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Lifetime Risk of Depression

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Over the past decade, major epidemiological studies have been conducted to determine the prevalence of depressive syndromes, primarily major depression or dysthymia. The highest prevalences occur in younger cohorts (18–29 years); considerably lower prevalences are found in older individuals (45 years and above), with the lowest in those aged 65 and older. Several studies have confirmed an increase in the cumulative lifetime estimates of major depression in successively younger birth cohorts during this century. At the same time, questions have been raised about the low prevalence of depression in the elderly, including the role of confounding factors (e.g. differential morbidity and response-biased memory). Standardised diagnostic assessment procedures may be insufficiently adapted for use in the elderly. It has also been recognised that a substantial number of elderly individuals suffer from clinically relevant symptoms of depression but do not meet the criteria for major depression. Future research will be required to elucidate fully the apparently changing rates of depression.

The ideal basis for evaluating depression across the life-cycle would be a prospective, long-term, epidemiological study in which different successive age-cohort samples of the general population are followed for many years, taking into account the many variables that might affect onset and recurrence of depressive disorders during a lifetime. Potential precipitating factors include external (social, cultural, and environmental) changes, but also many psychological, or internal, changes (self-perception, goals, aspirations, cognitive functions, experiences, and emotions). Furthermore, external and internal factors are closely interrelated with biological variations across the life-cycle, including changes in the central and autonomic nervous systems, development of biological dysfunctions and illnesses, regeneration capacity, and physical fitness (Wittchen, 1988).

Because complex studies that take these variations into account are not feasible, conclusions about the prevalence of depressive disorders are based on a patchwork of less perfect studies, ranging from anecdotal to retrospective or, less frequently, prospective, epidemiological studies. Several critical methodological issues make a review of the current knowledge about depression across the life cycle difficult. These include interstudy differences with regard to sampling, age group composition, diagnostic criteria, diagnostic assessment procedures, and different historical time frames covered. All of these issues affect the reported lifetime prevalence estimates. Studies also vary considerably with regard to the level of detail in which the depressive symptomatology, subtypes of the depressive disorder, and associated features are investigated.

With these concerns in mind, this paper focuses on the prevalence of depressive disorders, with specific emphasis on the variability of findings between studies, empirical support for age-cohort effects, and deficits in our current knowledge about depressive disorders across the life span.

Prevalence of depressive disorders

Since the landmark review of epidemiological studies conducted by Boyd & Weissman (1982), a number of major epidemiological studies have been carried out in representative samples of the general population using various diagnostic criteria and instruments (e.g. Diagnostic Interview Schedule (DIS), Composite International Diagnostic Interview (CIDI)) (Blazer & Williams, 1980; Weissman *et al*, 1985; Henderson, 1986; Lewinsohn *et al*, 1986; Bland *et al*, 1988; Parmelee *et al*, 1989; Burke *et al*, 1991; Robins & Reiger, 1991; Angst, 1992; Katona, 1992; Romanoski *et al*, 1992; Turrina *et al*, 1992; Wittchen *et al*, 1992; Henderson *et al*, 1993; Kessler *et al*, 1994*a*).

Since 1980, 20 studies have been identified in which the Research Diagnostic Criteria (RDC), DSM–III or DSM–III–R (American Psychiatric Association, 1980, 1987), or the ICD–10 (World Health Organization, 1992) criteria were used to report on the estimates of major depression, dysthymia and other affective disorders (Table 1). Although there was some variation, the point-prevalence of major depression was approximately 3% (i.e. 3% of the adult population suffered from major depression at the time of the study interview). Similarly, the reported 6-month to 1-year prevalence

Table 1
Point, six-month to one-year, and lifetime prevalence rates of depressive disorder reported in epidemiological surveys conducted since 1980 (see text for references)

Disorder	Median % (range)		
	Point	Six-month to one-year	Lifetime
Major depression/major depressive episode	3.1 (1.5–4.9)	6.5 (2.6–9.8)	16.1 (4.4–18)
Dysthymia	2.1 (1.2–3.9)	3.3 (2.3–4.6)	3.6 (3.1–3.9)
Recurrent brief depression	–	– (4.2–7.2)	11.1
Bipolar disorder	0.9 (0.1–2.3)	1.1 (1.0–1.7)	1.3 (0.6–3.3)

of major depression varied somewhat (range 2.6–9.8%), but was approximately 6%. Lifetime prevalence estimates across all studies show the most variation, but the majority of recent studies cite prevalences of 15–18%. However, in the five-site Epidemiologic Catchment Area (ECA) study conducted in the US, the lowest prevalence estimates for all time-frames were reported (e.g. lifetime prevalence of 3.0–5.9%: Robins & Regier, 1991).

