



RESEARCH ARTICLE

A survey on the prevalence of apathy in elderly people referred to specialized memory centers

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Background: Apathy is a pervasive neuropsychiatric syndrome in people with neurocognitive and psychiatric disorders. The diagnostic criteria for apathy (DCA) have been revised in 2018.

Objectives: Employing the 2018 DCA, in the present study, we investigated in groups of elderly subjects suffering from different neuropsychiatric disorders (a) the apathy prevalence; (b) the most commonly affected apathy dimensions (behavior/cognition, emotion, and social interaction); (c) the sensitivity and specificity of those dimensions for apathy diagnosis; and (d) the concurrent validity of 2018 DCA compared with the 2009 DCA.

Methods: This multicenter survey included 166 subjects. Each center checked the presence of apathy in subjects belonging to the following DSM-5 diagnoses: mild neurocognitive disorders (mild NCDs); major NCDs; affective disorders (Aff D); and subjective cognitive decline (SCD).

Results: The frequency of apathy varied significantly based on the diagnostic groups (0% of subjects with apathy in the SCD group; 25% in the mild NCD group; 77% in the major NCD group; and 57% in the Aff. D group). All subjects with apathy fulfilled the criteria for the behavior/cognition dimension, 73.1% fulfilled the criteria for the emotion dimension, and 97.4% fulfilled the criteria for the social interaction dimension. Behavior/cognition showed the highest sensitivity, the copresence of emotion and social interaction the highest specificity. The concordance between the 2009 and the 2018 DCA indicated an almost perfect agreement.

Conclusions: These results are consistent with previous reports and confirm that the social interaction dimension added to the 2018 DCA is present in most of subjects with apathy referred to specialized memory centers.

KEYWORDS

affective disorders, apathy, diagnostic criteria, elderly, neurocognitive disorders, psychiatric disorders, subjective cognitive decline

1 | INTRODUCTION

Apathy is a pervasive neuropsychiatric symptom characterized by a reduction in goal-directed behavior and activity that persists over time and causes identifiable functional impairment.¹ Reduction of activity can be found in different domains, including goal-directed behavior, cognitive activity, and emotions.² Apathy is very common in elderly people with neurocognitive and psychiatric disorders. It represents the most common behavioral and psychological symptom in people with Alzheimer's disease (AD)³ and is prevalent in other conditions, such as Parkinson's disease (PD)⁴ and vascular dementia.⁵ It is also found among important proportions of individuals following stroke and traumatic brain injury⁶ and in psychiatric conditions such as major depressive disorders⁷ and schizophrenia.⁸ The presence of apathy significantly affects the patient's and caregivers' quality of life.^{9,10} In people with neurodegenerative disorders, apathy can appear at the early stages of the disease progression, and the presence of apathy can be associated to a faster cognitive and functional decline.^{11,12} Apathy can be found also in healthy elderly people with subjective cognitive decline (SCD), a condition characterized by self-reported cognitive problems in absence of objective cognitive dysfunction,¹³ and in a minor percentage of healthy young adults.¹⁴

On the basis of the classical apathy definition,^{1,15} Robert et al.¹⁶ in 2009 proposed a set of diagnostic criteria for apathy (DCA) that patients with brain disorders should meet to receive an apathy diagnosis. Specifically, based on the 2009 DCA, a patient is diagnosed with apathy when he/she meets four criteria (A to D). Criterion A specifies the presence of a loss of (or diminished) *motivation* in comparison with the previous level of functioning. Criterion B stipulates the presence of symptoms in at least two of three domains (B1: behavior; B2: cognition; and B3: emotion) for at least 4 weeks, and present most of the time. Criterion C specifies that the symptoms (A and B) must cause clinically significant impairment. Criterion D specifies that the symptoms (A and B) should not be exclusively due to external factors (eg, the physiological effects of a substance).

In the last decade, there have been considerable advances in the domain of apathy, including its biological and neural bases,¹⁷ which led a group of experts to propose a revision of the 2009 DCA.¹⁸ The 2018 DCA are reported in Table 1. The 2018 DCA keep the same structure (criteria A to D) compared with the 2009 DCA. However, major modifications were performed to criteria A and B:

Criterion A: The term *motivation* was replaced by *goal-directed behavior*. The definition of apathy as a disorder of motivation has been extensively criticized,² as "motivation" is a psychological interpretation of behavioral internal states, which may be difficult to measure objectively. "Goal-directed behavior" is easier to observe and is thus more adapted to provide an empirical definition of apathy.

Criterion B: The list of domains proposed in the 2009 DCA (B1: behavior; B2: cognition; and B3: emotion) was modified. First, behavior and cognition were associated in a single category (B1: "behavior/cognition"). Even if the behavior/cognition dimension is very broad, in clinical practice, it is difficult to dissociate cognitive from behavioral deficits because both result in diminished observable activity. Second,

Key points

- Apathy prevalence ranged from 0% in elderly subjects with subjective memory decline, to 25% in subjects with mild neurocognitive disorders, to 57% in subjects with affective disorders, to 77% in subjects with major neurocognitive disorders.
- Behavior/cognition and social interaction were the most common apathy dimensions across diagnostic groups.
- A reduction in activity self-initiation was the most common example across dimensions and diagnostic groups.

