



Health Related Quality of Life and Personality Characteristics for Aging Well: Evidence from the Sardinian Blue Zone

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Abstract

This study pursued two main objectives: (1) to examine the associations among Big Five personality traits, health-related quality of life (HRQoL), and psychological well-being in late adulthood; and (2) to compare these variables between community-dwelling older adults living in the Sardinian Blue Zone and those residing in a neighbouring non-Blue Zone rural area. A sample of 125 older individuals (Mage = 80.1 years, SD = 5.3; range: 71–101) completed a battery of tests assessing cognitive efficiency, personality, psychological well-being, and HRQoL. The groups were balanced for age, sex, and global cognitive functioning. After controlling for age and education, correlational analyses revealed that higher levels of openness to experience, conscientiousness, and agreeableness were positively associated with psychological well-being and leisure activity engagement. Conversely, neuroticism was negatively associated with HRQoL. Examining group differences using multivariate and univariate analyses of covariance (MANCOVA and ANCOVA), it was found that individuals in the Blue Zone showed higher levels of openness to experience, more effective coping strategies, greater emotional competence, and more frequent involvement in cognitively and physically stimulating activities compared to their non-Blue Zone peers. Overall, these findings suggest that the combination of adaptive personality traits and coping resources promotes a more active lifestyle, providing insights into the mechanisms of successful aging.

Keywords Successful Aging · Quality of Life · Older People · HRQoL · Health Status · Personality Traits

The steady increase in the global aging population (WHO, 2024) necessitates targeted interventions to preserve Quality of Life (QoL) in late adulthood and promote

successful aging. However, defining these distinct but interrelated constructs remains contentious.

QoL is often inconsistently operationalized (Costa et al., 2021) either through the symptoms assessed (e.g., depressive symptoms, distress, pain) or specific outcomes (e.g., psychological well-being, functional health). Albeit defining QoL may be challenging, in the present study we bridge these perspectives by adopting the definition suggested by the American Psychological Association (APA, 2023), which integrates subjective life satisfaction with social, material, and physical, well-being. More specifically, the current investigation focuses on Health-Related QoL (HRQoL), evaluating the synergy between mental health, physical and social functioning (Wilson & Cleary, 1995). Extensive research has documented that HRQoL decreases with age in late adulthood, primarily due to a set of concurrent factors, such as functional limitations, poorer perceived physical and mental health, increased depressive symptoms, and social isolation (e.g., Ettxeberria et al., 2019). Similarly, the concept of successful aging has evolved from the biomedical model of Rowe and Kahn (1997) — focused on a low risk of disease and disability — to the conceptualizations emphasising the need to maximize gains (e.g., wisdom) and minimizing losses in later life (Baltes & Baltes, 1990) or the psychological approaches which highlight the importance of subjective well-being (Strawbridge et al., 2002) or integrate the objective and subjective dimensions of psychological, physical, and social well-being (Bowling & Dieppe, 2005). Reflecting this theoretical shift, Waddell et al. (2025) recently proposed the term “aging well” as a more inclusive alternative which prioritizes preserved cognitive and physical function and social participation over the mere absence of clinical pathology.

A substantial body of research further indicates that personality traits significantly influence HRQoL. Specifically, higher levels of openness to experience (i.e., curiosity and receptivity to new intellectual, creative, and aesthetic experiences), extraversion (i.e., assertiveness, sociability, and deriving positive emotions from social interaction), agreeableness (i.e., compassion, cooperation, and a tendency toward altruism and interpersonal harmony), conscientiousness (i.e., organization, responsibility, self-discipline, and goal-directed behaviour), optimism, self-esteem, self-efficacy, and sense of coherence are consistently associated with higher HRQoL. In contrast, higher neuroticism (i.e., emotional instability, proneness to psychological distress, and predominant negative affectivity), and elevated negative affect are linked to lower HRQoL (Huang et al., 2017). Relatively to late adulthood, lower neuroticism and higher levels of agreeableness, openness, extraversion, and conscientiousness have been associated with better cognitive functioning, greater autonomy in daily living, and more positive health perception (Baek et al., 2016), as well as enhanced psychological well-being (Hicks & Mehta, 2018). Extending this, Ettxeberria et al. (2019) found that among the oldest-old, life satisfaction was positively associated with extraversion and negatively related to neuroticism. More recently, it has also been shown that older individuals with lower neuroticism and higher extraversion and openness are more prone to engage in socially and cognitively demanding leisure activities, which, in turn, favor a better cognitive functioning (Olaru et al., 2023).

