Published in final edited form as:
Psychol Med. 2007 January ; 37(1): 61–71.

Lifetime Prevalence and Inter-cohort Variation in DSM-IV Disorders in Metropolitan China

Sing Lee, MB, BS, FRCPsych,
Department of Psychiatry, The Chinese University of Hong Kong, HKSAR, PRC

Adley Tsang, BSocSci,
Hong Kong Mood Disorders Center, The Chinese University of Hong Kong, HKSAR, PRC

Ming-Yuan Zhang, MD,
Shanghai Mental Health Center, PRC.

Yue-Qin Huang, MD, MPH, PhD,
Peking University Institute of Mental Health, PRC.

Yan-Ling He, MD,
Shanghai Mental Health Center, PRC.

Zhao-Rui Liu, MD, MPH,
Peking University Institute of Mental Health, PRC.

Yu-cun Shen, and **Ronald C. Kessler, PhD**
Department of Health Care Policy, Harvard Medical School, MA, USA.

Abstract

Background—This is the first study to examine variation across cohorts in lifetime risk of DSM-IV mental disorders in metropolitan China.

Method—Face-to-face household interviews of 2,633 adults in Beijing and 2,568 adults in Shanghai were conducted from Nov 2001 to Feb 2002 using a multi-stage household probability sampling method. The Chinese World Mental Health (WMH) Survey Initiative version of the WHO Composite International Diagnostic Interview (WMH-CIDI) was used for assessment.

Results—Lifetime prevalence of any disorder was 13.2%. Alcohol abuse (4.7%), major depressive disorder (3.5%), and specific phobia (2.6%) were the most common disorders. The median age of onset was later for mood (43 years) than anxiety (17 years) and substance use (25 years) disorders. Compared to observed lifetime prevalence, the projected lifetime risk as of age 75 years increased by 106% for major depressive disorder (7.2%), and was uniformly higher for all disorders. Relative odds of any lifetime disorder were 4.7 in the most recent cohorts (ages 18–34) compared to the eldest cohorts (ages o65).

Conclusions—The findings of this cross-sectional study tally with the view that rapid socioeconomic changes may bring about increasing incidence of mental disorders in China. However, prospective longitudinal studies are needed to confirm if the increase is real. Because of the huge size of the Chinese population, any increase in projected lifetime risk of mental disorders represents an enormous increase in the number of affected individuals.

Address for correspondence: Professor Sing Lee, Director, Hong Kong Mood Disorders Center, 7A, Block E, Staff Quarters, Prince of Wales Hospital, Shatin, NT, Hong Kong. Phone: (852) 2144 5338, Facsimile: (852) 2144 5129, Email: singlee@cuhk.edu.hk

INTRODUCTION

After more than two decades of economic reform, China has now become the most rapidly growing economy in the world. Alongside impressive economic expansion, though, has come a growth in social problems related to social disparities, unemployment, uncontrolled domestic migration, breakdown of extended family networks, and a high suicide rate (Tseng *et al.* 1995; Xu *et al.* 2002; Perry & Selden, 2003). Given that social and mental health problems are inter-linked, it is plausible that mental disorders might be on the rise in conjunction with these broader societal changes (Lee, 1997). However, no epidemiological research exists to examine whether this is the case. The two national surveys of mental disorder carried out in China in 1982 (n = 38,136) (Twelve Region Psychiatric Epidemiological Study Work Group, 1986) and 1993 (n = 19,223) respectively (Zhang *et al.* 1998) found practally no evidence of an increase in mental disorders. However, the implausibly low lifetime prevalence estimates in these surveys preclude a firm conclusion that prevalence was constant over the time interval between these surveys.

In an effort to overcome the methodological limitations of these earlier surveys, which included sampling problem and inadequate training of interviewers (Cheng, 1989; Shi *et al.* 2005; Shen *et al*, 2006), we implemented a new psychiatric epidemiological survey in the cities of Beijing and Shanghai. This survey was carried out in conjunction with the WHO World Mental Health (WMH) Survey Initiative (Demyttenaere *et al.* 2004), a project designed to administer community psychiatric epidemiological surveys in many countries using the same diagnostic instrument and the same centrally coordinated field quality control procedures. Results regarding 12-month prevalence, treatment, and their correlates are reported elsewhere (Shen *et al.* 2006). The current report focuses on lifetime prevalence and risk, with a special emphasis on inter-cohort variation.