"social interaction" was added as a separate dimension (B3), given that this was found as a dissociate apathy dimension in healthy people.¹⁴ "Emotion" was maintained as a separate dimension (B2), as there is convincing evidence that emotional blunting can be dissociated from the behavior/cognition dimension in different disorders.¹⁹

The aim of the present multicenter survey was to test the 2018 DCA in elderly patients suffering from neurocognitive disorders (NCDs), affective disorders (Aff D), and people with SCD. Specifically, the objectives were (a) to estimate the prevalence of subjects meeting the 2018 DCA within these different diagnostic groups; (b) to identify the most frequently met criterion B dimensions and examples in each diagnostic group; (c) to estimate the sensitivity and specificity of each criterion B dimension and combinations of dimensions; and (d) to estimate the concurrent validity of the 2018 DCA compared with the 2009 DCA.

2 | METHODS

2.1 | Participants

This cross-sectional, observational survey involved 166 subjects from five centers (Table 2). Data were collected in a 4-month timeframe (June to September 2018). Subjects were included if they met one of the following diagnoses, based on the DSM-5: mild NCDs; major NCDs; Aff D (depressive, anxiety and bipolar disorders); and SCD.²⁰ Informed consent was obtained from each subject. Subjects were excluded if they presented premorbid mental retardation or brain disorders not included in the previous list.

2.2 | Clinical interview

Subjects were assessed during their regular clinical visit by a trained clinician (psychiatrist, neurologist, or psychologist). At the end of the visit, clinicians checked the presence of the 2018 DCA based on a clinical interview. When present, caregivers participated to the interview.

TABLE 1 Apathy diagnosis criteria 2018

Apathy diagnosis criteria 2018	
CRITERION A: A quantitative reduction of goal-directed activity either in the behavioral, cognitive, emotional, or social dimension in comparison with the patient's previous level of functioning in these areas. These changes may be reported by the patient himself or by observation of others.	
CRITERION B: Presence of at least two of the following three dimensions for a period of at least 4 weeks and present most of the time.	
B1. BEHAVIOR & COGNITION	
Loss of, or diminished, goal-directed behavior and cognitive activity as evidenced by at least one of the following:	
General level of activity: The patient has a reduced level of activity either at home or work, makes less effort to initiate or accomplish tasks spontaneously, or needs to be prompted to perform them.	
Persistence of activity: He/she is less persistent in maintaining an activity or conversation, finding solutions to problems, or thinking of alternative ways to accomplish them if they become difficult.	
Making choices: He/she has less interest or takes longer to make choices when different alternatives exist (eg, selecting TV programs, preparing meals, and choosing from a menu).	
Interest in external issue: He/she has less interest or react less to news, either good or bad, or has less interest in doing new things	
Personal wellbeing: He/she less interested in his/her own health and wellbeing or personal image (general appearance, grooming, clothes, etc.).	
B2. EMOTION	
Loss of, or diminished, emotion as evidenced by at least one of the following:	
Spontaneous emotions: The patient shows less spontaneous (self-generated) emotions for their own affairs, or appears less interested in events that should matter to him/her or to people that he/she knows well.	
Emotional reactions to environment: He/she expresses less emotional reaction in response to positive or negative events in his/her environment that affect him/her or people he/she knows well (eg, when things go well or bad, responding to jokes, or events on a TV program or a movie, or when disturbed or prompted to do things he/she would prefer not to do).	
Impact on others: He/she is less concerned about the impact of his/her actions or feelings on people around him/her.	
Empathy: He/she is less empathetic to others' emotions or feelings (eg, becoming happy or sad when someone is happy or sad, or being moved when others need help).	
Verbal or physical expressions: He/she shows less verbal or physical reaction that reveals his/her emotional states.	
B3. SOCIAL INTERACTION	
Loss of, or diminished, engagement in social interaction as evidenced by at least one of the following:	
Spontaneous social initiative: the patient takes less initiative in spontaneously proposing social or leisure activities to family or others.	
Environmentally stimulated social interaction: He/she participates less, or is less comfortable or more indifferent to social or leisure activities suggested by people around him/her.	
Relationship with family members: He/she shows less interest in family members (eg, to know what is happening to them, to meet them or make arrangements to contact them).	
Verbal interaction: He/she is less likely to initiate a conversation, or he/she withdraws soon from it.	
Homebound: He/she prefer to stays at home more frequently or longer than usual and show less interest in getting out to meet people.	
CRITERION C: These symptoms (A and B) cause clinically significant impairment in personal, social, occupational, or other important areas of functioning.	
CRITERION D: The symptoms (A and B) are not exclusively explained or due to physical disabilities (eg, blindness and loss of hearing), to motor disabilities, to diminished level of consciousness, to the direct physiological effects of a substance (eg, drug of abuse and a medication), or to major changes in the patient's environment.	

