

Social Connectedness and Cognitive Decline: A Multidimensional Analysis Across Healthy and Cognitively Impaired Italian Adults

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Abstract

Purpose: Social isolation and loneliness are increasingly recognized as critical psychosocial determinants of cognitive aging and dementia risk. By adopting a multidimensional approach, this study examines how both objective and subjective features of social connectedness relate to cognitive functioning across healthy and older cognitively normal and impaired Italian adults.

Methods: In Experiment 1, 662 healthy participants ($M_{age}=51.7$ years) completed a brief assessment, including measures of general cognition, associative memory and social cognition, subjective cognitive decline and questionnaires on social connectedness. In Experiment 2, 141 older adults ($M_{age}=64.29$ years) were categorized as cognitively healthy (CH; $n=68$) and cognitively impaired (CI; $n=73$) after a comprehensive neuropsychological evaluation.

Results: Experiment 1 regression analyses revealed that larger social networks and cohabitation were associated with better associative memory and social cognition, while higher loneliness predicted greater subjective cognitive decline. Notably, the results observed in the larger sample were partially confirmed in experiment 2, with CI group having worse scores in delayed free recall of the Italian Face-Name Association Test. Furthermore, depression, rather than loneliness, was a significant predictor of subjective cognitive complaints, independent of cognitive status.

Conclusion: These findings underscore the distinct and interactive roles of objective and subjective social isolation in shaping cognitive trajectories and highlight the importance of integrating psychosocial variables into dementia prevention strategies.

INTRODUCTION

In 2024, the Lancet Commission on Dementia Prevention, Intervention, and Care revised its framework for understanding modifiable risk factors for Alzheimer's disease (AD), now accounting for nearly 45% of the variance in dementia prevalence [1]. Among the 14 recognized modifiable factors, social isolation has been confirmed as a crucial determinant of cognitive decline, alongside hearing loss, depression, physical inactivity, and other lifestyle-related risks. Building on the 2020 Commission's recognition of social engagement as a protective factor for cognitive health [2], the growing emphasis on social isolation, formally prioritized by global health authorities as a public health concern [3], since approximately 10-20% of adults, up to 30-40% among the older adults, in Western countries report loneliness [4,5], underscores its pivotal role in global dementia prevention strategies.

Social relationships offer continuous opportunities to engage and maintain neural networks underlying cognitive function. Social engagement promotes cognitive stimulation, leading to better performance in semantic memory tasks [6], perceptual speed, and verbal fluency [7]. A meta-analysis of 51 longitudinal cohorts found that greater social activity and network size were associated with better cognitive functioning in late life [8]. On the other hand, reduced social contact increased dementia risk across a cohort of over 800,000 individuals worldwide, with married individuals showing lower risk incidence

compared to single or widowed peers [9]. The 2024 update strengthened this evidence, showing that infrequent social contact predicted higher dementia risk [1]. Neuroimaging findings support this association, linking social isolation to reduced grey matter volume in temporal and frontal regions [10], underscoring the centrality of social connectedness in dementia prevention. Furthermore, longitudinal evidences reveal that prolonged loneliness is associated with a significantly increased risk of developing dementia, including AD, even after accounting for other risk factors [11,12].

Although often used interchangeably, social isolation and loneliness represent distinct yet interrelated constructs. The former refers to the objective absence or lack of social interactions, comprising limited contacts with friends and family, small social networks, and reduced participation in community and group activities [13]. In contrast, loneliness denotes the negative emotional state that arises from a subjective perception of incongruence between desired and actual social relationships [14,15]. The distinction between these two dimensions is crucial, as one may feel lonely despite regular social contact, or, instead, be emotionally fulfilled while objectively isolated. Their consequences are various, with significant effects on physical and mental health [15,16], contributing to elevated risks of cardiovascular disease, depression, cognitive decline, and mortality [17,18].

Particularly, loneliness has been associated with hypertension and immune system dysfunction [13,19], as well as subjective [20] and objective cognitive decline [21-25] and AD onset [26]. Persistent loneliness has been linked to impairments in executive function [27], memory (i.e., immediate and delayed recall [28]), and attention performance, as well as depressive symptoms [29]. Although some studies suggest that objective isolation exerts stronger effects than subjective loneliness [22], their interaction produces the most detrimental effects on cognition, especially on memory among the cognitive domains [30,31]. Altogether, identified as fundamental psychosocial determinants of cognitive aging, both affect neurocognitive outcomes through biological and behavioral pathways. Proposed mechanisms include stress-related neurobiological pathways, such as chronic activation of the hypothalamic-pituitary-adrenal axis, increased sympathetic tone, and glucocorticoid resistance, possibly damaging hippocampal and prefrontal regions critical for learning and memory [22]. Additionally, reduced social engagement may foster maladaptive behaviors that further compromise cardiovascular and cognitive health [32,33]. Neuroimaging studies reveal structural and functional alterations in the prefrontal cortex, insula, amygdala, and hippocampus among lonely individuals [34], and associations between loneliness and AD pathology, including elevated amyloid and tau burden, in genetically susceptible individuals [35,36].

