Journal of
Dementia and Alzheimer's Disease

MDPI

Article

We Are All in the Same Boat: Effects of a Five-Day, Multidimensional Intervention on Healthy and Alzheimer's-Affected Older Adults Aboard the Nave Italia

Francesca Morganti [1,2,*], Inaihà Laureano Benincà [1,2], Stefania Butti [1,2], Maria Gattuso [1], Marco Gagliani [3] and Paolo Cornaglia Ferraris [3]

[1] Department of Human and Social Sciences, University of Bergamo, 24129 Bergamo, Italy; stefania.butti@unibg.it (S.B.)
[2] CHL—Centre for Healthy Longevity, University of Bergamo, 24129 Bergamo, Italy
[3] Tender to Nave Italia Foundation, 16123 Genova, Italy
* Correspondence: francesca.morganti@unibg.it

Abstract

Background/Objectives: This study evaluated the effects of a five-day intensive intervention aboard the Italian Navy sailing vessel Nave Italia for both cognitively healthy older adults and individuals with Alzheimer's disease, focusing on autonomy, depressive symptoms, quality of life, and mobility. Given the limited sample size, the study is framed as a proof-of-concept investigation of a multidimensional intervention that can be experienced jointly by older adults and, in the case of dementia, within a supportive relational context. Methods: The program integrated the "Nave Italia Method" developed by the Tender to Nave Italia Foundation with cognitive stimulation, physical exercise, social engagement, and emotional support within a highly immersive outdoor experiential context. A total of 30 participants were involved: 10 healthy older adults and 20 individuals with Alzheimer's disease (10 embarked and 10 remained at home). Because of the small, non-randomized cohorts, the analyses focused primarily on within-group pre–post changes rather than formal between-group efficacy comparisons. Results: Autonomy and depressive symptoms showed no significant changes, while quality of life improved in embarked individuals with Alzheimer's disease for the timeframe participants were directly in the intervention and showed a positive trend in cognitively healthy older adults. Balance and gait improved in the healthy older adult group for the same intervention timeframe, likely reflecting the combined effects of structured exercise and physically engaging shipboard activities. The program strongly stimulated motivation, perceived self-efficacy, and active participation, highlighting the importance of experiential learning in facilitating the transfer of skills to daily life. Findings suggest that brief, intensive, and immersive interventions can act as a motivational catalyst by enhancing emotional, social, and cognitive engagement and supporting adherence to more structured programs to be continued on land. Conclusions: Due to the lack of literature on integrated and multidimensional outdoor experiences designed for both cognitively healthy older adults and those living with dementia, the study addresses this gap by exploring the potential of unconventional and immersive interventions to promote the well-being and quality of life of older adults. These findings support the feasibility and short-term promise of the intervention as a proof of concept rather than as definitive evidence of efficacy.

Keywords: healthy aging; outdoor training; quality of life; Alzheimer's disease; motivation; intensive intervention; depressive symptoms; mobility

Academic Editor: Takao Yamasaki

Received: 9 February 2026
Revised: 12 June 2026
Accepted: 22 July 2026
Published: 2 August 2026

1. Introduction

Population aging constitutes a substantial challenge for health and social care systems. The phenomenon is characterized by the coexistence of multiple aging trajectories: on the one hand are older adults who enjoy good psychosocial health and are free from significant pathologies; on the other are individuals living with dementia or other forms of comorbidity [1]. Such heterogeneity requires equally articulated intervention models capable of preventing the onset of diseases, mitigating symptomatic profiles, and simultaneously promoting well-being and quality of life in both frail and cognitively or physically intact older adults [2].

In this context, experiential and outdoor approaches have proven particularly promising as they integrate components of cognitive stimulation, physical activity, and social participation within motivating and immersive environments [3]. According to current scientific evidence, outdoor training and adventure-therapy interventions exert positive effects on emotional well-being, social relationships, and resilience in older adults [4]. In their systematic review of 35 experiential interventions involving healthy older individuals, the authors identified benefits in three major health domains: prevention of disease/disability, maintenance of physical and cognitive functioning, and active engagement. From a preventive perspective, with appropriate physical preparation—particularly strength and postural-stability training that supports overall health—even outdoor activities that may seem inherently more hazardous can be safely pursued, although activities such as mountain hiking appear to increase the risk of falls [5,6]. Studies on active engagement in outdoor experiences indicate that intentional participation—particularly in group contexts—enhances social interaction, sense of community, and perceived well-being, with benefits spanning both physical and cognitive domains [7–9]. Adventure therapy, which involves kinesthetic challenges and active components, appears capable of integrating physical and mental stimulation, which distinguishes it from more passive, nature-based experiences such as forest bathing or exposure to green/blue spaces [10–13]. Concerning functional maintenance, interventions such as hiking, walking, mountain biking, and trekking have been shown to improve physical strength, balance, psychosocial quality of life, and mood. Additional positive outcomes include increased gait speed, improved static balance, and reduced hypertensive symptoms [14–18].

With regard to clinical older populations, nature-based and socially interactive activities have shown immediate perceived benefits for quality of life and mood, reducing depressive symptoms and fostering social participation among individuals with dementia [19]. In this population, existing outdoor-based studies have predominantly investigated passive exposure to natural environments or activities such as gardening within residential care settings. They have demonstrated that outdoor environments and related activities can positively affect health, well-being, and quality of life in persons with dementia [20–22]. In addition, recent work on outdoor-based support for people living with dementia has emphasized the value of meaningful activity, social connection, and shared participation with supporters or care partners. Altogether, outdoor interventions are effective in keeping older adults physically, cognitively, and socially active and thereby contribute to successful aging. However, the literature still offers very limited evidence on integrated, multidimensional, and intensive outdoor interventions that are adaptable both to healthy older adults and to persons with dementia within a shared experiential setting.

Accordingly, the present study is framed as a proof-of-concept evaluation of a five-day intensive intervention aboard the Italian Navy sailing vessel Nave Italia on autonomy, depressive symptoms, quality of life, and mobility in older adults with Alzheimer's disease and in healthy older adults. Given the small sample and the non-randomized design, the study does not aim to draw robust comparative conclusions about differential effects

between groups. Instead, it explores whether this intervention format is feasible and whether short-term changes can be detected within each cohort, with particular interest in the potential for joint, socially embedded participation that may benefit both persons living with Alzheimer's disease and those participating alongside them in the broader intervention context. The intervention represents an innovative approach to the prevention of frailty and the promotion of health in aging populations, as it integrates the "Nave Italia Method" [3] with components of cognitive stimulation, physical activity, and social participation within a unique experiential context. Life on board—characterized by cruising in the open sea, living professional and nonprofessional sailor group dynamics, and daily seamanship activities carried out with and under the supervision of the naval crew—constitutes a transformative setting that combines physical, cognitive, and emotional stimulation and thus was expected to foster active and inclusive aging.

