnoses were confirmed in 35% of cases. Notably, substantial differences in the quality of diagnostic evaluations were observed when comparing patients from ethnic minorities to those in the general population. This highlights the existence of significant ethnic disparities in both the quality of diagnostic assessments and the outcomes related to dementia within the secondary healthcare system. |

4. Discussion

4.1 Neuropsychological assessment: cross-cultural and linguistic challenges

Culturally appropriate neuropsychological evaluations are crucial for accurately diagnosing dementia. The increasing prevalence of dementia cases underscores the importance of assessment tools that are culturally validated (Hatahet et al., 2023). However, the absence of such instruments for less-studied languages in migrants with dementia may result in misdiagnosis. Despite the rich cultural diversity among Arab nations, there is a notable shortage of neuro-cognitive assessment tools that are culturally sensitive (Fasfous & Daugherty, 2022).

Guidelines or similar documents on dementia care exist in 27 out of 35 European Union (EU) countries, with 12 addressing migration issues. These migration-related guidelines primarily emphasize early detection and diagnosis of dementia. They stress that conventional diagnostic tools like the Mini-Mental State Examination (MMSE) (Folstein et al., 1975) or clock test (Shulman, 2000) are unsuitable for linguistic minorities. While 9 countries offer recommendations for dementia care in migrant populations, only Norway, Sweden, and Denmark indicate available healthcare services. Several studies mention the Rowland Universal Dementia Assessment Scale (RUDAS) (Storey et al., 2004) as a valid assessment tool for migrants (Schmachtenberg et al., 2020).

Moroccan healthcare professionals in neurological settings, including neuropsychologists, clinical linguists, neurologists, and speech language therapits/pathologist (SLT/P), use various neurolinguistic and neuro-cognitive tests which have been translated, standardized, and validated wether in Arabic (Azdad et al., 2019; Oumellal et al., 2019; Taiebine et al., 2021; Rami et al., 2024; El Ouardi et al., 2023) or in Berber/Amazigh (El Houari et al., 2024). These tools have been developed following psychometric standards and international guidelines (ITC) (Nguyen et al., 2024). When translating tests into Arabic, it's vital to consider the linguistic and cultural characteristics of the target population (Fasfous et al., 2017).

The MMSE (Folstein et al., 1975) and the Montreal Cognitive Assessment (MoCA) (Nasreddine et al., 2005) are prominent neuropsychological assessments utilized for identifying cognitive decline and dementia. Nonetheless, their applicability in culturally diverse groups has been scrutinized, underscoring the necessity for modifications and a thoughtful approach to cultural considerations (Gangaram-Panday et al., 2024). Research indicates that these assessments have undergone socio-cultural adaptations for populations that are less representative of WEIRD (Western, Educated, Industrialized, Rich, and Democratic) societies and for languages that do not utilize Latin scripts.

In contrast, the RUDAS (Storey et al., 2004) has been thoroughly researched and validated as a culturally attuned cognitive screening instrument for migrant populations experiencing dementia. It comprises 14 distinct subtests that assess various cognitive domains, including orientation, attention, language, memory, visuospatial abilities, and executive functions. This assessment tool is especially beneficial for evaluating individuals from varied cultural and educational backgrounds, as it effectively reduces the influence of language and cultural differences on the outcomes of the test (Nielsen et al., 2013). Numerous studies have affirmed its efficacy across various cultural and linguistic demographics. For example, in Danish memory clinics, the RUDAS demonstrated high specificity and was less influenced by cultural and linguistic variables compared to the MMSE when evaluating multicultural patient groups (Nielsen et al., 2013). Likewise, research conducted in the Netherlands revealed that the RUDAS was effective in a geriatric outpatient population characterized by high illiteracy and cultural diversity, achieving diagnostic accuracy on par with the MMSE (Goudsmit et al., 2018). Additional instruments such as the European Cross-Cultural Neuropsychological Test Battery (CNTB), the Cross-Cultural Dementia Screening (CCD), and the Visual Cognitive Assessment Test (VCAT) have also shown potential application in migrant population (Delgado-Álvarez et al., 2023; Hsu et al., 2023; Chithiramohan et al., 2024). These alternatives present valuable options for enhancing the precision of dementia diagnoses in populations that are culturally and linguistically varied.

