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The epidemiology of functional psychoses of late onset

Abstract For the functional psychoses of late life, epidemiological information comes from two sources: studies of persons who have reached psychiatric services; and surveys of elderly persons sampled from the general population. A conspectus of published data from both sources leads to the following conclusions: States phenomenologically similar to those found in clinics do occur in the community in non-trivial numbers. There is no notable divergence in the information obtained from clinical series and from population-based surveys. These states are more common in women, they become more common with increasing age and are sometimes associated with decline in cognitive performance or with degenerative changes in the brain revealed by neuroimaging. Genetic factors appear to be less important than in early-onset psychoses but remain ill-defined, and the roles of social isolation and disorders of personality have not yet been sufficiently elucidated. Both clinical and community-based studies have found an association with sensory impairment. The community-based data suggest that paranoid symptoms may be detectable at subclinical level, and an association between them and cognitive impairment is demonstrable in individuals who are not diagnosable cases either of psychosis or of dementia. Differences exist between late-onset paranoid psychoses and affective psychoses in symptomatology and response to treatment. These observations confirm the importance of the late-onset psychoses for research directed towards uncovering the origins of psychotic symptoms in any age group.

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Background

The relation of the late-onset functional psychoses to those of earlier life, on the one hand, and to the organic syndromes of late life, on the other, has been controversial since it was examined by Kraepelin (1920). If they belong to the former, are they related to schizophrenia or to affective disorders, or are they heterogeneous? And if to the latter, why do they generally not show the progressive cognitive decline and high mortality associated with dementia? Could they be a separate group? Interest in this subject was re-awakened by Roth and Morrissey (1952) and Roth (1955) who classified the mental disorders of later life into five main groups, two functional, affective psychosis and late paraphrenia, and three organic, senile psychosis (i.e. dementia of the Alzheimer type), arteriosclerotic psychosis and delirium. This was done on the basis of clinical characteristics, response to treatment and outcome. The distinctions were later supported by neuropathological studies (Corsellis 1962; Blessed et al. 1968). Since then, neuropsychological studies and brain imaging have expanded our knowledge but, in the case of late paraphrenia, without adding greatly to our understanding. In fact, in some ways these new methods have produced new puzzles. Here we review what is known about the epidemiology and clinical features of this group of disorders.

As elsewhere in medicine, population-based studies of late-onset psychiatric disorders can be a useful complement to clinical and biomedical approaches. Firstly, clinical series of such disorders may be biased in unexpected ways compared with their occurrence in the general population. Such bias may be in the form of symptoms experienced, their severity or the amount of associated disability. Second is Berkson's bias (Berkson 1946) whereby various selection factors other than the disorder itself may influence who reaches a practitioner or a specialist psy-

chiatric service. Should this bias apply, the conclusions about aetiology may be false. Thirdly, paranoid states may be particularly open to selection effects through comorbidity: such a pattern might apply to paranoid persons who are also cognitively impaired or who are deaf or partially sighted. Any observed association between such comorbidity and psychotic disorders could plausibly be attributable not to an aetiological process but to selection effects in clinical series. Fourthly, population-based studies have the advantage that they are more likely to identify symptomatic persons at an early stage in the evolution of the disorder. This may prove useful in what is described as "completing the clinical picture" (Morris 1964). Lastly, ascertainment at the community level, particularly for subclinical states, is likely to carry advantages for preventive intervention, in accordance with the principles set out by Rose (1993).

These advantages for data obtained at the community level are balanced by some limitations, particularly non-random non-response (Kessler et al. 1995). As with cognitive impairment and dementia (Launer et al. 1994), the very nature of this group of disorders makes them more likely to remain hidden to the investigator through refusal to accept a research interview or, if it is accepted, through concealment of unusual ideas and experiences, or that they are controlled by medication. Living alone and in social isolation is common in this diagnostic group, so that there is often no informant to augment clinical assessment. Furthermore, these disorders have a low prevalence and an even lower incidence, making the confidence intervals for estimates very wide. An alternative approach in such circumstances is to set aside the traditional practice of identifying only cases and non-cases, and instead attempt to identify persons with psychotic symptoms. But this has been used only exceptionally (Christenson and Blazer 1984; Tien 1991). All of these constraints need to be borne in mind in assessing the value of population-based data.

In this paper we review the information available both from treated series and from field surveys of community samples. For this task it is firstly necessary to specify the categories of morbidity being examined.

Nosology of late-onset functional psychoses

Differentiation within this group focuses on distinctions between the following: affective psychoses (manic or depressive), paranoid psychoses with hallucinations in clear consciousness (paranoid schizophrenia, late paraphrenia), paranoid psychoses without hallucinations (delusional disorder) and, finally, those psychotic affective and paranoid syndromes that may arise in association with demonstrable or suspected cerebral disease in the absence of a diagnosable dementia syndrome. An important strategy in studying the role of ageing in the aetiology of these disorders is to compare them with psychoses with onset earlier in life.

The ICD-10 does not provide separate diagnoses for such conditions when they occur in the elderly. They therefore have to be accommodated under the Organic Disorders (F00–F09), Schizophrenia, Schizotypal Disorder and Delusional Disorder (F20–F29), or the Mood (affective) Disorders (F30–F39). Paraphrenic schizophrenia is subsumed under paranoid schizophrenia. Psychotic symptoms in mood disorders are defined as delusions, hallucinations or depressive stupor (F32.3). In the Organic Disorders, subtypes of dementia are specified where predominantly delusional or hallucinatory symptoms are present (World Health Organization 1992, p. 46). The criteria for Organic Delusional (Schizophrenia-like) Disorder (F06.2) and Schizophrenia (F20) do not refer to any particular age group, but ICD-10 recognises that delusional disorder (F22.0) may have its onset in later life, adding that "occasional or transitory auditory hallucinations, particularly in elderly patients, do not rule out this diagnosis, provided that they are not typically schizophrenic and form only a small part of the overall clinical picture" (p. 97). Under "Other Persistent Delusional Disorders" (F22.8), an "involutional paranoid state" is included (p. 98). By ICD-10 criteria, 25–30% of late paraphrenic patients could be classifiable as delusional disorder (F22.0), 2–13% as affective or schizoaffective disorders (F32.21, F25.0) and the remainder as paranoid schizophrenia (F20.0; Quintal et al. 1991; Howard et al. 1994; Almeida et al. 1995 a).