One promising approach to explore the interplay among HRQoL, personality characteristics, and healthy aging is to examine these constructs in older people living in the Blue Zones. Blue Zones are geographically isolated areas — such as central-eastern Sardinia (Italy), Okinawa (Japan), Ikaria (Greece), and Nicoya (Costa Rica) — characterized by the exceptional longevity and elevated levels of well-being among their inhabitants (Poulain et al., 2013; Ruiu et al., 2022). Although the demographic validation of long-lived individuals in Blue Zones has been extensive, it is important to approach this construct cautiously, as it is not possible to fully disentangle the relative contribution of genetic, environmental, dietary, socio-cultural, and psychological factors in determining the exceptional longevity of these populations (Legrand et al., 2021; Pes et al., 2018). Despite this, older adults in these areas typically lead a simple yet highly active lifestyle characterized by regular moderate-to-intense physical activity (e.g., gardening, walking), strong social engagement, high psychological well-being, preserved cognitive and physical efficiency (both self-reported and objectively evaluated), satisfaction with their family and non-family relationships, and sustained independency in activities of daily life (e.g., Legrand et al., 2021; Madrigal-Leer et al., 2020; Pau et al., 2025; Pes et al., 2018; Ruiu et al., 2022; Willcox et al., 2008).

Crucially, while the resilience trait of Blue Zone older people has been documented (Fastame et al., 2018), a significant gap remains in the literature concerning the broader dimensions of their personality. Specifically, the relationship between HRQoL and the Big-Five personality traits in these populations has yet to be empirically investigated. Although prior research (Fastame et al., 2014, 2021; Poulain et al., 2021) has identified preserved personality-related protective resources — such as dispositional optimism, resilience, coping — in older people of the Sardinian and Ikarian Blue Zones, these studies focus on state-like psychological assets, leaving the core personality domains that may underpin them largely unexplored. Closing this gap is crucial to understanding whether a distinctive personality profile contributes to the exceptional longevity and well-being observed in the Blue Zones, or if their older inhabitants follow the developmental trajectories seen in the general aging population. To address this, the present study employs a brief yet validated assessment of the Big-Five domains (i.e., the I-TIPI), providing a concise evaluation of personality among older adults living in the Sardinian Blue Zone and in another Sardinian rural area.

1 Purpose of the Present Study

This study was mainly aimed at pursuing two primary goals: (1) to examine the nature of the relationships among personality traits, HRQoL, and psychological well-being in late adulthood; (2) to investigate whether older people living in the Sardinian Blue Zone report a distinct profile of personality traits, psychological well-being, and HRQoL compared with peers recruited in another rural area of Sardinia (i.e., non-Blue Zone).

Based on previous literature, the following hypotheses were formulated:

H1 (primary) higher levels of openness to experience, conscientiousness, agreeableness, and extraversion, as well as lower levels of neuroticism, will be associated with better HRQoL (Baek et al., 2016; Huang et al., 2017);

H2 (exploratory) higher HRQoL will be positively associated with greater psychological well-being (Ettxeberria et al., 2019);

H3 (exploratory) neuroticism will be negatively associated with psychological well-being (Hicks & Mehta, 2018), including life satisfaction (Ettxeberria et al., 2019);

H4 (exploratory) participants who report higher openness are also expected to spend more hours in cognitively or physically demanding hobbies (Olaru et al., 2023);

H5 (exploratory) older individuals living in the Sardinian Blue Zone will exhibit a more adaptive profile — characterized by more favorable personality traits, higher HRQoL, and greater psychological well-being — compared with peers living in a non-Blue Zone rural area (Fastame et al. 2022b).

Given the exploratory nature of this study, due to the lack of previous evidence, no further *a priori* hypotheses were formulated.

2 Method

2.1 Sample

A sample of 125 community-dwellers, 71 females and 54 males ($M_{\text{age}} = 80.1$ years, $SD = 5.3$; age range: 71–101 years), were recruited from the Sardinian Blue Zone and from a Sardinian village located in a non-Blue Zone area ($n = 70$). The two groups were closely comparable regarding their socioeconomic and cultural backgrounds. Indeed, our participants belonged to traditional communities characterized by agropastoral economies, which, in turn, provide modest but homogeneous socioeconomic conditions in the Sardinian Blue Zone and non-Blue Zone regions. In addition, all participants could benefit from equal, free-of-charge healthcare access through the Italian National Health Service. This minimized the risk that our results were confounded by financial or healthcare access disparities.

