ORIGINAL ARTICLE

Incidence and Recurrence of Late-Life Depression

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Context: Depression is common in old age. Nevertheless, few incidence studies have established how often depression occurs in elderly persons with and without a history of depression.

Objectives: To determine the incidence and recurrence rates of depression in an elderly population.

Design, Setting, and Participants: A cohort study of community-dwelling elderly persons aged 56 years or older residing in Rotterdam, the Netherlands, performed between September 1993 and October 2005 and encompassing baseline and 2 follow-up examinations as well as continuous procedures. The study population consisted of 5653 participants free of dementia. Depression was identified through standardized psychiatric examinations, monitoring of medical records, registration of antidepressant use, and self-reported histories of depression. We categorized the depression as depressive syndromes, including *DSM-IV*–defined major depression, or clinically relevant depressive symptoms.

Main Outcome Measures: Incidence and recurrence rates for depressive syndromes as well as for depressive syndromes and symptoms combined. In addition to overall rates, sex- and age-specific rates were calculated.

Results: During the follow-up period of 8 years on average, 566 depressive syndromes and 1073 episodes of clinically relevant depressive symptoms occurred. For depressive syndromes, the incidence rate was 7.0 (95% confidence interval, 6.0-8.3) per 1000 person-years and the recurrence rate was 27.5 (95% confidence interval, 23.7-32.1) per 1000 person-years. The incidence and recurrence rates more than doubled when episodes of depressive symptoms were included. The recurrence rate of depressive syndromes was equal for women and men, but all other rates were almost twice as high for women compared with men. No rates seemed to change with age.

Conclusions: The incidence rate of depression in the elderly population is low except when episodes of clinically relevant depressive symptoms are accounted for. Most late-life depression occurs in persons with a history of depression. Moreover, the recurrence rate of depressive syndromes does not differ between men and women.

Arch Gen Psychiatry. 2008;65(12):1394-1401

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DEPRESSION IN OLD AGE places a severe burden on patients and relatives, and it occurs frequently.[1-4] Numerous studies have shown that the prevalence of clinically relevant depressive syndromes ranges from 9% to 18% in the general elderly population and to more than 30% in nursing home residents.[1-3,5] To further assess risk and establish risk factors for late-life depression, incidence studies are needed. However, incidence studies that focus on cohorts of elderly persons are scarce.[6,7] Incidence studies in mixed-age populations have often involved only small elderly subgroups and have not been geared to the specific characteristics of late-life depression.[8-10]

In elderly people, depressive syndromes that escape the strict criteria of the *DSM* for major depressive disorder (MDD) and dysthymia are more common.[1,3,11] Such subthreshold depressive syndromes are often considered clinically relevant because they are related to increased disability and mortality like *DSM*-defined depressive disorders are.[12-15] Therefore, these subthreshold depressions need to be included when estimating incidence rates. Finally, incidence studies to date have typically been based on sequential psychiatric examinations in consecutive follow-up rounds.[2,9,10,16] Depression that developed and remitted in the interval between follow-up rounds could have easily been missed owing to recall problems and loss to follow-up.[17,18] Therefore, methods to identify depression in the interval period are needed to validly estimate incidence rates.

To our knowledge, 2 studies have estimated incidence rates of *DSM*-defined depressive disorders in nondemented elderly cohorts. However, the observed incidence rates varied substantially, ranging between 8 per 1000 person-years in an American cohort and 23 per 1000 person-years in a Swedish cohort.[19,20] Case-finding methods as well socioeconomic backgrounds of the study populations differed significantly and might explain the discrepancy. Neither of

these studies and no other population-based study presented the rate of recurrent depression. Recurrence rates represent the risk of new depressive episodes in persons who already experienced 1 or more episodes of depression. In clinical studies, 13% to 88% of elderly patients had a recurrence, depending on whether they received maintenance treatment and on the duration of follow-up.[21-26] Information on recurrence rates of depression would complement information on incidence rates of new-onset depression in the general population.

Our objective was to determine incidence and recurrence rates of depression in a population-based cohort study of nondemented elderly persons. We used a combination of assessment methods, including continuous monitoring procedures, to identify new-onset depression.

METHODS

SETTING

This investigation was embedded in the Rotterdam Study, a prospective population-based study on incidence and determinants of diseases in late life. In 1990, all inhabitants of a district of Rotterdam, The Netherlands, aged 55 years and older were invited and 7983 agreed to participate (response rate, 78%).[27] The Medical Ethics Committee of the Erasmus Medical Center, Rotterdam, approved the study. Written informed consent was obtained from all of the participants.

