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Validation of the Italian version of the Apathy Evaluation Scale (AES-I) in institutionalized geriatric patients

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Abstract

Objectives. Apathy is a very common symptom in the institutionalized elderly and represents a condition of both clinical and public health importance. The Apathy Evaluation Scale (AES) has been shown to be a valid and reliable tool for characterizing, quantifying and differentiating apathy in various health conditions. The aims of this study were to establish the validity and reliability of the Italian version of the AES, and to assess the severity of apathy in a sample of Italian institutionalized geriatric patients.

Method. Data were collected from clinical interviews using the AES informant version (AES-I). Associations between measures of apathy and depression, cognitive functioning and perceived quality of life were evaluated, as well as the effects of the living environment on apathetic symptoms.

Results. Multiple forms of reliability and validity (*i.e.* test-retest, internal consistency, discriminability of apathy rating from a standard measure of depression) were satisfied. Our results also show that the characteristics of the care setting may affect the severity of apathetic symptoms.

Conclusions. The AES-I Italian version is a reliable and valid instrument for measuring apathy in Italian patients, also allowing a direct comparison with data gathered in other countries.

Key words

- apathy
- cognition
- depression
- institutionalization
- quality of life

INTRODUCTION

Apathy has been defined as a syndrome characterized by lack of motivation, evidenced by diminished self-initiated actions as well as emotional indifference not attributable to intellectual impairment, diminished level of consciousness, or emotional distress [1, 2].

Apathy may also be a symptom of some other neurological or psychiatric syndromes, such as Alzheimer's disease, Parkinson's disease, traumatic brain injury, major depression, and schizophrenia/schizoaffective disorders, especially in the aging population [3-5].

Both definitions of apathy, either as a syndrome or symptom, indicate in the lack of motivation the primary feature: apathetic individuals are characterized by a quantitative reduction of self-generated voluntary and purposeful behaviours and by the absence of responsiveness to a stimulus, demonstrated by a lack of self-initiated actions [5, 6]. Apathy is considered a health condition of clinical and public health importance, since it may contribute to both increased burden and distress in caregivers and health resource utilization by patients [7-9]. In fact, apathetic individuals have been found to have lower motivation for rehabilitation, poorer levels of functioning and treatment outcomes compared to non-apathetic individuals, as shown in elderly individuals recovering from a disabling event, such as traumatic brain injuries, and in patients with schizophrenia [10-12].

Apathy may thus represent a critical issue in countries, like Italy, with increasing aging population and with a substantial number of institutionalized individuals [13, 14]. In fact, depression and apathy are almost ubiquitous symptoms in nursing home patients, suggesting that either severity of disease or that the context of the chronic

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care setting (*e.g.* possible lack of stimulation) contribute to the manifestation of apathetic symptoms with a profound impact in patients' quality of life [15-17].

One of the most commonly used apathy measures is the Apathy Evaluation Scale (AES), developed by Marin *et al.* [2] to address the lack of appropriate tools to assess apathy. The AES uses multiple rater sources: clinician, informant and self-rated versions (AES-C, AES-I and AES-S respectively) and has been shown to be a valid and reliable tool for characterizing, quantifying and differentiating apathy in various health conditions [18, 19]. Non-English versions were also evaluated and have shown good reliability and validity (*e.g.* German version [20], Taiwanese version [21]).

Despite the large number of institutionalized elderly in Italy and notwithstanding the profound effect that apathy may have on patients functioning and caregiver burden, to date the validity and reliability of the Italian version of the AES has never been examined and, to our knowledge, very few studies have been conducted to evaluate apathy in the Italian population [22]. Hence main aims of the present study were: 1) to establish the validity and reliability of the Italian version of the AES-I (*i.e.* test-retest, internal consistency, convergent validity); 2) to assess the severity of apathy in a sample of institutionalized Italian elderly, evaluating possible overlaps between apathy and measures of depression, cognitive functioning and quality of life (discriminant validity); and 3) to evaluate the effect of the living environment (nursing homes vs. residential homes) on apathetic symptoms, taking into account the severity of depressive symptoms and the cognitive functioning of the two populations.

Validation of the Italian version of the AES may provide a reliable tool to rapidly screen for apathy in Italian patients, and to evaluate intervention strategies for institutionalized elderly, also allowing a comparison with data gathered in other countries.

