British Journal of Psychiatry (1988), **153**, 328–334

A Study of Mild Dementia in the Community Using a Wide Range of Diagnostic Criteria

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The result of, and difficulties in, applying a range of existing criteria for mild dementia to a random sample of community elderly aged 70 years and over is examined. By one or more criteria, 25% had mild dementia, and almost 30% of these had additional psychiatric disorders, mostly depression. Prevalence rates for mild dementia varied widely according to the different criteria. Rates of mild dementia increased with age. Poor specification of diagnostic criteria was a major problem. These criteria should be standardised and detailed, and prospective longitudinal studies conducted to elicit the natural history of this condition.

Dementia is now recognised as a serious public health problem of global dimensions. Against the background of a four-fold increase in the aged population, there is an age-specific prevalence for dementia of 5% over 65 rising to 20% over 80 (Kay & Bergmann, 1980; Henderson & Kay, 1984).

As Henderson & Huppert (1984) and Huppert & Tym (1986) point out, early detection of dementia is clearly a priority. This will help elucidate the natural history of the condition, achieve early intervention in order to avoid crises, and therefore help sustain people in the community for a longer period, test potential pharmacological treatments at an early stage, and promote the detection of homogeneous groups for neurobiological research. Early detection of dementia is, however, problematic (Cooper & Bickel, 1984). Reported prevalence rates for mild dementia vary widely from 10 to 50% (Bergmann, 1985; Jorm *et al*, unpubl.). There is no commonly agreed meaning of the term (Kral, 1962; Nielsen *et al*, 1977). There is also a lack of clearly defined criteria, and the major classificatory systems such as ICD–9 (World Health Organization, 1978) and DSM–III (American Psychiatric Association, 1980) do not mention mild dementia as a separate diagnostic sub-category (Henderson & Huppert, 1984). Further factors influencing prevalence rates include the interviewer's bias that demands "less of the very old than of the not so old" (Gruenberg, 1978) and the confounding factors of limited intelligence and education (Bergmann, 1985). These problems have stimulated efforts to devise standard criteria and case-finding methods for mild dementia.

DSM–III criteria for dementia have recently been criticised by Jorm & Henderson (1985) for treating dementia categorically rather than dimensionally, thus ignoring the problem of placing appropriate cut-offs, and for being too broad, thus encouraging diagnostic unreliability. In an effort to improve these criteria, Jorm & Henderson have proposed that anchor points for severity (mild, moderate, and severe) be incorporated and that specification of criteria be increased. Kay *et al* (1985) used these criteria in their point-prevalence Hobart study of the elderly at home. From the US–UK geriatric diagnostic study of the community elderly, Gurland *et al* (1982, 1983) have devised severity levels of dementia such as "limited dementia" and "pervasive dementia". Limited dementia refers to memory impairment not interfering with the subject's ability to live independently, whereas pervasive dementia refers to a degree of memory impairment rendering the subject incapable of doing specific daily tasks. Gurland *et al* also developed a rational scale for dementia, which made no distinction according to severity. It consisted of 19 items, of which at least 6 were necessary for a diagnosis of dementia.

Folstein *et al*'s (1975) Mini Mental State Examination (MMSE) is a brief, easily scored cognitive mental-state examination, consisting of items covering temporospatial orientation, attention and concentration, short-term memory, calculation, the ability to name, follow verbal and written commands, write a sentence, and copy two intersecting pentagons. The MMSE has been a widely used clinically validated screen for dementia (Anthony *et al*, 1982; Folstein *et al*, 1985), and was used to assess cognitive impairment in the large-scale epidemiological study, the Epidemiological Catchment Area (ECA) Program, begun in the USA in 1980 (Regier *et al*, 1984; Eaton *et al*, 1981). The purpose of this multicentre study was to gain comprehensive data on the extent and nature of adult psychiatric disorder in the community in relation to the

utilisation of health services. However, in a recent Australian study, Kay *et al* (1985) found the MMSE ineffective in detecting mild dementia and recommended for this purpose Pfeffer *et al*'s (1981) Mental Function Index (MFI). The latter is a composite of the MMSE, the Smith symbol Digit Design Test, and the Raven's matrices subtest B, the scores from each test being collated to produce the overall MFI score. Pfeffer *et al* considered the MFI more sensitive than the MMSE alone in detecting mild dementia.