The DSM-IV recognises that schizophrenia can begin in later life (p. 281), when a number of distinguishing features may be present: a higher ratio of women, a better occupational history and a higher frequency of marriage than in younger patients, with the occurrence of sensory loss being more common in those with onset at a more advanced aged. The DSM-IV also recognises that delusional disorder generally has its onset in middle or late adult life (p. 299). When both affective and schizophrenic symptoms are present, schizoaffective disorder may be diagnosed in both ICD-10 and DSM-IV, but this disorder in the elderly has not attracted much attention. The DSM-IV provides a subcategory of Dementia of the Alzheimer's Type for presentations in which delusions are the predominant feature (p. 143). Notably, it places "Psychotic Disorders Due to a General Medical Condition" (p. 306) not with the Dementias, Delirium or other Cognitive Disorders, but under the section dealing with Schizophrenia and Other Psychotic Disorders. It defines such psychotic disorders as having subtypes predominantly with delusions or hallucinations (p. 308). Although general medical conditions may have a higher prevalence in later life, the diagnostic criteria in DSM-IV do not refer to any particular age group. In the Scandinavian classification, emphasis is placed on paranoid states that are considered to be reactions to life events and situations (Retterstøl 1966; Strömgren 1974). The earlier studies of late-life paranoid psychoses tried to distinguish paranoid states from schizophrenia, and both of these from reactive (psychogenic) psychoses (Kay and Roth 1961; Funding 1963; Post 1966), but a somewhat better outcome in reactive psychoses was not consistent enough for individual prognosis or for adequate classification (Post 1966; Jorgensen and Jorgensen 1985). It has been found that, in general, classi-

fication of cases of late paraphrenia by DSM-IV criteria is very similar to the ICD-10 classification (Quintal et al. 1991; Almeida et al. 1995 a).

The boundary between the functional psychoses of late life is formed by features that have been recognised as a result of clinical experience and research over many years and which now carry general agreement. However, since the aetiology of schizophrenia and affective disorders at any age is still not known, their existence as distinct entities must be considered provisional. To the extent that differences can be shown, for instance, in response to treatment, course or mortality, or in neuropsychological testing, brain imaging or neuropathology, then the clinical distinction would be supported; if not, some modifications to the diagnostic model would have to be considered.

Categorical and dimensional states

In most of the foregoing, psychotic disorders have been viewed as present or absent according to the extent to which various diagnostic criteria are met. But it may also be useful to consider psychotic symptoms as having a dimensional quality: paranoid ideas, for instance, can extend from slight suspiciousness to extreme delusions. Such a dimensional view becomes particularly relevant in surveys of the general population where paranoid ideation may not reach levels warranting a diagnosis.

Late-onset schizophrenia, late paraphrenia and delusional disorder

Roth's (1955) choice of the term late paraphrenia to describe the schizophrenia-like states that arise in later life left the aetiology open. It also attracted attention to these conditions, at any rate in Europe, whereas in the United States they are usually called late-onset schizophrenia, and refer to illnesses with onset after the age of 40 or 45 years. However, Bleuler (1943) found that 5% of schizophrenias began after the age of 60. More recently, Castle and Murray (1993) reported that 4% of males and 18% of females experienced onset of broadly defined schizophrenia after the age of 65 years. In Europe, late paraphrenia gained the attention of psychiatrists interested in the mental disorders of elderly people. The lower limit for age of onset was usually 55 or 60 years and for first admission 60 or 65 years, with mean ages considerably higher. This difference means that age-related organic factors are more likely to be found in late paraphrenia than in late-onset schizophrenia, and increases the importance of age-matched controls. This paper is concerned with late paraphrenia or equivalent terms (Post 1966) for psychoses arising in the seventh decade or later. Late-onset schizophrenia, meaning schizophrenia beginning after age 40 or 45 years and its German equivalent "Spätschizophrenie" (Bleuler 1943; Klages 1961) is the subject of another contribution in this issue.

Roth (1955) defined late paraphrenia as a "well-organized system of paranoid delusions with or without auditory hallucinations existing in a setting of well preserved personality and affective response". It required clear consciousness, and was clinically distinct from affective and organic psychoses. Hallucinations could occur in all modalities. Although paranoid delusions in the absence of hallucinations and other schizophrenia-like symptoms may now be categorised as delusional disorder (Winokur 1977; Kendler 1980; American Psychiatric Association 1994), studies of late paraphrenia have usually included cases both with and without hallucinations, and these will be considered together unless authors have separated them. In the following, we try to compare late paraphrenia with late-onset affective psychoses in their demography, premorbid characteristics, and short and long-term outcomes, note some differences between late-onset and early-onset disorders and refer to data on normal controls when these are available.

One problem concerns the definition of psychosis. DSM-IV defines major depression with psychosis by the presence of delusions or hallucinations (p. 377), invalidating comparisons with earlier periods when affective psychosis was generally used synonymously with endogenous or melancholic depression. There are few studies of DSM-IV-defined psychosis of late onset (Meyers and Greenberg 1986; Baldwin 1988, 1995; Nelson et al. 1989; Baldwin and Tomenson 1995; Myers 1995); more often it comprises a subgroup in studies of major depression, and the number of cases is never large. Whether delusional depression is simply very severe depression or is due to a specific vulnerability to psychotic symptoms is still controversial (Schatzberg and Rothschild 1992; Parker et al. 1995), but in either case the study of cohorts in which less than half the cases are delusional is unsatisfactory. Additionally, the inclusion of patients with age at onset before senescence will dilute any association with cerebral degeneration. For example, in the series reported by Parker et al. (1991), the mean age of the 35 patients with psychotic (delusional) depression was 62.5 years (SD 12.1 years) compared with 47.9 years (SD 15.9 years) for the 102 with endogenous depression. Taken together, these problems constitute a serious obstacle to characterising those features that distinguish late-onset affective psychosis from other late-onset psychoses. We have therefore preferred studies which have treated psychotic (delusional) depressives as a separate group, with age at first onset not before 50 years and usually after 60 or 65 years.