The highest prevalence estimates have resulted from studies conducted in the late 1980s or early 1990s. For instance, in the Zurich cohort, the lifetime prevalence of major depression was estimated to be approximately 16–20% (Angst & Dobler-Mikola, 1985), a prevalence of 15.7% was reported in a representative sample of the Basel population (Wacker *et al*, 1992), and Kessler *et al* (1994*a*), in the National Comorbidity Survey, reported a lifetime prevalence of 17.1%.

Compared with DSM–III major depression, the prevalence estimates reported for dysthymia are much lower. However, at one time or another, many of these patients meet the criteria for major depressive disorder. This phenomenon was described by Keller & Shapiro (1982) as "double depression". Because of the immense overlap of major depression and dysthymia, and because most of the investigators who conducted epidemiological studies did not differentiate between non-remitting major depression and dysthymia, low prevalence estimates need to be considered with caution. The point-prevalences for dysthymia range from 1.2% to 3.9%, which is similar to the one-year or lifetime prevalence estimates of approximately 3.3% and 3.6% respectively (Table 1).

Several factors account for the variability of study findings. For instance, the studies did not all use the same diagnostic procedures. In the ECA study, reported estimates of major depression excluded short-term grief, bipolar 1 and 2 disorder, and schizophrenia. Other investigators did not use some or any of these exclusion criteria (Angst *et al*, 1990; Wacker *et al*, 1992; Kessler *et al*, 1994*a*). Thus, the findings of the latter relate to major depressive episodes and not to major depression.

The type of assessment instruments used is a second source of variation. Kessler *et al* (1994*a*) suggested that the higher estimates for major depressive episodes in their study might be partly due to three factors. These are (a) use of a non-respondent survey, which allowed them to correct prevalence estimates for the lower interview completion rate among people with a history of depression; (b) use of a life-review section that helped to stimulate the respondents' active memory search for recall of lifetime disorders; and (c) the critical role of sequence effects in the assessment of depressive disorders. Because an instrument such as the DIS assesses depressive symptomatology after lengthy sections for somatisation disorder have been completed, lower prevalences of depression might result (e.g. Wacker *et al*, 1992). Alternatively, when depression was evaluated earlier in the interview process, higher prevalences of depression were reported (Kessler *et al*, 1994*a*).

However, most of the variance between studies can be explained by the age composition of the samples studied, such that the highest prevalence estimates of depressive episodes were reported in the studies with the youngest samples, and vice versa. Additionally, the variable rates can be explained by the year in which the study was conducted, such that higher prevalences were reported in the most recent studies. These findings suggest that different rates of depressive disorders exist in the young versus the old, or that the prevalence of depressive disorders is changing with time.

Changing rates of depression

Traditionally, the risk of depression has been thought to increase with age. However, results of several studies, demonstrating considerably higher prevalences in younger than in older people, suggest

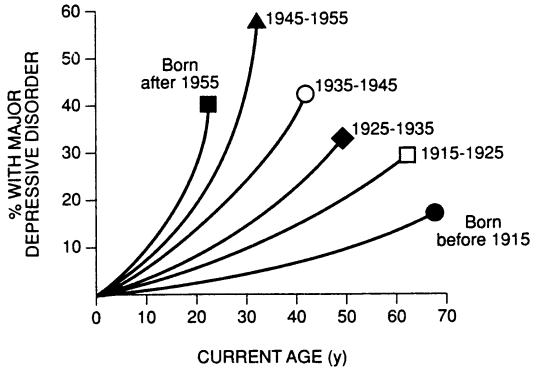

Fig. 1 Cumulative rates of depression among relatives and controls for successive birth cohorts and the respective age at the time of the clinician-administered interview (SADS). Reprinted with permission from Klerman & Weissman (1989), *Journal of the American Medical Association*, **261**, 2229–2235; copyright 1989, American Medical Association.