Thus, there exists a wide range of measures for detecting mild dementia, none of which is clearly superior. Hence this paper reports the application of the above criteria of mild dementia (DSM-III, Gurland's pervasive dementia, Gurland's limited dementia, Gurland's rational scale of dementia, the MMSE, and the MFI) to a community sample of elderly people with the purpose of: 1. comparing and contrasting prevalence rates of mild dementia detected by each criterion; 2. detecting practical problems in the application of criteria; and 3. suggesting further improvements in the detection of mild dementia in the community. The study reported here was one aspect of a study of the prevalence of psychiatric disorder, physical disease, and the associated needs for services in the community elderly (Mowry & Burvill, unpubl.).

Method

A random sample of non-institutionalised persons aged 70 years and over living in a socioeconomically representative area of Perth was drawn from the Electoral Roll along the same principles used by Kay *et al* (1985). One hundred respondents were interviewed at home by one of the authors. Where possible, informants were also interviewed. The sample size was limited to 100 because of time constraints and to the comprehensive nature of the overall study.

The interviews in this study included the Canberra GMS-6 (Kay *et al*, 1985), the MMSE, The Smith Symbol Digit Design Test, and the Raven's Matrices Subtest B. The Canberra GMS-6 incorporates: 1. a modified version of Copeland *et al*'s (1976) Geriatric Mental State schedule (GMS), itself an application of Wing *et al*'s (1974) Present State Examination (PSE), for specific use in the elderly; 2. some items relevant to community samples from Gurland *et al*'s (1977, 1983, 1984) Comprehensive Assessment Referral Evaluation (CARE); and 3. activities of daily living (ADL) items.

The MMSE, the Smith Symbol Digit Design Test, and the Raven's Matrices Subtest B allowed a measure of the MMSE alone, and the MMSE together with the other two tests, to produce the composite MFI. A positive score (i.e. greater than 0) signified mild dementia, and a negative score, normality (Pfeffer *et al*, 1981). With respect to the MMSE items measuring concentration, Anthony *et al* (1982) scored respondents either on Serial Sevens or on spelling 'world' backwards. We included only the latter, because we considered that scoring both items would place too much emphasis on concentration, allotting it 10 points out of a total of 35. Our maximum score was therefore 30, and we used Folstein *et al*'s (1975) scoring of 0–17 and 18–23 out of 30 reflecting severe and moderate/mild dementia respectively. The MMSE does not distinguish between mild and moderate dementia.

To apply the DSM-III criteria for dementia to the GMS-6 and MMSE data, we used Kay *et al*'s (1985) criteria reflecting three levels of severity: mild, moderate, and severe. In this study, minor amendments were made to these criteria (see Appendix 1). The Serial Sevens was dropped from DSM-III criterion A as explained above, and the face-hand test was dropped from criterion C because we considered it an unnecessary supplement to the already comprehensive list of cognitive items. ADL items, such as being able to use the telephone, take medication, and handle money, were added to the social-performance criterion (SPC). The criteria for Gurland *et al*'s limited dementia and pervasive dementia are shown in Appendix 2, and the contents of the Rational Scale of Dementia is shown by Gurland *et al* (1983, pp. 71–72).

As suggested by Kay *et al* (1985), a DSM-III diagnosis of mild dementia was made both with and without the social-performance criterion (SPC). Where appropriate, other psychiatric diagnoses were made according to DSM-III criteria, alcoholism was diagnosed according to the CAGE Questionnaire (Ewing, 1984) and pervasive depression according to Gurland *et al* (1983). This was done to explore the difficulties in making the diagnosis of mild dementia in the presence of other psychiatric disorders. The above diagnostic criteria were applied to the data independently by each of the authors. Any differences were discussed and consensus diagnoses were achieved.