Participants were recruited through a combination of convenience and snowball sampling, involving local non-profit organizations that provide recreational activities for older adults. Specifically, potential respondents were informed about the study through announcements during social gatherings and via word-of-mouth. Consistent with previous studies (e.g., Fastame et al. 2021, 2022b), to be enrolled, participants had to satisfy the following criteria: (1) showing no signs of moderate-to-severe cognitive decline, defined as a Mini-Mental State Examination (MMSE; Folstein et al., 1975) score > 18 ; (2) be community-dweller (i.e., no living in nursing homes); (3)

being native to and have resided in the area in which they were recruited for at least two previous generations. This last criterion was adopted to ensure a high-degree of socio-cultural and environmental homogeneity and therefore to minimize the potential confounding effect of migration on psychological profiles. In the context of Sardinia this is crucial in studies of older individuals, showing that long-term residency contributes to shaping lifestyle in late adulthood (Fastame et al. 2022a; Pes et al. 2013). A total of five participants were excluded due to MMSE scores < 19 , suggesting significant cognitive impairment.

3 Instruments

Each participant was asked to complete the following battery of tests:

The Mini-Mental State Examination (MMSE, Folstein et al., 1975) was administered to screen global cognitive functioning through a set of items assessing different cognitive processes (maximum score = 30). Scores were adjusted for years of education and age. As previously mentioned, an MMSE score ≤ 18 was the criterion used to exclude participants with signs of moderate-to-severe cognitive impairment. The MMSE was extrapolated from Addenbrooke's Cognitive Examination Revised (ACE-R, Mioshi et al., 2006), that was administered for its high discriminatory power in differentiating between healthy aging and suspected cognitive decline.

The socio-demographic interview by Fastame (2022) was used to collect the lifestyle and demographic information of the participants (e.g., age, marital status, years of education, alcohol intake, and participation in activities such as reading, gardening).

The EQ-5D-5 L questionnaire (Herdman et al., 2003; Italian validation: Mereaglia et al., 2023) was used to assess five dimensions of perceived HRQoL (i.e., self-care, daily activities, mobility, usual activities, pain/discomfort, and anxiety/depression), on a five-point Likert scale where 1 indicates 'no problems' and 5 'extreme problems' in performing the described activities. Hence, for each participant, a health state score was recorded that was determined by combining the responses provided, such that it ranged from the optimal full health state (i.e., 11111) to the worst one (i.e., 55555). Then, each health state measure was converted into a single utility index value (i.e., the maximum score is 1, indicating the best HRQoL condition, whereas negative values represent a perceived HRQoL status being worse than death) that was calculated using the predefined weights collected in the general Italian population. In the Italian older population (i.e., ≥ 65 years of age), the mean EQ-5D-5L utility index is .91 with a SD included between .15 (i.e., for the young old group) and .13 (i.e., for people over 75 years of age; Mereaglia et al., 2023).

The revised Italian version of the Ten-Item Personality Inventory (I-TIPI-R, Chiorri et al., 2015) was proposed to evaluate the Big Five personality dimensions. This ultra-brief measure was selected to minimize participant burden and avoid fatigue, a choice particularly relevant when older participants are asked to complete multidimensional assessment batteries. Specifically, the I-TIPI-R is a basic inventory composed of 10 items evaluating Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. Each item is defined by two descriptors,

and the respondents had to rate their agreement with each item on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). In the current sample, the inter-item correlation coefficients for Extraversion is 0.51, for Agreeableness is 0.34, for Conscientiousness is 0.33, for Neuroticism is 0.32, and for Openness to Experience is 0.29.

The Psychological Well-Being and Aging Questionnaire (De Beni et al., 2007) was administered to evaluate personal satisfaction (i.e., satisfaction about one's life), emotional competence (i.e., the ability to share and understand one's emotional status, satisfaction with social relationships), and coping strategies (i.e., the capacity to face the daily problems and overcome them). Apart from an index for each of the three dimensions just mentioned, this 37-item questionnaire provides a total well-being score. For each statement, participants had to evaluate the frequency with which they found themselves in the described situation (e.g., 'I can find different solutions to the problems') on a Likert scale ranging from 1 (never) to 4 (often). The maximum total score for this scale is 148, with a high score representing better psychological well-being. In the current sample, the internal consistency for the total score was Cronbach's $\alpha=0.88$.