METHODS

Participants

Participants were 127 elderly (94 women and 33 men) ranging in age between 65 and 96 years (M = 83.3, SD = 7.6); they were recruited from 7 nursing homes (known in the Italian health care system as *residenze sanitarie assistenziali*, *RSA*, intended for non-autonomous elderly who need some social/clinical assistance) and 4 residential homes (*case di riposo*, hosting both autonomous and partially-autonomous elderly in good health condition) in the Lazio Region (Rome and Viterbo districts, Italy) *(Table 1)*. Inclusion criteria were willingness to participate spontaneously and no seriously compromised cognitive abilities (Mini-Mental State Examination's score > 18). Informed written consent was obtained prior to any data collection in collaboration with the geriatrician and a nurse familiar with the patient in order to guarantee that he/she had fully understood the aim of the project and the procedure. Only those patients who showed to be aware of the procedure, and who were able to firm a written consent, were included in the study. Patients were divided in three groups according to their diagnosis: patients diagnosed with a major depressive disorder (n. = 37), dementia (n. = 18), and controls (n. = 72). Some of the patients were taking antipsychotic medications (n. = 32), antidepressants (n. = 33), and/or anxiolytics (n. = 39). This study was approved by the Ethical Committee of the Istituto Superiore di Sanità (Rome, Italy). Sensitive data have been handled with confidentiality and securely stored.

Instruments

The evaluation included administration of the following battery of tests.

Mini-Mental State Examination, MMSE [23]: an instrument used for screening cognitive functions, *i.e.* orientation, memory, attention and calculation, recall, and language. Score range: 0-30, higher scores indicate better cognitive performance. Scores were adjusted for age and level of education.

Geriatric Depression Scale, GDS-15 [24]: a 15-item assessment specifically designed for rating depression in the elderly. Score range: 0-15; higher scores indicate more severe depressive symptoms.

EuroQol, EQ-5D [25]: an instrument designed to measure generic health status/health related quality of life. EQ-5D provides a descriptive profile in which health is defined according to five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression), with three response levels (no problems, some problems, extreme problems) and a self-rating on a vertical scale (Visual Analogue Scale, VAS) with endpoints of "best imaginable health state" set at 100 and "worst imaginable health state" set at 0. The EQ-5D descriptive system was converted into a single summary weighted index [26].

Neuropsychiatric Inventory, NPI [27]: an informant-

Table 1
Demographic characteristics of the subjects grouped for residence

	Sex			Age					Education*				
Residence	**N.**	**M**	**F**	**Mean**	**SD**	**Range**	**Median**	**IQR**	**Mean**	**SD**	**Range**	**Median**	**IQR**
Residential homes (n. = 4)	56	11	45	83.8	7.5	65-96	85	78.5-89.5	6.8	3.5	3-18	5	5-8
Nursing homes (RSA n. = 7)	71	22	49	82.9	7.7	65-95	84	77-90	6.7	3.7	3-20	5	5-8
Total	**127**	**33**	**94**	**83.3**	**7.6**	**65-96**	**85**	**78-90**	**6.8**	**3.6**	**3-20**	**5**	**5-8**

* Years of education.
IQR: Interquartile range (Q1-Q3). RSA: residenze sanitarie assistenziali.

based interviewer-administered scale to assess neuropsychiatric symptom profile and psychopathology in a variety of neurological diseases. Ten behavioural and two neurovegetative areas are included in the NPI: delusions, hallucinations, agitation/aggression, depression/dysphoria, anxiety, elation/euphoria, apathy/indifference, disinhibition, irritability/lability, aberrant motor behaviour, sleep and night-timebehaviour disorders, appetite and eating disorders. Severity is ranked on a 3-point scale (mild, moderate, severe) and frequency on a 4-point scale (occasionally, often, frequently, and very frequently).

Apathy Evaluation Scale, AES-I [2]: a scale designed to provide global measures of apathy in adults and elderly individuals. The AES uses a 4 point, Likert-type scale, "Not at all", "Slightly", "Somewhat", and "A lot" characteristic. The AES has three versions: the clinician-administered (AES-C), the self-rated (AES-S), and the informant-rated version (AES-I), the latter based on direct observation of subjects' behaviour by a significant other (*e.g.* personal or professional caregiver) and administered as paper and pencil tests. Each version consists of 18-items and is based on subjects' functioning during the previous 4 weeks. Items worded with positive syntax were recorded so that higher scores on AES-I indicated more apathy, *i.e.* less motivation (score range: 18-72).