2. Materials and Methods

2.1. Study Design

This study employed a non-randomized controlled design including three groups assessed at baseline (T0) and after the five-day intervention period (T1). The first consisted of older adults with a diagnosis of Alzheimer's disease who participated in the outdoor training program aboard Nave Italia. A corresponding comparison group of individuals with Alzheimer's disease remained on land and engaged in an equivalent schedule of activities delivered in a non-nautical environment. The third group comprised cognitively healthy older adults who completed the same onboard training program. No land-based comparison group was recruited for the healthy older adults, as it would not have been possible to adequately control the types and intensity of activities they might undertake during the period corresponding to the onboard intervention. Because the cohorts were small, non-randomized, and differed descriptively in age and education, the comparison group was used as a contextual reference rather than as the basis for causal between-group inference. Importantly, the two Alzheimer's disease groups were not formally demonstrated to be equivalent on key baseline characteristics such as age, education, or dementia severity; therefore, any between-group differences in outcomes cannot be interpreted as definitively caused by the intervention alone, and the study does not support causal comparative conclusions between groups.

2.2. Participants

A total of 30 older participants (see Table 1) were recruited and assigned to three groups of 10 individuals each. For the persons with Alzheimer's disease, the inclusion criterion was a documented clinical diagnosis of Alzheimer's disease. The severity of dementia was mild to moderate on clinical grounds, as only participants able to engage in group activities, follow simple instructions, and safely tolerate the program were enrolled; however, a formal staging tool such as the Clinical Dementia Rating was not available, and this is acknowledged as a limitation. For the group of healthy participants, the criterion was being an older adult without known cognitive impairment. Across groups, participants also had to be able to communicate adequately with the clinical staff in Italian and to ambulate with sufficient balance and endurance to take part in shipboard or land-based activities, with or without usual assistive support when compatible with safety requirements. In both cases, exclusion criteria included the presence of severe medical conditions (e.g., severe unstable cardiovascular or cardiometabolic disease), severe behavioral disturbance, severe sensory or language impairment preventing participation in activities or assessments, major comorbidities incompatible with the program, and complete functional dependence.

All selected participants were deemed fit for the sailing experience based on a medical certificate provided by their general practitioner.

Table 1. Participant's details resumed for group.

	Alzheimer's Disease (Onboard)	Alzheimer's Disease (at Home)	Healthy Older Adults
n	10	10	10
Age (years)	83.2 ± 7.6	87 ± 4.8	70.5 ± 6.7
Gender (F/M)	5/5	8/2	7/3
Years of education	8.4 ± 3.6	5.6 ± 2.7	13.7 ± 2.7

2.3. Intervention

The intervention consisted of an integrated approach combining the "Nave Italia Method," ideated from the Tender to Nave Italia Foundation [3], with tailored psychosocial and cognitive activities designed on the basis of the specific difficulties and needs of the older adults recruited for the project. It had three main phases. The first involved the definition of objectives: during this stage, participants became acquainted with one another and underwent a multidimensional assessment (cognitive, emotional, functional autonomy, and quality of life) before they embarked. Assessment findings were discussed within the clinical team and used to calibrate task complexity, the balance between cognitive stimulation and social support, the amount of prompting required, and the degree of environmental orientation assistance needed during onboard activities. Cognitive functioning was assessed using the Mini-Mental State Examination (MMSE), emotional status with the GDS or BDI-II depending on age, functional autonomy with IADL or AIADL, quality of life with the WHOQOL-BREF, and mobility/balance with the Tinetti Performance-Oriented Mobility Assessment. These domains were chosen to cover core aspects of everyday functioning, mood and perceived well-being that are relevant for aging interventions. For example, participants showing greater disorientation or reduced attentional capacity received simpler instructions, more task repetition, and more structured spatial cues during navigation-related tasks, whereas those with better preserved abilities were encouraged to take a more active role in group activities and crew routines.

During the second phase—the navigation, which lasted five days—participants fully experienced life on board, becoming, in effect, members of the crew of the Italian Navy. They took part in daily service shifts (such as preparing breakfast for all, cleaning common areas, assisting in the galley, and setting and clearing the table). They also participated in crew activities through specific workshops supervised by experienced sailors, which gave them the opportunity to engage in tasks such as knot-tying, mast-climbing, and sail handling. It was during this period that the psychosocial and cognitive activities—designed and conducted by qualified psychologists—were implemented.

With regard to the individuals with Alzheimer's disease, the activities focused primarily on cognitive enhancement and spatial orientation (4 h per day), as well as both structured and unstructured socialization (2 h per day). Non-pharmacological interventions, including Reality Orientation Therapy (ROT) and cognitive training sessions for memory and complex cognitive abilities, were introduced, with these interventions being adapted to the routine required by life on board and the spatial configurations of Nave Italia. For individuals diagnosed as having Alzheimer's disease who did not participate in the program, equivalent activities were conducted in the comfort of their own homes, without any necessity for adaptation to life aboard. To clarify, the land-based program matched the onboard intervention in nominal duration of psychologist-led cognitive and social activities. It includes seamanship tasks, continuous exposure to crew-based routines,

or the sensorimotor demands of moving and acting on a sailing vessel. Therefore, the present study cannot isolate which onboard component was most active; rather, it evaluates the added value of the overall sailing-based intervention package. For the group of healthy older adults, the activities concentrated on psychosocial components. Each day, participants engaged in group sessions with a specific focus on emotional recognition and expression, the strengthening of interpersonal relationship skills through simulated scenarios, and the identification and appraisal of their own strengths and weaknesses. Each activity lasted approximately 90 min, followed by a 30-min group debriefing in which participants reflected on the session, how it had been experienced and perceived, and how the specific skill could be applied in their own aging trajectories. All the groups also participated in socialization activities for two hours per day.

The third and final phase of the Nave Italia Method is aimed at consolidating the experience. It takes place after disembarkation and lasts approximately three months. During this period, the participants were followed through monthly follow-up meetings. For individuals diagnosed with Alzheimer's, meetings were designed to evaluate compliance with the cognitive and autonomy training program set on Nave Italia and to be continued at home. For the healthy aged individuals' group, meetings were aimed both at encouraging reflection on the overall experience and at assessing any personal changes, such as the application of skills acquired on board in daily life or the achievement of personal goals, identified during the onboard period. The post-disembarkation follow-up phase of the broader Nave Italia method is not considered part of the present analysis because no outcome data were collected during that period; it is therefore omitted from the interpretation of the study findings.