Despite the growing evidence linking social isolation and loneliness to cognitive decline, significant methodological and conceptual gaps limit the consistency and interpretability of findings. One fundamental issue concerns the heterogeneity of measurement tools used to assess social isolation and loneliness. Most studies rely on brief self-reports or single-item measures and overlook contextual factors such as marital status and living arrangements, limiting the ability to distinguish and integrate objective and subjective aspects of social isolation and to capture their distinct effects across cognitive domains like social cognition, associative memory, and self-reported cognitive decline. Most of these

outcomes could be directly influenced by social engagement [20,37], possibly representing early and sensitive markers of cognitive changes related to social isolation.

The present study aims to advance understanding of the relationship between loneliness, social isolation, and cognitive functioning through a multidimensional and integrative approach. Specifically, it investigates how objective indicators of social connectedness (e.g., marital status, cohabitation, and network size) and subjective experiences of loneliness differentially relate to both objective cognitive performance and the subjective perception of cognitive impairment. Particular attention is given to underexplored yet socially relevant cognitive functions, including face-name associative memory and social cognition. Through the combined analysis of social variables and varied cognitive measures, this research offers a nuanced investigation of how social connectedness shapes cognitive outcomes in a cohort of Italian adults (Experiment 1) and in a smaller sample of older adults with and without cognitive impairment (Experiment 2).

EXPERIMENT 1

MATERIALS AND METHODS

Participants

Six-hundred-sixty-two participants (434 women and 228 men) aged between 21 and 80 years ($M_{age}=51.7$ years, $SD_{age}=13.6$; $M_{edu}=13.5$ years, $SD_{edu}=4.5$) were recruited through snowball sampling by psychology students from the University of Bari "A. Moro". Exclusion criteria included history or current diagnosis of psychiatric and neurological (e.g., traumatic brain injury, stroke, epilepsy, neurodegenerative) disorders. All participants obtained a Montreal Cognitive Assessment (MoCA) equivalent score above 1 [38].

Procedure

The study was approved by the Local Ethical Committee of IRCCS Istituto Oncologico "Gabriella Serio" (2123/CEL) and was conducted in accordance with the Helsinki Declaration and its subsequent amendments. After giving their consent to participate, each participant underwent a brief neuropsychological assessment and completed a battery of questionnaires, which lasted approximately one hour.

The neuropsychological assessment included the Italian version of the MoCA [38,39] ($M=24.89$, $SD=3.37$), used as a screening test of global cognitive functioning, the Italian Face Name Association Test [40] (ItFNAT, $M=6.31$, $SD=3.33$), which investigates associative memory through the learning and recall of face-name pairs, and the Story-Based Empathy Task [41] (SET, $M=13.93$, $SD=3.49$), aimed at assessing social cognition and, in particular, empathic components. The social connectedness was measured through information on marital status (i.e., single $N=136$, married $N=439$, divorced $N=58$, widowed $N=29$) and living arrangement (number of cohabitants: lives alone $N=58$, with another person $N=221$, with two or more people $N=383$), and by administering two standardized questionnaires: the

UCLA Loneliness Scale [42] (UCLA-LS, $M=40.54$, $SD=10.40$) and the Lubben Social Network Scale [43] (LSNS, $M=16.75$, $SD=5.00$).

Measures

The MoCA [38,39] is a rapid neuropsychological screening test (10-15 minutes), developed to detect cognitive decline. The items are organized into different subtests (i.e., visuospatial/executive, attention, memory, language, abstraction, and orientation) to cover different domains, making the scale a comprehensive measure of cognitive functioning. Scores range from 0 to 30, with higher scores indicating better global cognitive functioning.

The ItFNAT [40] was used to assess cross-modal associative memory and was administered in computerized form. The task consisted of a learning phase, in which participants were presented with 16 faces associated with proper names, followed by immediate free recall. After a 15-minute interval, during which the participants performed non-interfering activities, a delayed free recall (DFR) was administered to measure the stability of associations over time. A multiple-choice recognition test was proposed in case of omitted or wrong answers. Score ranges 0-16, with higher scores reflecting better associative memory performances.