Results

Criteria stringency

Of the 100 subjects interviewed, 25 had mild (and no more than mild) dementia by one or more criterion. Table I shows the distribution of these subjects according to the different criteria. Detailed inspection of Table I shows that the different criteria diagnosed different individuals, with some degree of overlap among several of the criteria. In order of decreasing stringency, the criteria were: DSM-III with SPC, the MMSE, Gurland's rational scale of dementia, Gurland's pervasive dementia, DSM-III without SPC, Gurland's limited dementia, and the MFI. With respect to the MFI, only 20 of the 25 subjects with mild dementia agreed to complete the MFI, and 17 of these had positive scores for dementia. An additional 47 of the 75 subjects in the sample who did not have mild dementia by any other criterion, had positive MFI scores for dementia. Hence, of the 81 who completed the MFI, 64 (79%) had positive MFI scores for dementia.

https://doi.org/10.1192/bjp.153.3.328 Published online by Cambridge University Press

TABLE I
Subjects with mild dementia according to different criteria

Subject number	DSM-III mild		Gurland			MMSE		MFI	Additional psychiatric diagnosis
	With	Without	Rational scale	Pervasive dementia	Limited dementia	Mild/moderate dementia	Score	Dementia = 1	
1	1	1	1	1	1	1	(23)	1	
2	1	1	1	1	1	1	(22)	1	
3	1	1	1	1	1	1	(21)	1	
4	0	1	0	0	1	1	(22)	1	
5	0	1	0	0	1	1	(22)[1]	—	Pervasive depression
6	0	1	1	0	1	1	(21)	1	
7	0	1	1	1	1	0	(25)	—	Pervasive depression
8	0	1	0	1	1	0	(24)	1	
9	0	1	0	1	1	0	(27)	—	
10	0	1	0	1	1	0	(25)	—	
11	0	1	0	0	1	0	(24)	1	Pervasive depression
12	0	1	0	0	1	0	(27)	1	
13	0	1	0	0	1	0	(27)	0	
14	0[2]	1	0	0	1	0	(26)	1	
15	0	0	1	0	1	1	(22)[1]	1	
16	0	1	0	0	0	0	(28)	1	
17	0	0	1	1	1	0	(26)	1	
18	0	0	1	1	1	0	(25)	1	Pervasive depression/ adjustment disorder with depressed mood
19	0	0	0	1	1	0	(28)	1	
20	0	0	0	1	1	0	(28)	—	Major depression/ pervasive depression
21	0	0	1	1	1	1	(23)[1]	1	Pervasive depression/ adjustment disorder with depressed mood
22	0	0	0	1	1	1	(23)	0	
23	0	0	0	1	1	0	(28)	1	
24	0	0	0	0	1	0	(26)	—	Alcoholism[3]
25	0	0	0	0	1	0	(26)	1	
26–73[4]	0	0	0	0	0	0		1	See text

1. Subjects would not try 'world' backwards.
2. ADL difficulty due primarily to effects of a recent CVA, not to the effects of dementia.
3. Alcoholism according to the CAGE Questionnaire (Ewing, 1984).
4. 47 additional cases of mild dementia according to the MFI only.
For explanation of abbreviations, see text.

Additional psychiatric diagnoses

Seven of the total 25 subjects (28%) with mild dementia had additional psychiatric diagnoses, six of these seven being Gurland's pervasive depression. Of the 47 subjects in the sample who had mild dementia according to the MFI alone, and not according to any other criteria, 12 had Gurland's pervasive depression, three had DSM-III major depression, three had DSM-III generalised anxiety disorder, one had an adjustment disorder with depressed mood, and three had alcoholism.

Prevalence rates

Table II shows the sample's age-specific prevalence rate for mild dementia according to various criteria. There was an increased percentage of mild dementia in the older age group compared with the younger age group judged by every criterion except the MFI, which showed only a marginal increase. The three least stringent criteria, namely the MFI, Gurland's limited dementia, and DSM-III without SPC, showed a high rate in both age groups, but again even higher in the older age group. Gurland's pervasive dementia also detected a high rate in the older age group (30%). The MFI detected an exceptionally high rate in both age groups, 63% and 67% respectively.