2.4. Outcome Measurements

All the participants were assessed for autonomy, depressive symptoms, quality of life, and mobility at T0 (4 weeks before embarkation) and T1 (4 weeks after the onboard intervention or the intensive intervention for the group not embarked on Nave Italia). All the evaluations were conducted by a licensed psychologist and a licensed physiotherapist, each with more than five years of professional experience.

Autonomy was assessed with the Instrumental Activity Daily Living Scale (IADL) [23] for patients aged 65 years or older and with the Advanced Instrumental Activities of Daily Living Scale (AIADL) [24] for participants younger than 65 years of age. While the IADL evaluates the ability to carry out essential functional activities required to maintain independence, the AIADL is an updated instrument that assesses more complex and technologically oriented activities.

Depressive symptoms were assessed with the 15-item Geriatric Depression Scale (GDS) [25] for participants aged 65 years or older and with the Beck Depression Inventory-II (BDI-II) [26] for participants younger than 65 years of age. The GDS was developed for older adults, whereas the BDI-II was designed for adults and adolescents. As noted above, no participant with Alzheimer's disease was younger than 65 years; accordingly, the BDI-II was relevant only to younger participants outside the Alzheimer's cohorts.

The 26-question World Health Organization Quality of Life Brief Version (WHOQOL-BREF) [27] was used to assess four domains of quality of life: physical health, psychological well-being, social relationships, and environment. It assesses an individual's perceived health and well-being in relation to the previous two weeks. This recall period should be borne in mind when interpreting short-term post-intervention improvement.

Lastly, participants' physical functioning was assessed using the Performance-Oriented Mobility Assessment developed by Tinetti [28]. This scale was designed for older adults and evaluates balance and gait through two subscales. The instrument com-

prises 16 items, with a total maximum score of 28 points, and higher scores indicate better balance and gait performance.

2.5. Statistical Analysis

The software R 4.3.3 (R Foundation for Statistical Computing, Vienna, Austria) was used to conduct the analysis [29,30]. Because autonomy and depressive symptoms were assessed using age-dependent instruments, scores from each pair of scales (IADL/AIADL and GDS/BDI-II) were normalized prior to analysis to ensure comparability across participants. Specifically, raw scores were rescaled within each instrument to a common 0–1 metric using the theoretical range of the scale, so that higher values represented the same direction of functioning or symptom severity before pooling the age-dependent measures. In addition, WHOQOL-BREF scores were transformed to a 0–100 scale.

Data were first visually inspected, and outliers were identified using boxplots with case-wise labeling (car package; Team, 2021) and removed prior to analysis. For clarity, observations were considered potential outliers when they fell beyond 1.5 times the interquartile range from the lower or upper quartile in the boxplot representation. In the figures, red dots indicate these outlying observations. Descriptive statistics were computed for all demographic and outcome variables. The normality of the distributions was evaluated using the Shapiro–Wilk test.

For within-group comparisons, one-tailed paired *t*-tests were performed on variables meeting the normality assumption, whereas Wilcoxon signed-rank tests were applied to non-normally distributed variables. Effect sizes for parametric tests were calculated using Cohen's d for paired samples (interpreted as: <0.2 negligible, <0.5 small, <0.8 medium, $\geq$0.8 large). For nonparametric tests, effect sizes were expressed as Wilcoxon r (0.10 $\leq$ 0.30 small, 0.30 $\leq$ 0.50 moderate, and $\geq$0.50 large). Because multiple outcomes were tested, family-wise error rates were controlled using Holm's correction applied to the resulting p values. Both unadjusted and adjusted p values are reported, together with their corresponding effect sizes. Statistical significance was defined as $p < 0.05$. No a priori power or sample size calculation was conducted for this study. The number of participants was determined by the logistical constraints of the Nave Italia program (fixed berths and safety considerations for each voyage). As a result, the study is underpowered for detecting small effects and the analyses are best interpreted as exploratory, proof-of-concept findings rather than as definitive efficacy tests.

3. Results

A total of 30 older adults were included in the final analysis. The demographic characteristics of the participants in each group are reported in Table 1. Years of education refer to total formal schooling completed, including primary, secondary, and any post-secondary education.

No significant changes were observed for autonomy (Figure 1). The mean difference for the Alzheimer's disease (at home) and the median difference for the healthy older adults were both zero. The Alzheimer's disease onboard group showed a mean difference of -0.05, corresponding to a small effect size (Cohen's d = -0.32).

No significant changes were observed for depressive symptoms (Figure 2). The Alzheimer's disease at-home group showed a median difference of zero. The healthy older adults group had a mean difference of -0.05 with a small effect size (Cohen's d = –0.39). The Alzheimer's disease onboard group showed a mean difference of -0.06, also indicating a small effect size (Cohen's d = -0.45).

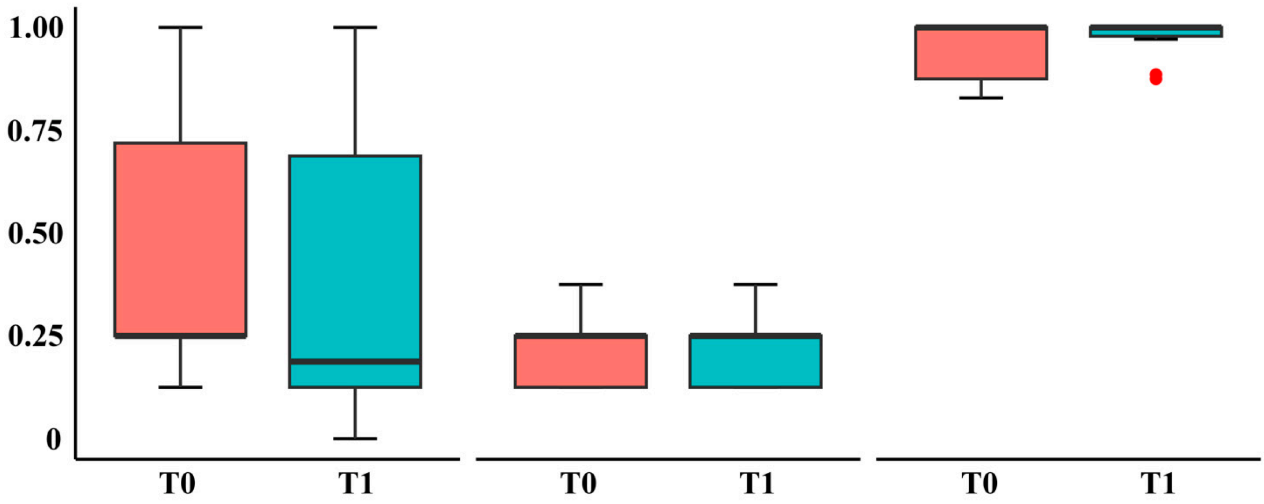

Figure 1. Boxplots illustrating normalized autonomy (IADL and AIADL) scores at baseline (T0) and follow-up (T1) for the Alzheimer's Disease onboard, Alzheimer's Disease at home, and Healthy Older Adults groups. The normalized test scores are depicted on the Y axis. Red dots indicate outlying observations identified by the boxplot criterion.