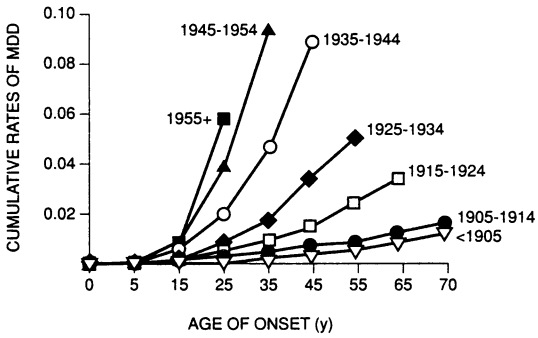

Fig. 2 Cumulative lifetime rates of major depressive disorder by birth cohort and age of onset in subjects ($n = 18\,244$) evaluated in the Epidemiologic Catchment Area Study (ECA). Reprinted with permission from Cross-National Collaborative Group (1992), *Journal of the American Medical Asosciation*, **268**, 3098–3105; copyright 1992, American Medical Association.

that for successive birth cohorts during this century the prevalence of depression has been increasing and that the age of first onset has been decreasing (Fig. 1). Additional evidence supporting changing rates of depression has been derived from observations made during the 1960s and 1970s, including an increase in hospital admissions for affective illnesses during the latter half of this century versus the first half, a younger age of onset of illness than that reported before the Second World War, an increase in the number of childhood depressions seen by clinicians, and an increase in suicide attempts and deaths among adolescents (Klerman & Weissman, 1989). Furthermore, on the basis of clinical and epidemiological studies, depression does not appear to increase following menopause, and the prevalence of suicide among elderly persons is low.

Temporal trends

Several studies using multivariate statistical techniques for analysing time-dependent data (e.g. life-table methods, survival analysis) have been published that focus on the changing rate of major depression across the life span (Cross-National Collaborative Group, 1992; Lewinsohn *et al*, 1993; Kessler *et al*, 1994*b*). The term 'temporal trends' is most often used to describe these findings (Crow, 1986), but other terms have also been used, including 'birth cohort trends' (Klerman *et al*, 1985) and 'birth cohort changes' (Gershon *et al*, 1987).

Temporal trends are variations in prevalences over time and can be age, period, or cohort trends (Klerman & Weissman, 1989). Age trends refer to changes in age-specific rates of illness, usually using the age of first onset of the disorder. Period trends are defined by rates of illnesses associated with specific time periods, such as infectious epidemics. Lastly, cohort trends refer to changes in rates of illness among individuals who are defined by some shared continued temporal experience (i.e. the year of their birth).

The Cross-National Collaborative Group (1992) directly reanalysed the temporal trend hypothesis of major depression using data from nine epidemiological and three family studies conducted independently in the 1980s in North America, western Europe, the Middle East, Asia, and the Pacific Rim. These studies used similar diagnostic criteria and assessment instruments (DSM–III, Schizophrenia and Affective Disorder Schedule (SADS), DIS), and a common data analysis plan. In the reanalysis, seven birth cohorts, divided into ten-year time intervals, were defined (i.e. earlier than 1905, 1905–1914, and so on, up to 1955 or later). Age of onset of major depression was divided into similar ten-year time intervals from age 5 to 74 years. This study confirmed a significant trend for increasing rates of major depression over time, in addition to an earlier age of onset for younger cohorts (Fig. 2). However, there was intersite variation with regard to the age-specific cohort prevalences of depression, ranging from 6% in the 1945–1954 age cohort in Puerto Rico, to 9% in the same age cohort of the ECA, to as high as 14% in Munich, 18% in Florence, and 21% in Beirut. It is also important to note that the consistently lower prevalence estimates for the elderly also varied (2%

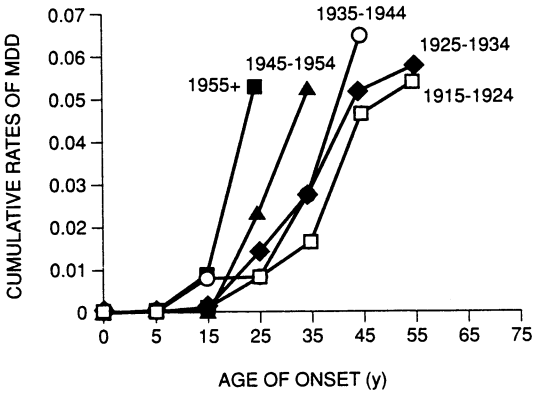

Fig. 3 Cumulative lifetime rates of major depressive disorder by birth cohort and age of onset in Puerto Rican subjects ($n = 1551$) representing a lack of an age–cohort effect. Reprinted with permission from Cross-National Collaborative Group (1992), *Journal of the American Medical Association*, **268**, 3098–3105; copyright 1992, American Medical Association.