Conversely, language barriers and difficulties in health communication pose significant challenges in providing dementia care to migrants (Nielsen & Waldemar, 2022). To ensure effective communication and culturally sensitive care, interpreters with knowledge of dementia play a crucial role (Nielsen & Waldemar, 2022). Moreover, the educational background and cultural heritage of migrants prior to relocation can impact their interactions with healthcare systems (Canevelli et al., 2019). However, assessments that are culturally biased may result in incorrect diagnoses or unsuitable dementia care for migrant populations (Nielsen & Waldemar, 2022). In healthcare communication, skilled interpreters are essential in facilitating clear exchanges between healthcare professionals and dementia patients. As such, interpreters employing culturally competent care become acquainted with both dementia care practices and the cultural norms of patients and their families (Yijälä & Jasinskaja-Lahti, 2010).

A crucial aspect of neuro-cognitive evaluation is to consider the subject within their own cultural framework rather than that of the clinician (Puente & Perez-Garcia, 2000). This is particularly significant for Moroccan migrants, who may encounter specific obstacles such as language difficulties, cultural disparities, and restricted healthcare access, which can complicate the diagnostic procedure (Wood, 2017; El Alaoui Faris, 2022; Taiebine et al.,

2023; Taiebine, 2024a,b). Neuropsychological examinations are designed to identify cognitive and behavioral abnormalities, which are vital for early dementia detection and differentiation between various dementia types (Al-Qazzaz et al., 2014). Notably, while neuropsychological assessment is a valuable tool, no specific interventional studies within the given context address its application among Moroccan migrants. Only qualitative studies using phenomenological frameworks exist in countries like Belgium and the Netherlands (Lillekroken et al., 2023).

Language barriers present a significant challenge, as they can lead to misunderstandings during assessments, potentially compromising the validity of the results (Evenden et al., 2022). Moreover, limited healthcare access, a common issue among migrants, can hinder their ability to obtain neuropsychological assessments. This restricted access often stems from a combination of factors, including legal status, financial limitations, and lack of awareness about available services (Aborode et al., 2023).

To adress these issues, the introduction of innovative frameworks such as Community Cultural Competence (CCC) has been suggested as a comprehensive and multifaceted approach that incorporates critical awareness, sensitivity to diversity, and the ability to take action within organizations and communities (Garrido et al., 2019). Nevertheless, there is a pressing requirement for a more integrated framework that comprehensively addresses the intricate needs of migrant populations affected by dementia, highlighting the necessity of taking into account both individual and societal determinants in the provision of healthcare services.

4.2 Non-pharmacological interventions

Alternative neurocognitive treatments that don't involve medication are also used to address Alzheimer's disease symptoms. While these approaches don't alter the disease's underlying biology, they are frequently employed to sustain or enhance cognitive abilities, overall quality of life, engagement, and the capacity to perform daily tasks. Such interventions may encompass physical exercises, memory and orientation training, as well as music, animal, and art-based therapies (Galik, 2016; Benabdeljlil et al., 2021; Taiebine, 2023). These non-pharmaceutical methods might also be utilized to specifically reduce behavioral and psychological issues like depression, apathy, wandering, sleep problems, agitation, and aggression. Family members providing care often implement these strategies, believing they positively impact dementia symptoms, despite challenges such as organizational burdens and resource scarcity (Ross et al., 2023).

The existing literature on non-pharmacological interventions for migrants reveals a notable deficiency in the specifics regarding their cultural adaptability. Nonetheless, several scholars have underscored the significance of employing culturally sensitive methodologies when addressing the needs of migrant and refugee groups. In their work, Rothe and Pumariega (2020) explored a range of treatment frameworks, such as the cultural competence model, the cultural sensibility model, and the community systems of care model, all of which consider the intricate cultural dynamics at play. Furthermore, they stress the necessity of crafting treatment strategies that resonate with the cultural values and beliefs held by immigrant families (Rothe & Pumariega, 2020). While evidence-based therapies, including cognitive behavioral therapy for post-traumatic stress disorder, testimonial psychotherapy, narrative exposure therapy, and eye movement desensitization and reprocessing, are applied to various medical issues affecting migrant populations, the cultural adaptability of these interventions, particularly for migrants experiencing cognitive decline, remains inadequately addressed.

Two non-drug interventions, Cognitive Stimulation Therapy (CST) and Reminiscence Therapy (RT), have demonstrated effectiveness in boosting cognitive function and life quality across various groups, although the existing literature does not detail interventions among migrants (Suárez-González et al., 2024). Given CST's adaptability to different cultural contexts (Werheid et al., 2021) and the broad application of psychosocial interventions like CST and RT in enhancing cognitive function and quality of life (Lin et al., 2021), it's reasonable to assume these interventions could benefit migrants if culturally adapted. Consequently, there's a need for Arabic translation and cultural adaptation of CST for Moroccan migrants with dementia in their host countries. It's recommended to reflect on cognitive stimulation session activities and scripts, respecting the socio-cultural and socio-linguistic diversity of Moroccan migrants. Additionally, developing a workshop training kit in Moroccan dialect and Berber/Amazigh for individuals with dementia and their families is advised (Taiebine, 2024b).