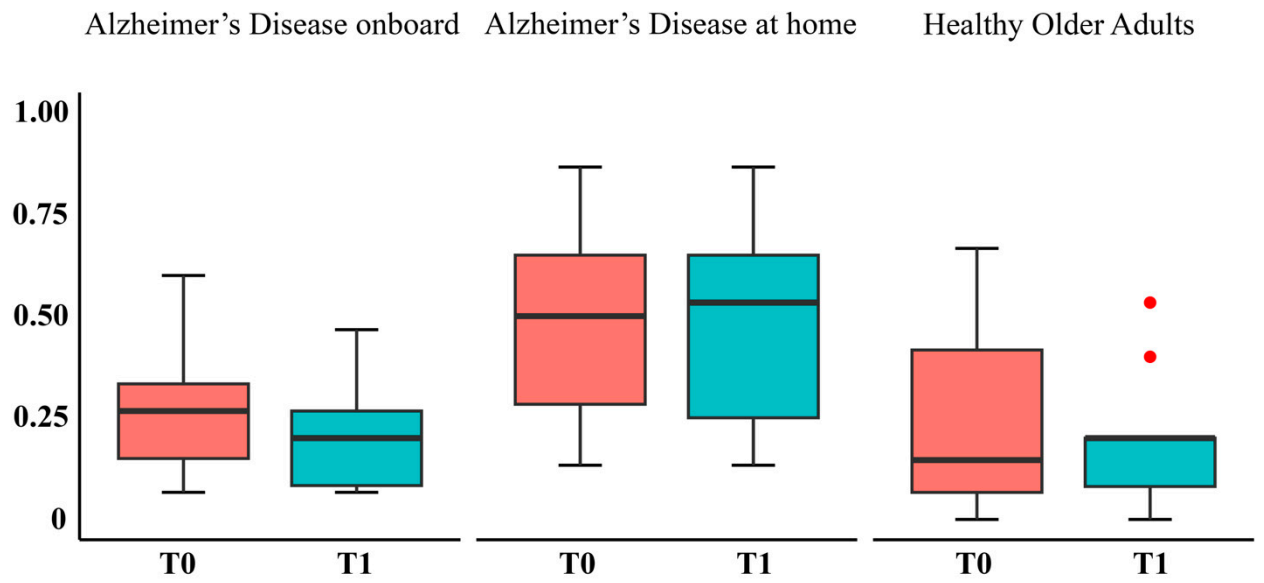

Figure 2. Boxplots illustrating normalized depressive symptoms (GDS and BDI-II) scores at baseline (T0) and follow-up (T1) for the Alzheimer's Disease onboard, Alzheimer's Disease at home, and Healthy Older Adults groups. The normalized test scores are depicted on the Y axis. Red dots indicate outlying observations identified by the boxplot criterion.

Regarding quality of life (Figure 3), no significant difference was observed for the Alzheimer's disease at-home group (mean difference = 1.53; small effect size, Cohen's d = 0.37). The healthy older adults group showed a mean difference of 3.65 with significance in the unadjusted analysis; however, after adjustment, this difference was no longer significant, despite a medium effect size ($t(9) = 2.10$, p unadjusted = 0.032, p adjusted = 0.097, 95% CI [0.47, ∞], d = 0.67). It is therefore not interpreted as a statistically reliable change. The Alzheimer's disease onboard group exhibited a statistically significant mean difference of 2.02 with a large effect size ($t(9) = 2.68$, p unadjusted = 0.012, p adjusted = 0.049, 95% CI [0.64, ∞], d = 0.85).

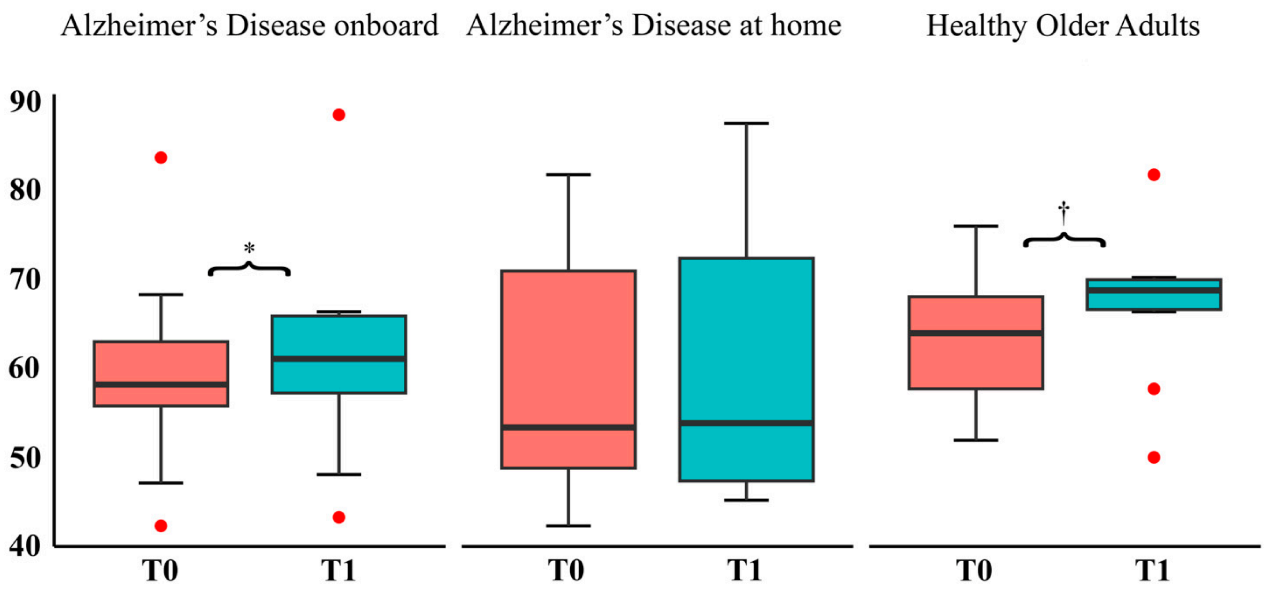

Figure 3. Boxplots illustrating quality of life scores (WHOQOL-BREF) at baseline (T0) and follow-up (T1) for the Alzheimer's Disease, Alzheimer's Disease at home, and Healthy Older Adults groups. Symbols indicate significant within-group changes: * denotes significance after Holm correction; † denotes significance in the unadjusted analysis. The test scores are depicted on the Y axis. Red dots indicate outlying observations identified by the boxplot criterion.