The SET [41] is a nonverbal test designed to assess social cognition by presenting the participant with 18 comic strip vignettes divided into three conditions: attribution of emotions, attribution of intentions, and causal inference. Each vignette is followed by three possible conclusions, and participants are asked to select the correct ending among the options. Scores range from 0 to 18, with higher scores indicating better social cognition performance.

The brief neuropsychological assessment was accompanied by the Subjective Cognitive Decline Questionnaire (SCD-Q) [44], investigating the subjective perception of cognitive difficulties. The questionnaire consists of 24 items designed to detect a perceived decline in daily cognitive abilities over the past two years. Each item requires a dichotomous response (yes/no), covering domains such as memory, executive functions, attention, and language. The total score ranges from 0 to 24, with higher scores indicating a greater perceived cognitive change [45]. A cut-off of 7 is used to discriminate between cognitively impaired subjects and those who are cognitively healthy [44].

The UCLA-LS [42,46] consists of 20 items that focus on the subjective experience of loneliness. Items assessed everyday experiences such as lack of companionship, feeling of exclusion, or difficulty finding someone to turn to in times of need, and the sense of integration and belonging. The LSNS [43] is a tool developed to investigate the extent and frequency of social contacts. Each item is rated on a 6-point Likert scale to estimate the number of relatives and friends seen or heard from at least once a month, those who can be contacted to share private matters, and those available to help in times of need [47].

DATA ANALYSIS AND RESULTS

Data analysis was performed using JASP statistical software [48]. The raw scores of the cognitive tests (MoCA, ItFNAT DFRs, and SET) were adjusted according to the Italian normative data available [38,40,41]. Cognitive test scores are normally distributed accordingly to skewness (ranging from -1.157 to 0.463) and kurtosis (ranging from -0.354 to 0.867) values.

Pearson's correlation analysis, conducted to assess the relationship between subjective (UCLA-LS) and objective (LSNS) social connectedness, revealed a significant negative correlation between the two scores ($r=-0.527$, $p<.001$), indicating that higher levels of subjective loneliness were associated with smaller social network sizes. The independent samples *t*-test carried out to examine potential sex differences in UCLA-LS and LSNS scores showed no significant differences (both $ps\geq.471$). The two ANOVAs conducted to test whether marital status and living arrangement were associated with UCLA-LS and LSNS scores, respectively, showed neither main nor interaction effects (all $ps\geq.372$).

Four simple linear regression models were implemented, one for each dependent variable: the total MoCA, the ItFNAT DFR, the overall SET, and the SCD-Q scores. For each model, living arrangement and marital status were used as categorical predictors, while UCLA-LS and LSNS scores were used as continuous predictors. Sex (F, M) was also included in the models to check its influence. All the linear regression models' outcomes are summarized in Table S1 and significant associations are represented in Figure 1.

The linear regression model performed on the MoCA score using the various social connectedness indices as predictors was not significant ($\text{Adj } R^2=-0.001$, $F_{8,653}=0.918$, $p=.501$).

The linear regression model performed on the ItFNAT DFR score using the various social connectedness indices as predictors was significant ($\text{Adj } R^2=.013$, $F_{8,653}=2.082$, $p=.035$). In particular, there was a significant positive association between DFR performance and living with two or more people ($B=0.874$, $p=.006$). However, the distribution of participants having low (equivalent score ≤ 1) and high (equivalent score >1) DFR score within the three housing situation categories was not significantly different from chance ($\chi^2_2=2.884$, $p=.236$).

The linear regression model performed on the SET score using the various social connectedness indices as predictors was significant ($\text{Adj } R^2=0.060$, $F_{8,653}=6.267$, $p<.001$). Specifically, a significant positive association was found between the social cognition performance and the breadth and quality of social relationships (LSNS; $B=0.106$, $p<.001$). Concerning marital status, negative associations were observed between SET scores and being widowed ($B=-3.355$, $p<.001$). Finally, a positive association was observed with cohabitation with two or more people ($B=-0.854$, $p=.003$). To further examine the independent contribution of these predictors, an ANCOVA was conducted with SET score as the dependent variable, marital status and living arrangement as between-subjects factors, and LSNS score as a covariate (Table 1). Results showed a significant main effect of marital status, $F_{3,649}=9.555$, $p<.001$, and a significant effect of LSNS, $F_{1,649}=8.741$, $p=.003$. Post hoc Tuckey comparisons indicated that widowed participants had significantly lower SET scores when compared to single ($p<.001$) and divorced ($p=.028$) individuals.