Difficulties in application of criteria

Subjects 5 and 21 (see Table I) would not try spelling 'world' backwards. Their MMSE scores were thereby reduced to 22 and 23 respectively, and subject 5 fulfilled the DSM-III without SPC criteria for mild dementia. Interestingly, both had Gurland's pervasive depression as well, which raises the possibility that it was this latter condition, and not mild dementia, that caused impaired concentration and hence the low MMSE score. In subject 14, the clinical decision made

TABLE II
Age-specific prevalence rates (%) for mild dementia according to different criteria

	70–79 years (n = 73)	*80+ years (n = 27)*	*All ages (n = 100)*
DSM-III mild dementia			
With SPC[1]	3	4	3
Without SPC	12	22	15
MMSE: 18–23[2]	5	19	9
Gurland's rational scale	7	15	9
Gurland's pervasive dementia	8	30	14
Gurland's limited dementia	19	41	24
MFI[3]	63	67	64

1. SPC = social performance criterion (see Appendix 1)
2. Mini-Mental State Examination (Folstein *et al*, 1975)
3. Mental Function Index (Pfeffer *et al*, 1981).

was that the ADL impairment was due more to the effects of a recent cerebrovascular accident (CVA), namely hemiplegia, than to the effects of dementia. Hence, the patient did not fulfil DSM-III with SPC criteria for mild dementia.

Discussion

The overall rates for mild dementia were 3, 9, 9, 14, 15, 24, and 64% according to DSM-III with SPC, MMSE, Gurland's rational scale, Gurland's pervasive dementia, DSM-III without SPC, and Gurland's limited dementia and the MFI respectively. These rates compare with 3.6% (Shibayama *et al* 1986), 5.7% (Kay *et al*, 1964), 11.5% (Essen-Moller, 1956), 15.4% (Nielsen, 1962), 19.5% (Williamson *et al*, 1964), 21.9% (Parsons, 1965), and 52.7% (Kaneko, 1969). In these studies, the lower age limit was generally 65 years, with a variable proportion of the very old being included. Severity grades of dementia were not defined in some (e.g. Williamson *et al*, 1964) and inadequately defined in others (e.g. Kaneko, 1969). Most studies relied on cognitive impairment alone to define severity, while some (e.g. Shibayama *et al*, 1986) included ADL impairment as well. As Shibayama *et al* (1986) have pointed out, the greatest obstacle to useful comparisons is that investigators have each used their own set of criteria, both for diagnosis and for grading the severity of dementia. Using a shortened version of the Geriatric Mental State schedule together with a computerised diagnostic system called AGECAT, Copeland *et al* (1987) have reported a 5.2% point-prevalence rate for cases of organic disorder, and an additional 4.8% for organic sub-cases according to AGECAT's 'index of definition'. It is difficult to determine which of these categories corresponds to 'mild dementia', as Copeland does not use this term.

Comparing our work with studies that have used the same diagnostic and severity criteria, Kay *et al*'s (1985) Hobart study is particularly relevant. Rates of DSM-III without SPC dementia were very similar to Kay *et al*'s (1985) rates [12% *vs* 12% (70–79 years), 22% *vs* 25.5% (80+ years)]. Gurland's pervasive dementia rates found in this study were twice those reported by Kay *et al* [8% *vs* 4.4% (70–79), 30% *vs* 16.4% (80+ years)]. Kay *et al* acknowledge that their inability to represent Items 1 and 3 algorithmically (see appendix 2) could have resulted in a slight underestimate of the rate of pervasive dementia. In our study, algorithms were not developed, and hence all items of raw data were assessed directly by the authors. The biggest difference in rates between these two studies was a DSM-III with SPC dementia rate in the older age group five times higher in Kay *et al*'s study than in the present study [17.2% *vs* 4% (80+ years)]. It was felt that this was probably due to different interpretations of ADL impairment in the older age group where there was greater physical disability. The present study's rational scale dementia rates were in accord with Kay *et al*'s rates and the US-UK geriatric diagnostic study rates [7% *vs* 4.4% *vs* 3% (70–79 years); 15% *vs* 12.1% *vs* 14.3% (80+ years)]. The overall rate of 9% for those who had an MMSE score of 18–23 in this study was lower than the 12.7% and 14.9% rates reported by Weissman *et al* (1985) and Kay *et al* (1985) respectively.