METHOD

Sampling

The present survey was based on a multi-stage clustered area probability sample of householddwelling adults aged 18–70 years in the metropolitan areas of Beijing and Shanghai (Shen et al. 2006). The target sample was 2500 completed interviews in each city. The final completed numbers of 5201 interviews were 2633 in Beijing and 2568 in Shanghai. Interviews were administered face-to-face by trained interviewers in the homes of respondents between November 2001 and February 2002. The response rates were 74.8% (Beijing) and 74.6% (Shanghai). The interviews were in two parts. Part I, which was administered to all 5201 respondents, included the core diagnostic assessment. Part II, which was administered to all Part I respondents with any core disorder and a 5% probability sub-sample of other Part I respondents (n=1628), included information about correlates and disorders of secondary interest. All respondents provided written informed consent prior to the interview. Training and assessment of interviewers, sampling and field procedure were undertaken according to the standardized procedures of NCS-R (Kessler et al. 2004) as in the surveys conducted by other participants of the WMH Demyttenaere et al. 2004.)

Measures

Diagnostic Assessment—The WMH version of the WHO Composite International Diagnostic Interview (WMH-CIDI; Kessler & Üstün, 2004) was used to assess lifetime mental disorders. The WMH-CIDI is a fully structured diagnostic interview that generates diagnoses according to both the ICD-10 and DSM-IV diagnostic systems. DSM-IV criteria were used in the current report. Core disorders included anxiety disorders (panic disorder, agoraphobia without panic disorder, specific phobia, social phobia, generalized anxiety disorder, post-

traumatic stress disorder, separation anxiety disorder), mood disorders (major depressive disorder, dysthymic disorder), impulse-control disorders (conduct disorder, intermittent explosive disorder), and substance use disorders (alcohol abuse with or without dependence, drug abuse with or without dependence). Diagnostic hierarchy and organic exclusion rules were applied in making all diagnoses. Based on concerns that recall of conduct disorder (CD), a child-adolescent onset disorder, would be low among older respondents, CD was assessed only for Part II respondents in the age range of 18–34 years (n = 570).

The CIDI was translated into Chinese using the standard WHO protocol in which a team of survey experts completed the initial translation and a separate team then carried out an independent back translation to confirm preservation of the meaning of the original English version. The translators had access to an expert panel for consultation about potentially ambiguous questions. The panel included three academic psychiatrists with epidemiological expertise and a survey methodologist fully trained in the CIDI and responsible for fieldwork from the Research Center for Contemporary China [RCCC] in Beijing. The expert panel evaluated the translation for content validity using information based on the results of the back translation as well as pilot tests with Chinese patients. Final revision was then carried out by the panel to ensure that lay people could understand the Chinese terms easily.

Blinded clinical reappraisal interviews with a mixed convenience sample of 95 inpatient and outpatient psychiatric patients and 77 normal controls using the Structured Clinical Interview for DSM-IV (SCID; First *et al*, 2002) to generate diagnoses found generally good concordance with the CIDI diagnoses of anxiety, mood, and substance use disorders, with area under the receiver operator characteristic curve (AUC), a prevalence-free measure of concordance, of . 74 for anxiety disorders, .83 for mood disorders, and .82 for substance use disorders (Huang *et al*, 2005). We did not validate impulse-control diagnoses because the SCID does not assess these disorders.

Age-of-onset—Based on evidence that retrospective age-of-onset reports in structured diagnostic interviews are often erroneous (Simon & Von Korff, 1995), a special question sequence was designed to improve the accuracy of reporting. This began with questions designed to emphasize the importance of accurate response: “Can you remember your exact age the *very first time* (emphasis in original) when you (had the symptom/the syndrome)?”. Respondents who answered “no” were probed for a bound of uncertainty by moving up the age range incrementally (e.g. “Was it before you went to school?”; “Was it before age 13?” etc.). Age-of-onset was set at the upper end of the bound of uncertainty (e.g. age 12 years for respondents who reported that onset was before the beginning of their teens). Experimental research has shown that this question sequence yields more plausible responses than standard age-of-onset questions (Knauper *et al.* 1999).

Predictor variables—Predictor variables included cohort (age at interview: 18–34, 35–49, 50–64, 65–70), sex, and education (none and primary, junior high school, senior high school, university and beyond). Education was coded as a time-varying predictor by assuming a history of orderly education that started at the age of six.