So far, 4 examination rounds have taken place from July 1989 to June 1993, September 1993 to December 1995, March 1997 to December 1999, and January 2002 to July 2004. Participants underwent an extensive home interview and a physical examination at the research center. Continuous monitoring for major events that occurred during follow-up was achieved through linkage with the medical files from general practitioners (GPs). These files contain all medical information as the Dutch health care system requires all residents to be registered with a GP and specialists report back to the GP. Information on vital status was obtained bimonthly from the municipal authorities in Rotterdam.

STUDY POPULATION

During the first examination round of the Rotterdam Study, 7983 persons participated. Of these participants, 771 died before the second examination round and 736 were lost to follow-up or refused further participation in any subsequent rounds. In total, 6476 participants participated in the second examination of the Rotterdam Study; this examination constituted the baseline of the present study (**Figure 1**).

Of these 6476 participants, 4940 were screened for depressive symptoms, 1372 did not receive a questionnaire containing the screening instrument for depressive symptoms, and 164 did not complete the screening questionnaire. However, 829 of these 1536 nonscreened persons were successfully screened in the next examination round. Of the remaining 707 persons, 339 died before this round and 395 were lost to follow-up or refused further participation. Thus, 5769 persons (4940 + 829) were screened for depressive symptoms. We excluded 105 persons with dementia at baseline according to earlier published criteria,[28] 9 persons who had been diagnosed with bipolar disorder before or after baseline, and 2 persons who died on the day they had been screened. This resulted in a cohort of 5653 persons for the analysis.

Persons with dementia were excluded because they cannot report depressive symptoms validly, and without information from primary caregivers, estimates of the incidence of depression in persons with dementia are invalid.[3]

ASSESSMENT OF DEPRESSION

Screening for depressive symptoms was introduced as a pilot project in the Rotterdam Study. At baseline, 48% of the participants filled out the validated Dutch version of the Center for Epidemiologic Studies Depression Scale (CES-D) and 52% filled out the validated Dutch version of the Hospital Anxiety and Depression Scale.[29,30] The CES-D consists of 20 questions with possible scores of 0 to 3. A score of 16 or higher on the CES-D is considered indicative of a depressive disorder. Ten percent of participants scored higher than this cutoff. The Hospital Anxiety and Depression Scale contains a subscale of 7 questions on depressive symptoms with possible scores of 0 to 3. We applied a score of 9 or higher as the cutoff for the Hospital Anxiety and Depression Scale as it yielded a percentage of screen-positive participants similar to that of the CES-D (10%). Among community populations, the Hospital Anxiety and Depression Scale had a sensitivity of 90% and a specificity of 91%, and the CES-D had a sensitivity of 100% and a specificity of 88%.[30,31] To enhance case finding during the follow-up period, information on the occurrence of new-onset depression was collected with multiple assessment methods.

PSYCHIATRIC EXAMINATION

During the 2 follow-up rounds, we used a 2-step procedure to assess whether participants were going through a depressive episode. First, all of the participants were screened with the CES-D as part of the home interview. The screen-positive participants were invited for a clinical interview. A psychiatrist (W.O.), psychogeriatrician (H.J.L.), or clinical psychologist (H.R.T.), each with extensive clinical experience, conducted the interview using the Dutch version of the Present State Examination. This is a semistructured psychiatric interview included in the Schedules for Clinical Assessment in Neuropsychiatry.[32] Scoring of items is conservative and relies on clinical judgment instead of the participant's answer only. Each interviewer was trained in the certified Dutch World Health Organization center. With a computerized diagnostic algorithm based on the item scores, major and minor depressive disorders and dysthymia were classified according to *DSM-IV* criteria. The psychiatric examination data were complete for 97% of the participants in the first follow-up round and 97% of the participants in the second follow-up round.

CONTINUOUS MONITORING OF MEDICAL RECORDS

Active surveillance for the occurrence of depression took place from baseline onward. Trained research assistants systematically scrutinized all of the information contained in the medical records of the GPs, for instance, hospital discharge letters, specialist reports, and notes of the GP, for a number of predefined cues such as symptoms of depression, prescriptions of psychiatric medication, the occurrence of major life events, and psychosocial problems. They copied information that indicated potential depression. By October 1, 2005, this information was complete for 85% of participants in the follow-up period. Next, 2 physicians (H.J.L. and M.J.H.J.D.) and a research psychologist (J.F.B.) independently read all copied information. They categorized each depression according to a predefined protocol. Instances of bipolar depressive disorder were ascertained as well. All discordant categorizations were discussed in consensus meetings.