For balance and walking abilities (Figure 4), no significant differences were observed for the Alzheimer's disease at-home or the Alzheimer's disease onboard groups (median difference = 0). In contrast, the healthy older adults group showed a statistically significant mean difference of 2.5 with a large effect size ($t(9) = 3.92$, p unadjusted = 0.001, p adjusted = 0.049, 95% CI [1.33, ∞], d = 1.24).

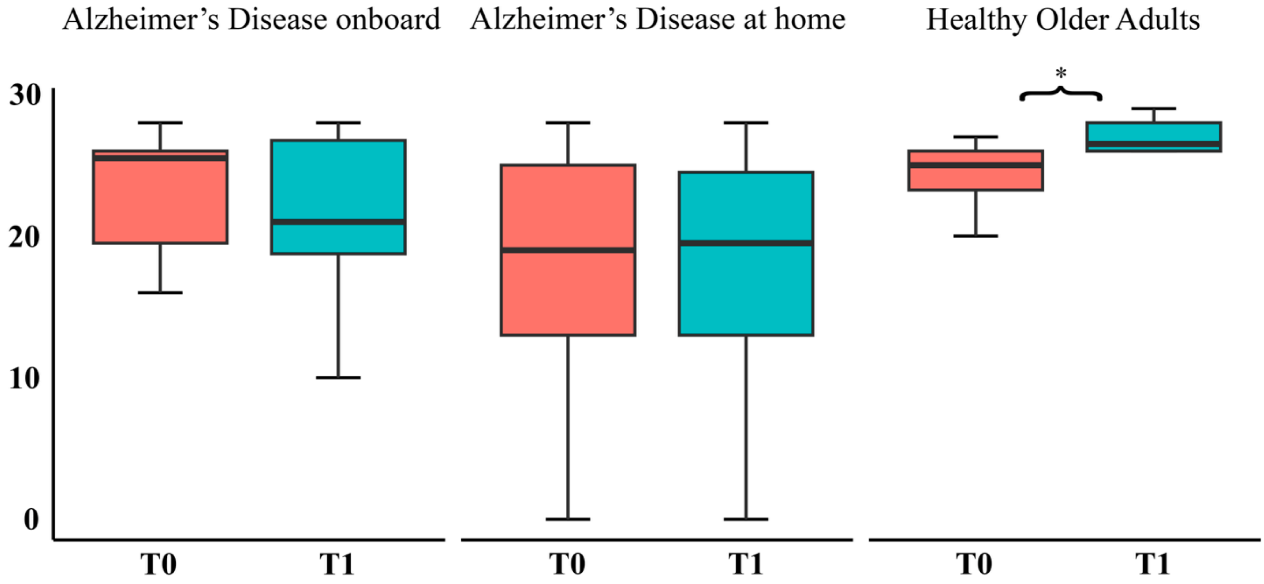

Figure 4. Boxplots illustrating balance and walking abilities scores (Tinetti) at baseline (T0) and follow-up (T1) for the Alzheimer's Disease onboard, Alzheimer's Disease at home, and Healthy Older Adults groups. * indicates significant within-group changes after Holm correction.

Given the small sample size, baseline differences between cohorts, and the absence of planned between-group inferential testing adjusted for these differences, the results are presented as within-group pre–post changes only. The study therefore does not support firm

conclusions regarding differential benefits across groups. The absence of demonstrated baseline equivalence between the on-board and on-land Alzheimer's disease groups—including differences in age and the lack of formal dementia staging—means that between-group contrasts cannot be attributed solely to the intervention.

4. Discussion

This study investigated, using a pre–post design, the effects of a five-day intensive intervention conducted aboard the Italian Navy sailing ship Nave Italia. The findings are best interpreted as proof-of-concept evidence regarding feasibility and short-term responsiveness in selected domains, rather than as generalizable evidence of efficacy. The program targeted both older adults with Alzheimer's disease and cognitively healthy older adults. It combined the "Nave Italia Method" pioneered by the Tender to Nave Italia Foundation with cognitive stimulation, physical exercise, and social engagement, while addressing the emotional dimension within a highly stimulating outdoor experiential context.

The outcomes of the intervention varied depending on the domain measured and participant profiles. Regarding autonomy, assessed with the ADL and IADL scales, and depression, measured with the GDS for participants 65 years old or over and the BDI-II for those under 65, no statistically significant changes were observed. Specifically, in the Alzheimer's disease at-home group and in the cognitively healthy older adults, mean and median differences were zero, while in the Alzheimer's disease onboard group, the mean difference was -0.05 (Cohen's d = -0.32). These null findings should be interpreted cautiously because the intervention was brief, the sample was small, and the measures assessed relatively stable domains that may require longer follow-up or repeated exposure to detect change. At the same time, the present study does not demonstrate that extending the intervention would necessarily be feasible, scalable, or cost-effective in a setting such as Nave Italia. Despite the wide range of stimuli offered by the program, the five-day duration may have been insufficient to generate lasting changes in relatively stable aspects of daily functioning and emotional state, which typically require longer or repeated interventions for effects to be measurable. The literature suggests that structured physical exercise programs and formal cognitive interventions tend to produce detectable improvements in ADL and psychological well-being when delivered over longer periods (e.g., weekly sessions repeated for several months or multi-week structured protocols). Recent meta-analyses and reviews indicate that medium- to high-frequency, long-duration exercise programs (often $\geq$8–12 weeks) can improve daily living skills in people with Alzheimer's disease or dementia, although outcomes vary depending on exercise type and study quality [31].