Statistical analysis

We used weighting to adjust for differential probabilities of selection within households, for the over-sampling of Part I cases into the Part II sample, and for residual discrepancies between the sample and official population statistics on the cross-classification of socio-demographic variables. Lifetime prevalence was estimated as the proportion of respondents who had ever had a given disorder up to the age at interview. Age-of-onset and projected lifetime risk as of age 75 were estimated using the two-part actuarial method implemented in SAS version 8.2

(SAS Institute Inc., 2001). This method differs from the more familiar Kaplan-Meier method (Kaplan & Meier, 1958) in using a more accurate way of estimating onset within a given year (Halli & Rao, 1992). Socio-demographic predictors of lifetime risk were examined using discrete-time survival analysis with person-years as the unit of analysis (Efron, 1988). Survival coefficients and their standard errors were exponentiated for ease of interpretation and are reported as odds-ratios (OR's) with 95% confidence intervals (CI's). Variation in the effects of other predictors across cohorts was evaluated by including interactions between predictors and cohorts.

Because of the use of weighting and clustering, standard errors of estimates were based on the Taylor series linearization method (Wolter, 1985) implemented in the SUDAAN software package (Research Triangle Institute, NC, USA). Multivariate significance was evaluated using Wald □□ tests computed from Taylor series design-adjusted coefficient variance-covariance matrices. Standard errors of lifetime risk estimates were estimated using the jackknife repeated replication method (Kish & Frankel, 1974) implemented in a SAS macro (SAS Institute Inc., 2001). Statistical significance was based on two-sided tests evaluated at the 0.05 level of significance.

RESULTS

Demographic distribution

The demographic distribution of the weighted sample in Beijing is similar to that of Shanghai. (Results available on request.) The demographic distribution of the combined and weighted sample is similar to the general population on post-stratification variables after being weighted. The present paper combined data from the two cities to increase the power of analysis (Shen *et al*. 2006).

Lifetime Prevalence

The estimated lifetime prevalence of any DSM-IV/CIDI disorder was 13.2% (Table 1). The majority of cases (8.5% of the sample) met criteria only for a single disorder, 3.7% for two disorders, and 1.2% for three or more disorders. The most common disorders were alcohol abuse (4.7%), major depressive disorder (3.5%), and specific phobias (2.6%). Prevalence of several different disorders (social phobia, intermittent explosive disorder, alcohol abuse-dependence, drug abuse, any disorder, three or more disorders) was significantly associated with age, with prevalence lowest among respondents aged 65+ and generally highest among respondents in the age range 18–34 years.

Projected lifetime risk

As not all respondents were old enough at the time of interview to have passed through the period of risk for the disorders, the proportion of respondents who will eventually develop a mental disorder is higher than the proportion with lifetime prevalence to date. We generated age-of-onset distributions to estimate projected lifetime risk, which was 18.0% for any disorder (Table 2). For the majority of disorders, most cases had onset in the twenty-five year interval between the early teens (age 13) and middle age (age 44), although this varied across disorders. Median age-of-onset (the 50th percentile of the age-of-onset distribution in Table 2 was earliest for anxiety disorders (age 17), somewhat later for substance use disorders (age 25), and latest for mood disorders (age 43). The median age-of-onset of any disorder was 25.

The difference between lifetime prevalence to date and projected lifetime risk varied depending on the age-of-onset distribution. For anxiety disorders, where ages-of-onset were relatively early, the difference between the two estimates was small (4.8% lifetime prevalence vs. 6.0% projected lifetime risk). For intermittent explosive disorder, the only impulse-control disorder

assessed for the full age range of the sample, the difference was even smaller (1.9% lifetime prevalence vs. 2.1% projected lifetime risk). Difference was larger for substance use disorders (4.9% lifetime prevalence vs. 6.1% projected lifetime risk), and considerably larger for mood disorders. More than half of all lifetime cases of mood disorder estimated in the sample had not yet occurred at the time of interview (3.6% lifetime prevalence vs. 7.3% projected lifetime risk). At the level of individual disorders, the largest discrepancies between prevalence and projected risk were for generalized anxiety disorder and major depressive disorder, for each of which the projected lifetime risk was more than twice lifetime prevalence to date.

Cohort effects

In Table 1, the lifetime prevalence of some disorders were higher among younger than older respondents. In Table 2, the projected lifetime risk exceeds the lifetime prevalence of some disorders and many respondents have not passed the median age of onset of highly prevalent late-onset disorders (e.g. mood disorders). These findings suggest an increase in reported risk in more recent cohorts. We used dummy variables to define cohorts born in the years 1967 or later, 1952–1966, 1937–1951, and earlier than 1937. Discrete-time survival analysis was used to predict lifetime disorders. The findings indicate the existence of inter-cohort difference, especially for major depressive disorder, any mood disorder, intermittent explosive disorder, and alcohol-drug use disorders (Table 3). These disorders also had older age of onset than anxiety disorders, which did not show intercohort difference. In each of the inter-cohort difference comparisons, the ORs are highest in the most recent cohorts and monotonically decrease in the earlier cohorts. The most dramatic effect is an OR of 20.8 in the most recent cohort for mood disorders, which means that the relative odds of reporting a lifetime history of mood disorder adjusting for year at risk is estimated to be 20.8 times as great among respondents born in 1967 or later as among those born earlier than 1936. The OR of the most recent cohort in predicting any disorder is considerably lower (4.7), although still substantial, owing to the risks not changing for most anxiety disorders and those changing less dramatically for impulse-control disorders and substance use disorders than for mood disorders.