4 Procedure

Written informed consent was given by each participant before beginning the experimental session, which was individually conducted in a quiet room of his/her home. First, the MMSE was administered to screen the global cognitive functioning, and then the sociodemographic interview was conducted. After that, the presentation order of the questionnaires was counterbalanced across the participants according to the Latin Square procedure. To prevent the fatigue effect of the examinees, the examiner read aloud the items of the questionnaires and wrote the responses given by the participants in the response sheet. Overall, the testing lasted approximately 50 min. To mitigate potential interviewer bias, each examiner underwent a standardized administration protocol, focused on maintaining a neutral tone of voice and strictly adhering to the written instructions, avoiding to provide non-verbal cues and different verbal prompts.

4.1 Data analysis

The statistical analyses reported were conducted on a sample of 125 participants. Statistical analyses were performed using IBM SPSS Statistics version 24, with the significance level set at $p < .05$. Prior to conducting the main analyses, the data were screened for missing values, outliers, and adherence to the assumption of General Linear Model. Normality was assessed using Shapiro-Wilk tests, alongside an inspection of Skewness and Kurtosis shape parameters for each group separately. Linearity among dependent variables and covariates was visually inspected and confirmed via bivariate scatterplots. Following George and Mallery (2024), it was assumed that if a dependent variable did not adhere to normality (i.e., Shapiro-Wilk score < 0.05), Skewness and Kurtosis indices included between -2 and $+2$ were acceptable and

justified the use of parametric procedures. Hence, preliminary descriptive analyses were carried out to examine the socio-demographic and lifestyle characteristics of the participants. Then, to pursue the first research goal, — exploring the nature of the associations among psychological well-being, HRQoL, personality characteristics, and leisure time — and to test Hypotheses 1 through 4, Pearson's partial analyses were conducted, controlling for education and age. Regarding the second goal, which intended to investigate the impact of the area of residence (i.e., Sardinian Blue zone vs. non-Blue Zone) on personality traits, psychological well-being, and HRQoL — and to test Hypothesis 5 (predicting better psychological well-being and HRQoL and more adaptive personality traits in Blue Zone residents) — a between-subjects Multivariate Analysis of Covariance (MANCOVA) was conducted. In this analysis, age was included as a covariate. Assumptions underlying the MANCOVA were examined prior to analysis. The homogeneity of covariance matrices assumption was tested using Box's M, which was significant [Box's $M=115.58$, $F(55, 43481.99)=1.91$, $p < .001$], indicating a formal violation. However, Box's M is known to be sensitive to deviations from multivariate normality and to the inclusion of multiple dependent variables (Tabachnick et al., 2007). Given the relatively balanced group sizes ($n=55$ for the Blue Zone group and $n=70$ for the non-Blue Zone group), this violation was not considered critical (Tabachnick et al., 2007). Levene's tests indicated homogeneity of variances for all dependent variables except the HRQoL index ($p = .029$). Therefore, multivariate effects were interpreted using Pillai's Trace, which is more robust to such violations. Furthermore, an Analysis of Covariance (ANCOVA) was performed to explore the impact of the area of residence on time spent on leisure activities, using educational attainment and age as covariates due to their theoretical relevance in shaping leisure patterns in late adulthood (Park et al., 2019). Assumptions underlying the ANCOVA were also examined prior to analysis. Although Levene's test indicated a violation of the homogeneity of variances assumption [$F(1, 123)=7.235$, $p = .008$], considering the relatively balanced group sizes and the conservative nature of the F-test under these specific variance distributions, this violation was considered unlikely to substantially bias the results (Field, 2024). The analysis was therefore retained without further adjustments.

