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### Age-associated memory impairment: a suitable case for treatment?

**Citation for published version:**

Deary, IJ 1995, 'Age-associated memory impairment: a suitable case for treatment?' *Ageing and Society*, vol. 15, pp. 393-406. DOI: 10.1017/S0144686X00002610

**Digital Object Identifier (DOI):**

[10.1017/S0144686X00002610](https://doi.org/10.1017/S0144686X00002610)

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Publisher's PDF, also known as Version of record

**Published In:**

Ageing and Society

**Publisher Rights Statement:**

© Deary, I. J. (1995). Age-associated memory impairment: a suitable case for treatment?. *Ageing and Society*, 15, 393-406 doi: 10.1017/S0144686X00002610

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Ageing and Society / Volume 15 / Issue 03 / September 1995, pp 393 - 406

DOI: 10.1017/S0144686X00002610, Published online: 14 November 2008

**Link to this article:** [http://journals.cambridge.org/abstract\\_S0144686X00002610](http://journals.cambridge.org/abstract_S0144686X00002610)

### How to cite this article:

Ian J. Deary (1995). Age-Associated Memory Impairment: A Suitable Case for Treatment?. *Ageing and Society*, 15, pp 393-406 doi:10.1017/S0144686X00002610

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## Forum

# Age-Associated Memory Impairment: A Suitable Case for Treatment?

IAN J. DEARY\*

### *ABSTRACT*

The provisional criteria for age-associated memory impairment (AAMI) attempt to define a potentially treatable decline in mental function found in people over 50 years of age. It is suggested here that the present criteria are likely to apply to a large proportion of those over age 50 in the population. From a psychometric viewpoint the criteria have several shortcomings that are detailed. Finally, the social and ethical problems of the wider use of such a diagnosis are adumbrated.

**KEY WORDS** – Age-associated memory impairment, AAMI, ageing, intelligence, memory, premorbid IQ.

### **Introduction**

A work group based at the National Institute of Mental Health (NIMH) suggested some criteria for a disorder they called Age Associated Memory Impairment (AAMI) (Crook, *et al.* 1986). This set of provisional criteria for the AAMI syndrome, intended to replace terms such as benign senescent forgetfulness, sought to ‘describe the

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memory loss that may occur in healthy, elderly individuals in the later decades of life'. The report was intended as a spur to further research into the characterisation, epidemiology and treatment of the disorder. It is in this spirit of iteration toward an optimal characterisation of the disorder that this commentary is offered.

### **AAMI criteria**

The following criteria for a diagnosis of AAMI were suggested by the NIMH work group,

- a) Sufferers must be at least 50 years of age.
- b) The sufferer must complain of memory loss in everyday life. Instances of such complaints were: failure to recall people's names after introduction, misplacing objects, and forgotten telephone numbers. The onset of these complaints must be gradual.
- c) Memory test performance must be at least one standard deviation below the young adult mean on a standardised test of secondary memory such as the Benton Visual Retention Test, or the Associate Learning Test or the Logical Memory Test from the Wechsler Memory Scale.
- d) There must be evidence of adequate premorbid intellectual function, indicated by a scaled score of at least 9 (a raw score of 32) on the Vocabulary subtest of the Wechsler Adult Intelligence Scale.
- e) Dementia must be absent, in that there must be a score of 24 or higher on the Mini-Mental State Examination.

In addition to these diagnostic criteria the work group made several suggestions for treatment studies. First, it was suggested that a wide range of indicators of mental performance be used, i.e. that aspects of information processing and experimental memory paradigms should be included. Further, it was recognised that such objective tests, family ratings, assessments by clinicians and assessments of activities of daily living would be necessary supplements to the unreliable self-reports of memory function. These suggestions are difficult to criticise, but there are also some potential problems with the original criteria for the disorder that future revisions of the AAMI concept might consider. One is that AAMI has attracted criticism for being too broad an entity with insufficient validation (O'Brien and Levy, 1992); but, as a putative syndrome, the major drawbacks of AAMI are psychometric.

