



Successful aging and lifestyle comparison of Greeks living in Greece and abroad: the epidemiological Mediterranean Islands Study (MEDIS)

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ABSTRACT

Objectives: Comparing lifestyle and successful aging between Greeks living in Greece (GG) and Greeks living abroad (GA) using a multidimensional model of successful aging including both biomedical and non-medical components.

Methods: Anthropometric, clinical, psychological, socio-demographic, dietary and lifestyle parameters were assessed in a random sample of 252 GG and 252 GA. Successful aging was evaluated using the validated successful aging index (SAI range 0–10).

Results: GA had better financial and educational status and scored higher in all social activity parameters (p 's < 0.05). GA were more likely to be physically active (p < 0.001), had higher adherence to the Mediterranean diet (p < 0.001) and were less likely to be smoking (p = 0.008). Depression was more evident among GG compared to GA (p < 0.001). GA was aging significantly more successfully than GG (p < 0.001). Men irrespective of location were aging significantly more successfully than women (p < 0.05).

Conclusion: Place of residence and personal choices significantly affect the level of healthy aging among people with similar genetic backgrounds.

1. Introduction

The aging rate of the Greek population is among the fastest compared to all other European Union countries. In 2020, people >65 years old accounted for 22.28% of the overall population of Greece compared to 6.8% in 1951 (Statista, 2021). Over the same period the prevalence of cardiovascular diseases (CVD) has increased significantly, whilst mental health conditions, such as dementia and depression, already affect a large portion of the older population (Argyropoulos et al., 2015; Efklides et al., 2003; Kollia et al., 2018; Vlachos et al., 2021b). It is therefore crucial and urgent to create a plan that will not only prevent and treat disease, but also improve overall quality of life and promote

the concept of “successful aging” for the population.

Successful aging was originally defined as the absence of disease among older populations. Recently the definition has been altered to better describe its multifactorial nature. Current definitions of successful aging embrace multiple aspects of everyday life, suggesting that successful aging depends on several lifestyle factors. The first structured definition of successful aging was proposed by Rowe and Kahn in 1997 who described successful aging as a multidimensional subject characterized by low probability to develop a disease or disability, maintenance of high physical and cognitive function, and sustainable engagement in social and productive activities (Rowe & Kahn, 1997). However, the aforementioned model disregarded social and

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environmental factors, as well as spiritual aspects, such as purpose in life, sense of meaning, and connectedness to the sacred (Crowther et al., 2002; Depp & Jeste, 2006; Ng et al., 2009; Sadler & Biggs, 2006). More recently, the World Health Organization proposed another comprehensive definition of healthy aging; if people preserve their functional ability and continue to be able to perform activities they like while growing older, they are considered to age healthy (World Health Organization (WHO), 2018). Fundamental activities that should be maintained over time include satisfying basic personal needs, being able to learn, grow and make decisions, being mobile, building and maintaining relationships, and being a valuable member of society.

Since the aging process is known to be affected by both genetic and environmental factors, a proper way to focus on the later when comparing populations is choosing populations of similar genetic background. Even though studies comparing health outcomes (obesity, diabetes, BMI, blood pressure, cancer, etc.) between immigrants and people born in the host country exist in the literature, their comparison groups are not appropriate to draw conclusions regarding their health status in case they had never migrated. Thus, the aim of the present work was to compare successful aging levels among people of similar genetic background but very different living conditions i.e. a) Greeks living in Greece and b) Greeks born in Greece but living abroad, i.e., a population probably affected by migration. The goal was to determine the role of the living environment on health and personal choices of people with similar genetic background i.e. “nature vs. nurture”.

