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Cognitive limitations among Middle Eastern and North African immigrants

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Abstract

Objectives: To estimate and compare the prevalence of cognitive limitations among Middle Eastern and North African (MENA) immigrants compared to US- and foreign-born non-Hispanic Whites from Europe (including Russia/former USSR) and examine differences after controlling for risk factors.

Methods: Cross-sectional data using linked 2000-2017 National Health Interview Survey and 2001-2018 Medical Expenditure Panel Survey data (ages >=65 years, n=24,827) were analyzed.

Results: The prevalence of cognitive limitations was 17.3% among MENA immigrants compared to 9.6% and 13.6% among US- and foreign-born non-Hispanic Whites from Europe. MENA immigrants had higher odds (OR=1.88; 95% CI=1.06-3.34) of reporting a cognitive limitation than US-born non-Hispanic Whites after controlling for age, sex, education, hearing loss, hypertension, depression, social isolation, and diabetes.

Discussion: To further examine cognitive health among the MENA aging population, policy changes are needed to identify this group that is often absent from research because of their federal classification as non-Hispanic Whites.

Keywords

Arab American; Middle Eastern and North African; immigrant health; Alzheimer's disease and related dementias; cognitive limitations; National Health Interview Survey; Medical Expenditure Panel Survey

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Cognitive limitations are characterized by confusion, as well as difficulties remembering, concentrating, and making decisions (Luo et al., 2018; Okoro et al., 2018). National prevalence estimates of cognitive limitations among adults range from 6.7% to 11.9% (Luo et al., 2018; Okoro et al., 2018; US Census Bureau, 2018). Importantly, Alzheimer's disease and related dementias (ADRD) are often preceded by symptoms of cognitive limitations (Kelley & Petersen, 2007). New-onset symptoms of cognitive limitations can signify early indicators of ADRD, which affects 6.2 million adults in the United States (US), and costs $355 billion in health care, long-term care, and hospice costs (Alzheimer's Association, 2021). There is a growing body of literature that recognizes several other risk factors for ADRD that are potentially modifiable at various points in the life course.

Life Course Risk Factors

A review published by the Lancet Commission (2017) calculated a population attributable fraction (PAF) for multiple risk factors of ADRD, a major cause of cognitive limitations in older adults, based on previous studies. Significantly, the life course model suggests there are nine preventable risk factors. Each PAF for risk factors that may be preventable are identified according to the stage of life at which they are most likely to occur or have an effect (Livingston et al., 2017), including: less than secondary (9^{th} grade in US) education during early life; hearing loss, hypertension, and obesity during midlife; and smoking, depression, physical inactivity, social isolation, and diabetes during late life (Livingston et al., 2017). The coexistence of cognitive limitations and each of these risk factors contributes to the physical, mental and social complications associated with ADRD. It may be that these risk factors are differentially prominent among underserved racial and ethnic groups, both US- and foreign-born. Identifying and understanding these risk factors for cognitive limitations, as an indicator of potential ADRD, will help tailor interventions that may delay or prevent these complications.

Health Disparities and Within-Group Comparisons

Disparities in the prevalence of cognitive limitations by race, ethnicity, and nativity status have been identified (Ferdinand & Nasser, 2015). The immigrant health paradox suggests that immigrants are healthier than their US-born counterparts, which has been shown in several studies comparing US- and foreign-born Hispanic individuals (Reynolds et al., 2016). This health advantage does not appear to correspond with the health of older foreign-born non-Hispanic Whites. For example, the prevalence of cognitive limitations is higher among foreign-born non-Hispanic Whites than their US-born counterparts (Moon et al., 2019). Furthermore, little research has been conducted to determine disparities by nativity status among adults with cognitive limitations *within* US- and foreign-born non-Hispanic White subgroups. The non-Hispanic White classification represents diverse groups, characterized by the US federal government as "a person having origins in any of the original peoples of Europe, the Middle East, or North Africa" (Office of Management and Budget, 1997). This classification stems from the first wave of immigration among Arab/Middle Eastern and North African (MENA) individuals to the US from 1880-1918. The main driver for the MENA migration was economic factors (Nassar-McMillan et al., 2015). Most immigrants came from Syria and Lebanon, were poorly educated, worked as