Demography and background

Late paraphrenia is comparatively rare: at different times it has constituted 5–10% of admissions to mental hospitals in the United Kingdom (Kay and Roth 1961; Blessed and Wilson 1982; Christie 1982). Reported series usually include prevalent cases, often of many years' duration, whereas in major depression single episodes are usually being described. In geriatric practise, psychotic depression is not rare (Baldwin 1995). Among geriatric admissions, 20–45% of patients with depression have psychotic

features (Baldwin 1988; Burvill et al. 1991; Hinrichsen 1992). An association between delusions and late age of onset would support a role for cerebral degeneration (Meyers 1995), but this has not been confirmed for depression (Nelson et al. 1989; Baldwin 1995), although it appears to be true for mania (Shulman et al. 1992).

The lesser importance of heredity in the disorder of late onset compared with early onset (Funding 1962; Post 1962; Kay 1972; Shulman et al. 1992) has promoted research into factors in the social environment of elderly persons or in age-related somatic or cerebral changes; however, there is some recent evidence that late-onset paranoid psychoses may be genetically related to affective disorder (Castle and Murray 1991; Howard et al. 1997). Delusional disorder does not appear to be genetically related either to schizophrenia or affective disorder (Winokur 1977; Kendler 1980). A consistent finding is the marked excess of females in late paraphrenia (Table 1), which might be a continuation of the change of gender ratio in schizophrenia, which increases steadily in favour of females after age 35 years (Castle and Murray 1993; Häfner and Hambrecht 1994), or could be explained if some psychoses were reactive to adverse circumstance, assuming that many elderly women are relatively underprivileged. In late-onset affective psychosis, the gender ratio less consistently favours females (Meyers and Greenberg 1986; Baldwin 1988; Nelson et al. 1989) and in one study was near unity (Baldwin 1995).

Lowenthal (1964) drew attention to social isolation in the aetiology of mental illness in the elderly. This has been a consistent finding in late paraphrenia where it appears to be of long standing (Kay and Roth 1961; Post 1966; Kay et al. 1976; Holden 1987), rather than a recent development due to illness (Almeida et al. 1995 b). Social isolation has been examined mainly from two points of view: lack of close relatives, and personality traits that alienate the individual from other people. In the first category, previous studies found a marked excess (40–60%) of never-married patients of both genders (Kay and Roth 1961) and a high proportion (51–77%) of female patients without children (Kay and Roth 1961; Herbert and Jacobson 1967). These percentages are approached in a recent study of 101 cases (87% female) in which 36 and 50%, respectively, were never married or childless (Howard et al. 1994). In another study of patients with late-onset paranoid symptoms, nine met criteria for delusional disorder, of whom seven were childless, five were immigrants and four were refugees who had fled their own country; early-life trauma was thought to have increased susceptibility to a paranoid psychosis (Gurian et al. 1992).

In previous studies, elderly patients with affective psychosis, mainly endogeneous depression, complained of loneliness but were seldom socially isolated (Kay and Roth 1961; Post 1962; Kay et al. 1976) and 5–25% were unmarried (Post 1962; Kay et al. 1976). They had experienced a recent independent life event more often than late paraphrenics (Post 1962; 1963; Kay et al. 1976) and in a later study, the frequency of a life event before onset of depression was unrelated to the presence of psychotic symptoms (Emmerson et al. 1989). Data on affective disorders fulfilling DSM-III-R or IV criteria for psychosis are scarce, but the finding in a study of delusional depression that 44% of patients were unmarried compared with only 12% of non-delusional depressives suggests that failure to marry may be associated with late-onset psychosis and not only with late paraphrenia (Baldwin 1995).

Premorbid personality

The contribution of premorbid traits conferring vulnerability to paranoid delusions was described by Kretschmer (1918) in "Die sensitive Beziehungswahn". In late paraphrenia, patients are described as jealous, suspicious, sensitive, with few interests, cold or solitary; but also, unlike younger schizophrenics, as quarrelsome, dictatorial, domineering and determined (Kay and Roth 1961). Sexual adjustment and personal relationships are often poor (Post 1966). Nevertheless, occupational histories indicate that nearly all patients have been in regular employment until retirement and some have held responsible posts, in marked contrast to younger patients with schizophrenia. A comparison of elderly affective and paranoid groups with onset over age 50 years found evidence of long-standing schizoid personality traits that distinguished the groups (Kay et al. 1976). In another study, ICD-10 personality disorders, mostly of paranoid type, were diagnosable in approximately half of the 25 patients, but no case with paranoid personality disorder was found among the healthy controls (Howard and Levy 1993). With respect to its symptomatology, gender ratio and premorbid personality traits, late paraphrenia closely resembles schizophrenia beginning after the age of 40 years (Häfner and Hambrecht 1994). By contrast, in patients with affective disorder, the premorbid personality is often anxious or dysthymic (Post 1962, 1972; Kay et al. 1976), although in a group with paranoid delusions it was often of paranoid type (Funding 1963).

Psychopathology

The delusions and hallucinations in late paraphrenia are often florid and fantastic, accompanied by quarrelsome or abusive behaviour, repeated complaints to the police, or self-seclusion; lack of insight is complete (Kay and Roth 1961; Almeida et al. 1996 a). The onset is usually insidious but may be sudden, with hallucinations. The patients manifest schizophrenic symptoms, including first-rank symptoms (FRS), in approximately the same frequency as reported in younger patients with the paranoid type of schizophrenia (Grahame 1984); delusions of persecution and reference are most common but delusions of control, hypochondriasis (Howard et al. 1994) and jealousy (Breitner and Anderson 1995) also occur. However, so-called *partition delusions* (delusions that people, substances or forces are entering through the walls from next door) seem to be characteristic of late paraphrenia (Herbert and

Jacobson 1967; Howard et al. 1992a), whereas the formal thought disorder, catatonic symptoms and inappropriate or blunted affect seen in schizophrenia of earlier life are rare or absent (Howard et al. 1994; Almeida et al. 1995 a). Well-marked depressive symptoms occur in approximately 25% and are occasionally accompanied by grandiose or melancholic delusions (Post 1966; Almeida et al. 1995 a). The high frequency of hallucinations (70–90%) in late paraphrenia is another difference from early onset schizophrenia (Post 1966; Howard et al. 1994); they are usually auditory, whereas visual hallucinations are associated with impairment of vision due to eye disease (Berrios and Brook 1984) and later age of onset (Howard et al. 1994). Almeida et al. (1995 a) concluded that while late paraphrenics display many typically schizophrenic symptoms, some characteristic features are lacking, and approximately one third of the cases do not meet DSM-IV criteria for schizophrenia.