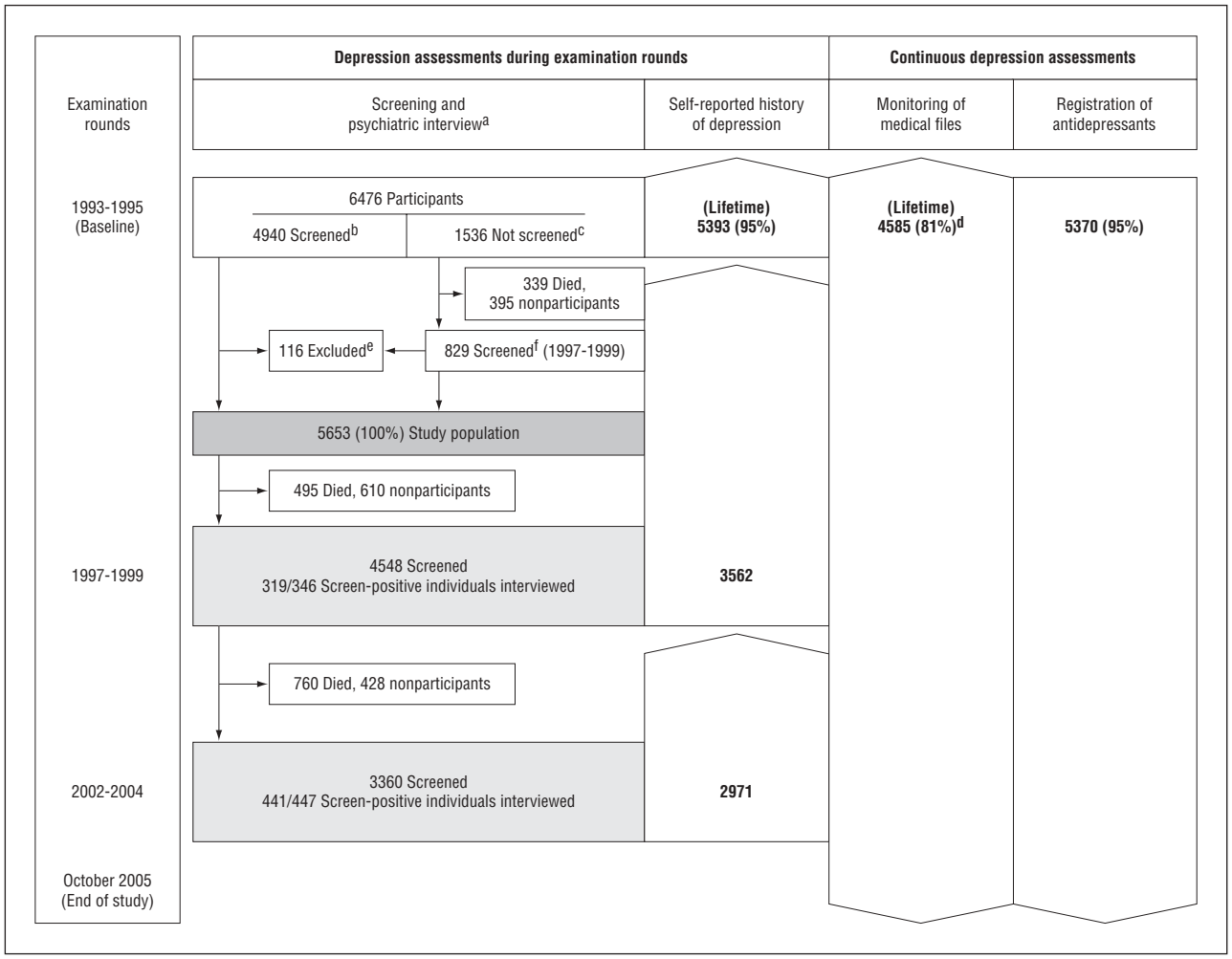

Figure 1. Assessment of depression in the Rotterdam Study, including participant flow, methods, and timing. [a]The Hospital Anxiety and Depression Scale and Center for Epidemiologic Studies Depression Scale were used as screening instruments at baseline (in 52% and 48% of participants, respectively); in consecutive rounds only the Center for Epidemiologic Studies Depression Scale was used, and screen-positive individuals were interviewed with the Present State Examination included in the Schedules for Clinical Assessment in Neuropsychiatry. [b]These 4940 persons contributed person-years from the 1993 to 1995 baseline examination round onward. [c]A total of 1372 participants were not screened because their questionnaire did not contain the depression screening instrument owing to logistical reasons, and 164 participants did not complete the screening questionnaire. [d]Overall, 81% of participants had their medical records monitored, but coverage of person-years was 85%. [e]Of these 116 participants, 9 were excluded owing to bipolar disorder, 105 were excluded owing to dementia, and 2 died on the day of baseline assessment. [f]These 829 persons contributed person-years from the 1997 to 1999 examination round onward.