To evaluate the possibility of recall bias influencing estimates of cohort effects, we disaggregated these estimates by length of the recall period. If there was a pattern that intercohort differences decreased significantly with increasing age, it could happen that lifetime risk was in fact constant across cohorts but appeared to vary because onset occurred earlier in more recent cohorts than in earlier cohorts. Such difference in onset might be due to either secular changes in environmental triggers or age-related differences in age-of-onset recall accuracy. The pattern could also result when differential mortality had an increasingly marked effect on sample selection bias with increasing age. As the number of cases of specific disorders was insufficient for analysis, we explore this issue by class of disorders. We focused on mood disorders because they exhibited the most dramatic evidence of cohort effects. Differences were examined separately for first onset in the age ranges categorized into early, middle, and late. We estimated cohort effects in each of these three age ranges and found that the estimated cohort effects do not differ significantly by length of the recall period [$x2(4)=2.7$, $p=0.61$]. (detailed results available upon request).

Sociodemographic predictors

Controlling for cohort, survival analysis showed that females had significantly higher lifetime risk than males of anxiety disorders, that males had significantly higher lifetime risk than females of impulse-control and substance use disorders, and that the female-male difference was insignificant in predicting mood disorders (Results not shown, but available on request). Education was found to be significantly and inversely related to risk of anxiety disorders, but not to any of the other classes of disorders. Analysis of interactions showed that the trend for prevalence of substance use disorders to increase in recent cohorts was significantly more

pronounced among men than women [$\chi^2(2) = 20.3$, $p < .001$], while cohort effects were the same among men and women for other disorders (Results not shown, but available on request). None of the cohort effects differed consistently across sub-groups defined by level of education (detailed results available upon request).

DISCUSSION

Limitations and methodological issues

This study focuses on four kinds of analysis : lifetime prevalence of mental disorders, prediction of lifetime risk, exploration of cohort effect on the report of mental disorders, and association between the lifetime occurrence of sociodemographic predictors with lifetime prevalence estimates after cohort effect was controlled. Before any cross-national comparison and interpretation of findings are made, a number of limitations and methodological issues should be cautiously considered.

First, legitimate questions can be raised about the generalizability of findings beyond the two metropolitan areas in which the survey was conducted because enormous regional differences exist in population mental health profiles across metropolitan China Furthermore, it is important to remember that 75% of the Chinese population live in rural areas whereas indices of mental health such as suicide are particularly worrying (Phillips et al. 2002), the current results relevant, at best, to only one-fourth of the population.

With regard to lifetime prevalence estimate, even within the two metropolitan areas we studied, caution is needed in interpreting prevalence estimates owing to the possibility of bias. This possibility exists despite the good concordance found in clinical reappraisal interviews between WMH-CIDI diagnoses and independent clinical diagnoses because the clinical reappraisal study was carried out in a patient sample while the survey was carried out in a community sample. People with a history of mental illness might have been less willing than others to participate in the survey, leading to a reduction in estimated prevalence. Stigma might have led survey respondents with disorders to deny disorders to interviewers to a greater extent than patients in the clinical reappraisal study denied symptoms to interviewers whom the patients knew to be aware of their mental disorders. Based on these considerations, the prevalence estimates we obtained should be considered lower bounds on the true prevalence of these disorders.

In the prediction of lifetime risk, our analysis relied on the respondents' recall of age of onset. Lifetime prevalence of mental disorders in metropolitan China 7 for estimating lifetime risk at age 75. Age of onset might be recalled incorrectly, thereby creating the false appearance of cohort effects (Giuffra & Risch, 1994). Although the probing strategy we used in the WMH-CIDI helped reduce this problem, it is possible that the problem was not corrected completely. The assumption of constant conditional risk of first onset in a given year of life among people of different age, which was used to estimate lifetime risk, is implausible in the context of higher prevalence in more recent cohorts, possibly leading to an underestimation of lifetime risk in recent cohorts.