TABLE 2 Centers participating in the study, number of subjects, and diagnostic categories

Center	n = 166	Diagnostic Categories of Included Subjects
Nice (France)	76	SCD (N = 6); mild NCD (N = 33); major NCD (N = 29); Aff D (N = 8)
San Paulo (Brazil)	35	SCD (N = 5); mild NCD (N = 19); major NCD (N = 11)
Madrid (Spain)	26	mild NCD (N = 2); major NCD (N = 9); Aff D (N = 15)
Paris (France)	24	mild NCD (N = 12); major NCD (N = 12)
Maastricht (the Netherlands)	5	mild NCD (N = 2); major NCD (N = 3)

Abbreviations: Aff D, affective disorders; major NCD, major neurocognitive disorders; Mild NCD, mild neurocognitive disorders; SCD: subjective cognitive decline.

Guidelines on how to perform this interview, and how to collect the relevant information, were provided to all the centers. In summary, the DCA assessment was mainly based on the symptoms observed during the interview (answers to questions, spontaneous emotional and verbal expressions, attitude and involvement in the relationship,

and scores on behavioral assessment scales). The observed symptoms could be enriched, when available, with information on (a) the subject's history, social relations, and personality; (b) daily life or behavioral disorders reported by caregivers; (c) subject's involvement and attitude during cognitive testing or in other situations (individual or

group stimulation sessions); and (d) information obtained through new technologies (video, audio, or motion sensors).

For a diagnosis of apathy, the subjects should fulfill criteria A, B, C, and D (see Table 1). In the Nice center, for 52 subjects, clinicians were asked to fill in both the 2009 DCA¹⁶ and the 2018 DCA.¹⁸ The order of filling in the two DCA versions was randomized across subjects.

2.3 | Statistical analysis

Descriptive analyses were conducted using percent and frequency for qualitative variables and mean with standard deviations (SDs) for quantitative variables. For demographical, clinical, and diagnostic characteristics of apathy data, group comparisons were performed with χ^2 tests or Fisher exact test for qualitative variables and Student *t* tests, Wilcoxon-Mann-Whitney test, or analysis of variance (ANOVA) for quantitative variables. Analyses were performed for the whole population and for each diagnostics of apathy. Sensitivity and specificity were calculated to evaluate the link between apathy diagnosis and the three criteria of apathy. To estimate the concurrent validity of 2018 DCA compared with the 2009 DCA, Cohen's κ was employed.

A *P* value less than .05 was considered significant. Statistical analyses were done with R software, version 3.5.1.

3 | RESULTS

The demographical and clinical characteristics of the whole population as well as of each diagnostic group are shown in Table 3. Seventy-eight subjects (47%) fulfilled the DCA (criteria A, B, C, and D). Subjects with apathy (DCA+) were significantly older compared with subjects without apathy (DCA-); $t_{(65,9)} = 6.34$, $P = .001$. No gender differences were found ($\chi^2 = .22$, $P = .642$). The distribution of DCA+ subjects varied significantly based on the diagnostic group ($\chi^2 = 48.06$, $P < .001$), with no (0%) DCA+ subjects in the SCD group, 25.0% in the mild NCD group, 76.6% in the major NCD group, and 57.1% in the Aff D group.

3.1 | Criterion B

To fulfill criterion B, subjects should show impairments in at least two of the three apathy dimensions (B1: behavior/cognition; B2: emotion; B3: social interaction).

TABLE 3 Demographics and frequency of diagnostic criteria for apathy in the diagnostic groups

	N	Sex ratio M/F (%)	Age, Mean (SD)	N DCA+ (%)
Total population	166	65/101 (39.2/60.8)	74.5 (8.5)	78 (47.0)
SCD	13	5/8 (38.5/61.5)	69.1 (4.8)	0 (0)
Mild NCD	68	27/41 (39.7/60.3)	74.3 (8.5)	17 (25.0)
Major NCD	64	25/39 (39.1/60.9)	76.2 (8.5)	49 (76.6)
Aff D	21	8/13 (38.1/61.9)	71.7 (9.4)	12 (57.1)

Abbreviations: Aff D, affective disorders; major NCD, major neurocognitive disorders; Mild NCD, mild neurocognitive disorders; SCD: subjective cognitive decline.