## **Categories and dimensions**

It is not entirely clear from the literature on AAMI whether it is meant to capture *otherwise* healthy individuals who suffer from what is to become a recognised disorder, perhaps in a future DSM revision, or whether it describes an entity that is a part of normal ageing, like the loss of motor strength and speed, which, although it is found in most individuals (Drachman, 1986), is to be rendered treatable. Therefore, it would be helpful to have this clarified.

Trying to devise categorical criteria for AAMI gives rise to many of the same problems that a categorical approach to personality disorder involves, i.e. it is difficult to find a cut-off that everyone will accept when the phenomenon involved is likely to be better conceptualised as a continuum. This problem applies also to many medical disorders, e.g. hypertension. However, although both medical and psychiatric disorders appear on a continuum of severity, the decision to treat is a binary decision and requires the application of a threshold. Therefore, a categorical approach is not the wrong approach, even to a dimensional disorder, but the rules for applying the category require scrutiny in order to decide whether there are inherent flaws.

## **Memory complaints**

The fact that subjective complaints of poor memory are to be included as a criterion is problematic. There is little evidence from cross-sectional studies to suggest that memory complaints are directly related to memory problems or objectively tested memory performance (Scogin *et al.* 1985; O'Connor *et al.* 1990), though not all reports agree on this (Christensen, 1991). Moreover, longitudinal studies have found that self-reported memory problems do not predict later memory performance declines (O'Brien *et al.* 1992; Taylor *et al.* 1992).

A recent study by Jorm *et al.* (1994) shows that subjects who have relatively high trait neuroticism and depression levels are more likely to complain of memory difficulties. Additionally, they showed that, whereas subjects' and informants' reports of memory difficulties showed little association in a community sample, informants' reports had closer associations with measured memory decline. However, informants' reports of memory problems in subjects were also related to informants' own affective status. The tendency of those individuals with high trait neuroticism generally to report more problems in a number of areas, such as in health, social and emotional life, appears also to apply to

memory complaints (Watson and Pennebaker, 1989). Thus, the reporting of memory difficulties is partly determined by both the subject's and the informant's level of the trait called 'negative affectivity'.

Therefore, the inclusion of memory complaints in the criteria for AAMI presents two main difficulties. First, the complaints are likely to bear little relevance to actual memory status, though informants' reports might help. If AAMI becomes an accepted diagnosis, and if a treatment becomes available, much clinical time may be spent seeing patients who prove to be free from the disorder and who become disgruntled at not receiving memory-enhancing medication for a problem they think they have. Second, a possible corollary of there being no association between memory complaints and tested memory performance is that many of those who do have AAMI might be unaware of it. The criteria for AAMI, as originally suggested, would fail to diagnose someone with poor objective memory performance if they failed to complain. Again, informants' reports might help, but a greater reliance on objective testing might be a better solution.

### **Comparing young and old**

A more troublesome criterion in AAMI is the rule which states that the patient must fall below the normal young adult score on a standardised memory test by at least 1 SD. First, there is the sheer number of people that this would apply to. By definition, this refers to 15.87% of young adults and corresponds to a raw score of 17 on the Logical Memory II test of the Wechsler Memory Scale-Revised (WMS-R) (Wechsler, 1987). Figure 1 shows the 10th, 50th and 90th percentile scores on this test for age groups from 16 to 74 as tabulated in the Manual of the WMS-R. If only those age groups which contain individuals over 45 years are considered, the percentage of each group falling below the normal young adult score (age 16-17, which represents the best level of achievement) would be 38% between 45-54 years, 48% between 55-64, 52% between 65-69, and 62% between 70-74. If one uses the 20-24 age group as the young normal mean group the percentages fall to 23%, 24%, 36% and 48% for each age group, respectively. The concern over the numbers involved is justified in results from empirical research. The rate of AAMI among individuals aged 55-98 in community samples can be as high as 96% (Smith, Ivnik *et al.* 1991). Even using revised criteria advocated by Blackford and La Rue (1989) the rates may be as high as 83%.