2. Materials and Methods

2.1. Sample

The Mediterranean Islands (MEDIS) study is a population-based, observational survey which has been studying individuals over 65 years of age. To date, 3,723 subjects have been studied from 27 Mediterranean islands and 7 countries. In the present work, we compared a random sample of $n = 252$ Greek men and women living in 20 Greek islands (i.e., Greeks of Greece), obtained from the pool of 3,723 individuals, with $n = 252$ men and women born in Greece and living in the USA and Australia (i.e., Greeks Abroad). Similarly, a random population-based scheme was applied to voluntarily enroll the Greeks abroad. The study participants were considered to be genetically similar since all were born in Greece where the immigrant population is very low (1.63% in 1991), as reported by the Hellenic Statistical Authority. A group of health scientists (physicians, dietitians, public health nutritionists and nurses) with experience in field investigation collected all the required information at the time of recruitment using a quantitative questionnaire and standard procedures. Investigators collecting data from Greeks abroad were trained by the investigators that collected data from Greeks in Greece to ensure consistency of the data collection process. According to the design of the study, individuals who resided in assisted-living centers, had a clinical history of CVD or cancer or had left the island or the studied country for a considerable period of time during their life (i.e., >5 years) or lived abroad for less than 20 years, were excluded from the study.

2.2. Measurements

2.2.1. Socio-demographic characteristics

Main socio-demographic characteristics such as age (measured in years), sex (man/woman), place of residence (Greece, USA and Australia), years of education and financial status were evaluated. Participants were asked to report their average income during the previous three years using a four-point scale (“Low” for inadequate to cover daily expenses = 1, “Moderate” for trying hard to cover daily expenses = 2, “Good” adequate to cover daily expenses = 3, “Very good” for very adequate to cover daily expenses = 4). If the respondents reported moderate or good mean income, they were considered having

satisfactory financial status. Moreover, in order to evaluate the participants’ social participation, the weekly frequency of their social activities with their family, their friends as well as their annual frequency of excursions were recorded.

2.2.2. Lifestyle and Dietary assessment

Smoking status was evaluated following standard procedures for observational studies. Current smokers were defined as smokers of tobacco at the time of the interview. Former smokers were defined as those who previously smoked but had not done so for a year or more. Current and former smokers were further classified as ever smokers. Dietary habits were assessed through a similar semi-quantitative, validated, and reproducible food frequency questionnaire (FFQ) (Tyrovolas et al., 2010). Consumption frequency of various food groups (i.e., meat and meat products, fish and seafood, milk and other dairy products, fruits, vegetables, greens and salads, legumes, cereals, pasta, olive oil and alcohol) was reported on a daily, weekly or monthly basis. To evaluate the level of adherence to the Mediterranean diet, the previously developed and validated Mediterranean Diet Score (MedDietScore) with theoretical range 0–55 was used, with higher values indicating greater adherence (Panagiotakos et al., 2006).

2.2.3. Physical activity assessment

Physical activity was evaluated in metabolic equivalent (MET) minutes per week, using the shortened, translated and validated Greek version of the self-reported International Physical Activity Questionnaire (IPAQ) (Papathanasiou et al., 2009). Individuals who had at least 3 MET-minutes per week were classified as “physically active” while others were defined as “physically inactive”.

2.2.4. Anthropometric and clinical characteristics

Weight and height were measured using standard procedures to calculate body mass index (BMI) (kg/m^2). Obesity was defined as $\text{BMI} > 29.9 \text{ Kg}/\text{m}^2$. Type 2 diabetes mellitus was determined by fasting plasma glucose and was analysed in accordance with the American Diabetes Association diagnostic criteria (glycated haemoglobin A1C levels greater or equal than 6.5 or fasting blood glucose levels greater or equal than 126 mg/dl or 2-h plasma glucose greater or equal than 200 mg/dl during an oral glucose tolerance test-OGTT- or a random plasma glucose greater or equal than 200 mg/dl or by history of previously established diagnosis of diabetes). Participants who had blood pressure levels $>130/80 \text{ mmHg}$ or used antihypertensive medications were classified as hypertensive. Fasting blood lipids levels (HDL-, LDL-cholesterol and triglycerides) were also recorded and hypercholesterolemia was defined as total serum cholesterol levels $>200 \text{ mg}/\text{dL}$ or the use of lipid-lowering agents according to the NCEP ATP III guidelines (Expert Panel on Detection & Treatment of High Blood Cholesterol in Adults, 2001). A cumulative variable (range 0–4) indicating the overall burden of classical cardiometabolic risk factors (i.e., obesity and hypertension, diabetes and hypercholesterolemia) was developed (participants having none of the aforementioned risk factors received score 0, having one factor score 1, etc.). Assessment of depressive symptoms for the last month before the interview was performed by using the validated Greek version of the shortened, self-report Geriatric Depression Scale (GDS) (range 0–15) (Montorio and Izal, 1996; Fountoulakis et al., 1999). Higher scores show more severe depressive symptoms. The total scores were allocated into two categories for clinical purposes meaning that scores 0–5 indicated no signs of depression and scores 6–15 indicated mild and severe depression.