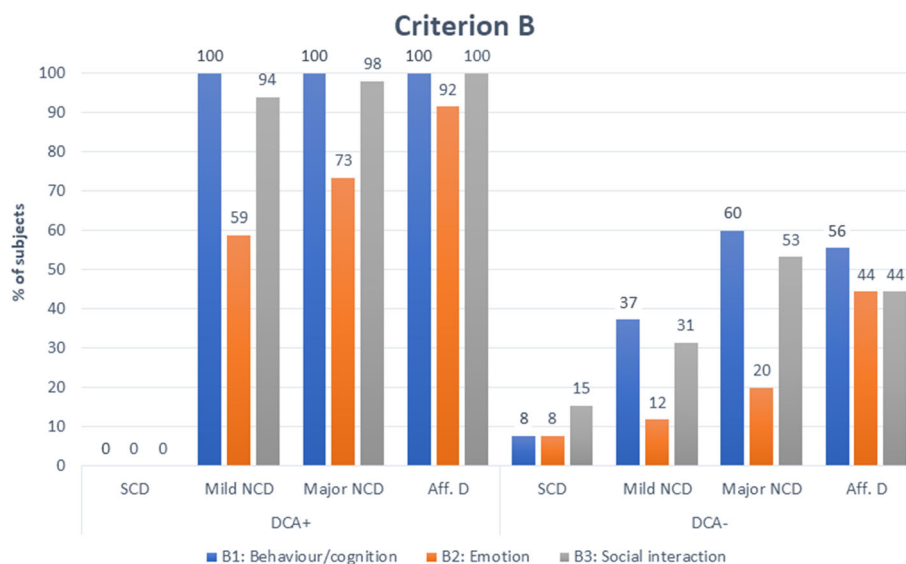


FIGURE 1 Percentage of subjects presenting the three B dimensions criteria according to the diagnostic categories in the DCA+ and DCA- subjects. DCA+, patients fulfilling the diagnostic criteria for apathy; DCA-, patients not fulfilling the diagnostic criteria for apathy [Colour figure can be viewed at wileyonlinelibrary.com]

and B3: social interaction). Each dimension is evidenced by at least one of five examples/situations.

3.1.1 | Subjects meeting the DCA

The DCA+ group included 78 subjects (17 subjects with mild NCD, 49 with major NCD, and 12 with Aff D). In the DCA+ group, all subjects (100%) fulfilled the criteria for dimension B1, 73.1% fulfilled dimension B2, and 97.4% fulfilled dimension B3. B1 and B3 were more frequently associated (ie, both present; 97.4%) compared with B1 and B2 (73.1%) and B2 and B3 (70.5%). 70.5% of subjects fulfilled all the three criterion B dimensions. The percentage of participants fulfilling the

three criterion B dimensions in the different diagnostic groups is reported in Figure 1.

In all diagnostic groups, B1 and B3 were present in more than 90% of subjects. Subjects fulfilling B2 criterion increased from mild NCD (58.8%) to major NCD (73.5%) to Aff D (91.7%). The percentage of subjects reporting each of the five examples for the three dimensions is reported in Figure 2.

B1: Behavior/cognition

In the DCA+ group, the most common example across diagnostic groups was a reduction in the general level of activity (B1-A), which was present in more than 95% of subjects in each diagnostic group.