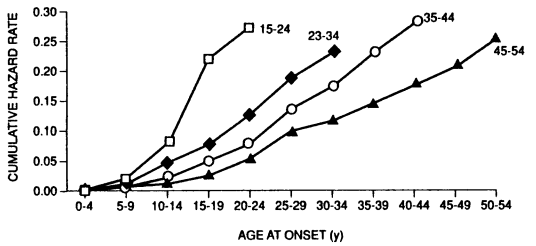

Fig. 4 Cumulative lifetime hazard rate for the development of major depressive episodes by birth cohort and age of onset in women evaluated in the National Comorbidity Survey. Reprinted with permission from Kessler *et al* (1994*b*).

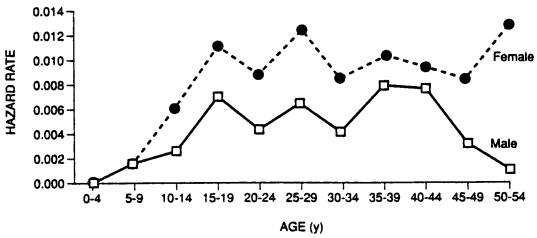

Fig. 5 Lifetime hazard rates for developing major depressive episodes based on gender and age in subjects evaluated in the National Comorbidity Survey. Reprinted with permission from Kessler *et al* (1994*b*).

in the ECA, 6% in Munich, and 5% in Puerto Rico). Interestingly, the weakest age–cohort effect was found among Hispanic samples (Puerto Rico, Los Angeles Hispanics) (Fig. 3).

In another analysis, data from three samples of adults and a larger sample of adolescents aged 14–18 ($n = 1710$) were used to study age–cohort effects (Lewinsohn *et al*, 1993). A significant age–cohort effect was found in all three adult samples as well as the adolescent sample, with a trend for an earlier age of onset of illness. In an additional analysis of the possible role of confounding factors that might artificially influence prevalence estimates, four critical variables were identified: current mood state, social desirability response bias, labelling, and time interval between episodes and diagnostic interview. Although these variables, except for labelling, were significantly associated with reports of past episodes of the disorder and with birth cohorts, they did not influence the age–cohort effect.

The National Comorbidity Survey (NCS) is the first survey in the US conducted in a representative sample of the general population (Kessler *et al*, 1994*b*). Younger age groups (15 years old) were included in the evaluation, and specific innovations of social survey research, in conjunction with the CIDI, were used to improve the probands' memory with regard to past symptoms specifically relevant for the assessment of lifetime psychopathology (Wittchen *et al*, 1991). This study provides further evidence that there is a consistent trend for the lifetime risk of depression to be higher in successively younger cohorts (Fig. 4). The cohort difference seems to be more pronounced in the youngest cohort for both men and women, as found in the earlier studies such as the ECA (Robins & Regier, 1991). Respondents in the youngest cohort of the NCS study were between 5 and 15 years of age at the time the ECA study was carried out in 1981. Therefore the substantially increased risk of depression in this youngest cohort suggests a possible extension of the cohort effect found in the ECA.

Another important finding of the NCS is that differences with regard to rates of depression between men and women begin in early adolescence and persist until late middle-age (Fig. 5). A similar observation was made by Burke *et al* (1991) in the ECA. However, in the NCS, the gender difference in cumulative onset risk appears five years earlier than in the ECA (age 10 v. age 15). This might be important because of speculation in the literature that the gender difference in depression is triggered by puberty (Nolen-Hoeksema, 1987), which is more consistent with the NCS results than the ECA finding. No decrease in the hazard rate after age 30 was observed in the NCS, which is consistent with observations of stable rates of depressive episodes

across mid-life. In addition, men and women with a history of depression did not differ from each other in either the probability of being chronically depressed or having an acute recurrence in the past year. Therefore, the higher prevalence of 12-month depression in women is a result of the increased risk of developing depression in women.

Explanations for the variation between young and old subjects

In almost all of these studies, the estimates of major depressive episodes have increased with successively younger birth cohorts. High estimates of childhood and adolescent depression have been confirmed in at least two independent child psychiatry investigations (Garrison *et al*, 1992; Lewinsohn *et al*, 1993). However, the low prevalence of depression observed among the elderly has been criticised heavily as being possibly artefactual (Klerman *et al*, 1985; Klerman & Weissman, 1989; Knäuper & Wittchen, 1994). Differential morbidity, institutionalisation, selective migration, and response-biased memory are some of the possible confounding factors that may contribute to the findings in the elderly, and most of these factors have had a significant impact on prevalence estimates (Blazer, 1989*a*; Lewinsohn *et al*, 1993). However, it is widely held that none of these factors, singly or in combination, is completely responsible for the large difference between the prevalence of depression in the young versus the old (Cross-National Collaborative Group, 1992; Lewinsohn *et al*, 1993).