In contrast, living arrangement and the interaction between marital status and living arrangement were not significant.

The linear regression model performed on the SCD-Q score using the social connectedness indices as predictors was significant (Adj $R^2=0.115$, $F_{8,653}=11.76$, $p<.001$). In particular, a significant positive association was observed between the severity of subjective cognitive decline and perceived loneliness (UCLA-LS; $B=0.154$, $p<.001$). The distribution of participants with or without subjective cognitive impairment according to their perceived loneliness significantly differed from chance ($\chi^2_3=41.75$, $p<.001$). Almost all participants with high levels of loneliness (UCLA-LS score >49) were distributed within the group reporting cognitive impairment (92.31%), while most of those with low levels of perceived loneliness (UCLA-LS score ≤ 49) were among those who did not report cognitive difficulties (67.28%) as reported in Table 2.

Table 1. ANCOVA ran on Story-based Empathy Task scores by using linear regression significant predictors: marital status and living arrangement as between factor and Lubben Social Network Scale scores as covariate.

Factors	Df	F	p-value
Marital status	3	9.555	< .001
Living arrangement	2	0.447	.640
Lubben Social Network Scale	1	8.741	.003
Marital Status * Living arrangement	6	1.408	0.209
Residuals	649	-	-

Table 2. Chi-Squared Test run on the distribution of participants reporting High (UCLA Loneliness Scale score ≥ 50) or Low (UCLA Loneliness Scale score <50) levels of loneliness according to presence of Subjective Cognitive Decline (Subjective Cognitive Decline-Questionnaire score ≥ 7).

$\chi^2=18.85$, $p<.001$		High Loneliness	Low Loneliness
No SCD	N (%)	47 (13.70 %)	296 (86.30 %)
Yes SCD	N (%)	87 (27.27 %)	232 (72.73 %)

EXPERIMENT 2

MATERIALS AND METHODS

Participants

An independent sample of 169 older adults (113 F; age range: 50–80, $M_{age}=62.72$ years, $SD_{age}=9.66$; $M_{edu}=11.06$ years, $SD_{edu}=4.38$), recruited among local senior centers within the Metropolitan City of Bari, underwent a comprehensive neuropsychological assessment, including a battery of questionnaires. Exclusion criteria included history or current diagnosis of traumatic brain injury, stroke, epilepsy, and psychiatric disorders. According to an extensive neuropsychological assessment of all the cognitive domains, consistent with DSM-5 criteria for Neurocognitive Disorders [49], participants were assigned to Cognitively Impaired (CI) and Cognitively Healthy (CH) groups. For this experiment, a subsample of 73 CI and 68 CH participants was selected to match sex, age, and years of education (between-group comparisons of sociodemographic and neuropsychological variables are reported in Table S2).

DATA ANALYSIS AND RESULTS

Data analysis was performed using JASP statistical software [48]. Due to the limited sample size living arrangement was dichotomized in living alone vs. cohabiting (including both residing with another person and with two or more people). Furthermore, sex was removed as a variable due to the balance between the groups and the lack of significant effects in Experiment 1. Given the association between loneliness and affective symptoms, HADS Anxiety and Depression scores were included in the analyses where appropriate.

Pearson's correlation conducted to examine the association between UCLA-LS, LSNS, Anxiety and Depression in both CI and CH samples revealed a Bonferroni corrected significant positive correlation between Anxiety and Depression scores, in the whole sample and within groups (all $r_s>0.464$, $p_s<.001$). Furthermore, a significant positive correlation was also found between Depression and UCLA-LS scores and Anxiety and UCLA-LS scores, both in the whole sample and within groups (all $r_s>0.417$, $p_s\leq.001$). A marginal negative correlation between LSNS and Depression emerged only in the whole sample ($r=-0.207$, $p=.015$). The negative correlation between UCLA-LS and LSNS scores was significant in the whole sample ($r=-0.229$, $p=.007$) but only marginal in the CH group ($r=-0.295$, $p=.014$) (see Table S3).

The Multivariate Analysis of Variance (MANOVA) conducted to test whether group, marital status, and living arrangement differed in LSNS and UCLA-LS scores revealed no significant differences in objective or subjective social connectedness (all $p_s>.086$); however the LSNS ANOVA revealed a significant group effect ($p=.036$), with CH group reporting larger social networks compared to CI, and marginal effect of living arrangement ($p=.064$) (see Table S4).