REGISTRATION OF ANTIDEPRESSANT DRUG USE

The 7 fully computerized pharmacies that serve the study area routinely store information on drugs dispensed to participants in an online database. Ninety-five percent of the participants of the Rotterdam Study fill their prescriptions at one of the pharmacies in the study district. The other 5% either moved out of the study district or resided in a nursing home with its own pharmacy. Files were updated from the start of the Rotterdam Study until October 1, 2005. For this study, we used the information on antidepressants to identify potential depressive symptoms or specify the date of onset of a depressive episode.

SELF-REPORTED HISTORY OF DEPRESSION

At baseline and during each follow-up round, all of the participants were interviewed by a physician to establish their medical history, including depression and certain somatic diseases. Participants were asked standardized questions to assess whether they had an episode of depression since the previous examination round, and if so, whether they had been treated and at what age the episode had occurred. Baseline data were complete for 95% of the participants.

CATEGORIZATION OF DEPRESSION

We recorded depression that fulfilled *DSM-IV* criteria as well as depressive episodes that were clinically relevant but did not meet *DSM* criteria. The GPs frequently diagnosed depression without using or documenting the formal *DSM* criteria. We applied a categorization of depression that reflects this variation in severity and diagnostic approach. Our categorization consisted of 2 categories: depressive syndromes, including *DSM-IV* depressive disorders, and clinically relevant depressive symptoms.

The category of depressive syndromes consisted of MDD and dysthymia together and other depressive syndromes. The MDD and dysthymia group encompassed depressive episodes that clearly met the *DSM-IV* criteria for these disorders. Furthermore, the episodes were diagnosed by a psychiatrist or another mental health professional—be it in specialist health care or by psychiatric interview as part of the Rotterdam Study. The group of other depressive syndromes covered the following: (1) depression recorded by a GP or physician; (2) self-reported depression for which the participant consulted a GP or a mental health professional; and (3) *DSM-IV* minor depression.

The category of clinically relevant depressive symptoms included the following: (1) 1 clinically relevant core symptom of major depression recorded during the psychiatric interview or in the medical record; (2) self-reported depression of a participant who did not consult a GP or a mental health professional; and (3) initiation of antidepressant drug treatment (without documentation of clinical symptoms).

We applied the same criteria to categorize depression that preceded the study period. Grief, adjustment disorder, and burnout, characterized by emotional exhaustion and reduced satisfaction in personal accomplishment,[33] were not regarded as depression.

RECURRENT EPISODES

We assumed that a person had recovered fully if no depressive symptoms had been recorded and no antidepressant had been used for a period of at least 2 years.[34] This 2-year criterion not only reflects a conservative approach but was also deemed appropriate because depression often has a long-term course, with only 60% of patients recovering in 1 year and 70% to 80% recovering in 2 years.[6,12,21,22,35-38] This way, we took into account that ongoing depressive episodes are frequently poorly documented in primary care medical records and that a long lag exists between the onset of a depressive episode and its presentation to a GP. Ideally, actual cessation dates are used, but these are difficult to ascertain in population-based studies.

DATE OF ONSET

We defined the date of onset of a depressive episode as the following: (1) the self-reported date of onset as provided in the psychiatric interview or the self-reported history of depression; (2) the first occurrence of a depressive symptom in the medical records; or (3) the day on which the first prescription of an antidepressant drug was dispensed.

DUPLICATE REPORTS

When an episode was identified with 2 or more assessment methods, we used the most specific assessment method to determine the diagnosis, ie, the psychiatric interview overrules the medical records, which in turn overrule the self-reported histories and prescription data. We took the earliest date to define the date of onset with the exception that a date reported retrospectively in the history of depression could not overrule a date from any other assessment method.

DATA ANALYSIS

We analyzed incidence and recurrence rates. Persons with no history of depression could experience first-ever depression during follow-up (incidence rate). Persons with a history of depression or prevalent depression at baseline were at risk for recurrent depression (recurrence rate).

First, we calculated the incidence and recurrence rates of all depression combined, including MDD, dysthymia, other depressive syndromes, and clinically relevant depressive symptoms. The incidence rate was calculated in 3459 participants who did not have depressive symptoms at baseline or a history of depression and were therefore at risk for first-ever depression. The recurrence rate was calculated in a total of 2753 participants who were at risk for recurrent depression: 1645 participants had a positive history of depression and 549 participants had prevalent depression at baseline; 559 participants were at risk after they had experienced a first-ever episode during follow-up.