Regarding mood and depressive symptoms, research on older adults, including reviews on populations with major depressive disorder, depressive symptoms, or comorbidities [32,33], shows that physical activity and related interventions can reduce depressive symptoms. Positive effects are typically observed in programs lasting 8–20 weeks [32], in line with clinical guideline recommendations, such as those from the NICE (National Institute for Health and Care Excellence), which suggest structured interventions over 10–14 weeks [32]. Studies on outdoor training, including nature-based interventions and nature-based adventure interventions, indicate that the variability of positive effects on depressive symptoms depends on factors such as intervention length, frequency, and duration and on individual participant characteristics, including motivation [34]. Therefore, a brief, intensive experience, while insufficient to produce statistically significant stable results, may serve as a motivational catalyst to initiate longer-term programs that can be consolidated on land later.

In the domain of quality of life, measured with the WHOQOL-BREF, a significant improvement was observed in onboard participants with Alzheimer's disease, supported by a large effect size (t(9) = 2.68, unadjusted $p = 0.012$, adjusted $p = 0.049$, 95% CI [0.64, ∞], d = 0.85). This suggests that even short interventions can enhance perceived well-being, likely through mild cognitive stimulation, social interaction, and motivational engagement, factors known to produce immediate emotional effects in this population [20–22]. However, this finding reflects a short-term post-intervention assessment, and the WHOQOL-BREF asks participants to consider the previous two weeks; accordingly, the observed improvement may primarily capture the immediate experience around the intervention and cannot be assumed to persist over time. The lack of significant changes in the Alzheimer's group (mean difference = 1.53; Cohen's d = 0.37) who remained at home during the intervention period supports the hypothesis that the improvement can be specifically attributed to the onboard intervention and to the combination of the "Nave Italia Method" and the specific intervention tailored for Nave Italia. Nevertheless, because the onboard and land-based conditions differed in multiple respects and the intervention is resource-intensive, the study cannot determine whether similar benefits could be achieved through simpler or more cost-effective alternatives. The Nave Italia experience should therefore be understood as a high-resource, distinctive context whose primary value may lie in its role as a motivational catalyst—stimulating engagement and self-efficacy that can subsequently support adherence to more accessible, land-based programmes. Whether cheaper and simpler, off-the-shelf programmes could yield comparable outcomes remains an important question for future research.

Although literature on such brief interventions remains limited, the findings provide new evidence on the motivational and emotional power of intensive social and cognitive stimulation in limited and extremely distinctive spaces, even over short periods. The cognitively healthy older adults also showed a positive trend in quality of life, with a medium effect size; however, after correction, the difference was no longer statistically significant (t(9) = 2.10, unadjusted $p = 0.032$, adjusted $p = 0.097$, 95% CI [0.47, ∞], d = 0.67). This pattern aligns with recent studies with cognitively healthy older adults where nonpharmacological interventions, such as psychosocial, cognitive, educational, or social engagement programs, typically produced modest improvements in quality of life [35]. It is plausible that these participants, starting from high baseline well-being levels, had less room for improvement, making longer, more complex, or repeated interventions necessary to achieve statistically significant changes. With a larger sample, additional therapeutic effects might become observable across further outcome domains; however, whether such effects would be statistically significant and clinically meaningful remains to be demonstrated in future, adequately powered studies.

For balance and gait, measured with the Performance-Oriented Mobility Assessment (Tinetti scale), significant improvement was observed in the cognitively healthy older adult group (t(9) = 3.92, unadjusted $p = 0.001$, adjusted $p = 0.049$, 95% CI [1.33, ∞], d = 1.24), while no changes were found in either of the Alzheimer's groups (median difference = 0). This aligns with literature showing that short outdoor-based interventions (OBIs) can improve balance and gait in older adults [4]. This finding suggests that the physically demanding onboard setting may be associated with short-term mobility gains in healthy older adults, but it does not establish that a sailing-based intervention is superior to more accessible balance or exercise programs likely to be less expensive and easier to implement. The mobility improvement among healthy participants may result not only from structured motor training but also from shipboard activities—moving around the ship, participating in work shifts, and other onboard naval tasks—which constitute physically engaging exercises motivated by context. In contrast, individuals with Alzheimer's disease may

have executive function deficits, motor planning difficulties, and reduced motor learning capacity, limiting benefits from brief programs and necessitating longer interventions. The absence of improvement in the Alzheimer's disease groups may reflect the need for longer, more targeted, or less complex motor training, but this remains speculative.

Several limitations should be emphasized. These include the very small sample size, the non-randomized design, descriptive baseline differences between cohorts, the absence of formal dementia staging data such as the Clinical Dementia Rating, limited control over possible confounders, the use of only short-term outcome assessment, and the inability to isolate which component of the onboard experience was most active. Despite the limitations, which influence generalizability to larger populations, the data provide valuable practical insights. Purely statistical analyses capture only part of the complex, multidimensional nature of the intervention; some experiential and motivational dynamics, difficult to quantify, may nonetheless have a meaningful impact on participants. Previous research has shown that participants of all ages involved in an OBI experienced positive health outcomes, including increased physical activity [36] and improved mental health [37]. Based on this evidence, the present findings suggest that immersive and engaging outdoor environments, featuring motivating and stimulating elements, can enhance the effectiveness of cognitive and motor interventions even over short periods, with outcomes varying by domain and participant profile. In particular, the absence of formal baseline equivalence testing between the two Alzheimer's disease groups—given the observed descriptive differences in age (onboard: 83.2 $\pm$ 7.6 years; at-home: 87.0 $\pm$ 4.8 years) and years of education, and the lack of formal dementia staging—means that between-group outcome differences cannot be attributed definitively to the intervention.

5. Conclusions

This study provides proof-of-concept evidence that a brief, multidimensional intervention aboard Nave Italia is feasible and may yield short-term benefits in selected domains, specifically quality of life in participants with Alzheimer's disease and balance/gait in healthy older adults. The findings should not be overgeneralized beyond the small cohorts examined, and they do not establish durable benefit, comparative superiority, or cost-effectiveness. Future studies should use larger samples, clearer dementia staging, better matched or randomized comparison groups, and longer follow-up to determine whether the observed short-term effects persist and whether similar outcomes can be achieved with more scalable interventions. With larger and better-matched samples, further therapeutic effects might become observable; however, this remains to be demonstrated in adequately powered future studies.