2.2.5. Successful aging index

Successful aging is a complex phenomenon with several definitions, including biomedical, social functioning, psychological and subjective models. Following this multi-dimensional approach, we used a previously developed and validated successful aging index (SAI) (total score ranging from 0 to 10) associated with the aging process (Tyrovolas et al.,

2014). SAI encompasses health-related, social, lifestyle and clinical factors, including education, financial status, physical activity, BMI, depression, participation in social activities with friends and family, number of yearly excursions, total number of clinical CVD risk factors (i. e., history of hypertension, diabetes, hypercholesterolemia and obesity) and level of adherence to the Mediterranean diet.

2.3. Statistical analysis

Continuous variables are presented as mean $\pm$ standard deviation (SD) and categorical variables as frequencies. Comparisons between categorical variables were tested using the chi-square test, while comparisons of continuous variables between groups were performed using the independent samples *t* test for normally distributed variables and the Mann-Whitney *U* test for non-normally distributed variables. Scatter plots with quadratic lines were used to graphically represent the relationship between SAI index (y-axis) and age (x-axis) by place of residence (Greece or Australia/USA). STATA software version 15 (M. Psarros & Associates, Sparta, Greece) was used for all calculations.

3. Results

Table 1 presents basic lifestyle, socio-demographic and clinical characteristics of the study participants, i.e. Greeks living in Greece (GG) and Greeks living Abroad (GA). GG were more likely to be older (76 ± 7.7 vs. 71 ± 9.1 years old, $p < 0.001$) compared to GA. GA had higher financial status (12% vs. 42%, $p < 0.001$) and educational level (6.1 ± 3.3 vs. 10 ± 5.0 years, $p < 0.001$) compared to GG and used health care services more often on an annual basis (3.8 ± 3.8 vs. 5.6 ± 5.6 , $p = 0.02$).

3.1. Lifestyle, socio-demographic and clinical characteristics

More GA were physically active compared to GG (87% vs. 54% of total participants for each group, $p < 0.001$) and had higher adherence to the Mediterranean Diet (37 ± 4.4 vs. 27 ± 5.9 , $p < 0.001$); this was true for both sexes and all ages. Also, more current smokers were found among GG in comparison to GA (18% vs. 9.6% $p = 0.008$). Regarding social activities, GA were more likely to be more socially active for all three categories. More specifically, GA were going on more excursions annually (26% vs. 80% of total participants for each group, $p < 0.001$) and were interacting more with family members (51.5% vs. 83.6% of total participants for each group, $p < 0.001$) and friends (66% vs. 75% of total participants for each group, $p < 0.001$). Additionally, an estimation of visits to health care services annually have shown that GA of both sexes visit doctors or perform medical procedures more often than GG (3.8 ± 3.8 vs. 5.6 ± 5.6 , $p = 0.02$).