In affective psychosis, the delusions are congruent with the altered mood, most commonly of justifiable punishment, hypochondriasis or guilt (Post 1962; Kivelä and Pahkala 1989; Rodriguez-Cano et al. 1996). They have to be distinguished from the common depressive preoccupations, which may not be easy. Paranoid delusions predominate in women, hypochondriacal delusions in men (Baldwin 1995). Hallucinations are less frequent than delusions and usually occur only when there are delusions (Meyers 1995); hence delusional depression may be used as a synonym for psychotic depression. In most cases differential diagnosis between paraphrenia and affective psychosis appears not to have been seriously in doubt, but in a small minority of cases late paraphrenia begins as an affective psychosis (Kay and Roth 1961; Post 1966; Roth 1987), and in some psychoses (9–20%) the delusions are mood incongruent (Baldwin 1988; Funding 1962; Post 1962), or the features vary from one time to another (Janzarik 1957). These psychoses will be diagnosed as affective when there is good evidence of a primary mood disorder, but their treatment may include neuroleptics, and they appear to form a bridge between late-onset affective psychosis and paraphrenia. Late paraphrenia will be diagnosed if schizophrenia-like symptoms, such as hallucinations or bizarre delusions, are present (Post 1966) particularly if they persist in the absence of altered mood (American Psychiatric Association 1994). A few cases may fulfil criteria for schizoaffective disorder (Post 1971). In these borderline cases differential diagnosis is usually based on operational criteria that have yet to be validated by long-term studies of outcome and mortality.

Sensory and somatic deficits

A paranoid syndrome, including delusions and hallucinations, may accompany many neurological, toxic and metabolic disorders (Manschreck and Petri 1978). Usually, though, patients with symptomatic psychoses have been excluded from studies of late paraphrenia (Holden 1987), and their general health is found to be good or at least normal for their age. However, hearing impairment has been reported to be more frequent in late paraphrenia than in normal controls of similar age (Almeida et al. 1995 b) or depressed patients (Cooper et al. 1974; Cooper and Curry 1976; Kay et al. 1976), but auditory hallucinations occur independently of hearing loss. The role of visual impairment is unclear (Cooper and Porter 1976). A study of risk factors showed that impairment of hearing, female gender, living alone and social isolation were strongly and independently associated with late paraphrenia (Almeida et al. 1995 b).

Affective disorder in the elderly is associated with poor health and disability (Post 1962; Murphy 1983; Murphy et al. 1988) particularly from vascular disease when onset is late (Roth and Kay 1956; Baldwin and Tomenson 1995). Whether this association is true for psychosis is uncertain; in a community study, delusional depressives had better health than non-delusional major depressives (Kivelä and Pahkala 1989).

Cerebral disease and cognitive impairment in the functional psychoses

Usually patients with active brain disease or dysfunction have been rigorously excluded from studies of late paraphrenia. When this criterion was relaxed in one study, brain disease with some cognitive impairment was found in 16%, but there was no evidence for a specific "organic" paranoid psychosis; instead, it was indistinguishable from those without brain disease (Post 1966). A similar conclusion was reached concerning depressive disorders complicated by brain disease: the clinical picture was often indistinguishable from any other melancholic depression (Post 1962). The clinical picture in the presence of neurological disease may be indistinguishable from any other melancholic depression (Post 1962), but psychosis appears to be related to basal ganglia disease and limbic dysfunction (Beckson and Cummings 1992; Cummings 1992). Late-onset mania is also associated with cerebral disease (Shulman et al. 1992).

Systematic studies of patients *with dementia* have, however, shown that though delusions and hallucinations are common (30%; Allen and Burns 1995), they usually differ from those seen in functional psychoses in which diagnosable dementia is excluded by definition. Though fantastic and complicated delusions typical of late paraphrenia may occur, they are much more often of a simple kind, at least partly understandable in terms of impaired memory and perception (Post 1966; Drevets and Rubin 1989; Burns et al. 1990 a, b; Lopez et al. 1991; Förstl et al. 1994). Delusions of theft followed, in order, by persecution, misidentification syndromes involving the caregiver, "phantom boarders", infidelity or of being abandoned may persist for several years (Ballard and Oyebode 1995). Visual hallucinations are characteristic (Burns et al. 1990b; Förstl et al. 1994) and are reported to be a special feature of Lewy body dementia (McKeith et al. 1996). Mania is rare and typical depressive delusions appear to be unusual

(Retterstøl 1966; Drevets and Rubin 1989; Förstl et al. 1992; Burvill et al. 1995). However, delusions and other features of severe depression are reported to be common in pseudodementia, in which cognition improves after treatment of depression (Rabins et al. 1984; Bajulaiye and Alexopoulos 1994) and this may be a point of distinction from dementia.

One may conclude that fully formed paraphrenic or affective delusions are rarely found after dementia has been diagnosed. Delusions of this type may be more likely to occur in the earliest stages of Alzheimer's disease or frontal lobe dementia (Gustafson and Risberg 1992) before definitive diagnosis is possible, but it is not known how common this presentation is. Other instances of late paraphrenia with a covert organic basis may be found when the psychosis is atypical (Lesser et al. 1992), or an early symptom of basal ganglia disease (Beckson and Cummings 1992) or when unsuspected subcortical white matter lesions are revealed by brain imaging (Miller et al. 1991; Cummings 1992). As in the schizophrenia-like psychoses of younger patients with various organic and metabolic diseases, the resemblance to disorders without demonstrable cerebral disease may be very close, though they differ aetiologically (Davison and Bagley 1969).