Although based on a relatively small sample, this study provides preliminary evidence on the potential of brief, intensive, and experiential interventions targeting older adults with Alzheimer's disease and cognitively healthy individuals. The experience aboard Nave Italia represents an innovative model capable of integrating the "Nave Italia Method" with the structured design of professional interventions in psychological and motor domains. Quantitative results show that, in the domains most sensitive to emotional and relational dimensions—particularly quality of life—significant improvements can be observed even over a short time frame. The evidence aligns with the literature recognizing the immediate impact of psychosocial interventions and social engagement on perceived well-being in people with dementia. Conversely, more stable domains, less influenced in the short term (e.g., functional autonomy and depressive symptoms), require longer durations and ongoing programs to produce measurable changes. Beyond numerical data, qualitative aspects related to the experiential dimension of the intervention strongly emerged: motivational activation, perceived self-efficacy, active participation, and the symbolic value

of the journey appeared to play crucial roles in participant engagement and the potential transfer of skills to daily life. Although difficult to capture through conventional statistical assessment, these elements represent essential components of the intervention's success. The experience aboard Nave Italia immediately elicited interest and active participation, supporting intrinsic motivational mechanisms, partly due to the context and partly to the gratification derived from direct action and strengthened self-efficacy. These elements, characteristic of experiential and situated learning activities [38], may increase receptivity to the intervention even over a brief period. They not only support adherence to the program but also appear to facilitate the transfer of skills, positive habits, and self-efficacy experiences into daily life. For this reason, interventions of this type for older adults with the aim of supporting responsible longevity [39] can serve as a powerful initial stimulus and be useful for initiating more stable and structured programs once participants return to everyday life.

Overall, the experience aboard Nave Italia can be interpreted as a motivational catalyst capable of activating personal, social, and emotional resources that, if consolidated through structured programs and continuous interventions on land, may translate into longer-lasting benefits [39]. The project highlights the value of combining traditional approaches with immersive and highly motivating experiences capable of stimulating older adults, with or without cognitive impairments, beyond the boundaries of conventional activities. From a broader perspective, we can conclude that the experiences on Nave Italia dedicated to older adults with or without dementia may represent an innovative concept not only in terms of the potential for empowerment and reorientation of over-65s but also, and above all, in terms of an inclusive culture and approach to empowering people who, despite their advanced age and condition, continue to be considered active protagonists of change in the short and medium term. The project presented in this paper and its results are in fact perfectly in line with the new narratives of healthy longevity and the personalization of interventions in neurodegenerative diseases, which are changing the ageist narrative of growing old as nothing other than a negative experience.

Author Contributions: Conceptualization, F.M.; methodology, F.M., S.B. and I.L.B.; formal analysis, I.L.B.; data collection S.B., I.L.B. and M.G. (Maria Gattuso); data curation, I.L.B.; writing—original draft preparation, F.M.; writing—review and editing, F.M. and I.L.B.; supervision, P.C.F.; project administration, M.G. (Marco Gagliani); funding acquisition, P.C.F. and F.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research was partially funded by Fondazione Cariplo "Extrabando", grant number 2023-2708, 2024-3873, 2025-3213, MUR-PRIN2022 and 2022RAESSJ.

Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the University of Bergamo (protocol code 2024_05_03 and date of approval 17 May 2024).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. Written informed consent was obtained from the participants for the publication of this paper.

Data Availability Statement: The original contributions presented in this study are included in the article; further inquiries can be directed to the corresponding author.

Acknowledgments: We thank the Lombardy Region for its help in promoting this research initiative in the Bergamo area within the REINT2565 intergenerational program.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analysis, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