The risk for developing cardiometabolic diseases seemed to be slightly higher among GA; however the difference was not significant (1.5 ± 1.1 vs. 1.6 ± 1.1 number of CVD risk factors, $p = 0.72$). The prevalence of hypertension was significantly higher among GG (60% vs. 42%, $p < 0.001$), obesity was significantly higher among GA (29% vs. 45%, $p < 0.001$), whereas differences in diabetes and hypercholesterolemia rates between the two groups did not reach statistical significance. GG had significantly lower BMI (28 ± 4.3 vs. 30 ± 5.5 , $p = 0.01$) when compared to GA. Finally, GG presented significantly higher depression scores than GA (2.9 ± 2.4 vs. 4.1 ± 3.7 , $p < 0.001$).

3.2. Successful aging

The level of successful aging was significantly higher among GA of both sexes in comparison to GG (5.1 ± 1.4 vs. 3.1 ± 1.2 , $p < 0.001$) (Table 2). Regardless the location of living, men were more likely to age successfully than women (3.3 ± 1.2 vs. 2.8 ± 1.1 , $p = 0.003$ for GG and 5.3 ± 1.3 vs. 4.8 ± 1.4 , $p = 0.008$ for GA). Moreover, Fig. 1 shows that GG have lower SAI compared to GA for all age groups.

Table 1

Lifestyle, socio-demographic and clinical characteristics of $n = 504$ participants, based on their place of residence.

	All (n = 504)	Greeks of Greece (n = 252)	Greeks Abroad (n = 252)	<i>p</i>
Age (years)	73 ± 8.8	76 ± 7.7	71 ± 9.1	<0.001
Men (%)	46	48	44	0.421
Satisfactory financial status (%)	27	12	42	<0.001
Education (years)	8.5 ± 4.8	6.1 ± 3.3	10 ± 5.0	<0.001
Number of yearly excursions				
0 (%)	46	74	20	<0.001
1 (%)	23	11	35	
2 (%)	18	9	26	
3-5 (%)	9	5	14	
>5 (%)	4	1	5	
Social activities with friends per week				
0 (%)	30	34	25	<0.001
1 (%)	29	21	37	
2 (%)	18	14	22	
3-5 (%)	17	23	12	
>5 (%)	6	8	4	
Social activities with family per week				
0 (%)	32	48.5	16.4	<0.001
1 (%)	34	36.1	31.2	
2 (%)	14	10.3	18.4	
3-5 (%)	9	4.7	12.4	
>5 (%)	11	0.4	21.6	
Physical Activity (%)	71	54	87	<0.001
Current smokers (%)	14	18	9.6	0.008
Health care visits (times/year)	4.8 ± 4.9	3.8 ± 3.8	5.6 ± 5.6	0.02
Hypertension (%)	51	60	42	<0.001
Diabetes (%)	24	25	23	0.68
Hypercholesterolemia (%)	44	40	48	0.06
BMI (Kg/m ²)	29 ± 5.0	28 ± 4.3	30 ± 5.5	0.01
Obesity (%)	37	29	45	<0.001
CVD risk factors (0-4)	1.6 ± 1.1	1.5 ± 1.1	1.6 ± 1.1	0.72
Depression symptoms (0-15)	3.5 ± 3.2	4.1 ± 3.7	2.9 ± 2.4	<0.001
MedDietScore (range 0-55)	32 ± 6.9	27 ± 5.9	37 ± 4.4	<0.001
Successful Aging Index (range 0-10)	4.0 ± 1.6	3.1 ± 1.2	5.1 ± 1.4	<0.001

Values are presented as percent (%) or mean $\pm$ standard deviation. *p*: *p*-values derived from Pearson's *t*-test for continuous variables or the chi-square test for the categorical variables.

4. Discussion

The present study compared the levels of successful aging between two similar populations born in the same country, Greece, with one group living in their native country and the other, living in a foreign country which was either Australia or the United States. People living in Greece seemed to score less on most successful aging components than their counterparts living abroad; hence total successful aging scores were lower among Greeks living in Greece for both sexes. In more detail, Greeks living abroad were more physically active, adhered more to the Mediterranean diet, smoked less, were more socially active, had fewer depressive symptoms, and were of higher educational and financial status. However, Greeks living abroad seemed to have higher body mass index and obesity rates. Also, men found to age more successfully than women in both locations, suggesting that sex could be considered as a predicting factor of health status in older ages, regardless the living location.