There is evidence from service statistics that organic factors play a role in some phenomenologically functional psychoses with late onset. Age-specific hospital first admission rates in England and Wales in 1966 for schizophrenia and paranoid psychoses in both sexes (Kay 1972), and first contact rates with psychiatric case registers in females for schizophrenia (Castle and Murray 1993), have been found to rise in the oldest age groups. A similar increase has been reported for non-affective, non-organic psychoses in patients of both genders aged 60 years and over admitted to hospital in parts of England and Wales and in The Netherlands (van Os et al. 1995 a). In Scotland, first-onset rates for mania are highest after age 74 years (Eagles and Whalley 1985). It seems that new factors, presumably including degenerative brain disease, come into play at higher ages, resulting in increased rates of late-onset psychoses which are symptomatically non-organic.

Cognitive deficits of the subtle kind have been found in paraphrenic patients more frequently than in age-matched healthy controls (Naguib and Levy 1987), but their pathogenesis is still in doubt. Three and a half years later, only 6.5% of the patients (and 5.9% of controls) were considered demented (Hymas et al. 1989). On a battery that included some recently developed computerised tests, a distinction was made between patients who had declined only in executive functions and patients with a general decline in cognitive ability (Almeida et al. 1995 c). The former were found to exhibit a wider range and a more severe pattern of psychotic symptoms, whereas the latter had more restricted and mainly negative psychotic symptoms associated with the presence of neurological soft signs and with abnormal involuntary movements (Hymas et al. 1989; Almeida et al. 1995 c; Almeida et al. 1995 d). On this basis it was proposed that two subgroups, or syndromes of late paraphrenia may exist, one closely related to schizophrenia, and the other more akin to the group of organic mental disorders (Almeida et al. 1995d; Howard et al. 1992b). Since patients with late-onset delusional disorders performed worse on a cognitive test than late paraphrenics (Howard et al. 1994), and in another study were found on CT scan to have more clinically silent cerebral infarctions (Flint et al. 1991), the relationships between delusional disorders and the subgroups of late paraphrenia described above need further exploration.

In an early study, late-onset affective disorders were not more likely than early-onset disorders in elderly patients to be associated with cerebral disease (Kay et al. 1955), but there is new evidence that vascular risk factors or cerebrovascular pathology are involved in at least some late-life affective disorders (Shulman et al. 1992; Krishnan 1993). The association with psychosis has been inconsistent (Lesser et al. 1991; O'Brien et al. 1996). Paradoxically, while technical advances seem to be showing that there is often an organic substrate, the traditional clinical entities of involutional and senile melancholia have largely been abandoned.

Follow-up studies

In the past, late paraphrenia was a chronic disorder, patients spending many years in institutions (Kay 1962). In a follow-up study during the pre-neuroleptic era, spanning 1945–1959, only 24% of patients with paranoid psychoses were recovered and 58% had not improved. Among manic depressive patients with paranoid delusions, 40% were recovered and only 14% were unchanged (Funding 1962). In two hospital studies in which comparisons were made with one carried out nearly 30 years earlier (Roth 1955) using the same diagnostic criteria, the discharge rate after 6 months had increased from 10 to 80% in one hospital and to 93% in the other, and the discharge of patients with affective disorder (with mixed ages of onset) had increased from 58 to 89% and 75%, respectively (Blessed and Wilson 1982; Christie 1982). The change was thought to be due to the use of psychotropic drugs and improved community care. With neuroleptic treatment, immediate and complete remission of symptoms occurred in 59% of previously untreated patients, and only 8% were unchanged (Post 1966); nevertheless, a prospective study revealed that paranoid symptoms had persisted for 3–5 years in 45% of patients (Table 1). In a Scandinavian study, paranoid psychoses diagnosed as reactive or psychogenic had a better prognosis than other types of paranoid psychosis (Jorgensen and Jorgensen 1985).

Studies of late paraphrenia include many patients with illnesses of long duration. In affective disorder the focus of interest is on the short-term outcome of the index episode, the response to various treatments and the rate of relapse or recurrence. Compared with non-delusional depression, delusional depression is associated with longer stay in hospital and with relative resistance to single antidepressants, often requiring drug combinations or electro-convulsive

Table 1 Some characteristics distinguishing late paraphrenia from late-onset affective psychosis and non-delusional major depression. LP late paraphrenia; EOS early-onset schizophrenia; DD delusional disorder; AMC age-matched healthy controls

