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Cognitive functioning and quality of life:

Diverging views of older adults with Alzheimer and professional care staff

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Abstract

Objective: Staff-ratings of quality of life (QoL) in dementia are often lower and more strongly related to the cognitive functioning of the person with dementia than self-ratings. However, cognition-related items in QoL measures and limited cognitive screening measures hamper a clear understanding of the relationship; two issues we addressed in the current study.

Methods: We collected data of 88 pairs of older adults with Alzheimer's disease and their professional caregivers in 9 residential care settings. Both self-report and staff-report of the QoL of residents was assessed with the QOL-AD. Cognitive functioning was assessed with the MMSE and a battery of specific cognitive measures.

Results: Intra-class correlations and a paired-sample t-test confirmed a discrepancy between self and staff-ratings, with staff significantly underestimating QoL as experienced by the resident. After removing the possibly confounding memory-item of the QOL-AD, MMSE score remained a significant predictor of staff-ratings but not self-ratings in regression analyses. Exploratory analyses of specific cognitive measures showed a significant contribution of a memory test of intentional visual association learning in the prediction of staff-rated QoL.

Conclusions: Staff-reports cannot simply substitute reports of the subjective experience of residents with Alzheimer, so both judgements should be taken into account to form an adequate picture of QoL. Staff might be guided more strongly by a cognitive point of view when evaluating QoL of residents with Alzheimer's disease, while the latter might have shifted their evaluation standards to cope adequately with the challenges posed by their disease.

Keywords: Quality of life, Alzheimer, cognitive functioning, residential care, staff-report

Key points:

- Residents with Alzheimer and staff differ in their views of quality of life of the resident, with staff giving a more negative evaluation.
- Staff-report is related to cognition of the resident while self-report is not.
- Including more specific cognitive measures can add to the understanding of these differing associations. Exploratory analyses showed that, in our sample, staff-report

was associated with performance on a visual association memory task, under intentional learning instructions.

- Staff may use different evaluation standards for QoL and should be aware of their potentially more cognitively informed frameworks, which might deflect from the subjective experience of people with dementia.

Introduction

According to recent estimates, the worldwide incidence of dementia today amounts to roughly one new case every three seconds.¹ Given this staggering growth and the fact that a cure is not within close reach, efforts are increasingly targeted at finding ways to maintain and improve well-being of individuals confronted with dementia. In clinical research and practice, *quality of life* (QoL), has gained recognition as a useful indicator of well-being. According to the World Health Organization,² QoL can be described as “individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (p. 1405).

Assessing QoL in individuals with dementia is, however, not an unequivocal matter. A highly debated issue is who is best fit to make the QoL evaluation: the individual with dementia or a proxy-rater.³ A recurrent finding is that people with dementia rate their own QoL higher than others do. This discrepancy seems persistent and has been found when proxy-raters are professional caregivers from residential settings⁴⁻⁶ as well as when proxy-raters are family caregivers of individuals with dementia living in the community⁷⁻¹² or living in residential settings,¹³⁻¹⁵ and this as well in Western as in non-Western cultures.¹⁶⁻¹⁸

While recent years have seen an evolution towards greater appreciation of the opinion of individuals with dementia themselves, many researchers and clinicians still predominantly rely on proxy-ratings when evaluating QoL in dementia.¹⁹ Underlying this decision seem to be concerns about the ability of individuals with dementia to make valid and reliable self-evaluations due to their deficits and reduced awareness thereof.^{9,20} On the other hand, studies suggest that individuals with dementia are often able to reliably report on their QoL.^{3,21,22} Moreover, proxy-ratings have been linked to characteristics of the proxy rather than the person with dementia, such as caregiver burden,^{11,12} depression,^{12,23} stress, and health.²⁴

QoL and cognitive functioning

Caregivers might make a more negative evaluation of the QoL of people with dementia because of a more deficit-driven point of view, resulting in an underestimation of QoL as experienced by the person with dementia.¹⁹ Accordingly, proxy ratings might be more influenced by a cognitive mindset.