References

1. Morganti, F. Longevity as a responsibility: Constructing healthy aging by enacting within contexts over the entire lifespan. *Geriatrics* **2024**, *9*, 93. [CrossRef] [PubMed]
2. Morganti, F. *Psicologia Dell'Invecchiamento in Salute*; Carocci: Roma, Italy, 2022.
3. Fondazione Tender to Nave Italia. *Outdoor Training, Disabilità e Qualità Della Vita: Il Metodo Nave Italia*; Erickson Direct: Trento, Italy, 2022.
4. Mueller, K.E.; Thomas, A. Successful aging and older adults' health outcomes through outdoor-based interventions like adventure therapy: A scoping review. *J. Outdoor Environ. Educ.* **2025**, *28*, 447–464. [CrossRef]
5. Gasser, B. Half of emergency calls in hikers are injuries from falls in 50–70-year-olds. *Dtsch. Z. Sportmed.* **2019**, *70*, 209–214. [CrossRef]
6. Granacher, U.; Gollhofer, A.; Hortobágyi, T.; Kressig, R.W.; Muehlbauer, T. The importance of trunk muscle strength for balance, functional performance, and fall prevention in seniors: A systematic review. *Sports Med.* **2013**, *43*, 627–641. [CrossRef] [PubMed]
7. Berger, R. Being in nature: An innovative framework for incorporating nature in therapy with older adults. *J. Holist. Nurs.* **2009**, *27*, 45–50. [CrossRef] [PubMed]
8. Russell, K.; Gillis, H.L. The adventure therapy experience scale: The psychometric properties of a scale to measure the unique factors moderating an adventure therapy experience. *J. Exp. Educ.* **2017**, *40*, 135–152. [CrossRef]
9. Kahana, E.; Kahana, B.; Lee, J.E. Proactive approaches to successful aging: One clear path through the forest. *Gerontology* **2014**, *60*, 466–474. [CrossRef] [PubMed]
10. Gass, M.; Gillis, H.L.; Russell, K. *Adventure Therapy: Theory, Practice, & Research*, 1st ed.; Routledge: Abingdon, UK, 2012.
11. Pringle, G. *A Tale of Two Systems: Polarising Beliefs in Adventure Therapy*; OSF Preprints: Charlottesville, VA, USA, 2024. [CrossRef]
12. Song, C.; Ikei, H.; Nara, M.; Takayama, D.; Miyazaki, Y. Physiological effects of viewing bonsai in elderly patients undergoing rehabilitation. *Int. J. Environ. Res. Public Health* **2018**, *15*, 2635. [CrossRef] [PubMed]
13. Wen, Y.; Yan, Q.; Pan, Y.; Gu, X.; Liu, Y. Medical empirical research on forest bathing (Shinrin-yoku): A systematic review. *Environ. Health Prev. Med.* **2019**, *24*, 70. [CrossRef] [PubMed]
14. Boyes, M. Outdoor adventure and successful ageing. *Ageing Soc.* **2013**, *33*, 644–665. [CrossRef]
15. Gatterer, H.; Raab, C.; Pramsohler, S.; Faulhaber, M.; Burtscher, M.; Netzer, N. Effect of weekly hiking on cardiovascular risk factors in the elderly. *Z. Gerontol. Geriatr.* **2015**, *48*, 150–153. [CrossRef] [PubMed]
16. Hepperger, C.; Gföller, P.; Hoser, C.; Ulmer, H.; Fischer, F.; Schobersberger, W.; Fink, C. The effects of a 3-month controlled hiking programme on the functional abilities of patients following total knee arthroplasty: A prospective, randomized trial. *Knee Surg. Sports Traumatol. Arthrosc.* **2017**, *25*, 3387–3395. [CrossRef] [PubMed]
17. Prossegger, J.; Huber, D.; Grafetstätter, C.; Pichler, C.; Weisböck-Erdheim, R.; Iglseder, B.; Wewerka, G.; Hartl, A. Effects of moderate mountain hiking and balneotherapy on community-dwelling older people: A randomized controlled trial. *Exp. Gerontol.* **2019**, *122*, 74–84. [CrossRef] [PubMed]
18. Yang, C.H.; Conroy, D.E. Feasibility of an outdoor mindful walking program for reducing negative affect in older adults. *J. Aging Phys. Act.* **2019**, *27*, 18–27. [CrossRef] [PubMed]
19. Innes, A.; Dal Bello-Haas, V.; Burke, E.; Lu, D.; McLeod, M.; Dupuis, C. Understandings and perceived benefits of outdoor-based support for people living with dementia. *Int. J. Environ. Res. Public Health* **2024**, *21*, 1072. [CrossRef] [PubMed]
20. Spring, J.A. Design of evidence-based gardens and garden therapy for neurodisability in Scandinavia: Data from 14 sites. *Neurodegener. Dis. Manag.* **2016**, *6*, 87–98. [CrossRef] [PubMed]
21. Motealleh, P.; Moyle, W.; Jones, C.; Dupre, K. The impact of a dementia-friendly garden design on people with dementia in a residential aged care facility: A case study. *HERD Health Environ. Res. Des. J.* **2022**, *15*, 196–218. [CrossRef]
22. Murroni, V.; Cavalli, R.; Basso, A.; Borella, E.; Meneghetti, C.; Melendugno, A.; Pazzaglia, F. Effectiveness of therapeutic gardens for people with dementia: A systematic review. *Int. J. Environ. Res. Public Health* **2021**, *18*, 9595. [CrossRef] [PubMed]
23. Lawton, M.P.; Brody, E.M. Assessment of older people: Self-maintaining and instrumental activities of daily living. *Gerontologist* **1969**, *9*, 179–186. [CrossRef]
24. Bordin, A.; Busato, V.; Borella, E.; Optale, G.; De Beni, R. Advanced Instrumental Activities of Daily Living Scale (AIADL): Assessment scale for advanced instrumental activities of elderly people daily life, observed in different living frameworks, and belonging to an increasingly fast-evolving, highly technological world. *G. Gerontol.* **2011**, *59*, 155–162.
25. Yesavage, J.A.; Brink, T.L.; Rose, T.L.; Lum, O.; Huang, V.; Adey, M.; Leirer, V.O. Development and validation of a geriatric depression screening scale: A preliminary report. *J. Psychiatr. Res.* **1982**, *17*, 37–49. [CrossRef] [PubMed]
26. Ghisi, M.; Flebus, G.B.; Montano, A.; Sanavio, E.; Sica, C. *Beck Depression Inventory—II (BDI-II): Manuale*; Organizzazioni Speciali: Firenze, Italy, 2006.
27. De Girolamo, G.; Rucci, P.; Scocco, P.; Mazzi, M.; Santone, G.; Picardi, A. Quality of life assessment: Validation of the Italian version of the WHOQOL-Brief. *Epidemiol. Psichiatr. Soc.* **2000**, *9*, 45–55. [CrossRef] [PubMed]

28. Tinetti, M.E. Performance-oriented assessment of mobility problems in elderly patients. *J. Am. Geriatr. Soc.* **1986**, *34*, 119–126. [CrossRef] [PubMed]
29. R Core Team. *R: A Language and Environment for Statistical Computing*; R Foundation for Statistical Computing: Vienna, Austria, 2021. Available online: https://www.r-project.org/ (accessed on 15 January 2026).
30. Fox, J.; Weisberg, S.; Price, B. *car: Companion to Applied Regression, R Package*; CRAN: Vienna, Austria, 2001. [CrossRef]
31. Liu, C.; Gao, S.; Li, S. The effect of physical exercise intervention on the ability of daily living in patients with Alzheimer's dementia: A meta-analysis. *Front. Aging Neurosci.* **2024**, *16*, 1391611. [CrossRef] [PubMed]
32. Mura, G.; Carta, M.G. Physical activity in depressed elderly: A systematic review. *Clin. Pract. Epidemiol. Ment. Health* **2013**, *9*, 125–135. [CrossRef] [PubMed]
33. Schuch, F.B.; Vancampfort, D.; Richards, J.; Rosenbaum, S.; Ward, P.B.; Stubbs, B. Exercise as a treatment for depression: A meta-analysis adjusting for publication bias. *J. Psychiatr. Res.* **2016**, *77*, 42–51. [CrossRef] [PubMed]
34. Rosa, C.D.; Chaves, T.S.; Collado, S.; Larson, L.R.; Profice, C.C. The effect of nature-based adventure interventions on depression: A systematic review. *Environ. Behav.* **2023**, *55*, 140–174. [CrossRef]
35. Koh, W.Q.; Wora, N.; Liong, N.W.L.; Ludlow, K.; Pachana, N.A.; Liddle, J. Non–exercise-based interventions to support healthy aging in older adults: A systematic review and meta-analysis of randomized controlled trials. *Gerontologist* **2025**, *65*, gnae156. [CrossRef] [PubMed]
36. Winter, P.L.; Selin, S.; Cerveny, L.K.; Bricker, K. Perceived value and its impact on travel outcomes in youth tourism. *J. Outdoor Recreat. Tour.* **2020**, *31*, 100327. [CrossRef]
37. Coventry, P.A.; Brown, J.E.; Pervin, J.; Brabyn, S.; Pateman, R.; Breedvelt, J.; Gilbody, S.; Stancliffe, R. Nature-based outdoor activities for mental and physical health: Systematic review and meta-analysis. *Soc. Sci. Med.* **2021**, *279*, 113964. [CrossRef] [PubMed]
38. Lave, J.; Wenger, E. *L'apprendimento Situato: Dall'osservazione alla Partecipazione Attiva nei Contesti Sociali*; Edizioni Erickson: Trento, Italy, 2006.
39. Morganti, F. Quality of life in people living with dementia: Personalized early diagnosis, individual empowerment, and community inclusion. In *Longevity and Geriatrics*; IntechOpen: London, UK, 2025; pp. 175–194. [CrossRef]