5 Results

Data inspection for normality assumption revealed that the use of parametric procedures was justified. Descriptive analyses showed that the distribution of participants in the Sardinian Blue Zone ($n=55$) and Sardinian non-Blue Zone areas was balanced ($\chi^2=1.8$, $df=1$, $p = .18$), as well as gender (n males = 54, $\chi^2=2.312$, $df=1$, $p = .128$), and engagement in gardening/yard work (i.e., yes vs. no, $\chi^2=1.352$, $df=1$, $p = .245$). Indeed, 69 individuals declared to regularly spend time on this physical activity. In addition, as expected in the Sardinian rural areas (e.g., Ruiu et al., 2022), education level (i.e., ≤ 8 years of formal education vs. ≥ 9 years of schooling) was not equally distributed ($\chi^2=55.112$, $df=1$, $p < .0005$), that is, 104 participants stated to have attended school for less than 9 years. Despite this, participants from the Sardinian Blue Zone were relatively more educated ($M=7.9$ years, $SD=4.4$) than peers recruited

elsewhere ($M=6.01$, $SD=2.2$, $t(123)=-3.071$, $p=.003$). Besides, most of our participants were also engaged in cognitively stimulating leisure activities or sports ($n=98$, $\chi^2=40.328$, $df=1$, $p<.0005$), and lived with other people ($n=88$, $\chi^2=20.808$, $df=1$, $p<.0005$). Moreover, a t-test documented no age differences between the participants recruited in the Sardinian Blue Zone ($M=79.3$ years, $SD=5.9$) and in the other Sardinian rural area ($M=80.8$ years, $SD=4.6$, $t(123)=1.588$, $p=.115$). Similarly, no significant differences were found between the two groups in terms of global cognitive efficiency evaluated through the ACE-R [$t(123)=0.817$, $p=.415$]. But although both groups were mainly composed of cognitively efficient participants, as documented by the MMSE mean score of the sample >24 , older individuals recruited in the Sardinian Blue Zone exhibited a significantly higher MMSE score ($M=27.6$, $SD=1.9$) than their peers living elsewhere ($M=26.1$, $SD=2$; $t(123)=-4.015$, $p<.0005$). Additionally, no significant differences were found between the groups in terms of healthy habits. That is, smoking (i.e., yes vs. no; $\chi^2=1.218$, $df=1$, $p=.383$) and daily alcohol consumption (i.e., yes vs. no; $\chi^2=1.336$, $df=1$, $p=.271$) were equally distributed between the areas of residence. Table 1 details the socio-demographic and lifestyle characteristics of the participants recruited in the Sardinian Blue Zone and in the non-Blue Zone rural areas.

Then, to address the first goal, Pearson's partial correlations were conducted among I-TIPI-R, EQ-5D-5 L, psychological well-being, HRQoL scores, and weekly hours spent on hobbies, while controlling for years of education and age.

As illustrated in Table 2, positive significant associations were found between agreeableness and personal satisfaction, as well as between conscientiousness and total psychological well-being, personal satisfaction, and coping, respectively. Moreover, a positive correlation was found between openness to experience, psychological well-being (i.e., total, coping, and emotional competencies), and the number of hours spent performing leisure activities. Besides, coping strategies were positively associated with the HRQoL score. In addition, a moderate association was found between neuroticism and HRQoL.

Moreover, a MANCOVA was performed to explore the impact of area of residence (i.e., Sardinian Blue zone vs. Sardinian non-Blue Zone) on psychological well-being, personality traits, and HRQoL scores of our participants, using age as the covariate. The Multivariate tests revealed the significant main effect of area of residence [$V=0.150$, $F(10;113)=1.991$, $p=.04$] and age [$V=0.156$, $F(10;113)=2.087$, $p=.031$]. The main effect of area of residence was significant in coping strategies [$F(1,122)=4.859$, $p=.029$, $\eta^2p=.038$], emotional competence [$F(1,122)=4.785$, $p=.031$, $\eta^2p=.038$], and I-TIPI-R-openness [$F(1,122)=5.055$, $p=.026$, $\eta^2p=.040$] conditions, respectively. Overall, participants recruited in the Sardinian Blue zones reported better psychological well-being and openness to experience. Table 3 summarizes the mean scores reported by the two groups in the abovementioned measures.