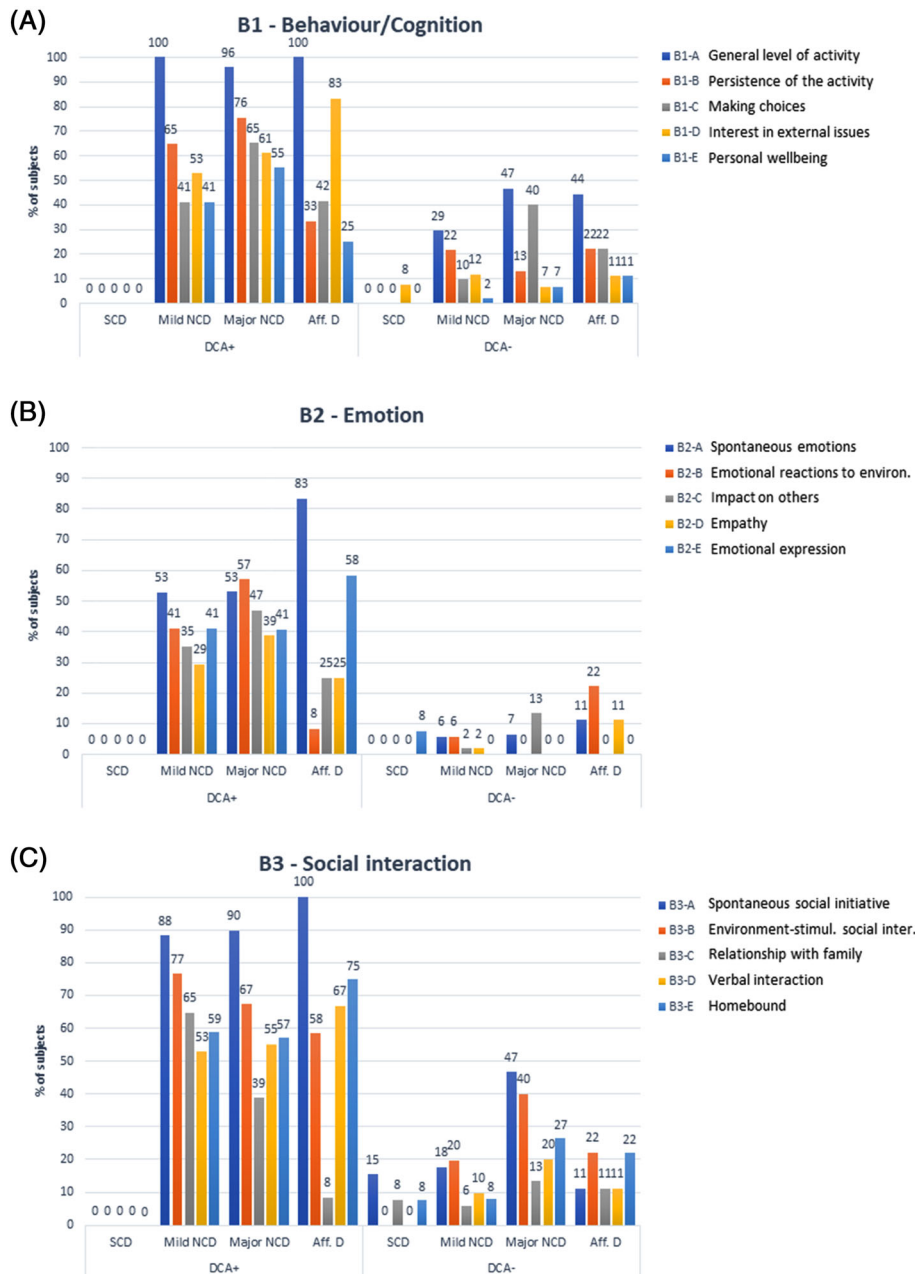


FIGURE 2 Percentage of subjects who present the five clinical examples according to the diagnostic category for DCA+ and DCA- subjects for the dimensions (A) behavior/cognition; (B) emotion; and (C) social interaction. DCA+, patients fulfilling the diagnostic criteria for apathy; DCA-, patients not fulfilling the diagnostic criteria for apathy [Colour figure can be viewed at wileyonlinelibrary.com]

The examples B1-A (an index of the behavioral dimension) and B1-D (an index of the cognitive dimension) were associated in 62.8% of the participants (61.5% in which B1-A and B1-D were both present; 1.3% in which they were both absent; 35.9% in which B1-A was present and B1-D absent; and 1.3% in which B1-A was absent and B1-D present).

B2: Emotion

The most common example was a reduction in spontaneous emotions (B2-A) for the mild NCD group (53%) and the Aff D group (83%) and a loss of environment-stimulated emotional reactions (B2-B) for the major NCD group (57%).

B3: Social interaction

The most common example across diagnostic groups was a reduction in spontaneous social initiative (B3-A), which was present in more than 85% of subjects in each diagnostic group.

3.1.2 | Subjects NOT meeting the DCA

The DCA- group included 88 subjects (13 subjects with SCD, 51 subjects with mild NCD, 15 with major NCD, and nine with Aff D). In the DCA- group, the B1 dimension was present in 38.6% of subjects, B2 in 15.9%, and B3 in 34.1% of subjects. B1 and B3 were associated (ie, both present) in 22.7% of subjects. B1 and B2 were both present in 11.4% of subjects. B2 and B3 were both present in 9.1% of

subjects. 6.8% of subjects fulfilled all the three criterion B dimensions. The percentage of subjects fulfilling the three criterion B dimensions in the different diagnostic groups is reported in Figure 1. The percentage of subjects reporting each of the five examples for the three dimensions is reported in Figure 2. The distributions of participants fulfilling the three B subcriteria, as well as the reported examples, are similar to those in the DCA+ group.

3.1.3 | Criterion B dimensions: Sensitivity and specificity

To explore which criterion B dimensions (B1: behavior/cognition; B2: emotion; and B3: social interaction) were associated to the presence of the DCA (that is, fulfilling criteria A, B, C, and D), we calculated the sensitivity and specificity for each B dimension (B1, B2, and B3) and for each combination of dimensions (B1 + B2; B1 + B3; B2 + B3; and B1 + B2 + B3). Results are presented in Table 4.

Dimensions B1 and B3 showed a very high sensitivity, meaning that their presence is strongly associated to presence of apathy (DCA+). Dimension B2 showed a lower sensitivity but a higher specificity compared with B1 and B3, meaning that the absence of B2 is a good predictor of absence of apathy (DCA-). In terms of dimensions' combinations, the highest sensitivity was found for the copresence of B1 and B3. However, this was not higher compared with the sensitivity of B1 and B3 alone. The highest specificity was found for the copresence of B2

TABLE 4 Sensitivity and specificity for each B dimension (B1, B2, and B3) and combination of dimensions

	DCA- n	(%)	DCA+ n	(%)	P value	Sensitivity	Specificity
B1					<.001		
No	54	(61.4)	0	(0.0)		1	0.614
Yes	34	(38.6)	78	(100.0)			
B2					<.001		
No	74	(84.1)	21	(26.9)		0.731	0.841
Yes	14	(15.9)	57	(73.1)			
B3					<.001		
No	58	(65.9)	2	(2.6)		0.974	0.659
Yes	30	(34.1)	76	(97.4)			
B1 and B2					<.001		
No	78	(88.6)	21	(26.9)		0.731	0.886
Yes	10	(11.4)	57	(73.1)			
B1 and B3					<.001		
No	68	(77.3)	2	(2.6)		0.974	0.773
Yes	20	(22.7)	76	(97.4)			
B2 and B3					<.001		
No	80	(90.9)	23	(29.5)		0.705	0.932
Yes	8	(9.1)	55	(70.5)			
B1, B2, and B3					<.001		
No	82	(93.2)	23	(29.5)		0.705	0.932
Yes	6	(6.8)	55	(70.5)			

and B3 and for the simultaneous copresence of B1, B2, and B3. The specificity of these dimensions' combinations was higher compared with the presence of B2 alone.