Logistic regression model performed to assess the contribution of UCLA-LS, LSNS, marital status, and living arrangements in predicting group (CH=0 vs. CI=1) was not significant ($R^2=0.053 - 0.094$, $p=.255$); however, the LSNS score was a significant predictor ($B=-0.068$, $p=.029$) (see Table S5).

Finally, regression analyses were limited to predictors showing significant effects in Experiment 1. For each outcome measure (ItFNAT DFR, SET, and SCD-Q), a simple regression model including social connectedness as continuous predictors and group as a categorical predictor was run. The linear regression for the ItFNAT adjusted DFR score, with living arrangement and group as categorical

predictors, was significant ($\text{Adj } R^2=0.112$, $F_{2,115}=8.348$, $p<.001$), with a worse DFR score for CI group ($B=-2.231$, $p<.001$). On the other hand, the linear regression model performed on the SET global adjusted score, with LSNS as continuous predictors and marital status, living arrangement, and group as categorical predictors, was not significant ($F_{6,128}=1.941$, $p=.079$), although group was a significant predictor ($B=-1.602$, $p=.011$). Finally, the linear regression ran on the SCD-Q score, using UCLA-LS, Anxiety and Depression as continuous predictors and group as a categorical predictor, was significant ($\text{Adj } R^2=0.112$, $F_{4,133}=5.305$, $p<.001$). A significant positive association was observed between the severity of subjective cognitive decline and Depression ($B=0.346$, $p=.016$). All the linear regression models' outcomes are summarized in Table S5.

Discussion

This study examined how objective and subjective indicators of social connectedness relate to distinct cognitive outcomes across adulthood and in older adults with and without cognitive impairment. Across both experiments, subjective and objective isolation emerged as partially overlapping yet distinct predictors of cognitive performance, with the latter influencing predominantly associative memory and social cognition, and the former associated with subjective cognitive decline. Particularly, in the large community sample (Experiment 1), although general cognition seems not to be affected by social connectedness, living arrangement predicted associative memory performance, marital status and social network size were associated with social cognition, while perceived loneliness predicted higher levels of subjective cognitive decline. In the older cohort (Experiment 2), after controlling for affective status, depression rather than loneliness predicted greater self-reported cognitive decline, while social network size was the only social connectedness feature predicting cognitive functioning.

Higher loneliness was associated with smaller social networks, especially within the general population (Experiment 1). Demographic factors also played different roles across samples. In the healthy adult group (Experiment 1), loneliness and social connectedness did not vary by sex, marital status, or living arrangement. On the other hand, CI older adults (Experiment 2) reported smaller social networks than CH older adults, even though their loneliness levels were similar. A similar trend was also found for older adults living alone compared with cohabiting peers. These observations are consistent with outcomes from large-scale studies confirming the advantages of spouses in reducing feelings of perceived loneliness [50] and further supported by considerations of the interrelation between loneliness, isolation, and living alone, suggesting a clear association but not an overlap of concepts [51]. Consistent with previous findings [4,52], perceived loneliness remained moderate across groups, suggesting that marital or cognitive status alone does not fully capture subjective social experience. Together, these findings indicate that feelings of loneliness may depend less on the size of one's social network and more on the quality and perceived supportiveness of social ties [53]. Furthermore, both MANOVA and logistic regression suggest that the social connectedness feature mostly linked to impaired cognitive aging might be the social network width, confirming once again the role of social activity and network size in better cognitive functioning in late life [8].

Regarding the linear regressions, no significant associations were found between global cognitive functioning, as measured by the MoCA, and the different indices of social connectedness. This result suggests that general cognitive performance may be relatively unaffected by variations in social integration within a cognitively healthy population. Similar results are found on Chinese community-dwelling older adults, where the negative association between MoCA performance and UCLA-LS scores occurred only when moderated by depressive symptoms [34]. Furthermore, a retrospective study on a large American sample highlighted the negative effects of persistent loneliness on MoCA scores, while no effect was yielded for incidental and transient loneliness [31]. Our study design does not allow for the investigation of moderator effects of mood or stratification for loneliness types, as mood was only briefly assessed in Experiment 2, and loneliness repeated measures were not included.