Clustering three recent systematic reviews of factors associated with QoL in dementia, the majority of the studies that included cognition reported a significant association with proxy-ratings.²⁵⁻²⁷ For some studies, the association was found bivariately but disappeared in

multivariate analyses.^{7,27} One additional study comparing different measures of QoL found no associations with cognition.²⁸ Importantly, none of the studies reported an association between self-reported QoL and cognition, though longitudinal assessments have generated more mixed results. One found that deteriorating cognition predicted decreases in self-reported QoL.²⁹ In contrast, another study showed some evidence that declines in episodic memory were associated with stable or increased QoL, though most changes in cognition were unrelated to changes in QoL.³⁰ A third study found that decreases in QoL were predicted by better cognition at baseline.³¹ A cognitive stimulation intervention study, finally, found that even though baseline QoL was unrelated to cognition, improvement in cognitive functioning did predict improvement in QoL.³² Some of the inconsistent findings might be due to heterogeneity in approaches and populations across different studies.^{20,27} In this study, we aim to, at least partly, clarify this inconsistency in results by addressing two measurement issues that might cloud our current understanding of the relationship between QoL and cognition.

First, a closer look at different measures of QoL reveals that some include cognition-related items. Of course, this might give problems of confounding when investigating the relation with cognitive functioning, inflating the association.

Second, most studies up to now rely on cognitive screening, predominately the Mini-Mental State Examination (MMSE)³³. However, cognitive functioning is a complex phenomenon, and some aspects might be more important in the relation with QoL than others.³⁴ A closer examination of which elements of cognition are related to QoL assessments might provide two important insights. First, it can shed more light on the underlying framework individuals rely on when making QoL judgments. Second, it may provide a better indication of possible mediators in the relation between cognition and QoL.

One study on QoL that included specific cognitive measures found no relation between specific cognitive measures and QoL scores (self or proxy) in a group with mild cognitive impairment. In a group with normal cognition, executive functioning was significantly predictive of proxy-ratings but not self-ratings.³⁵ A recent study in community dwelling older adults with mild to moderate dementia, found that self-reported QoL was unrelated to specific cognitive domains.³⁶ For carer-reported QoL, results were inconsistent. At two assessments with an 18-months interval, carer-reported QoL showed some relation with executive functioning and information processing speed but the relationship disappeared after adjustment for control variables. For the subgroup that dropped out at follow-up, carer-

reported QoL was related to episodic memory at baseline, but there was no relation in the total sample at baseline or follow-up.

The current study

One of the most widely used QoL measures in dementia, the Quality of life in Alzheimer's disease (QOL-AD),⁸ contains an item asking individuals to rate '*memory*'. First, we will reexamine the association between the QOL-AD and cognition after excluding the possibly confounding memory-item. Second, we will explore the association between QoL and specific cognitive measures. As the empirical findings regarding specific cognitive domains up to now are limited and inconsistent, these analyses are largely exploratory. Some tentative hypotheses might be that verbal skills are weighted more in the proxy-evaluations, that executive functioning is related to the proxy-ratings because of its negative impact on activities of daily living,^{36,37} or that memory functions are deemed important because of their impact on a coherent life narrative.^{38,39}

In contrast to Bosboom and colleagues,³⁶ we focus on older adults with Alzheimer's disease (AD) in *residential care*. Previous research has indicated that QoL might be lower in residential settings compared with the home environment.^{13,25} Furthermore, the role of cognition in QoL might be more evident in residential settings than in the community, since individuals with larger cognitive challenges are more likely to live in residential care.²⁵ Given the challenges that many settings face in balancing work pressure and optimizing residents' well-being, research in this area is important to foster continuing progress in care practices.

Methods

Sample

Participants were a convenience sample recruited from residential care settings in Flanders. Settings were contacted with information about the study. Nine agreed to participate and provided a list of potential participants. Inclusion criteria for the residents were having a diagnosis of probable Alzheimer's disease (AD), being older than 65, speaking Dutch, and not having a severe hearing or speech impairment. We did not adopt a lower limit of MMSE score, potentially including all stages of dementia, as long as the resident could be addressed adequately. A total number of 138 residents were interviewed and for 99 residents, staff filled in proxy-reports. For eight of these 99 residents, no self-report of QoL was available, because only part of the questionnaire was completed (due to differing circumstances). For three other residents, no QoL scale-score was calculated due to missing items. We selected data for which the QoL score was available from both the resident and a staff member, to be able to

make a clean comparison, leading to 88 resident-staff pairs. These pairs came from seven residential settings: three small-scaled, homelike (“normalized”) settings and four traditional, larger scale nursing homes.

Procedure

Data were collected from November 2016 to March 2017 as part of the first wave of an ongoing longitudinal project on well-being and meaning in AD. Potential participants were visited in their private rooms, by the first author or a psychology research trainee, who both had had previous experience interviewing older adults in care homes. After providing comprehensive information on the study, written informed consent was obtained. The questionnaires were administered to the residents in the form of a structured interview. Throughout the interview, the researchers remained sensitive to any signs of distress. Questionnaires for staff members were left at the setting and picked up when completed. The study was approved by the social and societal ethics committee of KU Leuven.