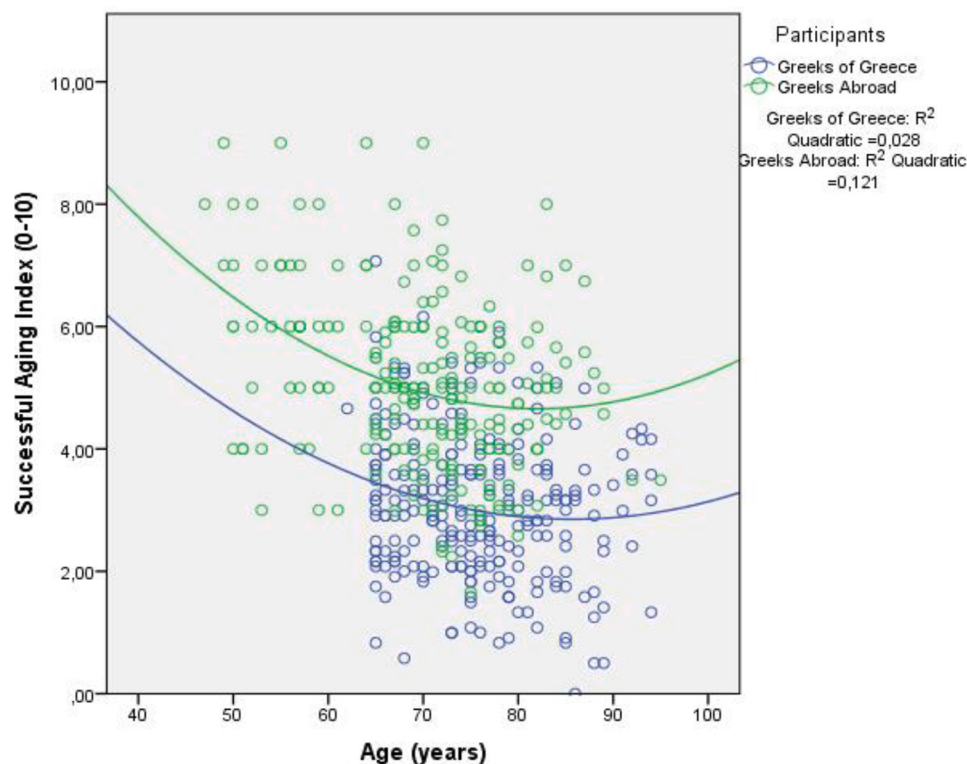
The health status of immigrants has been investigated in various studies focusing on different native and host countries. As such, literature presents the phenomenon of "healthy immigrant effect", especially

Table 2

Lifestyle, socio-demographic and clinical characteristics of n = 504 participants in total, based on their place of residence and their sex (men, women).