Procedure

The AES-I was developed using a translation and back-translation process: it was first translated from English into Italian by a bilingual person, and then a second bilingual person, who had not seen the original English AES-I, back-translated Italian version to English. The two English translations were then compared for consistency and this process was repeated until the original and the back-translated English versions agreed.

About 30 professional and informed caregivers (nurses, physiotherapists, occupational therapists and educators) spending at least 4 hours per day at least 4 days per week with the patient and who were knowledgeable about the patient's daytime and night-time behaviours, were recruited from the residential and nursing homes. One of the authors (F. Caccamo, female, research associate with a master's degree and a Ph. D. in Psychology and with two years of clinical experience in a psychological/psychiatric setting) administered the whole battery of tests to both participants and caregivers and collected information on age, sex, level of education, diagnosis and treatments. When the caregiver was consulted, the interview was made in the absence of the patient. The MMSE was administered to the elderly at the beginning of the study. Only participants with a MMSE's score > 18 were included in the consecutive analyses (mean ± SD: 22.9 ± 3.1, range: 18.4-30.4). The other questionnaires were administered immediately after in randomized order. Each test was administered once, with the exception of the AES-I, which was administered on a second occasion, 2-4 weeks after the first administration, to evaluate test-retest reliability.

Data analysis

We assessed test-retest reliability by calculating the Pearson product moment correlation coefficient between the two assessments (2-4 weeks interval) in the whole sample. We examined internal consistency using Cronbach's Alpha and construct validity using principal component analysis. In order to check the coherence between our data set and original Marin's work [2] we checked the factor structure of the AES-I by a Varimax rotation of the original principal component solution. The consistency between our and the original rotated factor solution [2] was assessed by means of Fischer exact test. The convergent validity of the AES-I was evaluated by computing the Pearson product moment correlation coefficient between AES scores and the apathy subscale scores of the Neuropsychiatric Inventory (NPI) [19, 21]. The Pearson product moment correlation coefficients between AES scores and GDS, MMSE, EQ-5D scores were also computed to evaluate associations between apathy and measures of depression, cognitive functioning and quality of life. Finally, group differences in AES-I scores (specifically possible differences due to group, sex and residence) were examined by analysis of variance (ANOVA). All statistical procedures were performed using SAS 8.3. Statistical significance was set at $p < 0.05$.

RESULTS

The Pearson correlation between the two apathy assessments (test-retest) showed a satisfactory reliability of the AES-I Italian version: diagnostic agreement between the initial and follow up evaluations was high ($r = 0.72$, $p < 0.001$).

The scale showed a very high internal consistency (Cronbach $\alpha = 0.96$). Principal component analysis (PCA) of the AES1 (first assessment of apathy) identifies three principal factors, which, together, accounted for 72% of the total variance. The first component (principal component 1, PC1) represented a general apathy factor accounting for 59% of the variance of the scale, while PC2 accounted for 7% and PC3 for 6% of the variance *(Table 2)*. The first component was demonstrated to scale almost perfectly ($r = 0.99$, $p < 0.0001$) with the sum of the items (AEStot) showing the internal consistency of the scale. Principal component analysis performed on AESretest scores showed similar results (correlation with PC1, $r = 0.99$, $p < 0.0001$).

The initial PCA solution was then rotated with the Varimax rotation, to compare our loading matrix with that of Marin's original work. The consistency between our and Marin's rotated factor solution was assessed by means of Fischer exact test. Each AES item was classified in terms of the factor which was maximally loaded in both analyses. The loading patterns of our and Marin's solutions showed a very clear superposition ($p = 0.025$, two-tailed Fisher's exact test, Cramer's $V = 0.508$).

The Varimax factors were not used in the following analyses that are based on the simple AES summation that was totally consistent with the first unrotated principal component in both AES and AESretest cases. The superposition between the first principal component and the sum of the items (AEStot) prompted us to use AEStot as global descriptor in the subsequent inferential analysis.