farmers and artisans, and were Christians. During this time, the US was racially segregated and there was a push for immigrants to assimilate to American culture (Nassar-McMillan et al., 2015). Non-Whites were not eligible for US citizenship (Awad et al., 2022). MENA immigrant leaders engaged in a series of court cases to identify their race as "White," which was reiterated by a 1944 court ruling, and currently exists today (Nassar-McMillan et al., 2015; Awad et al., 2022; Maghbouleh et al., 2022). Later waves of MENA immigrants were more socio-demographically diverse, with high and low levels of education and differing experiences of trauma and exposure to political instabilities and violent conflict from war torn countries (Nassar-McMillan et al., 2015; Awad et al., 2022). A growing body of evidence has shown that these factors, along with the racial discrimination towards both native and foreign-born MENA individuals due to the US involvement in the Gulf War, 9/11, and recent policies banning immigration from Arab countries may contribute to poor health outcomes (Abuelezam et al., 2018) and disability (Dallo et al., 2009; Dallo et al., 2015; Read et al. 2019). This evidence suggests MENA health deviates from non-Hispanic Whites and may be more similar to other racial and ethnic minorities (Ajrouch & Antonucci, 2018). Little is known about whether the cognitive health of older MENA individuals differs from non-Hispanic Whites.

Those who trace their heritage to MENA countries have more ADRD risk factors (Ajrouch et al., 2017). In addition to the life course risk factors identified by Livingston and colleagues (2017), MENA individuals may be more likely to experience chronic stress and discrimination, both of which have been linked to worse cognitive and brain health (Zahodne et al., 2017). Theoretical models, including the convoy model of social relations, highlight how social relationships with family, friends and neighbors among older individuals may reduce the risk of cognitive limitations but these benefits may differ by experiences of chronic stress, perceived discrimination, and within racial/ethnic groups (Abdulrahim & Ajrouch, 2015). Most studies that have identified and evaluated these risk factors have used small samples of participants recruited from the community (Abuelezam et al., 2018).

The only two nationally representative data sources that are publicly available and allow for separating MENA individuals from other non-Hispanic Whites are the National Health Interview Survey (NHIS) and the American Community Survey (ACS). Studies have used these data sources to calculate the prevalence of serious psychological distress (Dallo et al., 2013), chronic diseases (Dallo & Kindratt 2016), preventive services use (Dallo & Kindratt, 2015a, 2015b), behavioral risk factors (Kindratt et al., 2018), and physical disabilities (Read et al., 2018) *within* non-Hispanic Whites. Furthermore, previous studies have found the prevalence of cognitive limitations to be higher among MENA populations than other non-Hispanic Whites (Dallo et al., 2020; Kindratt et al., 2021). For example, Dallo and colleagues (2020) examined cognitive health disparities among US-born non-Hispanic Whites, foreign-born non-Hispanic Whites, and foreign-born Arab Americans (comprising foreign-born individuals born in the Middle East) using NHIS data. Results indicated that the prevalence of cognitive limitations was 9.7% among Arab American immigrants, which was greater than both US- (7.4%) and other foreign-born (7.3%) non-Hispanic Whites. The NHIS does not allow for comparisons between US- and foreign-born MENA individuals because identifying MENA can only occur through the place of birth question. The ACS, however, allows for comparisons between US- and foreign-born MENA because that survey

includes both place of birth and ancestry questions. Kindratt and colleagues (2021) used ACS data to estimate the prevalence of cognitive limitations among US- and foreign-born Arab Americans. Results indicated that the prevalence of cognitive limitations was 6% among Arab American immigrants compared to 4% among US-born Arab Americans (Kindratt et al., 2021). There is a need for more population-based studies to confirm these findings and explore other ways to capture cognitive health disparities among MENA populations on a national scale.

This study will use innovative methods to uncover cognitive health disparities among MENA populations by linking data from the NHIS and the Medical Expenditure Panel Survey (MEPS), accessed through a local restricted federal statistical research data center. Furthermore, this study will expand upon previous studies using nationally representative data to uncover foreign-born Arab American health disparities by including non-Hispanic Whites born in Africa as part of foreign-born MENA category. The inclusion of foreign-born non-Hispanic White Africans with those born in the Middle East is in alignment with the US Census content testing for race and ethnicity in 2015 (Matthews et al., 2017; Awad et al., 2022) and proposed by the current administration for inclusion in the 2030 Census (Wang, 2020). Using these two novel methods, we leverage the availability of these two data sources to accomplish the following two aims: 1) estimate and compare the age- and sex-adjusted prevalence of cognitive limitations among MENA immigrants compared to US- and foreign-born non-Hispanic Whites and 2) determine how the odds of cognitive limitations differs among MENA immigrants compared to US-born non-Hispanic Whites before and after adjusting for potentially modifiable risk factors across the life course.