A post-hoc power analysis was conducted using GPower 3.1. Given the observed multivariate effect size $f^2(V)=0.176$ and a sample size of $N=125$, the achieved power ($1-\beta$) was 0.897, a value that exceeds the recommended threshold of 0.80 (Cohen, 1988). Furthermore, to address potential residual confounding from global cognitive efficiency, a supplementary sensitivity analysis (MANCOVA) was conducted by adding MMSE scores as an additional covariate. The effect of the MMSE covari-

Table 1 Socio-demographic and clinical characteristics of the sample by area of residence. M denotes mean, whereas SD refers to standard deviation

Variable	Sardinian Blue Zone	Sardinian Non-Blue Zone	χ^2	t-Test
n	55	70	1.8, $p = .18$	
Age (years), M (SD)	79.3 (5.9)	80.8 (4.6)		1.588, $p = .115$
Gender			2.998, $p = .083$	
Males	19	35		
Females	36	35		
Education (years), M (SD)	7.9 (4.4)	6.01 (2.2)		-3.071, $p = .003$
Education level			10.615, $p < .001$	
≤ 8 years	39	65		
> 8 years	16	5		
Marital status			0.803, $p = .37$	
Unmarried	28	30		
Married	27	40		
Living with others			0.012, $p = .912$	
Yes	39	49		
No	16	21		
Medication intake			1.005, $p = .316$	
Yes	45	52		
No	10	18		
Smoking			1.218, $p = .27$	
Yes	1	4		
No	54	66		
Daily alcohol intake			1.336, $p = .248$	
Yes	18	30		
No	37	40		
Socially engaged cognitive or physical leisure activities			1.590, $p = .207$	
Yes	46	52		
No	9	18		
Reading			0.136, $p = .713$	
Yes	36	48		
No	19	22		
Watching television			2.739, $p = .098$	
Yes	51	69		
No	4	1		
ACE-R Total, M (SD)	83.57 (8.99)	84.91 (9.07)		0.817, $p = .415$
MMSE Total, M (SD)	27.6 (1.9)	26.1 (2.0)		-4.015, $p < .001$

χ^2 tests are reported with degrees of freedom $df = 1$, whereas t-tests are reported with degrees of freedom $df = 123$

ate was not significant, and all primary multivariate and univariate results remained unchanged, confirming the robustness of the main findings illustrated above.

Finally, an Analysis of the Covariance (ANCOVA) was performed to examine the impact of area of residence on time spent on hobbies, controlling for both education

Table 2 Pearson's partial correlations calculated among I-TIPI-R dimensions (i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience), total psychological well-being (i.e., WB-total), personal satisfaction (i.e., WB-ps), coping strategies (i.e., WB-cop), emotional competence (i.e., WB-ec), weekly hours spent on leisure activities (time-hobbies), and HRQoL score (i.e., EQ-5D-5 L). The impact of years of education and age was controlled for

	1	2	3	4	5	6	7	8	9	10	11
1. I-TIPI-R-extraversion	—										
2. I-TIPI-R-agreeableness	-0.212 *	—									
3. I-TIPI-R-conscientiousness	-0.020	0.407 ***	—								
4. I-TIPI-R-neuroticism	0.067	-0.228 *	-0.001	—							
5. I-TIPI-R-openness	-0.002	0.106	0.191 *	-0.127	—						
6. WB-tot	0.075	0.140	0.299 ***	-0.332 ***	0.284 **	—					
7. WB-ps	0.020	0.226 *	0.320 ***	-0.297 ***	0.135	0.850	—				
8. WB-cop	0.081	0.072	0.217 *	-0.260 **	0.387 ***	0.825 ***	0.595 ***	—			
9. WB-ec	0.132	0.082	0.160	-0.207 *	0.235 **	0.781 ***	0.574 ***	0.535 ***	—		
10. time-hobby	-0.116	0.140	0.171	-0.106	0.204 *	0.049	0.044	0.127	-0.053	—	
11. EQ-5D-5 L	-0.142	-0.011	-0.036	-0.353 ***	0.039	0.131	0.038	0.224 *	0.047	0.079	—

Covariates: years of education and age

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3 Means (i.e., M), Standard Deviations (i.e., SD) reported by participants enrolled in the Sardinian Blue Zone (i.e., Blue Zone) and in another Sardinian rural area (non-Blue Zone) in I-TIPI-R (i.e., extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience), total psychological well-being (i.e., WB-total), personal satisfaction (i.e., WB-ps), coping strategies (i.e., WB-cop), emotional competence (i.e., WB-ec), and HRQoL (i.e., EQ-5D-5 L) conditions