Second, we calculated incidence and recurrence rates of depressive syndromes only, including MDD and other depressive syndromes. For this analysis, the first follow-up examination served as baseline because this was the first round during which prevalent depressive syndromes were formally diagnosed (n=4343). There were 3461 participants at risk for first-ever depression and 1158 at risk for recurrent depression. In addition, we calculated the incidence and recurrence rates of MDD and dysthymia in this study population.

All of the rates were obtained by dividing the number of new-onset episodes by the number of person-years at risk. Participants were censored when 1 of the following events occurred: dementia, death, loss to follow-up, or October 1, 2005 (end of the study). Individuals did not contribute person-time to the analyses of the recurrence rates as long as they used antidepressants or during the 2 years after the last prescription. Age-specific rates were calculated per 10-year age stratum (≤64, 65-74, 75-84, and ≥85 years) for men and women separately. The 95% confidence intervals (CIs) were based on the Poisson distribution. Female to male ratios for the rates were calculated using Cox proportional hazards analysis adjusted for baseline age. To assess the effect of the 2-year criterion in our definition of a recurrent episode, we recalculated the recurrence rates using a 1-year criterion and a 3-year criterion.

Finally, we compared the 736 persons who refused to participate at baseline with the 6476 responders. Similarly, we compared the 1536 participants who were not screened in the 1993 to 1995 baseline examination round with the 4940 screened participants.

RESULTS

At baseline, the study population consisted of 2945 women (58%) and 2159 men (42%). The mean age was 70 years (range, 56-102 years), 63% of the participants were married or living together, and 20% had a primary school education only. The participants lived independently (97%) or in an assisted living facility (3%). In total, 1744 persons died during the follow-up period. The mean follow-up period was 8.0 years.

In the follow-up period, 2093 episodes of new-onset depression were identified. After discarding 454 duplicate reports, 1639 episodes remained. **Table 1** displays the number of episodes that were identified with each assessment method. All of the methods contributed considerably to the number of episodes identified. Of these episodes, 174 were categorized as MDD or dysthymia, 392 as another depressive syndrome, and the remaining 1073 as clinically relevant depressive symptoms. Two-thirds of the episodes (1080 of them) involved recurrent episodes. A total of 216 persons experienced more than 1 episode during the follow-up period.

Table 2 presents the overall and sex-specific incidence and recurrence rates for episodes of depressive syndromes and clinically relevant depressive symptoms combined. The overall incidence rate was 19.3 (95% CI, 17.8-21.0) per 1000 person-years. The Cox proportional hazards regression generated an age-adjusted female to male ratio of 1.56 (95% CI, 1.31-1.86). The recurrence rate was 65.6 (95% CI, 61.8-69.7) per 1000 person-years. Thus, the rate of any new-onset depression in participants with a positive history is more than 3 times higher than the rate in participants with no history. The age-adjusted female to male ratio was 1.39 (95% CI, 1.21-1.59) for the recurrence rate. **Figure 2** shows that the incidence and recurrence rates appeared to be relatively stable across 10-year age groups.

Table 1. Number of Episodes of Depression by Assessment Method in 5653 Individuals[a]

Assessment Method	Depressive Syndromes, No. of Episodes: MDD and Dysthymia	Depressive Syndromes, No. of Episodes: Other Depressive Syndromes	Depressive Symptoms, No. of Episodes	All Depressive Episodes, No. (%)
Psychiatric examination	133	83	178	394 (24)
Medical records	41	89	122	252 (15)
Self-reported history	NA	220	115	335 (20)
Antidepressant use	NA	NA	658	658 (40)
Total	**174**	**392**	**1073**	**1639 (100)**

Abbreviations: MDD, major depressive disorder according to *DSM-IV* criteria; NA, not applicable.
[a]Only unique episodes are reported. When duplicate reports exist, the episode is reported under the most accurate assessment method. For instance, 35 duplicate reports of depressive syndromes in medical records were ignored.

Table 2. Sex-Specific and Overall Incidence and Recurrence Rates of Episodes of Depressive Syndromes and Depressive Symptoms Combined per 1000 Person-Years

Incidence and Recurrence	Episodes, No.	Person-Years	Rate (95% CI)[a]
Incidence (n=3459)			
Men	198	13 500	14.7 (12.8-16.9)
Women	361	15 431	23.4 (21.1-25.9)
Overall	559	28 932	19.3 (17.8-21.0)
Recurrence (n=2753)			
Men	295	5712	51.6 (46.1-57.9)
Women	785	10 745	73.1 (68.1-78.4)
Overall	1080	16 457	65.6 (61.8-69.7)
Total	**1639**	**45 389**	**36.1 (34.4-37.9)**

Abbreviation: CI, confidence interval.
[a]The rate is the number of episodes per 1000 person-years.