3.2 | Comparison between the 2009 DCA and the 2018 DCA

The subgroup in which subjects were classified based on the two versions of the DCA^{16,18} was composed by 52 subjects (29 females and 23 males; mean age = 74.6 years, SD = 7.9 years; and two with SCD, 31 with Mild NCD, 15 with Major NCD, and four with Aff D), 20 of whom were classified as DCA+ based on the 2018 DCA (38.5%).

Apathy diagnosis

The concordance between the 2009 and the 2018 DCA was 96.2%, with Cohen's κ coefficient = .92 (almost perfect agreement). All the subjects classified as having apathy employing the 2018 DCA were also classified as having apathy employing the 2009 DCA. Concerning the subjects classified as DCA- in the 2018 DCA (N = 32), 30 of them were also classified as DCA- employing the 2009 DCA (57.7%). The remaining two subjects were classified as having apathy in the 2009 DCA (3.8%).

Criterion B

In the 2009 DCA, criterion B included three dimensions: B1, behavior; B2, cognition; and B3, emotion. The list of dimensions was updated in the 2018 to B1: behavior/cognition (B1 + B2 in the 2009 DCA); B2: emotion (B3 in the 2009 DCA); and B3: social interaction (not present in the 2009 DCA). Concerning the 2018 B1 dimension (behavior/cognition), the concordance with the 2009 B1 (behavior) + B2 (cognition) dimensions was 98.1%, with Cohen's κ coefficient = .96 (almost perfect agreement). There was disagreement only for one subject (1.9%), who was classified as positive to the 2018 behavior/cognition dimension but negative to both behavior and cognition dimensions in the 2009 DCA. The concordance on the emotion dimension (B3 in the 2009 DCA, B2 in the 2018 DCA) was 90.4%, with Cohen's κ coefficient = .75 (substantial agreement). Specifically, three subjects (5.8%) were classified as positive to emotion dimension in the 2018 DCA and negative in the 2009 DCA. And two subjects (3.8%) were classified as negative to the emotion dimension in the 2018 DCA but positive to the emotion dimension in the 2009 DCA. This may be partially due to a slight difference between the reported examples in the two versions.

4 | DISCUSSION

The first objective of the present survey was to investigate the prevalence of subjects meeting the 2018 DCA in people with neurocognitive and affective disorders and with subjective memory decline. Apathy has been described as the most frequent behavioral symptom in AD and other dementias.²¹ A literature review²² indicated that its frequency ranges from 55% to 80% in studies using the

Neuropsychiatric Inventory and from 37% to 86% in studies using specific apathy scales. The present study showed that using the 2018 DCA, the apathy frequency in major NCD is of almost 77%, close to the higher end of the range and significantly higher than that found using the 2009 DCA in people with AD (55%).¹⁹ This difference may depend on the fact that we employed the new DSM-5-based diagnostic category "Major NDC," which includes subjects with cognitive impairment due to different etiologies (AD, but also vascular dementia, mixed dementia, etc.). For instance, in the same study, the percentage of people with apathy was over 70% in people with vascular dementia.¹⁹ The percentage of participants with apathy in the mild NCD group was 25%. This is consistent to what has been found in previous studies in people with mild cognitive impairment (with percentages ranging from 11% to 43%)¹⁷ and confirms that the presence of apathy is lower in subjects without significant impairments in activities in daily living. The prevalence of apathy in people with Mild NCD in the present study was lower compared with what found in subjects affected by other age-related conditions, such as PD. Recent studies found that the prevalence of apathy was around 35% to 38% in PD subjects without dementia^{23,24} and that, in PD, apathy was associated with higher cognitive decline, an increased risk of comorbid depression and more severe disability.²⁵ In our study, 57% of subjects were classified as having apathy in the affective disorders group, which included people with major depression, anxiety, and bipolar disorders. In people with major depression, the percentage of people with apathy has been found to be higher because of the partial overlap between apathy and depression (eg, 94%¹⁹; 68%²⁶). However, here we also included people with anxiety and bipolar disorders, which likely resulted in a lower global prevalence rate. However, the sample size for the affective disorders group was small, so it is difficult to derive strong conclusions.