While these interventions have demonstrated their effectiveness in various cultural contexts, there remains a necessity for well-defined, evidence-based guidelines for cultural adaptation (Cheung & Peri, 2021). This consideration becomes especially pertinent when evaluating the use of CST and RT among migrant populations, as cultural elements may significantly affect both the acceptability and efficacy of these therapeutic approaches. The community-oriented strategy proposed for modifying CST to suit diverse cultural backgrounds could be effectively utilized to customize these interventions for migrant groups (Aguirre et al., 2014).

4.3 Innovative and technology-based interventions for migrants

Technology-based interventions, such as home video telehealth visits and home safety assessments, have shown positive outcomes, including caregiver satisfaction (Aguirre et al., 2014; Maslow & Fortinsky, 2018). For example, there has been significant progress in overcoming access obstacles faced by migrant populations, particularly among Latinx immigrants (Arias et al., 2020). These initiatives have the potential to enhance healthcare service accessibility, particularly in marginalized communities during the COVID-19 pandemic (Goodman et al., 2021). Service providers have indicated that telehealth has generally facilitated improved access to services. Nevertheless, various challenges persist, such as inadequate access to technology, limited digital literacy, concerns regarding privacy during service delivery, restrictions on using specific digital platforms due to confidentiality laws, and a decline in service quality (Arias et al., 2020; Goodman et al., 2021; Hodges & Calvo, 2023). Nonetheless, the adoption of these e-health tools introduces distinct challenges that must be addressed to guarantee equitable access for all individuals including technological issues and caregiver reluctance to change (Taiebine & Keegan, 2024a,b). Contradictions and interesting facts emerge when considering the broader context of caregiving within migrant communities. In this context, Moroccan caregivers show a shift in perception away from cultural/spiritual paradigms of dementia, but also report a stigmatization and lack of emotional support and practical assistance (Hodges & Calvo, 2023). These findings suggest that while interventions can be effective, they must be tailored to address the specific challenges faced by caregivers from different cultural backgrounds (Taiebine, 2024c).

Digital health technologies hold significant promise for enhancing healthcare access for migrants, particularly those residing in remote or underserved regions. These technologies facilitate connections between patients and healthcare professionals, thereby serving as a vital resource for communities that struggle with limited healthcare availability regardless of geographical obstacles (Zemouri et al., 2024). Tele-neuropsychology (Arias et al., 2020) services exemplify this potential by linking migrants to specialists located far away, thereby alleviating the burdens associated with travel and reducing waiting periods for care. This is especially advantageous for individuals in areas where healthcare infrastructure is deficient. Additionally, E-health and mobile health (m-health) applications can deliver essential information regarding preventive care, disease management, and nutrition, empowering migrants to make well-informed health choices (Taiebine et al., 2025; Zemouri et al., 2024). Nevertheless, the effective deployment of digital health solutions for migrant populations encounters various obstacles, such as inadequate internet

access, low levels of digital literacy, and cultural differences. To tackle these issues, a comprehensive strategy is necessary, which includes providing digital literacy education and tailoring health technologies to align with the cultural and linguistic preferences of migrant communities (Awad et al., 2021). Cultural adaptations in telehealth are vital to ensure its success among diverse migrant groups, which may involve creating multilingual platforms, integrating culturally relevant health information, and equipping healthcare providers with skills in cultural competence.

4.4 Clinical and policy implications for healthcare workers

Healthcare providers encounter considerable difficulties in the diagnosis and treatment of dementia among migrant populations, which has significant implications for both clinical practice and policy formulation. Key challenges include language barriers, cultural disparities, and the absence of culturally appropriate assessment tools, all of which hinder the delivery of high-quality care (Awad et al., 2021). These obstacles can result in the underrepresentation of migrants in dementia care services and create barriers to accessing necessary healthcare. Moreover, the challenges associated with dementia care extend beyond mere diagnosis. Ethical dilemmas and cognitive biases may influence clinical decision-making for patients suffering from advanced dementia, potentially resulting in overly aggressive treatment approaches that fail to prioritize the patient's quality of life (Ramos et al., 2021). Additionally, legal and administrative complexities surrounding the appointment of surrogate decision-makers for patients lacking relatives can further complicate the provision of care (Erel et al., 2021; Taiebine & Keegan, 2024a). To mitigate these challenges, several recommendations have been proposed. Healthcare providers, particularly general practitioners, have indicated a need for enhanced information and support in diagnosing dementia within migrant communities (Chin & Sahadevan, 2003). It is essential to implement public health initiatives that assist clinicians, improve access to interpreting services, and furnish culturally relevant information for patients (Awad et al., 2021). Policymakers should prioritize the development of clear guidelines for culturally sensitive dementia care, enhance the capacity of healthcare practitioners, and facilitate the cross-cultural adaptation of effective practices (Nielsen et al., 2013; Taiebine, 2024a). Furthermore, advocating for the healthcare rights of migrants and addressing restrictive policies that may hinder their engagement with health services are critical steps toward enhancing care for this vulnerable group of individuals (Schicktanz et al., 2024).