Table 3. Sex-Specific and Overall Incidence and Recurrence Rates of Episodes of Depressive Syndromes per 1000 Person-Years

Incidence and Recurrence	Episodes, No.	Person-Years	Rate (95% CI)[a]
Incidence (n=3461)			
Men	40	8932	4.5 (3.3-6.1)
Women	107	11 990	8.9 (7.4-10.8)
Overall	147	20 922	7.0 (6.0-8.3)
Recurrence (n=1158)			
Men	47	1914	24.6 (18.5-32.7)
Women	120	4149	28.9 (24.2-34.6)
Overall	167	6063	27.5 (23.7-32.1)
Total	**314**	**26 985**	**11.6 (10.4-12.9)**

Abbreviation: CI, confidence interval.
[a]The rate is the number of episodes per 1000 person-years.

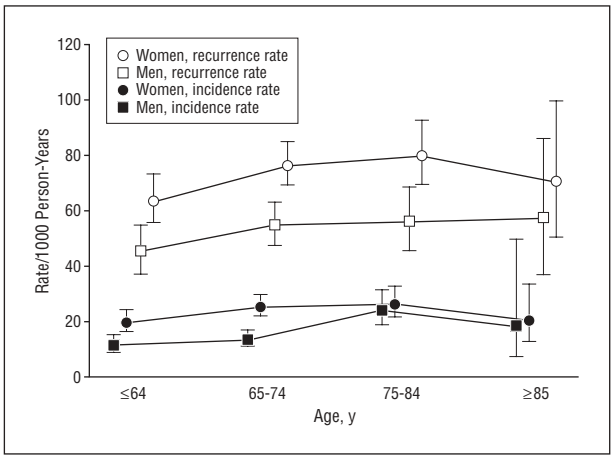

Figure 2. Sex-specific incidence and recurrence rates of episodes of depressive syndromes and symptoms combined per age group.

Table 3 shows the overall and sex-specific incidence and recurrence rates for depressive syndromes only. The overall incidence rate was 7.0 (95% CI, 6.0-8.3) per 1000 person-years. Using Cox regression, we found an age-adjusted female to male ratio of 1.95 (95% CI, 1.49-2.56). The overall recurrence rate was 27.5 (95% CI, 23.7-32.1) per 1000 person-years. The female to male ratio was 1.18 (95% CI, 0.84-1.65). Similarly, incidence and recurrence rates appeared to be relatively stable across 10-year age groups.

The incidence rate for MDD and dysthymia was 2.1 (95% CI, 1.6-2.8) per 1000 person-years, with a female to male ratio of 2.44 (95% CI, 1.47-4.06). The recurrence rate was 10.2 (95% CI, 8.0-13.0) per 1000 person-years, with a female to male ratio of 0.95 (95% CI, 0.56-1.60). The rates were relatively stable with age.

When reestimating the recurrence rates using a 1-year criterion and a 3-year criterion instead of a 2-year criterion for the definition of a recurrent episode, the overall rate for all episodes combined changed from 65.6 (95% CI, 61.8-69.7) per 1000 person-years to 76.9 (95% CI, 73.0-81.1) and 60.8 (95% CI, 57.0-64.8) per 1000 person-years, respectively. Likewise, the overall rate of 27.5 (95% CI, 23.7-32.1) per 1000 person-years for depressive syndromes only became 30.1 (95% CI, 26.2-34.6) per 1000 person-years using a 1-year criterion and 21.0 (95% CI, 17.4-25.4) per 1000 person-years using a 3-year criterion.

At baseline, nonparticipants as compared with participants were on average older (mean age, 75.8 vs 68.6 years, respectively), more likely to be female (70% vs 60%, respectively), and more likely to have a primary school education only (39% vs 23%, respectively). The 1536 participants who were not screened in the 1993 to 1995 round did not differ from the 4940 participants who were screened for depressive symptoms at that time.

COMMENT

In this study of community-dwelling elderly persons, incidence rates were 19.3 per 1000 person-years for first-ever depressive syndromes and clinically relevant depressive symptoms combined and 7.0 per 1000 person-years for depressive syndromes only. However, most episodes occurred in persons with a history of depression, with recurrence rates being more than 3 times as high as incidence rates. In women as compared with men, the incidence and recurrence rates of depressive syndromes and symptoms combined were almost twice as high, but women and men had similar risks of a recurrent depressive syndrome.