METHODS

Data Sources

Our sample consisted of 18 years of linked data from the 2000-2017 NHIS and 2001-2018 (Panels 5-22) Medical Expenditure Panel Survey (MEPS). The NHIS collects data on the health of individuals on an annual basis. The MEPS collects additional data using five panels across two years, as well as data from a subsample of the previous year's NHIS. Responses from NHIS and MEPS were matched by ID numbers (NHIS variable PX for years 2000-2003/FPX for years 2004-2016; MEPS variable DUPERSID).

Participants

Our sample included adults ages 65 and older. From 2000-2017, there were 211,517 adults ages 65 and older who participated in the NHIS. Among the NHIS participants, 42,776 participants completed the MEPS household component interview. The linked dataset comprised 24,827 US- and foreign-born non-Hispanic White adults, which when weighted, represents 17,820,435 US adults. Specifically, our sample comprised 23,880 US-born non-Hispanic White, 807 foreign-born non-Hispanic Whites from Europe (including Russia and former USSR) and 140 MENA immigrants.

Variables

Independent Variable—Our independent variable was created using questions from the NHIS. We combined responses to questions assessing each participant's race, ethnicity, and region of birth. Participants were asked to select their race (White, Black, American Indian/Alaskan Native, Asian, other) from flashcards provided by the interviewer and identify whether they were Hispanic or Latino/a. Participants were asked whether they were born in one of the 50 states, Washington DC, on a military base overseas, or on a US territory. Participants who were not born in the US or a US territory were asked "in what country were you born?" Responses were grouped into 10 world regions (US, Mexico, Central America & Caribbean Islands, South America, Europe, Russia, Middle East, India subcontinent, Africa, Asia, Southeast Asia). Responses to race, ethnicity and nativity status questions were combined to compare US-born non-Hispanic Whites as the majority population with foreign-born non-Hispanic Whites from Europe (including Russia/former USSR) and foreign-born non-Hispanic White MENA adults (1=US-born non-Hispanic White, 2=foreign-born non-Hispanic White from Europe/Russia, 3=foreign-born MENA). Foreign-born non-Hispanic Whites from born in any other region were excluded from the analysis. Because the NHIS collects race and ethnicity data based on the 1997 Office of Management and Budget Classification (Office of Management and Budget, 1997), there is no classification for MENA individuals. Non-Hispanic White respondents who were born in the "Middle East" or "Africa" region were categorized as MENA immigrants. US-born non-Hispanic White MENA individuals could not be disaggregated from other US-born non-Hispanic Whites with the available data.

Dependent Variable—Our dependent variable (cognitive limitations) was created using questions from the MEPS. The MEPS includes three questions to determine whether adults have any cognitive limitations. Participants were asked if adults in their family: "experience confusion or memory loss;" "have problems making decisions;" and "require supervisions for their own safety." Responses were matched with individual participants, and any participant who responded "yes" to one or more of those three questions is classified as having a cognitive limitation (0=no, 1=yes). Responses for adults unable to answer for themselves are collected by another member of their household as proxy (n = 615).

Covariates

Our covariates were selected using questions from the MEPS and NHIS. MEPS covariates that were explored included key demographic and potentially modifiable risk factors for cognitive limitations. Though all covariates were measured when participants were aged 65+, we identify each according to the life stage at which they may be potentially modified. Age (continuous) and sex (1=male, 2=female) were examined as demographic factors. Potentially modifiable risk factors were included according to early, middle, and late life indicators (Livingston et al., 2017). An early life risk factor we adjusted for was limited education (0=≤8th grade education, 1=9th grade or higher). Other risk factors adjusted for included hearing loss (0=no, 1=yes), hypertension (0=no, 1=yes) and current obesity, which was calculated based on body mass index (<30.0 not obese or ≥30.0 obese). We further adjusted for current smoking (0=no, 1=yes), depression symptoms determined by self-report of problems with anxiety or depression as measured by the EQ-5D (2001-2003) and