Variable	Blue Zone		Non Blue Zone		<i>p</i>	η_p^2
	M	SD	M	SD		
I-TIPI-R-extraversion	3.609	1.23	3.27	1.36	0.205	0.013
I-TIPI-R-agreeableness	5.964	1.15	5.964	1.65	0.998	<0.001
I-TIPI-R-conscientiousness	5.582	1.64	5.686	1.07	0.616	0.002
I-TIPI-R-openness	4.073	1.35	3.536	1.09	0.026	0.054
I-TIPI-R-neuroticism	3.300	1.55	3.286	1.27	0.829	<0.001
WB-total	119.3	15.01	114.8	14.6	0.121	0.020
WB-ps	37.29	5.02	37.6	4.5	0.750	0.001
WB-cop	26.53	4.83	24.39	4.75	0.029	0.038
WB-ec	33.16	5.63	30.87	5.2	0.031	0.038
EQ-5D-5 L	0.80	0.217	0.70	0.30	0.353	0.007

and age as covariates. The analysis showed that neither the main effect of education [$F(1,121)=0.134, p=.715$] nor that of age [$F(1,121)=0.001, p=.976$] was significant, whereas there was a significant main effect of area of residence [$F(1,121)=5.049, p=.026, \eta_p^2=.04$]. These outcomes revealed that the afore-mentioned socio-demographic factors did not confound the relationship between the area of residence and leisure engagement. Overall, participants recruited in the Sardinian Blue Zone were more engaged in leisure activities (M hours per week=11.3, SD=10.9) than peers recruited in another Sardinian rural area (M=6.8, SD=9.6).

6 Discussion

The present study aimed to deepen our understanding of the interplay among personality traits, HRQoL, and psychological well-being in late adulthood, comparing older adults of the Sardinian Blue Zone with peers from a rural non-Blue Zone area. Overall, the findings partially support our hypotheses and highlight specific psychological characteristics associated with successful aging in the unique longevity context of the Sardinian Blue Zone.

Preliminary analyses revealed that both the groups were balanced for age, gender distribution, global cognitive efficiency (i.e., evaluated through the ACE-R), and time spent on gardening/yard work. Overall, in line with previous literature (e.g., Fastame et al., 2021; Pau et al., 2025; Ruiu et al., 2022), both groups reported an active lifestyle, particularly regarding gardening and yard work. This suggests that observed differences in psychological variables are likely linked to specific environmental or dispositional factors rather than gross differences in physical activity levels or cognitive status.

Regarding our first goal, correlational analyses provided partial support for our hypotheses and extended previous findings. As expected (Hicks & Mehta, 2018), conscientiousness was positively associated with total psychological well-being, particularly with life satisfaction and adaptive coping strategies. A similar pattern

of results was also found between openness to experience and different facets of psychological well-being. These associations suggest that participants who were more socially engaged were also more likely to share their own emotions and to understand the emotions of others. Moreover, individuals more open to novelty were more likely to employ adaptive coping strategies (e.g., seeking social support), when facing difficulties. In addition, agreeableness was positively associated with life satisfaction, whereas the expected positive association between extraversion and psychological well-being was not observed (Hicks & Mehta, 2018). However, contrary to our hypotheses (Baek et al., 2016; Huang et al., 2017), no significant associations emerged between HRQoL and the Big Five traits, with the exception of neuroticism. This lack of association deserves attention; it suggests that in late adulthood, perceived physical and functional health (HRQoL) may be more strongly influenced by objective physical conditions or socio-environmental support rather than by stable personality dispositions, whereas it was documented that participants who reported higher levels of neuroticism also believed that their HRQoL was lower. Furthermore, extending the findings of Etxeberria et al. (2019), HRQoL was positively associated with coping strategies, indicating that the perceived ability to manage stress may be more critical for subjective health perception than personality traits themselves. In addition, consistent with previous research (Olaru et al., 2023), individuals with higher openness to experience were more prone to spend their time on leisure activities, which were typically performed with others (e.g., sports, cognitively stimulating activities carried out in centers for the older people).

The second goal addressed group differences. While no significant differences in HRQoL were found, residents of the Blue Zone showed higher levels of openness to experience, better coping strategies and emotional competencies, and greater involvement in stimulating leisure activities.