Before discussing our findings, we point out the strengths and weaknesses of our study. First, this is a large study population with a long follow-up, which enhances the accuracy of the estimates. Second, to overcome recall problems, we combined several assessment methods to enhance the detection of incident cases. During the follow-up rounds, an extensive psychiatric assessment was applied and a self-reported history of depression was recorded. As older patients are less likely to acknowledge having affective symptoms,[39] we chose the CES-D as a screening instrument; it has been validated in elderly populations and yields small numbers of false negatives when using a cutoff score of 16.[30,40] The Schedules for Clinical Assessment in Neuropsychiatry interview method has a high sensitivity compared with the Diagnostic Interview Schedule and Composite International Diagnostic Interview, especially in elderly populations, and provides accurate *DSM-IV*–defined diagnoses.[41-43]

Furthermore, we identified depression that occurred between the follow-up rounds by monitoring medical records and registration of antidepressant use. The major advantage of these prospectively gathered data are that recall and selection bias are reduced. People tend to forget or undervalue past episodes of depression and report only those episodes that occurred in the 5 years preceding the assessment.[18,44] Moreover, as depression is related to mortality and loss to follow-up, episodes will be missed especially in elderly persons.[12] However, abstracting diagnoses from medical records also has some limitations. The information in the records is recorded for the purpose of patient care, not for epidemiological research. Symptoms of depression may have been incompletely recorded or omitted. Even though we applied a broad range of cues that indicate depression, this drawback cannot be fully overcome. Moreover, depression often remains unrecognized as many elderly patients tend to present with somatic symptoms masking emotional symptoms.[35,45-47] General practitioners diagnose between 30% and 60% of depression, with lower recognition for milder cases.[48-50] However, when a GP diagnoses depression this probably reflects actual depression,[51] but the reports of other health professionals to the GPs were often elaborate with substantiated *DSM*-classified diagnoses.

Not only does automatic registration of filled prescriptions have the advantages of prospective methods, but also the data are particularly useful to specify the date of onset of episodes. In some etiological studies, antidepressant use is treated as an indicator of a depressive syndrome.[52,53] However, modern antidepressants are commonly prescribed for other indications such as anxiety disorders, sleeping disorders, migraine, or neuropathic pain.[54,55] Population surveys and family practice studies have shown that 43% to 56% of patients receiving an antidepressant do not fulfill the criteria of depression.[54,56-58] Hence, we regarded antidepressant use as a marker of depressive symptoms only.

The psychiatric assessment during the examination rounds yielded more valid diagnoses than the other methods. The main rationale for using data from other sources, albeit with different diagnostic certainty and reliability, was to identify the depressive episodes that occurred and remitted in the intervals between follow-up examination rounds. Information from the different sources is thus additive. At the same time, many episodes of depression successfully treated with antidepressants are not recalled and certainly not screened positive if assessed with the CES-D only. In addition, depression for which a participant has not sought help will have been missed more easily. The category of clinically relevant depressive symptoms probably covers the most diverse types of depression. One core symptom of major depression recorded in the psychiatric interview or in the medical record was considered a sufficiently valid indication of the presence of clinically relevant depressive symptoms. In addition, even though the use of an antidepressant drug provides less diagnostic certainty, it indicates depression in 50% of users.[54,56-58]

Our study yielded incidence rates lower than those presented by other studies in elderly populations. In our study the incidence rate for major depression and dysthymia was 2.1 (95% CI, 1.6-2.8) per 1000 person-years, whereas the Cache County study presented an incidence rate for major depression of 8 (95% CI, 6-11) per 1000 person-years.[20] To some extent, this higher incidence rate is explained by the diagnoses of depression that were made in interviews with family and caregivers of deceased participants (20% of total). Similarly, in our study the incidence rate for depressive syndromes, including major depression, dysthymia, and minor depression, was 7.0 (95% CI, 6.0-8.3) per 1000 person-years, whereas the Göteborg study yielded an incidence rate for major depression, dysthymia, and depression not otherwise specified of 23 (95% CI, 18-29) per 1000 person-years.[19] This study differed from ours in that it was performed more than 20 years ago in a relatively small birth cohort of 322 persons born in 1901 and 1902. Most likely, though, our lower estimates resulted from our conservative approach in categorizing depressive episodes as being a depressive syndrome. In addition, our study population may have included fewer participants with misclassified negative histories because data were available on the occurrence of depression in the period between the start of the study and the first follow-up examination, which served as the baseline for our analysis of depressive syndromes. Indeed, the incidence rate of depressive syndromes and symptoms combined that we found seems more in line with that of the aforementioned Cache County study: 19.3 (95% CI, 17.8-21.0) per 1000 person-years compared with 24 per 1000 person-years, respectively.[20] In particular, 20% of the depression cases in the latter study involved bereavement. Finally, some studies have found that late-life depression is more often characterized by somatic and cognitive symptoms even though others found no differences.[59-62] As the conventional core

symptoms of depression in the *DSM* are important for our categorization, the incidence and recurrence rates that we present are probably conservative estimates.