There is also the question of whether the 1 SD criterion would catch the appropriate individuals. It is likely to miss those who begin with exceptionally good memories and who, although still above the cut-off, have deteriorated considerably. This situation is shown as Subject A in Figure 1 who has a notional score at age 16–17 that is well above the 90th percentile and who falls dramatically by age 55 to below the 50th percentile in the respective age group. Such an individual might be considerably handicapped in work and social settings if his/her contribution was based on a previous very high level of functioning that has fallen to a mediocre level. Also, the criterion in question is likely to catch those who had a relatively poor memory to begin with and who are complaining of memory problems despite having no or very little change. Such an individual is represented as Subject B in Figure 1; this person has deteriorated less than the average for his/her peer group and yet is likely to meet the criterion for AAMI. Therefore, it is possible that such a person could be treated for something at age 50 that has altered little since age 16–17. In other words, individual differences in memory performance in the premorbid state are important and likely to be ignored by a criterion that is insufficiently sensitive to previous functioning.

### **Premorbid intellectual function**

The idea of 'adequate' premorbid intellectual function is too crude. Certainly, it is necessary to attempt to make some estimation of premorbid functioning, but there is little evidence to suggest that the WAIS or WAIS-R Vocabulary scale (with a single cut-off) would be a valid measure of premorbid functioning. There are at least four problems in this regard,

1. There are better measures of premorbid intellectual functioning, most notably the National Adult Reading Test (NART)-estimated premorbid IQ, at least in the UK (Nelson, 1982; Crawford, 1989; Crawford *et al.* 1988; Crawford 1990). NART scores are maintained better against ageing than WAIS-R Vocabulary scores, and it is also possible to check the validity of NART scores as an estimate of premorbid intelligence within individuals.
2. Although memory and intelligence are correlated, they are also psychometrically separable. There also is the obvious problem of establishing premorbid functioning on one index (IQ) and current functioning on another (memory).

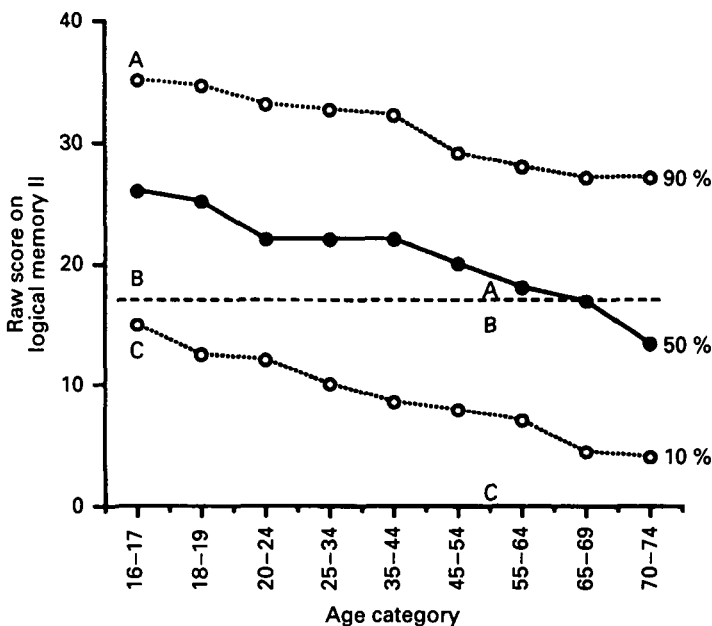


Figure 1. 90th, 50th and 10th percentile scores for the Logical Memory II test of the Wechsler memory Scale-Revised for different age groups. The horizontal line represents one standard deviation below the young adult mean. A, B, and C are hypothetical scores for three patients at age 17 and at age 55 (see text).