The second objective of the present study was to identify the most frequently met criterion B dimensions and examples in each diagnostic group. Results suggested that B1 (behavior/cognition) was present in the totality of DCA+ participants. The most commonly reported example was a reduction in the general level of activity (an index of behavior), followed by a reduced persistency in completing activities (behavior) for people with NCD and by reduced interests (cognition) in people with affective disorders. This suggests the interest of analyzing more in detail the reasons for meeting criterion B1. In larger cohort studies, it may be interesting to check whether the clinical profile of people with higher behavioral symptoms is different from that of people with higher cognitive symptoms. B3 (social Interaction), which was not present in the 2009 DCA, was the second most common criterion, present in 97% of the total population. A reduction of social initiative and of the response to social activities proposed by others were the most commonly reported examples. Behavioral and social apathy were found to be frequently associated also in other age-related conditions, such as PD.²³ Finally, criterion B2 (emotion) varied across diagnostic categories, ranging from 59% in the mild NCD, to 73% in the major NCD, to 92% in the Aff D. A result in spontaneous emotion was the most common example, followed by reduced environment-stimulated emotional reactions and by an overall reduction of emotional

expressions for people with Aff D. These results are comparable with those found in previous studies in people with NCD and PD^{19,23,24} and confirm that emotion represents a separate apathy dimension. Interestingly, for all the B dimensions, a deficit in self-initiated activities was the most commonly reported example. This is consistent with other studies¹⁹ and confirms that deficits in auto-activation represent a hallmark of apathy.^{2,16} Interestingly, the analysis of the presence of criterion B dimensions in subjects without apathy (DCA-) suggests that single B dimensions (and combinations of several dimensions) can be present in large percentages of the population (over 50% for people with major NCD and Aff D) even if these people do not meet the full spectrum of apathy criteria. We believe that it is interesting to take the presence of criterion B dimensions into account for DCA- people because we can hypothesize that this represents a risk factor for the conversion to DCA+. Quantitative apathy scales, such as the Apathy Inventory (AI),²⁷ the Dimensional Apathy Scale (DAS),²⁸ or the Apathy Motivation Index (AMI),¹⁴ should be used in combination with the DCA to explore if the intensity of the apathy symptoms is comparable in the DCA+ and the DCA- people.

Concerning criterion B's sensitivity and specificity (objective III), dimension B1 showed the highest sensitivity (followed by B3), meaning that its presence was strongly associated to presence of apathy (DCA+). This suggests that merging behavior and cognition (in the 2009 DCA) in a single category leads to a strong apathy index. The highest specificity was found for the copresence of B2 and B3, meaning that the absence of both B2 and B3 is the best predictor of the absence of apathy (DCA-).

Finally, the concordance between the 2009 and the 2018 CDA, estimated on a subsample of participants, was 96.2%, indicating an almost perfect agreement. This suggests that the new studies that will employ the 2018 DCA should lead to results comparable with those obtained in the literature employing the 2009 DCA. However, the two versions of the criteria were filled in by the same clinicians (in randomized order). It is thus possible that judgement of the second DCA version was biased.

5 | CONCLUSIONS

This is the first survey that employed the 2018 DCA in a sample of older adults with different neurocognitive and affective disorders in comparison with the 2009 DCA. We reported the percentage of participants meeting the 2018 DCA, each criterion B dimension, and each criterion B example. These detailed results may be of interest for researchers and clinicians working on apathy, as they indicate common areas of impairment in different disorders, which may be relevant to propose adapted trainings for patients.

Despite its interest, we acknowledge that this survey has several limitations. First, the sample size is quite small, especially for people with SCD (N = 13) and Aff D (N = 21). Bigger sample sizes are needed to verify that the prevalence estimates made in the present study are representative of the overall population. Second, we employed a non-random sample, and it is likely that the prevalence estimates coming

from a convenience clinical sample are more prone to bias than for a population-based study. Third, the concordance between 2009 and 2018 DCA was very high; however, the concordance was only assessed with French clinicians. This must be verified in other languages. Finally, with the study being a survey, we did not collect precise clinical information concerning the severity of the etiology and the disease and the subjects' clinical profile, which may contribute to explain part of the variability in apathy. Similarly, we did not assess apathy severity. The next step consists in conducting larger and more detailed clinical studies to investigate the prevalence of apathy in different age-related disorders.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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CONFLICT OF INTEREST

None declared.

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REFERENCES

1. Marin R. Apathy: a neuropsychiatric syndrome. *J Neuropsychiatry Clin Neurosci.* 1991;3(3):243-254.
2. Levy R, Dubois B. Apathy and the functional anatomy of the prefrontal cortex-basal ganglia circuits. *Cereb Cortex.* 2005;16(7):916-928.
3. Zhao Q, Tan L, Wang H, et al. The prevalence of neuropsychiatric symptoms in Alzheimer's disease: systematic review and meta-analysis. *J Affect Disord.* 2016;190:264-271.
4. den Brok MGHE, van Dalen JW, van Gool WA, Moll van Charante EP, de Bie RMA, Richard E. Apathy in Parkinson's disease: a systematic review and meta-analysis. *Mov Disord.* 2015 May;30(6):759-769.
5. Staekenborg S, Su T, van Straaten E, et al. Behavioural and psychological symptoms in vascular dementia; differences between small- and large-vessel disease. *J Neurol Neurosurg Psychiatry.* 2009;81(5):547-551.
6. Starkstein S, Pahissa J. Apathy following traumatic brain injury. *Psychiatr Clin North Am.* 2014;37(1):103-112.
7. Yuen G, Bhutani S, Lucas B, et al. Apathy in late-life depression: common, persistent, and disabling. *Am J Geriatr Psychiatry.* 2015;23(5):488-494.
8. Yazbek H, Norton J, Capdevielle D, et al. The Lille Apathy Rating Scale (LARS): exploring its psychometric properties in schizophrenia. *Schizophr Res.* 2014;157(1-3):278-284.