	Late paraphrenia	Late-onset psychotic (delusional) depression or mania	Late onset non-delusional major depression	Comparisons with AMC and other groups
Male, female ratio	1:2.8–1:8.1 [3, 21, 48, 49, 54, 56, 64, 67, 94, 102, 110]	1:5.0 [10]; 1:1.1 [11] 1:4.1 [88]	1:2.6 [88]	LP 1:6.2 AMC 1:3.4 [94]
Never married	26–63% [3, 60, 64, 67, 102]	44–58% [11, 74[a]]	8–12% [11, 74[a]]	LP 26% AMC 46% [3]
Socially isolated or living alone	Isolated: 31–79% [3, 56, 64, 67, 70]	Alone 33%; no close friends 42% [74[a]]	Alone 25%; no close friends 17% [74[a]]	Isolated: LP 79% AMC 18% [3]
Premorbid personality	50% Paranoid or schizoid [59, 67, 70, 102]	Paranoid when delusions are paranoid [49]	Neurotic, dysthymic, inadequate [101, 104]	LP less abnormal than EOS [53] DD differs from schizophrenia [72]
Life events	Uncommon, e.g. bereavement, litigation, family quarrels [54, 69, 70]	Common in psychosis but no data about late-onset psychosis [104]	Psychogenic and physical events common [92, 104]	Severe event in mixed onset age group is non-related to presence of psychosis [44]
Hearing	Often impaired [3, 35, 33, 54, 56, 57, 67, 70, 102]; not related to auditory hallucinations [60]	No data	Normal for age? (depressions onset > 50 years) [33, 35]	LP 37–43% AMC 5–15% [3, 94]
Duration before admission, severity and length of stay	Onset usually insidious, less often sudden; duration: weeks or years [67]; mean: 5.9–8.6 years [3, 62]	Duration uncertain; depression severe, hospital stay longer [10, 11]	< 1 year 81–88% [10]; depression milder, hospital stay shorter [10, 11]	
Treatment response and 1-year outcome after index admission	Neuroleptics [62, 102]: immediate response good: 58%; later response: sustained 45%, partial/none 55%; ECT: temporary response in patients with marked depressive symptoms [67]	Drug combinations or ECT [15, 89]; discharge: well 83%; improved 13%; no change 4% [10]; outcome good 10% [92]; recovery slower, hospital stay longer than non-psychotics	Anti-depressants; discharge: well 71%; imp 21% no change 8% [10]; outcome good 44% [92]; recovery quicker, hospital stay shorter than psychotics [10]	Neuroleptics for mood-incongruent delusion 1 year outcome not related to psychosis in mixed onset age group [27]
Outcome > 1 year	Chronic if untreated [67, 102]; discharge 2 years: (1948) 21% [110]; (1976) 75% [21]; remission 25%; partial remission 40%; relapse 27–35%; chronic 10% [62, 64]; readmitted after mean 3.7 years: 35% [62]	Recurrent 5 years: recovered 33%, relapse/recover 42% chronic 25% [10]; readmitted often; psychosis tends to recur [10]. Outcome worse in mania?	Recurrent 5 years: recovered 21% relapse/recover 42%, chronic 37% [10]; readmitted less often; usually recurs as non-psychosis [10]	Elderly depressives with mixed onset age: 3 years f.u.: no significant difference between psychotic and non-psychotic in symptoms or social outcome [104]; overall: recovery 26–31%; chronic 12–17% [101, 104]
Dementia rate during follow-up	Not increased? 2 years: 3–12% [21, 67] 3 years: 16% [102] 3–5 years: 7% [62] 5–10 years: 8% [64]	1 year: 0–3.3% [27, 92, 101]	Increase suspected	3–5 years: LP 6.6%; AMC 5.9% [62]; elderly depressives with mixed onset age: 3 years: 6.5% [104]; 8 years: 26% [101]
Life expectation and cause of death	Normal expectation? Dead 2 years: 16–28% [21, 32, 65, 110]; mean 3.7 years: 26% [62]; 5 years: 32–35% [65, 67]; non-specific causes of death [65]	Reduced expectation? Dead 1 year: 23%[92]; 5 years: 33% [10]; no data on cause of death in DSM-IV psychotic depression	Reduced expectation? Dead 1 year: 11% [92]; 5 years: 33% [10] cerebrovascular causes in LO depression and mania? [65, 93, 112]	Dead: mean 3.7 years; LP 26%; AMC 23% [62]

[a] Community sample

therapy (Baldwin 1988; Benbow 1994). Psychotic symptoms tend to recur and readmission to hospital is more common (Baldwin 1988). Because of the differences in the course of these disorders, direct comparisons are difficult.

Long-term follow-up of late paraphrenia has shown that *in the absence of cognitive impairment at the outset*, the mortality rate does not differ from expectation (Kay 1962; Post 1966; Holden 1987; Hymas et al. 1989); and the causes of death are similar to those in the general population (Kay 1962; Hymas et al. 1989). There appear to be no data about long-term outcome in late-onset psychotic depression, but mania occurring for the first time late in

life seems to have a poor prognosis. Follow-up of major depression has shown that, in the absence of evidence of cognitive impairment at the outset (Bajulaiye and Alexopoulos 1994), there is no increase of dementia (Kay 1962; Post 1962; Holden 1987; Korten et al. 1997); and in a 9-year prospective study, affective symptoms did not predict subsequent dementia (Persson and Skoog 1992). However, life expectancy is reduced in late-life depression, with some increase in death from cardiovascular and cerebrovascular disease (Kay 1962; Murphy et al. 1988) as well as from suicide and undefined factors. With the increasing expectation of life in the general population, these observations are due for re-examination.

Summary of clinical epidemiology

Recent data support the heterogeneity of late-onset functional psychoses. Late paraphrenia has been shown to include paranoid-hallucinatory psychoses closely resembling paranoid schizophrenia of earlier life and a smaller group fulfilling criteria for delusional disorder. Neuropsychological and imaging studies suggest that these disorders form distinct groups, cerebral disease being more important in the latter. Further investigation including prospective studies with long-term follow-up are needed to confirm this distinction and to delineate more clearly how they differ in their genetic, demographic and premorbid characteristics.

Compared with late paraphrenia, the affective psychoses of late onset have been neglected. While late paraphrenia preferentially affects socially isolated women, those with premorbid personality of paranoid type and the unmarried and childless, it is unclear whether these features characterise late-onset psychosis in general or are specific to late paraphrenia. This is due to lack of data. Most studies of affective disorder in the elderly have been concerned with major depression, but when psychotic features are present, differentiation from paraphrenia becomes the clinician's main task. In the early stages at least, this may be difficult because of the many common symptoms and a similarity in treatment response. As for cerebral disease, its role in late-life depression in general seems clearer than it is in late paraphrenia, but its relation to affective psychosis in particular remains unclear, and the long-term prognosis and causes of death appear not to have been studied.

In dementia, psychotic features are common, but the nature and type of the delusions and hallucinations are somewhat different. In other neurological disorders where dementia is absent, psychoses may occur that closely resemble paraphrenic and affective psychoses.

Population-based epidemiological studies of late-onset psychoses

All of the foregoing has been based on studies of treated series. To complement this, the main features of 15 population-based estimates of prevalence are set out in Table 2. These show considerable variation in the size of the samples interviewed, their age group, response rates, the disorders identified and the methods of ascertainment. The disorders include schizophrenia, paranoid psychoses, paranoid symptoms and depressive psychoses. Within broad diagnostic categories, the relative stability of the estimates is more impressive than their differences.