score of ≥2 on the Patient Health Questionnaire (PHQ-2) (2004-2018), physical inactivity (0=no, 1=yes) was determined by doctor's recommendation for more exercise (2001-2015) and self-report of vigorous/moderate physical activity per week (2016-2018), and social isolation measured by current marital status (0=not married, 1=married). The "not married" category included those who were never married, divorced, widowed, or separated. Diabetes diagnosis was measured by asking participants if they have ever been diagnosed with diabetes (0=no, 1=yes). Among foreign-born non-Hispanic Whites, we measured citizenship status (0=no, 1=yes) and length of time living in the US (0=less than 15 years, 1=15 years or greater) based on previous studies using NHIS data (Dallo et al., 2013; Dallo et al., 2020). Citizenship status and length of time living in the US were measured using NHIS data.

Statistical Analysis

Weighted percentages and standard errors were used to describe sociodemographics and characteristics of US- and foreign-born non-Hispanic Whites from Europe and foreign-born MENA adults. Weighted chi squares were used for bivariate analysis. Post-hoc chi square analyses were conducted to determine two-group comparisons between MENA immigrants and US- and foreign-born non-Hispanic Whites from Europe. Age- and sex-adjusted prevalence of cognitive limitations were calculated for foreign-born MENA adults compared to US and foreign-born non-Hispanic Whites. Logistic regression procedures were used to determine associations between the combined race, ethnicity and place of birth variable and cognitive limitations before (model 1) and after controlling for demographic factors (model 2) and potentially modifiable risk factors (models 3-5). In model 3, we adjusted for highest level of education. In model 4, we examined hearing loss, hypertension, and obesity. In model 5, we examined smoking, depression, social isolation, and diabetes. Hosmer & Lemeshow's purposeful selection methods for model building were used (Hosmer et al., 2013). Only statistically and clinically significant risk factors ($p<.05$) were included in multi-level models. After completing the model building process, obesity (model 4), smoking, and physical inactivity (model 5) were removed. We did not include citizenship status or length of time in the US in our regression models because our comparison group was US-born non-Hispanic Whites. Sensitivity analyses were conducted with foreign-born adults born in the Middle East to ensure our results were not influenced by non-Hispanic White Africans who may not be from North African countries based on previous studies that have reported Arab/Middle Eastern health disparities in comparison to US- and foreign-born non-Hispanic Whites using NHIS data (Read & Reynolds, 2012; Dallo et al., 2013; Dallo et al., 2020). Data were analyzed using STATA 16.0. SVYSET procedures were used to account for primary sampling units, clustering, and the sophisticated weighting in the MEPS and NHIS sampling designs, which were used to produce national estimates from the data. Sample weights for the linked dataset were divided by 18 based on analytic guidelines (Centers for Disease Control and Prevention, 2018; Agency for Healthcare Research and Quality, 2017).

We obtained approval to analyze the data from the Agency for Healthcare Research and Quality (AHRQ). A linked dataset was created and analyzed at a local Federal Statistical Research Data Center. Since this study used de-identified secondary data that does not meet

the federal definition for human subjects research, it was deemed not subject to review or approval by the institutional review board.

RESULTS

Selected Characteristics

We presented selected characteristics of the study sample in Table 1. MENA immigrants were less likely to be female (49.6%) than US- (55.3%) and foreign-born non-Hispanic Whites from Europe/Russia (59.5%). MENA immigrants were younger (*M*=73.8 years) than foreign-born non-Hispanic Whites from Europe/Russia (*M*=75.5 years). There were 10.8% of MENA immigrants who reported having less than a ninth-grade level of education compared to 15% of foreign-born non-Hispanic Whites from Europe/Russia and only 6.1% of US-born non-Hispanic Whites. MENA immigrants reported lower estimates of hearing loss (13.0%) than both US- (21.5%) and foreign-born (18.1%) non-Hispanic Whites from Europe/Russia. Depression estimates were significantly higher among MENA immigrants (38.2%) compared to US- (26.7%) and other foreign-born (34.9%) non-Hispanic Whites. Among foreign-born non-Hispanic Whites (results not reported in Table 1), most MENA (81.5%) and adults from Europe/Russia (81.9%) were citizens (p=0.9346). However, there was a statistically significant difference in the length of time that foreign-born individuals lived in the US (p=.0465) with 91.7% of non-Hispanic whites from Europe/Russia living in the US for 15 years or longer compared to 81.5% of MENA individuals.