Degree of criteria stringency

This study showed a wide variation in prevalence rates for mild dementia according to different criteria. The overall rates ranged from 3% for DSM-III with SPC, to 64% for the MFI. Moreover, different criteria diagnosed different individuals, although there was some degree of overlap among several of the criteria. Furthermore, all criteria showed an increased rate of mild dementia in the older age group. This is consistent with all studies of dementia no matter what level of severity. There is no 'gold standard' criterion for mild dementia. Therefore, the relative worth of each criterion may be assessed in terms of: 1. whether it delivers what seem reasonable rates of mild dementia in the light of available literature; 2. whether it depicts a rate that increases with age; and 3. whether it can differentiate mild dementia from other psychiatric diagnoses.

The lower rates found with DSM–III with SPC, the MMSE, and Gurland's rational scale indicate that they are more stringent measures than those used in the above studies of mild dementia. Gurland's rational scale rates were almost identical to those of the MMSE. Compared with other criteria used in this study, Gurland's pervasive dementia had a disproportionately large (four-fold) increase in rates from 70–79 years to 80+ years, to the extent that its 80+ rate (30%) was approaching the 80+ rate for Gurland's limited dementia (41%). It is is possible that Gurland's pervasive dementia is more sensitive (alternatively, less stringent) in picking up mild dementia in the 80+ years group than in the younger group. As certain cognitive disturbances in the older group reflect mild dementia according to Gurland's pervasive dementia and Gurland's limited dementia criteria, and reflect normality according to other criteria, the question of norms for cognitive disturbance in the very old must be raised. This important issue warrants further study. The MFI was the least stringent criterion for mild dementia. Moreover, it was the only criterion that did not show a substantial increase with age. In its present form, the MFI cannot be recommended as a screening instrument for mild dementia, detecting this condition in two-thirds of the entire sample. If it is to be used for this purpose, a range of higher threshold points (e.g. >0.5 or >1) would need to be tested against other criteria. However, its high refusal rate and cumbersome, time-consuming application further limit its attraction.

Possibly, other psychiatric diagnoses such as Gurland's pervasive depression may impair cognitive functioning sufficiently to fulfil some of the less-stringent criteria for mild dementia. For example, all six cases of Gurland's pervasive depression met Gurland's limited dementia criteria, four met Gurland's pervasive dementia criteria and three met DSM–III without SPC criteria, while only two cases had an MMSE score in the 18–23 range and no case fulfilled DSM–III with SPC criteria. This confirms the clinical impression of the difficulty in diagnosing mild dementia in the presence of mood disorder.

Thus, of the seven criteria used in this study, three (DSM–III with SPC, the MMSE, and Gurland's Rational Scale) and possibly a fourth (DSM–III without SPC) hold most promise, although it may be that the DSM–III with SPC is too stringent. Gurland's pervasive dementia appears to hold an intermediate position between this group and the other two criteria (Gurland's limited dementia and the MFI). On the one hand, it had an overall stringency very similar to DSM–III without SPC (14% *vs* 15%); on the other, it showed a disproportionately high (four-fold) increase in rates between the younger and older age groups (8% *vs* 30%). Gurland's Limited Dementia and the MFI may have limited usefulness, as they detected very high rates but seemed less able to differentiate mild dementia from other psychiatric diagnoses.

Problems of criteria application

Kay *et al* (1985) have advanced the detection of mild dementia by laying down explicit psychiatric criteria for grades of dementia, using DSM–III criteria for dementia as a basis. However, they did not likewise adequately specify the social-performance criterion (SPC). Experience in the present study has shown that it is just as important to specify the SPC in as much detail as the cognitive functional criteria have been specified by Kay *et al*. The poorly specified SPC made the application of the DSM–III with SPC criteria very difficult, e.g. what degree of difficulty with grooming constituted an impairment of the activity? Moreover, in most descriptions of ADL, including Kay *et al*'s (1985), there is no allowance made for sex differences. In the present study, it was found that most men's wives cooked and kept house for them, which made it difficult to determine whether or not a man's capacity for such activities was impaired; on the other hand, women often relied on their husbands to take them shopping, to visit the doctor, and so on. Moreover, the decision as to whether an ADL impairment resulted primarily from cognitive disability or from some physical disability presented major problems. Clinical judgment was required, and often the distinction was found to be far from clear-cut.