9. Yeager C, Hyer L. Apathy in dementia: relations with depression, functional competence, and quality of life. *Psychol Rep.* 2008;102(3):718-722.
10. Matsumoto N, Ikeda M, Fukuhara R, et al. Caregiver burden associated with behavioral and psychological symptoms of dementia in elderly people in the local community. *Dement Geriatr Cogn Disord.* 2007;23(4):219-224.
11. Starkstein S, Jorge R, Misrahi R, Robinson R. A prospective longitudinal study of apathy in Alzheimer's disease. *J Neurol Neurosurg Psychiatry.* 2006;77(1):8-11.
12. van Dalen JW, van Wanrooij LL, Moll van Charante EP, Brayne C, van Gool WA, Richard E. Association of apathy with risk of incident dementia: a systematic review and meta-analysis. *JAMA Psychiat.* 2018;75(10):1012-1021.
13. Zhang M, Wang H, Li T, Yu X. Prevalence of neuropsychiatric symptoms across the declining memory continuum: an observational study in a memory clinic setting. *Dement Geriatr Cogn Disord.* 2012;2(1):200-208.
14. Ang Y, Lockwood P, Apps M, Muhammed K, Husain M. Distinct subtypes of apathy revealed by the Apathy Motivation Index. *PLoS ONE.* 2011;12(1):e0169938.
15. Starkstein S, Petracca G, Chemerinski E, Kremer J. Syndromic validity of apathy in Alzheimer's disease. *Am J Psychiatry.* 2001;158(6):872-877.
16. Robert P, Onyike C, Leentjens A, et al. Proposed diagnostic criteria for apathy in Alzheimer's disease and other neuropsychiatric disorders. *Eur Psychiatry.* 2009;24(2):98-104.
17. Le Heron C, Apps M, Husain M. The anatomy of apathy: a neurocognitive framework for a motivated behaviour. *Neuropsychologia.* 2017;118:54-67.
18. Robert P, Lanctôt K, Agüera-Ortiz L, et al. Revision of the diagnostic criteria for apathy in brain disorders: the 2018 International Consensus Group. *Eur Psychiatry.* 2018;54:71-76.
19. Mulin E, Leone E, Dujardin K, et al. Diagnostic criteria for apathy in clinical practice. *Int J Geriatr Psychiatry.* 2011;26(2):158-165.
20. Jessen F, Amariglio RE, van Boxtel M, et al. A conceptual framework for research on subjective cognitive decline in preclinical Alzheimer's disease. *Alzheimers Dement.* 2014;10(6):844-852.
21. Lanctôt KL, Agüera-Ortiz L, Brodaty H, et al. Apathy associated with neurocognitive disorders: recent progress and future directions. *Alzheimers Dement.* 2017;13(1):84-100.
22. van Reekum R, Stuss D, Ostrander L. Apathy: why care? *J Neuropsychiatry Clin Neurosci.* 2005;17(1):7-19.
23. Ang YS, Lockwood PL, Kienast A, et al. Differential impact of behavioral, social, and emotional apathy on Parkinson's disease. *Ann Clin Transl Neurol.* 2018;5(10):1286-1291. Published 2018 Aug 14. <https://doi.org/10.1002/acn3.626>
24. Radakovic R, Davenport R, Starr JM, Abrahams S. Apathy dimensions in Parkinson's disease. *Int J Geriatr Psychiatry.* 2018;33(1):151-158.
25. den Brok MG, van Dalen JW, van Gool WA, Moll van Charante EP, de Bie R, Richard E. Apathy in Parkinson's disease: a systematic review and meta-analysis. *Mov Disord.* 2015;30(6):759-769.
26. Benoit M, Berrut G, Doussaint J, et al. Apathy and depression in mild Alzheimer's disease: a cross-sectional study using diagnostic criteria. *J Alzheimers Dis.* 2012;31(2):325-334.
27. Robert P, Clairet S, Benoit M, et al. The apathy inventory: assessment of apathy and awareness in Alzheimer's disease, Parkinson's disease and mild cognitive impairment. *Int J Geriatr Psychiatry.* 2002;17:1099e105.
28. Radakovic R, Abrahams S. Developing a new apathy measurement scale: Dimensional Apathy Scale. *Psychiatry Res.* 2004;219(3):658-663.

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