However, as a broad cognitive screening tool, MoCA may not be sufficiently sensitive to detect subtle, domain-specific effects of social connectedness. For this purpose, associative memory and social cognition were also investigated. In Experiment 1, individuals living with two or more people performed better in DFR of the ItFNAT. However, this effect did not persist in categorical analyses. These findings suggest that cohabitation and the consequent increase in social and cognitive stimulation may represent a facilitator rather than a causal factor in promoting more efficient face-name association recall, possibly benefiting more from the quality and emotional significance of interpersonal relationships. In Experiment 2, cognitive status (i.e., group) emerged as the main determinant of memory performance, while living arrangement no longer played a significant role, confirming that social engagement's protective influence on memory may be attenuated once pathological decline becomes evident. Although there are no previous direct investigations of the effect of cohabitation on this specific task, studies testing associative memory through the Face-Name Associative Exam (FNAME) paradigm, argued that face-name associations, involving the pairing of two abstract and unique pieces of information, require extensive use of episodic memory [54,55]. Hence, it is possible to compare our results with those reported by Mousavi-Nasab et al. [56], who found that marital status also significantly affects episodic memory. Specifically, married people performed better on episodic memory tasks than unmarried or widowed people, both in recall and recognition. These results support the hypothesis that a stimulating social environment and the quality of relationships reduce cognitive and memory decline.

Social cognition, as assessed by the SET, showed the strongest and most consistent association with social connectedness in Experiment 1. Participants with larger social networks demonstrated better social cognition performance, echoing evidence that broader social networks are associated with larger prefrontal volumes, thereby supporting social cognition brain networks and enhancing mentalizing abilities [57,58]. Living with two or more people was also linked to better social cognition abilities, while widowhood predicted poorer outcomes. However, after controlling social network size, the only effect that survived in the ANCOVA was marital status, indicating that the association with social cognition is not reducible to the breadth of one's network alone, while living arrangement does not exert an additional effect once these factors are controlled. Particularly widowed individuals showed worst social cognitive abilities compared with single and divorced peers, but not compared with married ones, despite the observed yet non-significant difference. This pattern may reflect genuine interindividual differences and

statistical factors, as the married group was overrepresented in our sample compared with the widow group. This aligns with the epidemiological evidence that marital status is a possible correlate of cognitive outcomes, with widowed typically showing worst cognitive performance and higher dementia risk than their non-widowed peers [59-62]. These results suggest that both the quantity and emotional quality of social relationships are key to preserving social-cognitive functioning, likely through sustained opportunities for empathy, perspective-taking, and emotional exchange. The loss of emotionally close relationships may negatively affect social-cognitive abilities, possibly through reduced opportunities for emotional resonance and perspective-taking. Conversely, the lack of significant effects in Experiment 2 indicates that in older adults, these social-cognitive benefits may diminish or be masked by broader physiological and pathological cognitive decline.

While loneliness did not affect objective cognitive outcomes, a robust association emerged with subjective perceptions of cognitive decline. In Experiment 1, higher loneliness scores were strongly related to greater self-reported cognitive difficulties, suggesting that loneliness primarily influences the subjective experience of cognitive functioning rather than objective performance. The observed result differs from those for objective cognition: while specific cognitive functions such as associative memory or social cognition are more sensitive to objective measures of social connectedness (i.e., marital status, living arrangements, and social networks) [8,63], subjective cognitive impairment seems to be particularly influenced by subjective dimensions of social contact, such as perceived loneliness.

However, both subjective cognitive decline and loneliness are strongly modulated by affective status. For this reason, Experiment 2 included also a measure of Anxiety and Depression, confirmed to significantly correlate with the loneliness measure. By introducing these two covariates in the linear regression, it was possible to attest that depressive symptoms are the principal predictor of SCD. These findings support the view that loneliness may heighten self-awareness of cognitive changes through increased emotional distress, attentional bias toward internal states, or depressive symptomatology, rather than directly impairing cognitive performance [64]. This interpretation is consistent with evidence indicating that subjective cognitive decline is strongly influenced by affective factors, with depressive symptoms playing a central role in shaping how individuals perceive and report cognitive changes [65,66]. In this framework, perceived social isolation may amplify concerns about cognitive functioning by increasing emotional vulnerability and self-focused monitoring, leading individuals to interpret normal cognitive lapses as signs of decline.

Conclusion

Overall, the present findings highlight the multifaceted relationship between social connectedness and cognitive functioning. Particularly, although correlated, objective connectedness (e.g., social network size, marital status, and living arrangement) affects socio-cognitive abilities, while loneliness, affected more by depressive symptoms rather than social network size, impacts self-reported cognitive difficulties. This double dissociation should be considered when investigating social connectedness as a modifiable risk factor of cognitive decline.