From a theoretical perspective, our findings lend strong support to both Activity Theory (Havighurst & Albrecht, 1953) and the Selective Optimization with Compensation Model (SOC, Baltes & Baltes, 1990). From the perspective of Activity Theory (Havighurst & Albrecht, 1953), the higher engagement in cognitively and physically stimulating activities observed in the Blue Zone may support the maintenance of psychological well-being. Furthermore, from the SOC perspective older participants of the Sardinian Blue Zone appear to actively counteract age-related cognitive and functional decline by maintaining awareness of their limitations, selectively focusing on activities they can still perform successfully and find gratifying, compensating for losses through the use of adaptive coping strategies, using their residual capacities to remain socially and cognitively engaged within their community. This combination of continued activity, selective engagement, and positive reappraisal helps them manage daily challenges (e.g., memory concerns, health-related anxiety) while preserving psychological well-being (e.g., emotional competencies).

In addition, both groups reported similar and modest levels of neuroticism. However, the coexistence of moderate levels of neuroticism with high openness to experience, greater emotional awareness (facilitating the maintenance of stable social relationships), and adaptive coping strategies (e.g., problem-focused coping, help-seeking) in Blue Zone residents might be linked to “healthy neuroticism” (Friedman, 2000, 2019). This may encourage healthier lifestyle choices and greater adherence to

preventive behaviours, including the preservation of cognitive and functional health through cognitively and physically stimulating hobbies.

From an applied viewpoint, these outcomes suggest that the promotion of an active lifestyle contributes to preserving psychological well-being and perceived HRQoL in the last decades of life. In the Sardinian Blue Zone older adults benefit from regular socially and cognitively stimulating activities. As reported elsewhere (Heatherington, 1999) they retain a meaningful social role and a sense of purpose — key elements for successful aging (Fastame et al. 2022b).

However, caution is needed in interpreting the current findings and therefore several limitations must be acknowledged. First, the cross-sectional design precludes causal inferences regarding relationships among personality traits, coping strategies, social engagement, and HRQoL. Therefore, longitudinal studies are needed to clarify the directionality of these associations. Moreover, terms like “promoting” or “protecting” should be understood as describing associations rather than direct causality. Third, the sample was relatively small, relied on convenience sampling, and restricted to rural areas of Sardinia. Consequently, our findings may primarily reflect the psychological health-related, and lifestyle characteristics of highly functional older individuals. Therefore, this may limit the generalizability of the findings to urban contexts, to institutionalized or frail individuals, or to other Blue Zones worldwide. Future research should include larger, multi-site cohorts and adopt a comparative approach across different Blue Zones. Fourth, the reliance on self-report measures suggests that future research should incorporate objective measures of physical performance and clinical assessments of pain and mood disorders. Extending this, in the current study personality traits were assessed using the I-TIPI-R. Although the inter-item correlation coefficients in our sample are psychometrically robust and fully acceptable considering the nature of the scale, the fact that each trait was defined by two items may have attenuated some true associations among variables and slightly increased the risk of Type II error (Chiorri et al., 2015). Therefore, future research should be focused on a more exhaustive evaluation of personality traits among older Sardinian adults. Fifth, the slightly more formal education among the Blue Zone residents could act as a confounding factor. Theoretically, a higher level of education could partly explain group differences in dimensions such as openness to experience, coping strategies, and emotional competence, as formal schooling often fosters cognitive resources and social skills. However, within the Italian socio-educational context for this age cohort, both groups are classified as having ‘low education’, remaining at or below the 8-year threshold used to distinguish low from high educational attainment (De Beni et al., 2007). Furthermore, a preliminary MANCOVA indicated that education had no significant association with the dependent variables, whereas the effect of residence area remained specific and robust. Consequently, following the principles of parsimony, education was not included as a covariate in the MANCOVA. In line with this, the ANCOVA further documented that the effect of education on the time spent on leisure activities was not significant. Therefore, its impact on the main findings, if present, appears limited. Finally, other potentially relevant factors, such as specific chronic diseases and polypharmacy may act as confounders. Future research should control their impact on the evaluation of HRQoL and psychological well-being.

Authors' Contributions The second, third, and fourth authors recruited the participants, collected the data, and were responsible for the scoring and the preparation of the input databases. The first author conceived the study, was in charge of overall direction and planning, and took the lead in conducting the data analyses, writing and revising the manuscript. All authors discussed the results and commented on the manuscript.

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Data Availability The data that support the findings of this study are not publicly available due to privacy or ethical restrictions.

Declarations

Competing interests The authors declare no competing interests.

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