As Jorm (1986) points out, the MMSE is more effective for community screening than other dementia scales such as the Mental Status Questionnaire and the Short Portable Mental Status Questionnaire. However, there are two versions of the MMSE in operation, one with a maximum score of 30, the other with one of 35, depending on whether both Serial Sevens and 'world' backwards are used or whether only one is used. We used 'world' backwards only, yet subsequently found out (personal communication) that Kay *et al* (1985) used both because they considered that both tests seem to be measuring quite different types of concentration. This raises the important question of whether it is best to use Serial Sevens, 'world' backwards, or both in applying the MMSE to screen for mild dementia. If both are used, the MMSE will become even more heavily loaded towards assessing concentration, allotting 10 out of 35 points (29%) to this end. This may lead to specious results, particularly if mood

disturbance is present. However, the choice between the 30-item and 35-item versions must await clarification by future research.

We have made some progress with the problem of assessing mild dementia. However, there are as yet no widely accepted criteria for mild dementia, nor are there any clinically useful biological markers. Consequently, whether normal ageing, benign senescent forgetfulness (Kral, 1962, 1978) and mild dementia lie on a continuum, or whether mild dementia is categorically distinct, is uncertain. Moreover, without knowledge of the natural history of mild dementia, we cannot take it for granted that patients with moderate to severe dementia will have passed through a stage of mild dementia (van der Cammen *et al*, 1987). Thus, prospective longitudinal studies using a range of reasonably standardised diagnostic criteria are imperative, as they may show which of the existing criteria most effectively distinguish those cases which progress from those which remain stable. Moreover, they will help clarify the confounding effect time-limited mood disorder has on the diagnosis of mild dementia.

Appendix 1

1.1 DSM-III dementia: Criterion A

Severe dementia	*Moderate and mild dementia*
Month	WORLD backwards
Year	Address (including postcode)
Address (excluding postcode)	Date (of the month)
City or town of residence	
(three errors required)	(two errors required for moderate, one error for mild dementia)

1.2 Criterion B

All degrees of dementia

Year of birth
Interviewer's name (first try)
Seen interviewer before? (provided not blind)
Prime Minister
Previous Prime Minister
Recall three objects
(three errors required for severe dementia, two for moderate, one for mild)

1.3 Criterion C

All degrees of dementia

1. One or more of the following:
   Repeat names of three objects
   Name two objects
   Follow three-stage command
   Close eyes on reading request
   Dysphasia
2. Write a sentence
3. Copy polygons
   (three errors required for severe dementia, two for moderate, one for mild)

1.4 Social-performance criterion

Impairment on one or more of the following activities of daily living:

cooking, dressing, light chores, shopping, grooming, bathing or showering, using the toilet, taking medication, using the telephone, and handling money
(This criterion applies for all degrees of dementia)

Appendix 2

Gurland's criteria for diagnosis and severity of dementia

A. Limited dementia

1. Reports a decline in memory
2. Has increased reliance on notes as reminders
3. Occasionally (less than once a week) forgets names of acquaintances, or forgets appointments or misplaces objects
4. Occasionally (less than once a month) has destructive or dangerous memory lapses such as burning cooking or leaving on gas tap
5. Has one or two errors on cognitive testing; forgets current or past president, exact date, phone number, zip code, dates of moving to present location;
   cannot remember interviewer's name even on third challenge

Two errors from different subsets of items are required for diagnosis.

B. Pervasive dementia

1. Frequently shows lapses in A3
2. More than two errors in A5
3. Keeps forgetting important or recent events after repeated reminders
4. Forgets name of close friends or family or other frequent contacts and cannot soon correct self
5. Has at least once in past month forgotten the way home from a point in neighbourhood.
6. Mistaken by several years in age, birth, or present year.

Two errors from different subsets of items are required for diagnosis.

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