Global cognitive functioning appears not to be influenced by social connectedness. Variations in the quantity and quality of social relationships selectively influence abilities that rely on socio-emotional engagement and associative processing rather than on global cognition, suggesting that social stimulation may contribute to cognitive resilience before the onset of decline. Conversely, in older individuals showing both healthy and pathological aging, the impact of social factors appears attenuated, possibly because neurodegenerative processes overshadow the compensatory benefits of social interaction. Furthermore, depressive symptoms predict self-reported cognitive complaints, regardless of the actual cognitive performance. This pattern confirms the role of mood and SCD as risk factors for cognitive impairment and dementia [1,67,68], supporting a successful aging framework that emphasizes affective and social assets.

Our study is not without limitations: particularly, our sample includes Italian participants only, hence its generalizability should be confirmed by further studies in other countries. A further limitation concerns the absence of longitudinal or retrospective measures of loneliness or social network, leading to an interpretation of results grounded in a static representation of the interaction between one's social connectedness and cognitive functioning. Moreover, the assessment of social networks does not capture qualitative aspects, such as relationship strength, perceived support, reciprocity, or relational dynamics. Finally, although those having a history of traumatic brain injury, stroke, and psychiatric disorders were excluded, the etiology of the Neurocognitive Disorder was not available, as participants in Experiment 2 were assigned to the CI group only through neuropsychological diagnosis.

From a clinical and preventive standpoint, these results underscore the importance of early interventions aimed at strengthening both the structural and emotional aspects of social connectedness, such as promoting opportunities for meaningful social participation, maintaining intimate relationships, and reducing loneliness and affective symptoms, to support cognitive health across adulthood and into old age.

Declarations

CRedit

G.F.S.: Conceptualization, Data Curation; Formal Analysis; Investigation; Methodology; Software; Visualization; Writing – original draft. **V.M.:** Conceptualization; Data Curation; Formal Analysis; Investigation; Methodology; Project Administration; Software; Visualization; Supervision; Writing – original draft. **E.C., D.G. & A.B.:** Investigation; Writing – review & editing; **P.T.:** Supervision; Project Administration; Writing – review & editing.

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Conflict of Interest Statement

The authors declare that this research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability Statement

The data supporting the results of this study are not publicly available due to privacy and participant protection considerations. However, data can be requested from the corresponding author (Giorgia Francesca Scaramuzzi, g.scaramuzzi6@phd.uniba.it) and access will be granted upon approval, in accordance with applicable ethical and legal standards.