Table 2
Eigenvalues of the correlation matrix

	Eigenvalue	Difference	Proportion
1	**10.6850648**	**9.4642175**	**0.5936**
2	**1.2208474**	**0.1740299**	**0.0678**
3	**1.0468175**	**0.2793801**	**0.0582**
4	0.7674374	0.1461250	0.0426
5	0.6213124	0.0581146	0.0345
Factor pattern – loading matrix (18 items)			
Items	**Factor 1**	**Factor 2**	**Factor 3**
AES1	0.83426	-0.12501	-0.1217
AES2	0.80517	0.22763	-0.13518
AES3	0.80187	0.16028	-0.2661
AES4	0.84308	-0.24755	0.11878
AES5	0.82916	-0.26212	0.14113
AES6	0.81469	0.21432	-0.12996
AES7	0.81810	-0.05804	-0.10082
AES8	0.83905	-0.06164	-0.0499
AES9	0.74184	0.00567	-0.26804
AES10	0.57464	0.38728	-0.27063
AES11	0.44896	0.47528	0.55310
AES12	0.71382	-0.33854	0.22005
AES13	0.72798	-0.45315	0.17682
AES14	0.74875	-0.22608	0.23314
AES15	0.52687	0.40674	0.51744
AES16	0.86536	0.15144	-0.00504
AES17	0.86486	0.09443	-0.15071
AES18	0.89767	0.01872	-0.06174

Convergent validity of the AES was then assessed, by computing a Pearson correlation with the frequency x severity scores of the apathy subscale of the NPI. Results show a moderate, positive correlation between the two measures of apathy, which was statistically significant ($r = 0.56$, $p < 0.0001$). Correlational analyses examining the discriminant validity of the AES were then computed. Results are shown in *Table 3*. The unique contribution of the AES was evaluated by computing the Pearson product moment correlation coefficients between AES scores and the GDS, MMSE, and EuroQol scores (the latter including the summary index, EQindex, and the visual analog scale, EQ-VAS).

Apathy, as measured by the first assessment (thus at the same time when the other assessments were held) significantly correlates with cognitive functioning as measured by the MMSE ($r = 0.39$). Also, apathy shows a moderate correlation with the generic health status/health-related quality of life, as measured by the EQ-index (0.35). Thus, subjects with less cognitive abilities (lower MMSE) and with a poorer health status/quality of life (lower EQ-5Dindex) tend to be more apathetic (higher AES). No correlation with the scores obtained by the visual analog scale of the EuroQol (EQ-VAS) was demonstrated. AES scores show low correlation with GDS scores suggesting that the scales measure two different conceptual variables/constructs (apathy and depression). Depression has relatively higher correlation with subject's self-reported quality of life, measured by two indexes of the EQ-5D (negative correlation, -0.48 and -0.46). Deterioration in the cognitive functioning does not explain depressive symptoms (no correlation between GDS and MMSE scores). The two indexes of the EuroQol - EQindex and EQ-VAS – show a moderate correlation (0.37) and appear to be independent of the cognitive functioning (no correlation with the MMSE).

Finally, group differences in AES scores were examined. A preliminary one-way analysis of variance

Table 3
Correlational analyses

a. Instruments' scores obtained from participants						
	AES1	**AESretest**	**GDS**	**MMSE**	**EQindex**	**EQ-VAS**
Mean	38.8	38.7	6.8	22.9	0.3	61.5
SD	14.7	13.3	3.3	3.1	0.4	25.9
Range	18-71	18-71	1-13	18.4-30.4	-0.53-1	2-100
Median	35	38	7	22.4	0.29	50
IQR	27-50	29-49	4-10	20.4-25	-0.02-0.69	50-85
b. Pearson Correlation Coefficients between instruments' scores						
	AES1	**AESretest**	**GDS**	**MMSE**	**EQindex**	**EQ-VAS**
AES1	/			-		
AESretest	0.72**	/				
GDS	0.19*	0.10	/			
MMSE	-0.39**	-0.35**	-0.07	/		
EQindex	-0.35**	-0.20*	-0.48**	0.03	/	
EQ-VAS	-0.09	-0.14	-0.46**	0.02	0.37**	/

AES1: first assessment of apathy; AESretest: second assessment of apathy; IQR: Interquartile range (Q1-Q3); GDS: Geriatric Depression Scale; MMSE: Mini-Mental State Examination; EQindex: EQ-5D EuroQol; EQ-VAS: EuroQol Visual Analogue Scale.
*p <0.05; **p <0.01.