A community study in Newcastle upon Tyne (Kay et al. 1964) found a prevalence of 1.9% for non-affective functional psychoses. This was determined by an unstandardised clinical assessment. Similar values of 1.0 and 1.6% were found in Scotland and in Wales (Parsons 1964; Williamson et al. 1964), respectively, again using unstandardised assessments by clinicians, and Bollerup (1975), who included institutions, found 0.3% with schizophrenia and 0.6% with psychogenic psychoses among 70-year-olds in Copenhagen. In 1173 U.S. subjects aged over 64 years and living in the community, with a response rate of 85%, "generalised persecutory ideation" as assessed on the paranoid scale of the Mini-Mult was present in 4% (Christenson and Blazer 1984). There was a significant excess of unmarried individuals, but no association with gender or living alone; other features were visual and hearing deficits, cognitive impairment, impaired physical health and disabilities in daily living, together with reduced social and economic resources. In a survey in Liverpool using the GMS/AGECAT package, there was one case with schizophrenia in a sample of 1070, a prevalence rate of 0.1%, but a higher rate of 3.0% for depressive psychosis (Copeland et al. 1987). In a later study on the same sample (Copeland et al. 1992), two subclinical cases were reported. Data from the Epidemiologic Catchment Area study, which had shown a 6-month prevalence of DSM-III schizophrenia of 0.3% among the elderly (Weissman et al. 1985), were also used to estimate the self-reported age-specific prevalence of hallucinations in a sample of 15 258 persons aged 18–80+ years; sleep-related and delirious states, but not dementia, were excluded. Although both visual and auditory hallucinations were highest in the age group 20–29 years, an increase in visual and auditory hallucinations was found between 60–69 years and 80+ years, more marked in women, and it was concluded that these results strongly pointed to the importance of ageing or age-related brain disorders for increased hallucinations in the elderly (Tien 1991).

Among 612 community-living elderly Singaporean Chinese interviewed with the GMS/AGECAT package, with a response rate of 68%, there were 3 cases (0.5%) with paranoid psychosis (Kua 1992). Two European studies included institutions and reported separate rates for delusional disorder. In one of these, only persons aged 85 years were included and 494 subjects of 783 were successfully interviewed, using a semi-structured interview and the Comprehensive Psychopathological Rating Scale (Åsberg et al. 1978; Skoog 1993). A strikingly high rate of 8.9% for all psychotic syndromes was found, with values of 2.6% for the schizophrenia group and 3.6% for delusional syndrome. The prevalence of the schizophreni-

Table 2 Community prevalence estimates for functional psychoses of late onset. C community; H residential and nursing homes: L long-stay hospitals; n. s. not stated

Authors	Site	No. interviewed	Residential status	Response rate (%)	Age range (years)	Disorder	Prevalence (%)	Comments
Kay et al. (1964)	England	309	C, H, L	98	≥ 65	Schizophrenia; late paraphrenia; paranoid states	1.0 0.1 1.0	Diagnosis by non--standardised interview by a psychiatrist M:F ratio 1:2.9
Williamson et al. (1964)	Scotland	200	C	81	365	Paranoid states	1.0	As above M:F no given
Parsons (1965)	Wales	228	C	93	≥ 65	Paranoid illness of psychotic intensity but no dementia	1.6	As above M:F not given
Bollerup (1975)	Denmark	588	C, H, L	94	70	Schizophrenia; Psychogenic psychoses; manic-depressive psychosis	0.3 0.6 0.5	Personal interviews
Christenson and Blazer (1984)	USA	997	C	85	365	Generalised persecutory ideation	4.0	Diagnosis by Mini-Multi paranoid scale, scoring 375 M:F not given
Weissman et al. (1985)	USA	2588	C	77	365	Schizophrenia	0.3[a]	Diagnostic Interview Schedule M:F 1:4.0
Copeland et al. (1987)	England	1070	C, H (not L)	72	≥ 65	Schizophrenia/ paranoid psychoses Depressive psychoses	0.1 3.0	GMS/AGECAT M:F not given
Bland et al. (1988)	Canada	358 199	C	72	≥ 65	Schizophrenia/ schizophreniform	0.0[a]	Diagnostic Interview Schedule
Kivelä and Pahkala (1989)	Finland	1529	C	?	> 60	Delusional depression	1.0%	Two-phase: Zung scale then GP interview M:F 1:2 58% unmarried
Tien (1991)	USA	15258	C	?	18–80	Hallucinations	10–15 (see text)	Diagnostic Interview Schedule M:F not clear
Keith et al. (1991)	USA	5723	ns	68–79	365	Schizophrenia/ schizophreniform	0.1[a]	Diagnostic Interview Schedule M:F 1:2
Copeland et al. (1992)	England	701	C, H (not L)	68	≥ 68	Schizophrenia/ paranoid psychoses Depressive psychoses	0.3 3.4	GSM/AGECAT M:F not given
Kua (1992)	Singapore	612	C	80	365	Paranoid disorder	0.5	Diagnosis by Geriatric Mental State/AGECAT M:F not given
Skoog (1993)	Sweden	494	C, H, L	63	85	Psychotic syndromes Schizophrenia/ schizophreniform Delusional syndrome	8.9 2.6 3.6	Semi-structured; rated according to Comprehensive Psychopathological Rating scale M:F not given
Copeland et al. (in press)	England	5220	C, H (not L)	87	≥ 65	Schizophrenia Delusional disorder	0.12 (CI 0.04–0.25) 0.04 (CI 0.00–0.14)	GMS/AGECAT M:F not given

[a] Estimates of 6-month prevalence

form syndrome was higher in persons with a dementia, particularly of the Alzheimer type, but this association did not hold for the delusional syndrome (Skoog 1993). In another study, 3519 individuals of 5222 aged 65 years or over were interviewed using the GMS/AGECAT package, an achieved rate of 67% (19% dead, 15% refused) and there were 12 cases (0.24%) and 39 subclinical cases (0.74%) of schizophrenia (Copeland et al., in press); in the same sample, by DMS-III-R criteria, there were 5 cases (0.12%) of schizophrenia and 3 cases (0.04%) of delusional disorder (Copeland et al., in press).

Prevalence of delusional depression in the population

In their Liverpool study, Copeland et al. (1987) found the prevalence of depressive psychosis by the AGECAT system to be 3.4%. Using the same system, Blanchard et al. (1994) found 13 cases of psychotic depression in a follow-up of 588 elderly persons in the Gospel Oak study, a prevalence of 2.2%. In a community study of the elderly (≥ 60 years) in Finland, depressive disorder was diagnosed by clinicians using DMS-III criteria. The prevalence of delusional depression was 1.0% (6 per 1000 in men and 12 per 1000 in women; Kivelä and Pahkala 1989). The depressive symptoms tended to be more severe than in non-delusional depression and the patients tended to be more lonely but to have better somatic health. Small numbers precluded further analysis.