Prevalence of Cognitive Limitations

We presented the age- and sex-adjusted prevalence estimates for cognitive limitations in Table 2. The prevalence of cognitive limitations was 17.3% among MENA immigrants, which was higher than US- (9.6%) and foreign-born (13.6%) non-Hispanic Whites from Europe/Russia.

We presented unadjusted and multivariable logistic regression models to investigate cognitive limitation disparities in Table 3. In the unadjusted model, MENA immigrants had greater odds (OR=1.75; 95% CI=1.01-3.04) of reporting a cognitive limitation than US-born non-Hispanic Whites. Results remained statistically significant after adjusting for age and sex (model 2) (OR=1.98; 95% CI=1.16-3.38), education (model 3) as an early life risk factor (OR=1.93; 95% CI=1.12-3.32), and hearing loss and hypertension (model 4) as risk factors that are modifiable during midlife (OR=2.10; 1.20-3.67). In the final model which further adjusted for depression, social isolation, and diabetes as additional risk factors that become most relevant in late life, MENA immigrants had 1.88 times greater odds (95% CI=1.06, 3.34) of reporting a cognitive limitation compared to US-born non-Hispanic Whites. MENA immigrants had greater odds of reporting a cognitive limitation than foreign-born non-Hispanic Whites from Europe/Russia in all logistic regression models; however, results were not statistically different as all 95% confidence intervals were wide and overlapping.

Results from our sensitivity analysis are presented in Supplementary Table 1. In the unadjusted model, there was no statistically significant difference between foreign-born Middle Eastern adults and US-born non-Hispanic Whites (OR=1.69; 95% CI=0.90-3.16).

After adjusting for age and sex, foreign-born Middle Eastern adults had 1.91 times greater odds (95% CI=1.01-3.63) of reporting a cognitive limitation than US-born non-Hispanic Whites. Results were attenuated and not statistically significant after adjusting for education (OR=1.81; 95% CI=0.95-3.46). In model 4, foreign-born Middle Eastern adults had 1.95 greater odds (95% CI=1.02-3.75) of reporting a cognitive limitation after adjusting for hearing loss and hypertension; however, results were no longer significant (OR=1.85; 95% CI=0.98-3.47) after adjusting for depression, social isolation, and diabetes in the fully adjusted model. Despite some differences in statistical significance, all confidence intervals overlapped when we compared results among foreign-born non-Hispanic Whites from the Middle East and foreign-born non-Hispanic whites from the Middle East and Africa, which demonstrates that our findings are not biased from non-Hispanic Whites born in African countries outside of the MENA region.

DISCUSSION

Our study evaluated the prevalence of cognitive limitations among MENA immigrants compared to US- and foreign-born non-Hispanic Whites. Our results suggest that MENA immigrants had a higher prevalence of cognitive limitations than both US-born non-Hispanic Whites and foreign-born non-Hispanic Whites from Europe. Furthermore, MENA immigrants had higher odds of reporting a cognitive limitation compared to US-born non-Hispanic Whites before and after adjusting for risk factors. We discuss the implications of these findings below.

First, we found that the prevalence of having a cognitive limitation among MENA immigrants was 17.3%, which is much greater than recent studies using NHIS (9.7%) data (Dallo et al., 2020) and US Census data from the American Community Survey (ACS) (6.0%) (Kindratt et al., 2021). Two main reasons why our results may differ are that 1) our sample size was limited to adults ages 65 and older compared to adults ages 45 and older in previous studies and 2) cognitive health was measured differently in each study. While a growing body of literature has demonstrated that cognitive limitations may emerge as indicators of ADRD during midlife, we limited our sample to adults ages 65 and older because ADRD is more likely to occur during ages 65 and older. Older age is considered the greatest risk factor for late-onset ADRD (Alzheimer's Association, 2021). The NHIS measures cognitive limitations by asking whether participants are limited by difficulty remembering or because of periods of confusion (Dallo et al., 2020). The US Census data from the ACS measures cognitive limitations by asking whether participants have difficulty remembering, making decisions and concentrating (Kindratt et al., 2021). The MEPS measures confusion, memory loss, and problems making decisions similar to both the NHIS and ACS but adds a question to assess whether participants need supervision for their own safety. We expect that age is the main driver for the difference in our results compared to other studies because the additional measure of cognition measures a substantial cognitive limitation that is mostly also captured by other questions related to general problems remembering or periods of confusion.