Further potentially confounding factors include the possibility that current diagnostic procedures (structured diagnostic interview questions and probes) have specific limitations in the assessment of psychopathology in the elderly (Knäuper, 1994; Knäuper & Wittchen, 1994). Decreased memory capacity in elderly patients may critically affect the diagnostic process. Content aspects, such as the role of somatisation in depression, have also been suggested as reasons for the lower prevalence of depression in the elderly (Blazer, 1989*a*,*b*, 1991). These studies may eventually lead to a revision or specification of both diagnostic criteria and adequate assessment tools for the elderly.

Henderson *et al* (1993), using ICD-10 clinical diagnostic criteria, reported that the overall prevalence for depressive episodes in the elderly was 2.9% in community residents, 6.4% among institutionalised residents, and 3.3% among the total population aged 70 and over. These data suggest both factors, the use of a clinical diagnostic instrument as well as the inclusion of an institutional sample, do not affect the finding of a lower prevalence of depressive disorders in the elderly compared with younger cohorts. Lower prevalences are reported when the DSM-III-R criteria for depression, which are stricter than ICD-10, are used. DSM-III-R criteria gave prevalences of 0.4%, 6.3%, and 1.0% among community residents, institutionalised residents, and the overall population, respectively (Henderson *et al*, 1993).

In addition to the impact of diagnostic criteria, higher prevalences have been found when less standardised assessment procedures are used. Kay *et al* (1985), who used a modified version of the Geriatric Mental State Schedule (GMS: Copeland *et al*, 1976) combined with a psychiatric rating, found higher prevalence rates of major depressive episodes compared with those who used fully standardised diagnostic instruments (Blazer *et al*, 1987; Henderson *et al*, 1993).

Thus the diagnostic procedures used in the elderly may not be fully appropriate. Many investigators agree that few of the elderly fulfil the criteria for major depression or dysthymia (Gaitz & Scott, 1972; Blazer, 1989*a*,*b*, 1991; Fuhrer *et al*, 1992). However, many elderly individuals appear to have clinically relevant syndromes of slightly or markedly different phenomenology that escape the strict DSM-III-R and ICD-10 criteria. Blazer (1991) regarded this as an epidemiologic dilemma and suggested the use of 'minor depression' as a diagnostic category in the elderly.

Conclusions

The most striking finding in recent years with regard to depression across the lifespan has been the increasing rates of depressive disorder in successively younger birth cohorts. Although the question has been raised as to whether this effect might be, at least in part, due to an artefact of the research methodology, many attempts have been made to explain the finding as a 'true' increase of depressive disorders during this century. For example, changing family structures, social forces and patterns of urbanicity have been discussed as contributing factors (Klerman *et al*, 1985; Klerman & Weissman, 1989). The fact that gender differences in depression in recent cohorts appear to be decreasing as the overall prevalence of depression increases has led to speculation that the most important causes are associated with the changing roles of men and women in society and, in particular, with changes in gender-related occupational patterns (Kessler & McRae, 1981, 1982). However, no empirical research has yet been carried out to provide a convincing evaluation of these hypotheses.

Further research is required not only to investigate the determinants of cohort differences in depression, but also to study factors that influence the natural

course of depressive disorders. We now know that the determinants of first onset of depression may differ from the determinants of recurrence and persistence, but not enough systematic research has been carried out to provide a good understanding of these differential effects. Several interesting hypotheses have been proposed. One is that early onset of depression may be a risk factor for recurrence. Another is that the rise in prevalence among more recent cohorts may be associated with a lower risk of chronicity because of the fact that these new depressions might be situational rather than biological (Wittchen & von Zerssen, 1988; Lewinsohn *et al*, 1993; Kessler *et al*, 1994*b*).

Future research will also be required to determine whether other types of depressive disorders, such as adjustment disorders or mixed anxiety/depressive syndromes, may account for changes in the prevalence of major depressive episodes across the lifespan. This issue is particularly relevant in the light of lower prevalence rates reported in the elderly, and the possibility that many of these individuals have subsyndromal illnesses and do not meet the criteria for major depression.

Additionally, evaluation of the diagnostic process and its special characteristics in the elderly will be required to assess depressive phenomena in old age. Whereas the self-report is not the perfect way to assess symptomatology in the elderly, it is still relied upon without accounting for different age-related cognitive abilities, the influence of physical conditions on depressive symptomatology, and differences in information-processing capacity that might play a critical role in reporting depression in this population.

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