	Greeks of Greece (n = 252)		Greeks Abroad (n = 252)		p^1	p^2
	Men (n = 121)	Women (n = 131)	Men (n = 112)	Women (n = 140)		
Age (years)	76 ± 7.9	75 ± 7.4	72 ± 9.5	70 ± 8.7	<0.001	<0.001
Satisfactory financial status (%)	16	7.1	46	38	<0.001	<0.001
Education (years)	6.5 ± 3.6	5.7 ± 3.1	11 ± 4.6	10 ± 5.4	<0.001	<0.001
Number of yearly excursions						
0 (%)	75	73	20	20	<0.001	<0.001
1 (%)	13	10	32	37		
2 (%)	9	10	27	25		
3-5 (%)	4	5	16	12		
>5 (%)	0	2	5	6		
Social activities with friends per week						
0 (%)	17	49	17	31	0.006	<0.001
1 (%)	23	19	40	35		
2 (%)	17	10	22	22		
3-5 (%)	34	14	14	11		
>5 (%)	9	8	7	1		
Social activities with family per week						
0 (%)	43	53	14	19	<0.001	<0.001
1 (%)	39	33	33	30		
2 (%)	11	10	15	21		
3-5 (%)	6	4	13	11		
>5 (%)	1	0	25	19		
Physical Activity (%)	66	43	85	89	0.001	<0.001
Current smokers (%)	29	7	13	6.5	0.004	0.87
Health care visits (times/year)	3.4 ± 3.2	4.0 ± 4.1	5.3 ± 3.5	5.8 ± 6.7	0.04	0.08
Hypertension (%)	57	63	43	42	0.03	0.001
Diabetes (%)	21	29	28	19	0.20	0.08
Hypercholesterolemia (%)	27	51	52	45	<0.001	0.372
BMI (Kg/m ²)	27 ± 4.0	28 ± 4.5	29 ± 4.8	30 ± 5.9	0.001	0.003
Obesity (%)	18	39	39	49	<0.001	0.11
CVD risk factors (0–4)	1.2 ± 1.0	1.8 ± 1.2	1.6 ± 1.2	1.6 ± 1.1	0.007	0.06
Depression symptoms (0–15)	3.2 ± 3.0	5.0 ± 4.1	2.4 ± 2.0	3.4 ± 2.6	0.01	<0.001
MedDietScore (range 0–55)	27 ± 4.8	28 ± 6.7	37 ± 4.4	36 ± 4.4	<0.001	<0.001
Successful Aging Index (range 0–10)	3.3 ± 1.2	2.8 ± 1.1	5.3 ± 1.3	4.8 ± 1.4	<0.001	<0.001

Values are presented as percent (%) or mean ± standard deviation. p: p-values derived from Pearson's t-test for continuous variables or the chi-square test for the categorical variables, p^1 : for the comparisons between men of "Greeks of Greece" and men of "Greeks Abroad" and p^2 : for the comparisons between women of "Greeks of Greece" and women of "Greeks Abroad".

**Fig. 1.** Combined scatterplots with quadratic lines showing the relationship between SAI and age by place of residence (Greece vs. Abroad).

among recent immigrants and notes that the health advantage of immigrants tend to transform to a disadvantage after living some years in the host country. For example, since one of the main immigrant populations in the US is Mexicans, there is increased scientific interest regarding their health status on arrival and after years living in the US, and the comparison with native-born Americans (Mehta et al., 2016). The results showed that Mexican immigrants in the US seem to be healthier than Americans during the first years of immigration. However, after living 10–20 years in the US, Mexican immigrants showed comparable health status or even worse than Americans (Markides & Gerst, 2011; Markides & Rote, 2019). The same observations were made for immigrants in Australia (Biddle et al., 2007; Markides & Rote, 2019). A possible reason could be the acculturation process and the resulting displacement of original healthy lifestyle habits with unhealthy ones of the host country (Antecol & Bedard, 2006). In support of this theory, older people living in high density Hispanic or immigrant neighborhoods were found to have lower mortality rates (Eschbach et al., 2004). As such, it seems that a health advantage might exist due to cultural characteristics and supportive exchanges among people of the same origin especially when they live in the same neighborhood.

Another study however, reported that health status is affected more by demographic characteristics, living conditions and having private insurance, rather than acculturation or time of stay in the host country (Choi, 2012). Other explanations of the health advantage among immigrants might be personal characteristics distinguishing them from their compatriots who chose not to migrate and remained in their native country. Such characteristics might be better health status and healthier lifestyle behaviors before migration, higher socioeconomic status, and health screening as part of the immigration process.

Regarding the immigrant Greek community, since the family institution is part of the Greek culture, older Greeks tend to live close to or together with family members which might provide them valuable support in everyday life or in special occasions but also give them a sense of purpose by giving them the chance to take care of other family members such as grandchildren (Nimrod & Kleiber, 2007). Having support and interacting with people who share common culture probably ameliorates stress induced by the acculturation process. Additionally, the presence of Greek Orthodox Church in the US and Australia is very strong and plays a major role in bringing together and supporting the Greek community as well as preserving the cultural heritage including native language, traditional dances, traditional food and cooking methods and traditional festivities. In that case, it can be said that Greek immigrants who preserve the beneficial habits of Greek culture while taking advantage from a better health care system and amenities of higher quality in the host country, may age more successfully than their compatriots (Saloutos, 1973).