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Figures

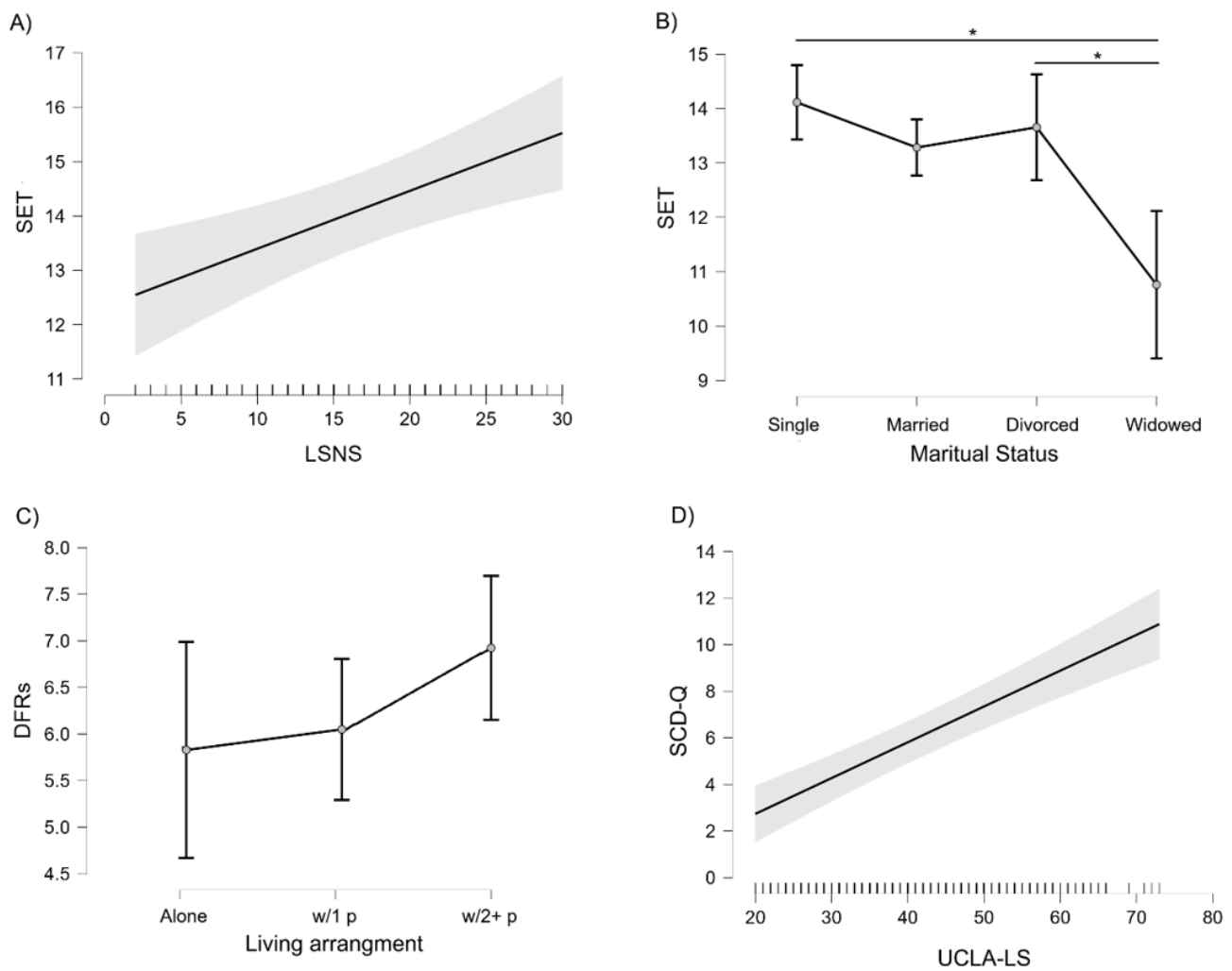


Figure 1

Marginal effect plots ($\pm 95\%$ CI) showing: A) Positive association between Story-based Empathy Task (SET) score adjusted according to Dodich et al. (2015) and Lubben Social Network Scale (LSNS) score; B) Association Between SET total score and Marital Status (indicate significant comparisons); C) Association between Italian Face-Name Association Test Delayed Free Recall (ItFNAT DFRs) score adjusted according to Manippa et al. (2025) and Living Arrangements; D) Positive association between Subjective Cognitive Decline Questionnaire (SCD-Q) scores and UCLA Loneliness Scale (UCLA-LS) scores.*

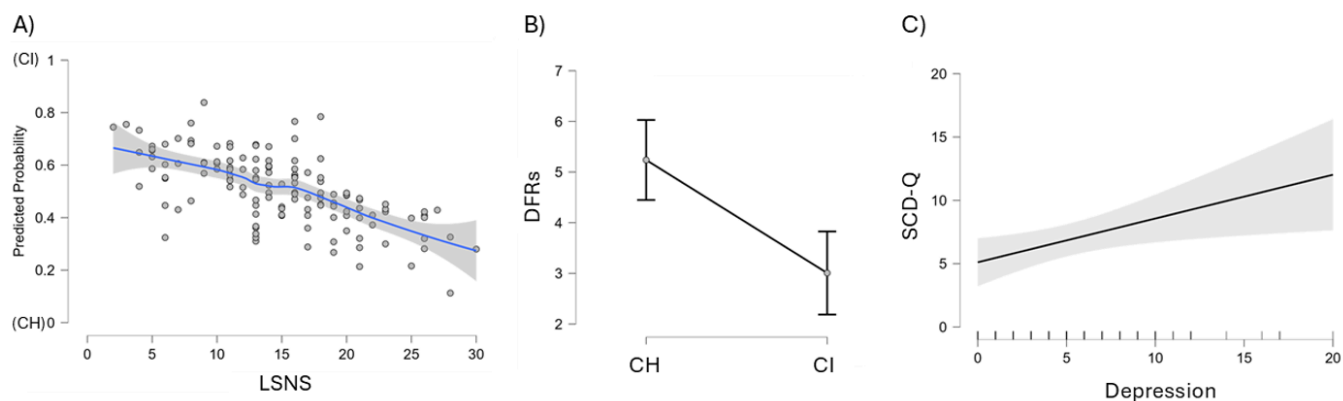


Figure 2

Effect plots ($\pm 95\%$ CI) showing: A) predicted probabilities from a logistic regression model showing the effects of LSNS on group membership (cognitively healthy, CH=0; cognitively impaired, CI=1); B) Association between Italian Face-Name Association Test Delayed Free Recall (DFRs) score adjusted according to Manippa et al. (2025) and Group (CH vs. CI); C) Positive association between Subjective Cognitive Decline Questionnaire (SCD-Q) scores and Hospital Anxiety-Depression Scale Depression score.

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