In the current study, MENA adults had the highest increase in odds of having a cognitive limitation in model 4 (OR=2.10; 95% CI=1.20, 3.67). The notable increase in odds from

1.75 in the unadjusted model to 2.10 in model 4 occurred after adjusting for demographics, education, hearing loss and hypertension as risk factors that may be modifiable during midlife. One reason for this increase may be because MENA immigrants were less likely to report hearing loss, than US-born non-Hispanic Whites in our study sample. To our knowledge, no studies have compared hearing loss among these groups. Although not statistically significant, MENA adults also had lower estimates of hypertension that US- and foreign-born non-Hispanic Whites from Europe. The lower estimates are consistent with previous research which has demonstrated that MENA immigrants were less likely to report hypertension when compared to US-born non-Hispanic Whites (Abuelezam et al., 2018; Dallo & Borrell, 2006; Dallo & Kindratt, 2016). It is important to note that the influence of these risk factors may underestimated in this study because they were not measured during midlife.

Once the model controlled for additional risk factors that become most relevant in late life (model 5), we found that older MENA adults had 1.88 times greater odds (95% CI=1.06-3.34) of reporting a cognitive limitation compared to US-born non-Hispanic Whites in the fully adjusted model. The decrease in odds from model 4 to model 5 suggests that depression, social isolation and diabetes attenuate the relationship between race/ethnicity and cognitive limitations. MENA immigrants had a higher prevalence of depression and diabetes in our sample. These findings are consistent with previous studies which have demonstrated that Arab Americans immigrants have higher estimates of poor mental health, physical inactivity and diabetes (Abuelezam et al., 2018; Ajrouch & Antonucci, 2018; Dallo & Kindratt, 2016). In contrast, there were 65.5% of MENA immigrants who reported being married compared to only 57.4% of US-born non-Hispanic Whites. The higher proportion of married MENA individuals may demonstrate the importance of social relations in this population (Ajrouch & Antonucci, 2018). Unfortunately, we were unable to evaluate social networks beyond marital status because questions assessing network structure, composition and support quality were not measured as part of the MEPS.

Strengths and Limitations

A strength of this study was the use of two linked nationally representative data sources (NHIS and MEPS), one of which was a subsample of the previous year's participants. While the utility of the NHIS for uncovering MENA/Arab American immigrant health disparities has been strongly established using NHIS data (Dallo et al., 2013, 2020; Dallo & Borrell, 2006; Dallo & Kindratt, 2016; Read et al., 2005), this is the first study to investigate disparities using the MEPS for expanding research on MENA health. Linking these datasets allowed for a broader assessment of ADRD risk factors, specifically those identified as potentially modifiable risk factors across the life course. Although we were able to include measures for all risk factors, our indicators were measured cross-sectionally and may not be representative of participants at each life stage.

Similar to studies using NHIS data only, we were only able to disaggregate MENA adults who were foreign-born. If we were able to remove US-born MENA individuals, we may have found different results. Specifically, we may have underestimated the disparity between MENA adults and other non-Hispanic Whites because there may be US-born MENA adults

included in the non-Hispanic White subgroup with ancestry from MENA countries. Since the MEPS is a subsample of NHIS, the sample size was smaller. The unweighted sample size for MENA immigrants (n=140) is much smaller than foreign-born non-Hispanic Whites from Europe/Russia (n=807) and US-born non-Hispanic Whites (n=23,880) which may have caused an inflation of the odds ratio and wider confidence intervals in our logistic regression models. Another limitation of the study was survey language. Both the NHIS and MEPS only collect data in English and Spanish. There was no Arabic language translation available. Despite this linguistic barrier, since the cognitive limitation questions were asked about all adults living in the household, we may have been able to capture some cognitive limitations in Arabic speakers from other family members. We were unable to adjust for variables such as exposure to trauma, chronic stress, or experiences of racism because they are not measured by the MEPS. Furthermore, due to our focus on adjusting for individual-level modifiable risk factors, we did not adjust for other institutional level barriers, such as health insurance or usual source of care. Results from a similar study among foreign-born MENA individuals and US- and foreign-born non-Hispanic Whites did not find statistically significant differences between these groups regarding institutional level barriers (Kindratt et al., 2022). As these large national surveillance systems evolve to meet the growing needs of our diverse population, there is an urgent need for translation and interpreter services to be available for face-to-face data collection efforts. Without these linguistic services available, it is likely that we are underestimating cognitive limitations among MENA immigrants who are monolingual speakers.