Some landmark studies performed among mixed-age populations in North America and Scandinavia, such as the Epidemiologic Catchment Area Study, the Lundby Study, and the Stirling County Study, have also estimated incidence rates of major depression in the elderly subgroups. The most recently published analyses show incidence rates for major depression between 0.9 and 4.5 per 1000 person-years.[8-10] We found an incidence rate for major depression and dysthymia of 2.1 (95% CI, 1.6-2.8) per 1000 person-years. The results seem similar to ours even though in the cited studies psychiatric assessments were generally based on the Diagnostic Interview Schedule, intervals between follow-up rounds were much longer (11-40 years), continuous monitoring during the intervals was generally lacking, and demented participants were not excluded.

In our study, we found particularly high recurrence rates for both depressive syndromes and clinically relevant depressive symptoms even though we discounted all events occurring within 2 years of the previous episode. To our knowledge, no other study to date has estimated recurrence of depression in a general elderly population. In clinical elderly populations, the risk of recurrence increased with the number of lifetime episodes and decreased as the duration of recovery increased.[21,63,64] A few population-based studies, all conducted in predominantly middle-aged adults, consistently found that about half of the depressed persons had a recurrence if followed up for longer periods.[38,65,66] Our study showed that the recurrence rates of MDD and dysthymia were 5 times as high as the first-ever incidence rates in later life. This suggests that clinicians must be aware not only that many episodes of late-life depression will be chronic or recurrent but also that few episodes of depression diagnosed are first-ever episodes. This emphasizes the importance of maintenance treatment and close monitoring after recovery from depression.

We found that men and women had similar risks for a recurrent depressive syndrome even though the female to male ratios of the other rates that we studied were in line with the well-known range of ratios between 1.5 and 3.0.[67,68] In adult populations, no significant sex differences in the course of MDD were found as well.[65,69] Prospective studies among adult populations have shown rather consistently that psychological and social risk factors such as higher levels of anxiety, lower self-confidence, lack of power, role strain, and sexual abuse contribute to the higher risk of first-ever depression in women.[70,71] In addition, men seem to recollect fewer episodes of depression and underreport the severity of symptoms compared with women.[72,73] Studies that investigated sex differences in late-life depression are scarce. One study suggested that depressed older men were less likely to endorse core depressive symptoms or to be referred for treatment.[74] Apparently, risk factors for incident depression do not always predict the course of depression as well. The risk factors for recurrent late-life depression are possibly less sex related, and recurrent depressive syndromes might be as easily recognized in men as in women.

In conclusion, if a person has never had depression in middle age, his or her risk of developing a first-ever episode in old age may be lower than estimated before. Conversely, if someone has experienced depression before, the risk of a recurrent episode in old age is high. In fact, most new episodes in our study were recurrent episodes. These findings in addition to the chronic nature of depression could explain the well-known discrepancy between the high prevalence and low incidence of late-life depression. Community-dwelling elderly persons have a much higher risk of developing recurrent depression than first-ever depression. To enhance diagnostic accuracy, it is important that clinicians become aware of this a priori risk. More research is needed to clarify the etiology of recurring late-life depression given that recurring episodes contribute substantially to the effect of depression on public health.

Submitted for Publication: February 6, 2008; final revision received June 19, 2008; accepted June 23, 2008.
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Financial Disclosure: None reported.
Funding/Support: Dr Luijendijk is funded by grant 100-002-008 from the mental health program GeestKracht of ZonMw.
Additional Contributions: Lida Brökling-Könst, Anne-Monique Ebens-van Beek, BSc, Marja Hof-Meijer, Anneke de Koning-Zuiderent, MA, and Jolande Verkroost-van Heemst, research assistants, conscientiously scrutinized thousands of medical records and copied relevant information and/or filed this information; Frank van Rooij, DSc, and René Vermeeren, BSc, programmers, helped with numerous data emergencies; and the participating inhabitants, GPs, and pharmacists of the Ommoord district contributed time and effort to make the Rotterdam Study possible.

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