- It might be better for the AAMI criteria to focus more clearly on the change between premorbid and current cognitive levels since, by clear implication, that is at the heart of the disorder.
- Subjects who begin with poor cognitive ability and who deteriorate markedly will fail to meet the AAMI criteria because they do not measure up to the adequate intellectual function criterion. Such an individual is shown as Subject C in Figure 1; this is someone who was notionally below the 10th percentile when aged 16-17 and falls in memory ability by more than the expected amount when assessed at age 55, yet fails to meet the diagnostic criteria for AAMI because of poor original ability, assessed by a low score on the Vocabulary subtest of the WAIS-R.

In all four instances, much information is lost by installing a binary criterion of adequate/inadequate premorbid intellectual functioning; there would seem to be little to gain by rendering this continuous variable into a binary division.

Related to this objection is a more general comment. The AAMI literature makes little reference to the fact that some abilities may be



expected to hold or even improve with age. Therefore, while more fluid skills might be declining, the so-called crystallised abilities are still accruing (Drachman, 1986). There is more than one way to skin a cat, and what is lost in raw intellect with age might be made up for in knowledge and wisdom (Baltes, 1987, 1991). Baltes (1991) has emphasised the processes of selection, optimisation and compensation which operate to alleviate the loss of other psychological abilities with ageing.

### **Theories of cognitive decline**

Yet another limitation of AAMI is that the concept is not obviously backed up by a theory of ageing relating to different aspects of intellect. The ageing curve for intellectual functions could be explained by very different models of intellectual decline. For instance, Rabbitt (1992) has shown that both steady decline and terminal drop models could produce the typical population age-related cognitive decline profile. If the terminal drop model were the correct one, this would suggest that there was little point in attempting to identify or treat AAMI since there would be no significant decline until a near-terminal period was entered. In fact, it is likely that the model is more complex with people falling in intellectual level at different rates and for different reasons. The processes that deteriorate and their mode of decline have been conceptualised by at least four different models (Light, 1991): failures of metamemory, defective semantic encoding, failures of deliberate recollection, and diminished processing resources. All of these lack adequate data for a proper assessment and none is adequately addressed by the NIMH Work Group document.

Is it wise to use one or a few small tests of memory to estimate the current level of functioning? First, there is the question of the reliability of memory estimation using one or two such tests. There is great variability in the percentage of subjects diagnosed as having AAMI depending on the memory test which is used to test memory function. In the study by Smith, Ivnik, Petersen, Malec, Kokmen and Tangalos (1991) mentioned above, the use of a different memory test could lower rates of AAMI diagnosis to as little as 11%. Second, there is evidence to indicate that some other measurement might be more relevant. The authors of the original AAMI criteria state that memory is one aspect of fluid intelligence that declines with age. Psychometrically, this is not precisely true; memory is to a large degree separable from general intelligence. However, the authors might have been remarkably

percipient, for recent studies do appear to indicate that the single measure that can best account for the variance in memory decline with ageing is a measure of fluid intelligence such as the Alice Heim 4 (AH 4) or the Raven's Progressive Matrices (RPM). Cockburn and Smith (1991) showed that scores on the RPM accounted for 32.8% of the variance on a test of everyday memory, whereas educational experience accounted for an additional 0.5% and ageing for 5.5%. Rabbitt (1992) has concluded, after conducting much research on the ageing of memory functions in a very large group of elderly subjects, that 'the AH 4 IQ test picks up most but not all of the age-associated variance in performance between individuals'. There is no evidence to indicate that any of the tests suggested by the AAMI workshop would perform at anywhere near this level of predictive validity. Furthermore, these easily administered IQ-type tests do not require the tester to read the stimuli as, say, the logical memory test requires; therefore, the IQ-type tests are likely to have better inter-tester reliability.

### **Some proposals toward refinement**

Two groups of suggestions may be made. The first relates to the background research on age-related cognitive decline and the general selection decisions that must be addressed before the disorder can be established more firmly. The other deals with proposals intended to improve the criteria for the disorder.