Measures

Quality of life. Self and staff-reported QoL was measured using the Quality of life in Alzheimer's disease (QOL-AD).⁸ We obtained a Flemish (i.e., Belgian Dutch) translation from the official distributor (Mapi Research Trust). This instrument has been shown to have good validity, reliability, and internal consistency, in mild to severe dementia.^{3,21,22} Thirteen items that tap into different life domains are scored on a scale from one (poor) to 4 (excellent). As mentioned, we removed the memory-item from our analyses, resulting in a 12-item version of the QOL-AD (range 0-48) Cronbach's alpha was .75 for self-report and .77 for staff-report.

Cognitive functioning. The Dutch translation of the Mini-Mental State Examination (MMSE) was used as a cognitive screening measure.^{33,40} This is a widely used, 11-item instrument, with higher scores indicating better cognitive capacities (0-30).

Specific cognitive functions were tested with a battery of neuropsychological tests. The Visual Association Test (VAT),⁴¹ a memory test of visual association learning, was used to measure *immediate visual recall*. It consists of six cards with two interacting objects and six cue cards, where one of the objects is missing, which the participant has to recall. In a first, incidental learning round (VAT1; 0-6), no instruction to try and memorize the items was provided. In a second, intentional learning round (VAT2; 0-6), participants were instructed to try and memorize the items. To test *working memory* we used the Digit Span Backward (DSB; 0-8), a subtest of the Dutch version of the Wechsler Adult Intelligence Scale-Fourth

Edition (WAIS-IV-NL).^{42,43} A semantic word fluency test (WFT) where participants had to produce as many animals as possible in one minute was used as an indication of *executive functioning*. A 15-item version of the Boston Naming test (BNT; 0-15)^{44,45} was used to examine participants' ability to name objects when shown a drawn image. Set B of Raven's Coloured Progressive Matrices (RCPM; 0-12)⁴⁶ was used to examine *abstract reasoning*. *Auditory word comprehension* was assessed using the Dutch version of the Auditory Word Comprehension subtask of the Aachen Aphasia Test (AAT; 0-48).^{47,48}

Statistical analyses

Analyses were performed in SPSS 24. Bivariate correlational analyses were calculated and a MANOVA assessed potential sex differences. Two-way mixed-model single measures intra-class correlations and a paired sample t-test were calculated to compare self and staff-reports of QoL. Four hierarchical regression analyses examined the predictive value of the MMSE and of specific cognitive measures on two QoL outcome variables (self-report and staff-report). In the first step, relevant control variables as identified in the preliminary analyses were entered. In the second step, the relevant predictors (MMSE or the cognitive measures) were entered. Tolerance statistics were calculated to check for multicollinearity.

Results

Preliminary analyses

Resident characteristics, staff position and descriptive statistics can be found in Table 1. Correlations between the variables are displayed in Table 2. Correlations among the specific cognitive measures ranged from .162 to .742, demonstrating that they are related but differentiate between different functions. QOL-AD self and staff-report were significantly correlated, but only staff-report had a significant correlation with the MMSE. WFT, RCPM, and AAT correlated significantly with QOL-AD self-report, with weak correlation sizes. VAT2, WFT, BNT, RCPM, and AAT correlated significantly with QOL-AD staff-report, with weak to moderate correlation sizes.

Additional correlations (not in the table) were calculated between the memory-item of the QOL-AD and the cognitive measures. All but one (BNT) of these correlations were significant, with values ranging from .248 to .470, showing that the exclusion of the item from the analyses is justified.

In line with previous empirical findings,²⁷ correlational analysis showed no significant relation between QoL and participant age. Furthermore, there were no significant correlations

between participant age and any of the cognitive measures. As such, age was not included as predictor in the regressions. MANOVA showed significant differences between male and female participants (Wilks' Lambda = .675, $F(7, 67) = 4.604$, $p < .001$), with men scoring higher on the BNT ($M = 8$, $SD = 3.16$) than women ($M = 6.38$, $SD = 2.84$), $F(1, 74) = 5.831$, $p = .018$. Therefore, sex was included as control in the regressions.