Our results may be limited by how our independent (race, ethnicity, and nativity status) variables were measured. Our foreign-born MENA sample included non-Hispanic White individuals born in countries geographically located in the Middle East or Africa. We acknowledge that there is a possibility that some non-Hispanic whites born in Africa in our study may have been born in countries outside of North Africa. Our justification for providing for inclusive estimates of foreign-born MENA individuals is three-fold. First, national estimates from the 2015-2019 American Community Survey demonstrate that 70.2% of foreign-born non-Hispanic Whites from Africa were born in North African countries identified as part of the 2015 forum for identifying MENA ethnic groups for the US Census (Matthews et al., 2017; Kindratt, 2022), including Algeria, Egypt, Libya, Morocco, Somalia, and Sudan. Second, our sensitivity analysis excluding individuals from Africa from the foreign-born MENA group produced similar estimates to previous studies which used foreign-born non-Hispanic Whites from the Middle East to inform Arab/MENA health disparities (Dallo et al., 2013; Dallo et al., 2020). Third, by not including Whites from Africa, we risk omitting a large number of individuals that represent the MENA population (Maghbouleh et al., 2022). Population reports estimate that roughly 30% of individuals born in or trace their heritage to North African countries represent 30% of the MENA population in the US (Cumoletti & Batalova, 2021). We were unable to determine whether our foreign-born participants were born to US citizens that may have been living abroad. With most foreign-born MENA individuals living in the US for 15 years or more (81.5%) and reporting being US citizens (81.5%), we acknowledge that our results may have been different if our sample included fewer US citizens and more recent immigrants.

Furthermore, our results may also be limited by how our dependent variables (cognitive limitations) were measured. While the self-reported cognitive limitation variable is more robust than other surveys because it includes three separate questions that may be sensitive to the presence of cognitive impairment (confusion of memory loss, making decisions, requiring supervision) and allows for proxy respondents, only subjective data were collected. Future iterations of the MEPS should include objective cognitive measures sensitive to ADRD, such as word listing learning and animal fluency, similar to the National Health and Nutrition Examination Survey (NHANES) (Brody et al., 2019). In addition to these cognitive data, validated questions about functional ability (e.g., AD8, Functional Activities Questionnaire) could allow for a more direct estimate of ADRD prevalence (Galvin et al., 2005; Pfeffer et al., 1982). Of note, studies that include high-quality measures of cognitive and/or functional health (e.g. NHANES) do not collect data that would allow for the identification of MENA participants, so we are unable to make comparisons with our study.

CONCLUSIONS

This is the first study to provide nationally representative estimates of cognitive limitations among older (ages 65 and older) MENA immigrants. The study contributes to the growing body of evidence which posits that MENA adults may have a higher burden of cognitive limitations than others. Furthermore, it supports other recent research which demonstrates that MENA cognitive health estimates do not align with the “healthy migrant” hypothesis (Abuelezam et al., 2019; Read et al., 2018), which speculates that immigrants are healthier when they first immigrate to the US but their health decreases over time. This emerging evidence demonstrates that the healthy migrant effect may not be relevant for cognitive or functional health outcomes and the health of MENA immigrants may be worse than the US-born and other foreign-born non-Hispanic Whites.

Our findings expand on previous studies examining Arab American health. Policy efforts are needed to include MENA as a racial/ethnic identifier for all individuals who trace their ancestry to the Middle East and North Africa so that greater funding and resources are made available for data efforts in this population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Selected characteristics of US- and foreign-born adults ages 65 and older, 2000-2017 NHIS and 2001-2018 MEPS