More research is required on three basic fronts.

1. More must be done to establish the patterns of individual decline in cognitive functioning and how these combine to provide the ageing curve in the population. There are likely to be large individual differences in patterns and rates of decline.
2. More research along the lines of that performed by Rabbitt (1992) and Baltes (1987, 1991) should examine the differential decline in different facets of cognitive ability and the extent to which a single information processing variable might underlie more than one area of decline (Light, 1991). There is a remarkable congruence between Salthouse (1985) and Rabbitt (1992) who, after large reviews of relevant research, both come to the conclusion that the key variable that changes with age is speed of general information processing, which slows as one grows older.
3. More epidemiological work is required to discover just how many individuals are likely to fit the criteria for the disorder. Validation of diagnostic criteria should not be driven by the sheer numbers

of 'cases' involved: the large number of elderly individuals with impaired glucose tolerance have an increased morbidity and mortality which are reduced by effective treatment. However, physicians and psychiatrists who specialise in the treatment of older people might not wish to be in a position where well over half of the population over age 50 are at their doors for the diagnosis and treatment of AAMI.

Some suggestions intended to improve diagnostic criteria address the following issues: degree of cognitive decline, baseline cognitive functioning and the occupational and social background of an individual.

1. There should be an attempt to take into consideration the pattern of individual intellectual decline, and those people who obviously exceed the normal range of decline would be candidates for treatment. This captures the fact that the *relative* intellectual level is important for functioning in an accustomed set of social and cognitive milieux.
2. Priority might be given to treating those falling in cognitive function from an already low baseline. This captures the fact that the *absolute* level of functioning is important.
3. Consideration should be given to treating someone with non-dramatic cognitive decline who is struggling with an intellectually demanding job. This highlights the fact that the occupational and social *situation* is important.

### Summary of specific suggestions

1. A better measure of premorbid ability should be adopted. In the UK the NART might be used to estimate premorbid functioning. This would be measured along a continuum rather than as a dichotomous variable.
  2. There is a need to adopt a more sensitive estimate of current memory and/or intellectual function in terms of both the test that is used and the cut-off criterion that is implemented. Because there is evidence to indicate that a straightforward fluid-IQ type test might be sensitive to the memory decline found in old people then the Raven's Progressive Matrices or one of the Alice Heim series of tests should be considered, perhaps in addition to a standardised memory test.
  3. An attempt should be made to devise some metric for estimating cognitive decline. The difference between the expected IQ as
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indicated by the NART and the actual intellectual level as indicated by the test of current fluid functioning might be a more valid index than the currently proposed criteria for AAMI.

4. Whatever criterion is adopted with regard to the level of cognitive decline required for caseness might be relaxed if the person's situation is such that great demands are placed upon fluid-type intellectual skills.

These are in agreement with, and may be added to, some of the suggestions for improving AAMI criteria made by Barker and Jones (1993), Smith *et al.* (1991) and Blackford and La Rue (1989).

### **Treating AAMI**

The above suggestions do not necessarily represent a workable scheme. There is no guarantee that they would result in a valid selection of AAMI cases, and they should not be taken to indicate that the author accepts the existence of the concept of AAMI. Others have argued cogently that such a concept cannot be validated (Bamford and Caine, 1988), and that the concept lies in a confused area between normal ageing and the early stages of dementia. The suggestions represent the attempt of a differential psychologist to correct what appears to be an even more unworkable set of criteria. In this concluding section some wider issues concerning AAMI will be addressed.

The above suggestions for the revision of AAMI criteria attempt to focus therapeutic efforts on those individuals who deteriorate more than expected in cognitive function as they grow older, while falling short of frank dementia. The original NIMH criteria appear to be addressing the normal decline in cognitive function experienced by those over 50 years. Should normal ageing be identified as an illness and treated? There is an absence of discussion about the abilities that hold with ageing and the extent to which they compensate for the loss of those fluid abilities which are emphasised in the NIMH criteria. Whereas it is hard to imagine that anyone would celebrate the decline in fluid ability there is certainly an ethical question about whether and in whom we should attempt to reverse it by some kind of therapy (Spagnoli, 1991).