Comparison between quality of life self and staff-reports

Two-way mixed-model single measures intra-class correlations (ICC's) for both consistency and absolute agreement were calculated to compare self and staff-reports of QoL. The ICC was .295 (95% CI = [.092 - .474]) for consistency and .140 (95% CI = [-.073 - .358]) for absolute agreement, indicating medium to low agreement. A paired sample t-test indicated that mean self-report ($M = 34.71$, $SD = 3.76$) was significantly higher than mean staff-report ($M = 28.41$, $SD = 4.66$), $t(87) = 11.762$, $p < .001$, Hedges' $g_{av} = 1.48$.⁴⁹

Regression analyses

To examine the contribution of cognitive measures in the prediction of QoL ratings by residents and staff, four hierarchical regression analyses were performed. In a first series, predicting respectively self-report and staff-report of QoL, sex was entered in step 1 and the MMSE was entered in step 2. In a second series, predicting respectively self-report and staff-report of QoL, sex was entered in step 1 and the specific cognitive measures were entered in step 2. Multicollinearity statistics showed acceptable tolerance between the cognitive measures (between 0.35 and 0.67), signifying that they could be included simultaneously as predictors.

Table 3 displays the results for the regressions examining the predictive value of the MMSE. Sex was not a significant predictor of either of the outcome variables (self-report: $F = 0.252$, $p = .617$, $R^2 = 0.003$; staff-report: $F = 0.077$, $p = .782$, $R^2 = .001$). When the MMSE was entered in Step 2, this did not add to the prediction of the QOL-AD self-report, $F = 1.961$, $p = .147$, $R^2 = .046$, $\Delta R^2 = .043$, $p = .059$. In contrast, the model with the MMSE added in Step 2 was significantly predictive of the QOL-AD staff-report, $F = 4.612$, $p = .013$, $R^2 = .101$, $\Delta R^2 = .100$, $p = .003$.

Table 4 displays the results for the regressions examining the predictive value of the specific cognitive measures. As in the previous set of regressions, sex was not a significant predictor of the outcome variables. Entering the specific cognitive measures in Step 2 did not add to the prediction of QOL-AD self-report, $F = 1.217$, $p = .303$, $\Delta R^2 = .128$, $p = .228$. In

contrast, the cognitive measures contributed significantly to the prediction of QOL-AD staff-report, $F = 2.128$, $p = .045$, $\Delta R^2 = .205$, $p = .028$. This effect was attributable to VAT2 (Table 4).

Discussion

Is cognitive functioning relevant to quality of life (QoL) in dementia? According to our results, and in line with previous findings, the answer appears to be: it depends on who you're asking. Most empirical studies on QoL in dementia up to now only indirectly touched upon this issue. They relied predominantly on cognitive screening measures and did not consider that many QoL measures contain items related to cognition.

In this study, we removed the memory-item of the QOL-AD and reexamined the association with cognition, by means of screening as well as a more elaborated assessment of different functions, without this confounding factor. Still, we found a clear predictive value of the MMSE score on staff-reported QoL, but not on self-reported QoL. When more specific cognitive functions were examined, multivariate analyses revealed no significant associations between cognition and self-reported QoL, as in previous findings.^{35,36}

For staff-rated QoL, the second learning round of an episodic memory task, the Visual Association Test (VAT2), significantly contributed to the prediction. The VAT is an immediate recall test of association learning. Previous research suggests that associative memory in particular might decline in old age, as compared with memory for single pieces of information.⁵⁰ Furthermore, the second learning round of the VAT is differentiated from the first by intentional learning instructions. Importantly, the age-related difficulties in associative memory have been shown in intentional learning but not incidental learning.⁵⁰ Under intentional learning instructions, participants are triggered to use explicit information-processing strategies to encode and retrieve information, which becomes more challenging in old age.^{50,51} Adults with Alzheimer will have even more difficulties in exercising the cognitive control needed to employ the appropriate strategies. In our sample, such difficulties seemed negatively linked to QoL-ratings by caregivers. One explanation of this link might be through the negative impact of these memory problems on coherently associating aspects of one's life, which might be deemed important by proxies in shaping a truthful and meaningful life story.

Bosboom and colleagues also found some evidence for a link between proxy-reported QoL and episodic memory, in a sub-sample that dropped out at follow-up. The authors reason that proxies' perspective on cognitive domains in QoL might change during the course of AD: "it is conceivable that carers view the ability to organize a meal or to communicate with ease his/her experiences and desires to others as more important to the QOL of the person with AD than memory lapses, but this view might change over time." (p. 283).³⁶ Indeed, as dementia progresses, executive functioning-related tasks are likely taken over by carers, while memory problems become more severe and might have a larger impact on QoL-ratings. Accordingly, our sample also included participant in more advanced stages.