Regarding, healthcare professionals who are engaged with migrants suffering from dementia, they should prioritize the enhancement of cultural

competence and the adoption of person-centered care approaches. It is essential to establish training initiatives and workshops that aimed at deepening healthcare practitioners' comprehension of various cultural contexts and their implications for dementia care (Tillmann et al., 2019). Additionally, providers need to recognize the potential discrepancies between the cultural backgrounds of patients, their families and the professional healthcare environment, as such differences may result in misunderstandings and hinder effective collaboration (Tillmann et al., 2019). To facilitate the early identification and diagnosis of dementia within migrant communities, healthcare providers should concentrate on raising awareness and framing dementia as a medical-psycho-social condition rather than merely a facet of aging or a stigmatized issue (Boulton et al., 2021). Moreover, it is crucial to assist general practitioners (GPs) in navigating the challenges associated with the diagnostic process, ensuring timely detection, and assessing the care requirements of immigrant patients with dementia (Bosma & Smits, 2022).

At the organizational and macro-systemic level, to effectively tackle these challenges and ensure equitable access to telehealth services, a collaborative approach involving multiple stakeholders is essential (Vissenberg et al., 2018; Biswas et al., 2022; Gallegos-Rejas et al., 2023). This strategy should prioritize bridging the digital divide by implementing actionable measures such as enhancing digital health literacy, providing training for the workforce in clinical telehealth, co-developing innovative telehealth models, executing change management initiatives, advocating for services that are culturally relevant, and establishing sustainable funding mechanisms (Biswas et al., 2022). Furthermore, partnerships between healthcare systems and community health organizations can empower community members to recognize obstacles in digital health utilization and devise culturally attuned interventions aimed at improving digital health literacy (Vissenberg et al., 2018).

To sum up, it is imperative that policy reforms concentrate on fostering collaboration among primary care providers, community care organizations, specialized memory clinics, and local governments to enhance the delivery of healthcare information and the accessibility of culturally sensitive services (Gallegos-Rejas et al., 2023). Additionally, it is crucial to create reimbursement and financing structures that facilitate the time healthcare providers dedicate to identifying, assessing, and supporting caregivers of dementia patients from various cultural backgrounds.

Future research should adopt intersectoral approaches that take into account various factors, including age, gender, socioeconomic status, and migration status, to develop a more detailed understanding of health disparities among Moroccan migrants. Qualitative research plays a crucial role in shedding light on the lived experiences of migrants (patients and caregivers), offering

insights into their perceptions of health, illness, and the healthcare system. Furthermore, it is recommended that research prioritizes the identification of evidence-based interventions and policies aimed at addressing the specific health needs of migrant populations in multi-cultural settings. Lastly, implementing cross-cultural competency training for healthcare professionals can significantly enhance communication and improve the quality of care delivered to migrant patients from a Moroccan backgound.

5. CONCLUSION

As highlighted in this review article, there is a critical need to understand the neuropsychological testing and care of dementia among Moroccan migrants. The findings underscored the unique challenges faced by this population, including cultural, linguistic, and socioeconomic factors, which can significantly impact the diagnosis, care, and their overall well-being. Longitudinal studies are necessary to track the progression of the disease and identify early cognitive biomarkers. Additionally, culturally sensitive assessment tools and interventions must be developed to address the unique needs of Moroccan migrants.

Specific recommendations for clinicians and policymakers should focus on culturally adapted screening tools and the need for training in culturally competent care. Future research directions should implement Big Data, personal and individualized neuropsychological testing and care which are essential for understanding the long-term health trajectories of migrant populations, as they allow for the monitoring of health and neurocogntive outcome changes over extended periods.

Declaration of interests

Authors disclose no conflict of interest.

Author contribution

Development and conceptualization: M.T.; Methodology: M.T., A.M., C.N.; Writing review and editing: M.T., A.M., C.N.

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