With regard to therapy, it is noteworthy that there is a strong interest in pharmacological treatment (Spagnoli, 1991; McEntee and Crook, 1990; Crook and Larrabee, 1988; Crook, 1990; Crook *et al.* 1990; Allain 1990; Grioli *et al.* 1990) even though the original NIMH Work Group article suggests that many aspects of the disorder, such as

epidemiology, clinical characterisation and aetiology are ill-defined. Perhaps these articles reflect the realisation that AAMI is a disorder that will apply to huge numbers of individuals, a large proportion of whom will clamour for its alleviation (Spagnoli, 1991). Great caution must be exercised in setting diagnostic and treatment rules in what is likely to be a very lucrative area for drug companies as they rush to respond to the basic human fear of growing old. More emphasis might be placed on psychological treatments and/or strategies for improving memory performance and cognitive functioning. Though few articles have addressed non-pharmacological approaches for the alleviation of AAMI specifically (Yesavage, 1989; Yesavage and Sheikh, 1988), the wider literature on memory facilitation offers numerous techniques for improving memory performance that make the best of what is available without resorting to medication (Gruneberg, 1992; Herrmann and Palmisano, 1992). However, although memory training has some lasting effects, improvements tend to be task-specific and tend not to generalise to a broader range of memory skills (Rabbitt, 1992; Stigsdotter and Backman, 1989).

Part of this caution required in the development of drugs aimed at AAMI relates to the existence of a shadowy trade in what are called 'smart drugs'. Central Scotland's listing's magazine, *The List* (1993; similar in format to London's *Time Out*), carried the following advertisement in its classified column 'Smart Drugs: Is the next step legal drugs that stimulate the mind and enhance the memory? For information send S.A.E. to...'. The typical reader of *The List* is young and educated, at the opposite quadrant, if you like, from the person captured in the AAMI criteria. This example is used to illustrate the fact that drugs developed to counter age-related change in cognitive functioning will probably be sought out by others, both younger and brighter than the AAMI target group, and will be potentially the source of a new and widespread form of drug abuse. Who, after all, would not like to be a bit cleverer and remember more? Even within those who meet the age criteria for AAMI would there not be a strong motivation to fake a bad score on the tests of current cognitive functioning in order to receive treatment? If someone has gone to the lengths of complaining to a doctor about his/her memory then, rather than be told that all is well and that no treatment is required, might it not be tempting to under perform on the cognitive test(s) to gain a medication that he/she thinks will alleviate worries about poor memory functioning?

Part of such concern related to deteriorating cognitive performance might be linked to the increasingly poor employment prospects of those

aged 50 or over. As it becomes known that there is a recognised disorder of mental function associated with the attainment of a 50th birthday, employers wishing to shed workers might find AAMI a convenient pseudo-medical criterion for early redundancy. Certainly, it will make employers wary of employing for the first time those in their forties. And what will be the pressures, either self-imposed or through covert threats from employers, on those over 50 to take medication to keep their cognitive functioning up to scratch? Instead of valuing the ageing worker for his or her accumulated knowledge and the other benefits that normal ageing might bring to employer and employee, there is likely to be pressure on the over 50s in work to attempt to 'stay young' and avoid the potentially stigmatising label of AAMI.

Whereas AAMI represents a clear business opportunity it remains to be demonstrated that it represents a clear disorder. It is hoped that some of the above suggestions will advance the process of clarification and continue the wider debate on the social and ethical implications of the introduction of this diagnostic term.

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### Acknowledgements

The author thanks Dr C. Gilleard, Professor W. MacLennan and Professor L. Whalley who made helpful comments on earlier drafts of this paper.