Different underlying frameworks

The recurring finding that proxy-reports are more often than not related to cognition while self-reports are almost never, holds true in our study. How can this difference be explained? Some authors point to anosognosia in people with dementia as a reason for their higher scores and for not taking into account their (cognitive) disabilities when evaluating QoL. There is some evidence that anosognosia is indeed associated with QoL ratings in dementia^{9,10} and that impaired insight might compromise the reliability of self-reported QoL.⁵²

On the other hand, others found no significant association between insight (or lack thereof) and self-reported QoL in AD.⁷ Furthermore, proxies cannot take into account the non-observable factors that co-determine the subjective world of the person with dementia to a considerable extent.⁵³ Instead, proxies might project some of their own feelings, values, expectations onto the person with dementia, relying on a different set of evaluation standards.¹⁷ In current *hypercognitive* society,⁵⁴ cognitive abilities might be overvalued as an important part of QoL by external evaluators who reason from a predominantly cognitive framework, while people with dementia themselves might have adapted to their capacities, and shifted their evaluation criteria, consciously or not.⁷ Of course, this does not mean that cognitive functioning is of no importance to adults with dementia themselves, as suggested by the more complex longitudinal relations found between cognition and self-reported QoL.²⁹⁻

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Accordingly, there is no compelling argument to prefer proxy-ratings as an indication for the experience of people with dementia, who "know better than anyone else just what it is like to be them" (p. 202).³ Indeed, individuals with dementia tend to make more "feeling-centered assessments," maintaining insight in their mood, despite lack of insight into

cognitive deficits.¹¹ Relying predominantly on proxy-reports might not only be sub-optimal but actually harmful when this means that treatment and care are not in line with the needs and wishes of the person with dementia.⁷ On the other hand, proxies can provide indispensable information on symptoms and difficulties. Therefore, an integrative approach, in which self-reports are taken seriously and complemented with important information by proxies, seems most recommended to optimize care.

Limitations

First, the sample was not randomly selected and relatively small, possibly limiting the generalizability and power. Moreover, for reasons of inclusiveness, we did not exclude residents with very low MMSE scores, but the possibility cannot be ruled out that residents in more advanced stages of dementia lacked the capacities to assess their QoL. Third, we did not control for (instrumental) activities of daily living or neuropsychiatric symptoms. Previous research suggests that these factors are associated with both cognition and QoL,^{7,27} but it remains unclear how they relate to each other precisely. Future research could test more complex models of how these variables are interrelated and implement longitudinal designs to allow for more firm conclusions. Fourth, residents were assessed during a structured interview, while staff filled in the questionnaire independently. These different assessment formats are not ideal for comparison. Finally, the results with regard to the specific cognitive functions will need replication to gain more evidential value as these were largely exploratory.

Conclusion

Both quality of life (QoL) and cognitive functioning in dementia are complex concepts which cannot be approached straightforwardly. Persons surrounding those with dementia should be aware of their potentially more cognitively oriented framework when asked to give a judgment on the QoL of a person with dementia. Different perspectives should be taken into account to create a full picture of QoL, without overlooking the voice of the individual with dementia. Researchers as well as practitioners can build on current results to move towards a better mutual understanding that respects differing views and their underlying motivations.

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Table 1

Resident demographic information, staff member position and descriptive statistics of cognitive functioning and quality of life ratings

Variable		Mean (SD)	n (%)	Range
Resident	Age (n = 88)	85.47 (6.03)		
	Sex (n = 88)			
	Male		19 (21.6)	
	Female		69 (78.4)	
	Civil state (n = 84)			
	Single		10 (11.9)	
	Married		15 (17.9)	
	Cohabiting		1 (1.2)	
	Widowed		56 (66.7)	
	Divorced		2 (2.4)	
	Missing		4	
	Degree of education (n = 57)			
	Primary education		1 (1.8)	
	Lower secondary education		16 (28.1)	
	Upper secondary education		30 (52.6)	
	Higher education		10 (17.5)	