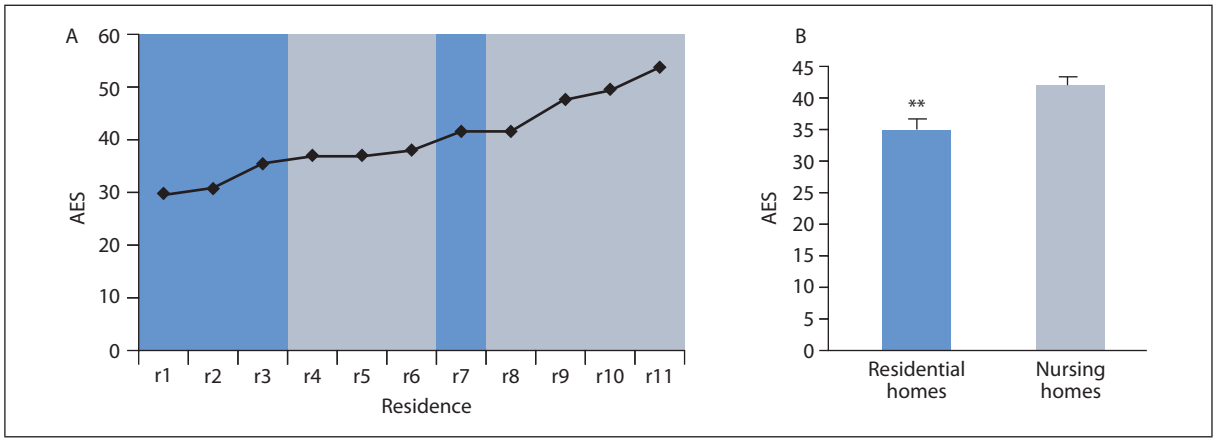

Figure 1
A) Average apathy level (AES total score, from the lowest to the highest) in patients in different residence (11 residences, r1-r11: 4 residential homes in blue, and 7 nursing homes in grey); **B**) Comparison between apathy levels in residential homes and nursing homes; graphs show mean ± SE, **p < 0.01.

(ANOVA) showed a significant effect of the residence on the AES scores ($F_{(10,126)} = 3.60$, p = 0.000, n. = 11 residences, *Figure 1A*). We therefore analysed whether the type of residence (residential vs. nursing homes, n. = 2) might have been responsible for the observed differences in apathy scores, also controlling for group and sex of the patients. ANOVA with Group (depression, dementia, controls), Residence (residential *vs* nursing homes) and Sex as between-subject factors showed a main effect of the residence (AES mean ± SD, nursing homes 41.9 ± 12.7, residential homes 34.9 ± 12.4; $F_{(1,117)} = 7.03$, p = 0.009; see *Figure 1B*), namely higher levels of apathy in nursing homes residents. Neither main effects of group ($F_{(2,117)} = 1.93$, p = 0.149) and sex ($F_{(1,117)} = 2.25$, p = 0.136) nor interaction effects between group, residence and sex were found (all p > 0.05). Age, years of education, and scores on GDS, MMSE, EQindex and EQ-VAS did not differ between patients in nursing homes and those in residential homes (independent sample t-test: all $t_{(125)} < 1.77$, all p > 0.08).

As for drug use, no significant interaction with Residence was observed. There were no significant effects of antihypertensive, antidepressant and anxiolytic drugs *per se*. On the contrary, antipsychotic drug use had a very statistically significant effect on apathy score ($F_{1,125} = 13.29$, p < 0.0005). Antipsychotic use increased the AES scores (AES mean ± SD, Antipsychotic users 46.3 ± 14.6, No Antipsychotic users 36.2 ± 13.9).

DISCUSSION

Results from this study provide support for the reliability and validity of the Italian version of the AES, informant version. The scale has high internal consistency, good test-retest reliability and, similarly to previous studies [2, 19], for the most part, the scale was found to be a single factor scale with apathy accounting for 60% of the variance. The correlation with the apathy subscale of the Neuropsychiatric Inventory indicates that the two scales measure the same construct, apathy. NPI and AES were significantly correlated (a value very similar to that found by Clarke *et al.* [19]). Such a correlation was however moderate, presumably due to a difference in length, item content, and format, leading to a different sensitivity to the broad range of apathetic presentations [3].

In the clinical practice, apathy may often be misdiagnosed as depression because of an overlap in symptoms, in particular diminished interest, psychomotor retardation and lack of energy and insight [2, 28]. Moreover, apathy appears as a prominent feature of depression, especially in subjects over 80 years of age [29]. However, the very low correlation between apathy and depression found in the current study is in line with previous research in showing that, although being related, apathy and depression are discriminable dimensions of behaviour, with apathy mostly due to problems with motivation without dysphoric symptoms [2-4, 28, 30, 31]. This is further confirmed by the findings that apathy, but not depression, correlated with cognitive function (*i.e.* higher levels of apathy were associated with lower MMSE scores). A similar relationship between apathetic symptoms and cognitive status was consistently found, especially in subjects with Alzheimer's disease [9, 21, 31, 32], but also in patients with stroke and in nursing homes residents [8, 15]. By contrast, some studies failed to replicate the correlation between apathy and cognitive deficits measured by MMSE, although it should be taken into account that this inconsistency may be a reflection of differences in inclusion criteria and methodologies [3, 4].