	US-Born	Foreign-Born		
	Non-Hispanic White	Non-Hispanic White	Middle Eastern and North African (MENA)	
	% (SE)	% (SE)	% (SE)	*p*
Demographic Factors				
Female Sex	55.3 (0.00)	59.5 (0.02)[b]	49.6 (0.04)	.0376
Age *mean (SE)*	74.3 (0.08)	75.5 (0.32)[b]	73.8 (0.54)	.0104
Potentially Modifiable Risk Factors				
Less than 9th grade education	6.1 (0.00)	15.0 (0.02)	10.8 (0.03)	<.0001
Hearing Loss[c] (%yes)	21.5 (0.00)	18.1 (0.02)	13.0 (0.04)	.0250
Hypertension[d] (%yes)	62.7 (0.00)	67.0 (0.02)	61.2 (0.05)	.1236
Obesity[e] (%yes)	25.5 (0.00)	21.1 (0.02)	25.6 (0.06)	.1144
Current Smoker (%yes)	9.8 (0.00)	7.2 (0.01)	8.3 (0.03)	.0847
Depression (%yes)	26.7 (0.00)[a]	34.9 (0.02)	38.2 (0.06)	.0002
Social Isolation (%not married)	42.6 (0.01)	43.6 (0.03)	34.5 (0.06)	.3772
Physical Inactivity (%yes)	47.2 (0.00)	45.3 (0.03)	40.1 (0.08)	.5201
Diabetes (%yes)	18.5 (0.00)	18.0 (0.02)	22.3 (0.05)	.6592

Note. *N* = 24,827 (*n* = 23,880 for US-born non-Hispanic White; *n* = 807 for foreign-born non-Hispanic White; *n* = 140 for Middle Eastern and North African (MENA) immigrants.

Abbreviations. GED = general education equivalent; HS = high school; MENA = Middle Eastern or North African; NHIS = National Health Interview Survey; MEPS = Medical Expenditure Panel Survey

[a]Post hoc comparison between MENA immigrants and US-born Whites ($p < .05$).

[b]Post hoc comparison between MENA immigrants and foreign-born Whites ($p < .05$).

[c]Hearing loss (yes or no) was determined by self-report of any hearing difficulty, including some or serious difficulty.

[d]Obesity was determined by self-reported body mass index (BMI) of ≥30 kg/m^2 (yes or no).

[e]Current smokers were compared to former and never smokers (“no” responses).

[f]Depression was determined by self-report of problems with anxiety or depression as measured by EQ-5D (2001-2003) or score of 2 or greater on Patient Health Questionnaire (PHQ2) (2004-2018) measuring little interest or pleasure or feeling down/depressed.

[g]Social isolation determined by current marital status (yes or no). “No” responses included divorced, widowed, and separated responses.

[h]Physical inactivity (yes or no) determined by receipt of doctor’s advised to exercise more (2001-2015) and self-report or current moderate to vigorous physical activity at least one half-hour five times a week.

Table 2

Age and sex-adjusted prevalence of cognitive limitations among US- and foreign-born adults ages 65 and older, 2000-2017 NHIS/2001-2018 MEPS.

	US-Born	Foreign-Born		
	Non-Hispanic White	Non-Hispanic White	Middle Eastern and North African (MENA)	
	% (SE)	% (SE)	% (SE)	*p*
Cognitive limitation	9.6 (0.00)	13.6 (0.01)	17.3 (0.02)	<.0001

Note. N = 24,827 (n = 23,880 for US-born non-Hispanic White; n = 807 for foreign-born non-Hispanic White; n = 140 for Middle Eastern or North African (MENA) immigrants.

Abbreviations. NHIS = National Health Interview Survey; MENA = Middle Eastern or North African; MEPS = Medical Expenditure Panel Survey

Table 3

Unadjusted and adjusted logistic regression models for cognitive limitations, ages 65 and older, 2000-2017 NHIS/2001-2018 MEPS.

	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 5[e]
	OR (95% CI)	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Cognitive Limitation					
US-Born					
Non-Hispanic white	1.00	1.00	1.00	1.00	1.00
Foreign-Born					
Non-Hispanic White	1.62 (1.27, 2.05)	1.48 (1.16, 1.88)	1.36 (1.06, 1.75)	1.40 (1.08, 1.80)	1.33 (1.03, 1.71)
MENA	1.75 (1.01, 3.04)	1.98 (1.16, 3.38)	1.93 (1.12, 3.32)	2.10 (1.20, 3.67)	1.88 (1.06, 3.34)

Note. N = 24,827 (n = 23,880 for US-born non-Hispanic White; n = 807 for foreign-born non-Hispanic White; n = 140 for Middle Eastern and North African (MENA) immigrants.

Abbreviations. MENA = Middle Eastern or North African; MEPS = Medical Expenditure Panel Survey

[a]Unadjusted model.

[b]Adjusted for age and sex.

[c]Adjusted for Model 2+highest level of education.

[d]Adjusted for Model 3+hearing loss, hypertension.

[e]Adjusted for Model 4+depression, social isolation, and diabetes.