	Missing	31	
	MMSE (<i>n</i> = 85)	15.99 (5.73)	0 – 27
	Cognitive measures		
	VAT1 (<i>n</i> = 85)	.73 (1.36)	0 – 6
	VAT2 (<i>n</i> = 84)	1.18 (1.70)	0 – 6
	DSB (<i>n</i> = 85)	2.60 (1.20)	0 – 5
	WFT (<i>n</i> = 85)	7.88 (4.72)	0 – 21
	BNT (<i>n</i> = 84)	6.75 (2.98)	0 – 13
	RCPM (<i>n</i> = 77)	4.12 (2.28)	0 – 10
	AAT (<i>n</i> = 83)	18.34 (5.02)	7 – 28
	QOL-AD self-report (<i>n</i> = 88)	34.71 (3.76)	24 – 43
Staff	Staff member position (<i>n</i> = 80)		
	Nursing assistant	34 (42.5)	
	Nurse	31 (38.8)	
	Psychologist	8 (10)	
	Occupational therapist	6 (7.5)	
	Care coordinator	1 (1.3)	
	Missing	8	
	QOL-AD staff-report	28.41 (4.66)	20 – 37

Note. Where $n < 88$, the difference between 88 and n is missing data. Percentages are valid percentages (missings not included). QOL-AD = Quality of life in Alzheimer's disease; MMSE = Mini-Mental State Examination; VAT = Visual Association Test; DSB = Digit Span Backwards; WFT = Word Fluency Test; BNT = Boston Naming Test; RCPM = Raven's Colored Progressive Matrices; AAT = Aachener Aphasia Test (Auditory Word Comprehension subtask).

Table 2

Bivariate Pearson correlations between QoL scores, cognitive screening and specific cognitive measures

	1	2	3	4	5	6	7	8	9	10
QOL-AD										
Self (1)	1									
Staff (2)	.297**	1								
MMSE (3)	.210	.313**	1							
Cognitive measures										
VAT1 (4)	.094	.187	.446***	1						
VAT2 (5)	.184	.378**	.605***	.742***	1					
DSB (6)	.182	.201	.454***	.162	.361**	1				
WFT (7)	.266*	.241*	.742***	.270*	.463***	.490***	1			
BNT (8)	.164	.319**	.675***	.376**	.434***	.448***	.498***	1		
RCPM (9)	.264*	.289*	.603***	.306**	.409***	.334**	.509***	.613***	1	
AAT (10)	.286*	.296**	.605***	.258*	.382**	.288*	.468***	.625***	.520***	1

Note. Correlations with QOL-AD and MMSE: $n = 85$; correlations with cognitive measures: $n = 75$. QOL-AD = Quality of life in Alzheimer's disease; MMSE = Mini-Mental State Examination; VAT = Visual Association Test; DSB = Digit Span Backwards; WFT = Word Fluency Test; BNT = Boston Naming Test; RCPM = Raven's Colored Progressive Matrices; AAT = Aachener Aphasia Test (Auditory Word Comprehension subtask).

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

Table 3

Stepwise regressions of sex and MMSE predicting self-rated and staff-rated QoL

	QOL-AD self-report						QOL-AD staff-report					
	Step 1			Step 2			Step 1			Step 2		
	β	p	ΔR^2	β	p	ΔR^2	β	p	ΔR^2	β	p	ΔR^2
Sex	.055	.617		.038	.728		-.030	.782		-.057	.590	
MMSE	-	-		.207	.059		-	-		.318**	.003	
			.003			.043			.001			.100**

Note. $n = 85$. QOL-AD = Quality of life in Alzheimer's disease; MMSE = Mini-Mental State Examination.

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

Table 4

Stepwise regressions of sex and cognitive measures predicting self-rated and proxy-rated QoL

	QOL-AD self-report						QOL-AD staff-report					
	Step 1			Step 2			Step 1			Step 2		
	β	p	ΔR^2	β	p	ΔR^2	β	p	ΔR^2	β	p	ΔR^2
Sex	.032	.788		.020	.886		-.014	.902		-.004	.978	
VAT1	-	-		-.027	.879		-	-		-.231	.178	
VAT2	-	-		.044	.825		-	-		.455*	.019	
DSB	-	-		.079	.593		-	-		-.015	.912	
WFT	-	-		.106	.529		-	-		-.044	.783	
BNT	-	-		-.168	.367		-	-		.140	.430	
RCPM	-	-		.160	.307		-	-		.074	.621	
AAT	-	-		.299	.148		-	-		.081	.589	
			.001			.128			.000			.205*

Note. $n = 75$. QOL-AD = Quality of life in Alzheimer's disease; VAT = Visual Association Test; DSB = Digit Span Backwards; WFT = Word Fluency Test; BNT = Boston Naming Test; RCPM = Raven's Colored Progressive Matrices; AAT = Aachen Aphasia Test (Auditory Word Comprehension subtask).

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