Adherence to physical activity recommendations may be influenced by the living environment and its exercise-friendly structures. For example, a recent study conducted in Australia showed that individuals of middle to older age regularly exposed to public open spaces were 35% more likely to meet the Australian physical activity guidelines while exposure to larger public open spaces was associated with higher levels of vigorous activity (Hooper et al., 2020). Similar observations were made among older adults of Germany and women in the US which showed that exposure to urban green spaces and having greener neighborhoods led to better health-related quality of life, higher physical activity levels and less obesity (Petersen et al., 2018; Villeneuve et al., 2018). Other characteristics of the built environment are also important in affecting physical activity levels among older adults which might account for the significantly different physical activity levels among our study groups (Barnett et al., 2017). Additionally, the infrastructure to support people with disabilities is very advanced in Australia and the USA giving everybody the opportunity to be independent and able to perform everyday activities without difficulties.

Intriguingly, the dietary habits of Greeks living abroad seemed to be closer to the Mediterranean diet compared to those living in Greece. A

possible explanation for this contradicting observation might be that the Mediterranean diet symbolizes a part of the Greek culture and national character, which makes Greeks living abroad more committed to preserve this characteristic and pass it over to next generations. In contrast, Greeks living in Greece are more prone to the Westernization of diet, a phenomenon widely evident between Greek children and adolescents that leads to increased prevalence of overweight and obesity among younger ages (Barnett et al., 2017). Nutrition transition in Greece and other Mediterranean countries attracted the scientific interest at least 20 years ago and the high number of studies relevant to this subject prove the importance of this issue and could also mean that it affects older people too, such as in our study group (Aounallah-Skhiri et al., 2011; Schmidhuber & Shetty, 2005). In fact, a recently published study from the Greek island of Crete showed that older people have moderate adherence to the Mediterranean diet. The authors suggested as potential reasons the diminished social support from family and the community, lower socioeconomic status and worse psychological status (Apostolaki et al., 2020).

GG were heavier smokers than immigrant GA, an observation that could be explained by the different smoking prohibition laws and their enforcement. In 2005 Greece accepted the WHO Framework Convention on Tobacco Control by regulating advertisement of smoking and tobacco products and voting legislation to prohibit smoking in public indoor places (Stafylis et al., 2018). However, ineffective enforcement of the legislation and the intensified economic and political crisis led to increased smoking prevalence; over 38% of Greek adults smoke (*Global Adult Tobacco Survey Greece*, 2013; Rachiotis et al., 2017; Teloniatis et al., 2018). Second-hand smoke is another major issue, since Greece was found to have the highest prevalence of adults exposed to passive smoking while drinking (83%) or eating (72%) in public places (Filippidis & Tzoulaki, 2016; Rachiotis et al., 2017; Schoretsaniti et al., 2014). Recent enforcement of the law has dramatically lowered secondhand exposure and possibly smoking rates, but scientific data are not available yet.

GA have higher participation in excursions on annual basis and engage more often with other family members and friends compared to GG. Going on trips is very common abroad, especially among older adults who have retired and have more time to spare on traveling, and those who have satisfying economic status and resources to spare for trips (van Nostrand et al., 2013). Additionally, the GA had better health status than those living in Greece, probably meaning that they also have higher self-perceived health rates which in turn, have been shown to increase traveling among older adults (Losada et al., 2016). It is also important to note that immigrant Greeks, at least in the United States, are usually traveling to Greece once per year for vacation and reunite with other family members. Increased interaction with family members could be explained by the fact that immigrant Greeks are preserving the family institution since it is part of their culture and in addition, works as a supportive mechanism while residing in a foreign country. Being abroad seems to support family bonds and lead people to spend more time with their families, but also preserves family traditions, such as having family dinners and contributing to other family members.