Incidence studies of late-onset psychoses

Data based on hospital statistics and first contacts with psychiatric registers indicate an annual treated incidence rate of late paraphrenia of approximately 15–20 per 100000 (Kay 1972; Holden 1987; Castle and Murray 1993; Howard et al. 1994). Population-based studies employing DSM-III-R criteria have shown mean annual incidence rates of 3 per 100000 for schizophrenia (one new case) and 45 (when two relapses are included) and for delusional disorder of 16 (2 cases), but 95% confidence intervals are very wide (Copeland et al., in press). Moreover, two of these five cases were first diagnosed before age 65 years. No incidence rates are available for psychotic depression of late onset.

Difficulties in evaluating community surveys in comparison with clinical series arise mainly from two sources:

1. Case ascertainment: in the samples examined, there is the suspicion that sample bias has not been entirely overcome, due to refusal of paranoid individuals to participate; there is however, no direct evidence to support this. Next, cases of psychosis may not be picked up from subjects' self-assessments of their symptoms. This applies particularly to delusions. Caregivers' reports and knowledge of medical history and current medications would improve the quality of information.

2. Information yield: when prevalence rates are reported in community studies, cases already known to psychiatric services are not separated from those who were not previously recognised; and there is often no information about age of onset of the psychosis. The advantages gained by carrying out community studies are therefore difficult to evaluate.

Conclusion from population-based studies

The information obtained from samples of the general population, as listed in Table 2, leads to the following conclusions:

1. Functional psychotic disorders in the elderly living in the community have low base rates compared with the dementias.

2. The prevalence of schizophrenia in late life may be lower than the approximate value of 1% generally accepted (Keith et al. 1991) for the general adult population. Referring to their own data, Copeland et al. (in press) have suggested that this could be due to selective mortality, remission of symptoms or non-availability of respondents. If there is indeed a lower prevalence of schizophrenia in late life, the reasons need to be pursued.

3. Within the elderly age group, the prevalence of schizophrenia and delusional disorder probably increases with age, but many studies do not provide data on this.

4. Very few of the field studies have been able to distinguish between longstanding psychotic disorders and those that have emerged only in later life: they rarely reveal the age of onset. An exception is a recent study (Copeland et al., in press) in which an attempt was made to estimate both the duration of prevalent disorders and the incidence of new ones. These authors found conspicuously low rates for both prevalence and incidence. While the lack of information about onset may in some instances be an oversight in the methods used, it is also likely to be attributable to difficulties in obtaining an independent history from an informant, which is desirable for valid information.

5. Psychotic symptoms are appreciably more common than formal diagnostic categories.

6. In those studies where separate rates have been provided, women have higher rates than men.

7. The reported prevalence rates are likely to be an underestimate, due to under-reporting and the possible over-representation of psychotic persons in those not interviewed (Launer et al. 1994).

8. In those studies that inquired about it, impaired hearing and vision have both been found to be associated with psychotic symptoms (e.g. Christenson and Blazer 1984).

9. Similarly, where it has been assessed, social isolation is a further associated factor, but it is unknown if this is contributory or secondary.

10. Self-report of poor health is more common in the psychotic group.

11. Only a small number of studies have determined the proportion of persons with psychotic symptoms who were receiving health or social services. Although it might intuitively be expected that paranoid or deluded individuals would be less likely to come to attention or to accept professional services, the evidence is that such persons do not differ from others in such contacts, at least in some communities (Christenson and Blazer 1984).

12. In population-based surveys where psychotic symptoms and cognitive function have both been assessed, there is consistent evidence that paranoid or delusional symptoms are more frequent in persons with cognitive impairment. Furthermore, the well-established association between functional psychotic syndromes and dementia in clinical series may be the same association that has now been reported in community samples, where paranoid symptoms have been found to co-occur with cognitive impairment.

13. Field studies have not often documented those variables identified in clinical series as being of interest. These include gender, marital status, number of offspring, social isolation, premorbid personality, adverse life events and longstanding difficulties, family history of mental disorders and mortality. The absence of data on these lies in part in the limitations on the coverage that is practicable in field interviews, but also in the low base rates that are obtained for late-onset psychoses or psychotic symptoms.

Research prospects

From the evidence brought together here, it is concluded that, despite the reservations set out at the beginning of this paper, the potential sources of bias in clinical series have not distorted the associations reported there. The phenomenology is consistent, with clear evidence that these states do occur in the community in non-trivial numbers; and that the same psychotic syndromes occur in the community as in clinical series. From the latter, it is clear that a substantial proportion have developed a psychosis only in later life (Post 1962; Kay et al. 1976; Howard et al. 1994). Although late-onset psychotic states are uncommon, the information about them reviewed here leads the present authors to conclude that they are a fertile group for fundamental research on the functional psychoses. The epidemiological data give the following pointers for future research.

Since prevalence rates of psychosis in elderly people have usually been obtained as a by-product of studies of mental disorders in general, or of surveys of dementia or depression, the yield of aetiological information has been modest. Multi-centre studies would provide larger numbers for analysis. The samples should include those persons already in contact with social and psychiatric services; and the information from research interviews supplemented by data from these sources. This would both increase the information available about the cases and possible cases already identified, and also help to identify any who were missed during the survey (Williamson et al. 1964). Whether population or clinic-based, long-term prospective studies are highly desirable. During these, when consent can be obtained, the course of the psychotic disorder needs to be monitored. Wherever national registers exist, life expectancy and cause and place of death should be determined by flagging the whole cohort. In such prospective studies, a strategy that is likely to help in advancing knowledge is to pursue the *interaction* of aetiological factors across several domains. This would bring the capacity to investigate interaction between personality traits, genes conferring vulnerability, experiential factors, the current social environment and degenerative changes in brain function. It is this interaction that must eventually explain why a small number of individuals become psychotic only towards the end of their lives.

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