Apathy may also affect patient's perception of quality of life (QOL). In particular, the relationship between apathy and QOL appears to vary with the cognitive functioning of the residents [15]. Our results show a significant, though moderate, association of AES with the summary index of the EuroQOL, a measure of quality of life, and a lack of correlation with the ratings of EuroQOL on the visual analogue scale. Hence, in line with previous research [15-17], apathy appears to affect the perceived QOL, although a stronger relationship was found between depression and the overall QOL, similar to what has been found in other clini-

cal populations (*e.g.* patients with HIV [33]). Future studies should identify psychological predictors of poor QOL in well-designed cohorts, with the aim of isolating the mediating role played by depression and other psychiatric symptoms (*e.g.* anxiety).

To our knowledge, this is the first study assessing severity of apathy in a large sample of Italian institutionalized elderly dwelling in different residences, *i.e.* nursing homes *vs* residential homes. In the Italian health care system the first (*RSA*) are intended for non-autonomous elderly who need some clinical assistance, while the latter (*case di riposo*) host both autonomous and partially-autonomous elderly in good health conditions. We found that neither cognitive status nor depressive symptoms differ between subjects in nursing homes and those hosted in residential homes, as well as quality of life. By contrast, our findings show overall higher apathy levels in nursing homes compared to those found in residential homes. These data suggest that the possible lack of stimulation in a chronic care setting (*i.e.* RSA) may contribute to the manifestation of apathetic symptoms. Further studies, controlling for environmental variables, such as presence of recreational interventions, number of visits, socializing activities, and their effect on apathy, should be encouraged. A better knowledge of the role that environmental factors play on patients' level of motivation may represent a source of information to guide intervention strategies aimed at reducing apathetic symptoms. In fact, there is some evidence that, to be effective, non-pharmacologic treatment strategies should include the introduction of new sources of pleasure, interest and stimulation (*e.g.* live interactive music [34]), provide increasing opportunity for socialization and daily exercise (*e.g.* visiting dogs [35]) and consider environmental modifications [28], although this has not been a subject of systematic research.

There are some limitations to the study that need to be listed. First, having enrolled only voluntaries might have biased the apathy assessment as we might have selected only those patients more motivated to participate and collaborate. However, if this was true, we would expect relatively high apathy scores, while the AES range observed is relatively wide, including also very low scores. Thus this enrolment criterion has resulted in no major bias. Second, the population considered mostly included women. This, however, reflects the actual situation in elderly institutions. Moreover, patients assigned to the three groups (depression, dementia and controls) widely varied in number. Further applications of the Italian version of the AES are thus recommended. In particular, the evaluation of the prevalence of co-occurring apathy and cognitive impairment and the relation of apathy with depression across different neurodegenerative conditions (*e.g.* Alzheimer disease, Parkinson disease, stroke, etc.) should be explored.

A correct diagnosis and treatment of apathy may improve patients' activities of daily living and, consequently, ease caregiver burden, as well as health resource utilization [7-9]. This is particularly important considering the high number of individuals dwelling in care institutions. More in general, the demonstrated wide variability among different institutions highlights apathy scale (AES) as a potentially useful tool for the evaluation of the quality of healthcare delivered in different residential settings.

Authors' contribution statement

Conceived and designed the study and supervised the data collection: F. Cirulli, E. Reda, F. Miraglia, M. Borgi, E. Alleva. Collected the data: F. Caccamo, A. Piergentili and S. Sessa. Responsible for the statistical design of the study and for carrying out the statistical analysis: A. Giuliani. Wrote the article: M. Borgi, F. Cirulli, A. Giuliani, F. Caccamo, E. Reda. All the authors have revised the article critically and have approved the final version.

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Ethical approval

This study was approved by the Ethical Committee of the Istituto Superiore di Sanità (Rome, Italy). Written informed consent was obtained from all participants. Sensitive data have been handled with confidentiality and securely stored.

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Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

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