GA and GG have similar risk to develop CVD. However, GG had significantly higher hypertension rates while GA seems to have significantly higher BMI in total and higher obesity rates. Prevalence of diabetes and hypercholesterolemia were found to be similar between the two study groups. Additionally, the evaluation of psychological health showed that GG displayed more depressive symptoms than GA that could be affected by the economic and political crisis in Greece and lower health status (Economou et al., 2013, 2016). Evidence show that depression is associated with various social determinants such as marital status, gender and social support, and economic factors including employment status, income and social class (Alonso et al., 2004; Ayuso-Mateos et al., 2001; Wilhelm et al., 2003).

Knowledge derived from the presented work could be valuable in the field of policy-making and public health. Promoting lifestyle and

environmental aspects that support healthy and functional older adults with better well-being may alleviate the economic needs of healthcare system and ensure having more active citizens in terms of social matters and workforce.

5. Strengths & Limitations

The innovation of the presented study is the comparison of populations of the same origin living in different countries. Most of migration studies so far, have compared immigrant populations with people of the host country which makes impossible to understand what their health status would be if stayed in their native country. As such, our work is, in our knowledge, the first to report information regarding the health status of older Greek immigrant populations and compare them to their Greek counterparts living in Greece. Accordingly, the unique design and population of the present study will shed light on successful aging and lifestyle habits in accordance with the living environment, while minimizing the influence of genetics on the outcome. Thus, the presented work could be the reference point for future migration studies with or without Greek participants that wish to extend the presented observations. Future studies with similar methodology to our work, should be designed on the basis of avoiding the following limitations. The cross-sectional study design could be considered a limitation, since the study results cannot provide information regarding causal relationships between the studied factors and outcomes. The sample size can be considered small but a random population-based, multistage scheme was applied to voluntarily enroll the participants and, in addition, the participation rate varied according to region from 75% to 89%; thus, we believe that there is no sampling-bias. Our sample was older than 50 years, since the focus of our work was the evaluation of successful aging. To the best of our knowledge, there is no published information regarding the older population of Greece, the United States and Australia, thus the generalizability of our findings is not clear. The findings of our work, may have low generalizability, however, they could constitute the basis for similar investigations and comparisons. Also, there was a 5-year difference in the mean age of the two groups. Finally, successful aging in our study did not include cognitive behavior, mobility, physical function, self-assessed quality of life (QoL) and self-rated health (SRH) of the participants. These factors often characterize successful aging and overall health, along with low probability of disease and active engagement with life, and this may constitute another limitation. However, the successful aging index, used in this work, has already been validated (Tyrovolas et al., 2014).

6. Conclusion

The place of residence, people's personal choices, social support networks, such as family, and maintenance of cultural practices significantly affect the rate of healthy aging, even among people who share the same genetic background. Greeks (and possible other Mediterranean populations) living abroad tend to follow the traditional Mediterranean lifestyle more than Greeks (and possible other Mediterranean populations) living in their country of origin. Greeks living in Greece have largely abandoned the Mediterranean lifestyle, a fact that has obvious detrimental effects to their health and wellbeing.

CRediT

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Declaration of Competing Interest

The authors declare that there is no conflict of interest.

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Declaration of Competing Interests

The authors declare that there is no conflict of interest.

Ethical approval

The study followed the ethical considerations provided by the World Medical Association (52nd WMA General Assembly, Edinburgh, Scotland, October 2000) and all research was conducted according to the World Medical Association Declaration of Helsinki. The study design was approved by the Institutional Ethics Board of Harokopio University (16/19-12-2006), the Human Ethics Committee of La Trobe University (FHEC 11/27), as well as the Institutional Review Board of Rutgers University (ID Pro20170001777). Participants were informed of the aims and procedures of the study and gave their verbal or written consent prior to being interviewed.

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