The projection from a cross-sectional design by referring to recalled age of onset also assumed predictable and constant longitudinal risk. We caution against over-interpretation of our findings given unforeseeable events in China's future. Concerning inter-cohort difference, although we analyzed the pattern which could indicate age-related differences in age-of-onset recall accuracy and this pattern did not exist in mood disorders, alternative explanations for the difference remain possible. For example, respondents from more recent cohorts might express distress in a manner more congruous with the core symptoms of mental disorders defined in the DSM-IV than earlier cohorts (Parker et al. 2001). Finally, given several decades

of socio-political change that often disrupted the education system in China, our assumption of a history of orderly education starting at the age of 6 years for predictor variable analysis is contestable.

Cross-national comparison

The lifetime prevalence estimates in this study are low when compared to those of Western surveys (Alonso et al. 2004;Kessler et al. 2005) including those of Chinese Americans in the United States (Takeuchi et al. 1998). Apart from methodological factors, several substantive explanations such as familial cohesiveness and low levels of alcohol consumption have been invoked to explain the low rates of mental disorders in Chinese communities (Chen et al. 1993;Shen et al. 2006). Although the increasing acceptance of depression as a mode of expressing distress could contribute to the significant inter-cohort difference, such difference may nonetheless suggest that the protective effect of such substantial factors, even if they existed, could be diminishing.

In contrast to other countries (Kessler et al. 2005), we find substance use disorders, especially alcohol abuse, not mood and anxiety disorders, to be the most prevalent class of disorders. This could be because alcohol disorders are less susceptible to stigmatization and other sources of under-estimation than mood and anxiety disorders in the Chinese context (Shen et al. 2006). It could also be the first sensitive sign of deterioration in mental health among Chinese people following China's increasing economic prosperity (Kleinman & Kleinman, 1999).

Unlike the situation in most other countries, no significant gender difference was found in lifetime risk of any anxiety, mood or impulse control disorders. This pattern of no or smaller than expected gender difference in mental disorders including depression was previously found among Chinese communities in theUnited States (Takeuchi et al. 1998), Chinese people in different regions of China (Wang et al. 1998), metropolitan China (Shen et al. 2006), Hong Kong (Chen et al. 1993;Lee et al. 2006) and Taiwan (Hwu et al. 1989). This unexpected gender pattern deserves more serious research because it may question the cross-national validity of the well-documented gender differences in mental disorders.

The differential age of onset of mood and anxiety disorders documented in the present study resembles the pattern found in other countries (Burke et al. 1990;Kessler et al. 2005). Thus, the small IQRs of impulse-control disorder (13–20 years) indicate their being concentrated in adolescents. The IQRs of mood and anxiety disorders likewise indicate their concentration in young to middle adulthood. Although the tendency for recent cohorts to develop mental disorders earlier in their life is consistent with Western research, the onset of any anxiety, mood, impulse-control, and substance use disorders in this study is later than in the United States (Kessler et al. 2005). It is tempting for us to speculate that the Chinese pattern of socialization may play a role in delaying the onset of these disorders. For example, Chinese children are well protected by their parents and go through an extended phase of adolescence that could extend into the late 20s or more. Because of such a moratorium pertaining to the task of individuation, they may be shielded from the early development of certain mental disorders (Chen et al. 1993;Ho, 1996).

Findings in the Chinese context

Methodological and sampling differences notwithstanding, the present survey revealed higher lifetime prevalence estimates than the previous Chinese national surveys (Zhang et al. 1998). There are at least two possible explanations for the discrepancy. First, our methodology might be more sensitive to case-finding. In particular, we used rigorously trained lay interviewers to administer fully structured psychiatric diagnostic interviews that covered a wide range of both mild and severe disorders. The earlier surveys, in contrast, relied on stringent case definitions

and clinical interviews carried out by psychiatric doctors who were accustomed in their clinical work to detecting severe mental disorders (Shen et al. 2006). That most of the disorders detected in the present survey were mild may lend credence to this possibility. Second, methodological factors such as stigma-induced concealment of symptoms in the previous surveys could have diminished among young urbanized Chinese respondents following societal psychologization that legitimizes the experience of depression as a culturally meaningful illness (Parker et al. 2001).

In contrast to the two previous national surveys indicating that the prevalence of mental disorders hardly changed between 1980 and 1990s, our findings suggest that mental disorders are more commonly reported among recent cohorts of Chinese people. However, the validity of interpreting any real increase in prevalence depends critically on whether our findings represent a true increase of disorders in recent cohorts or if the inter-cohort difference is merely a methodological artifact. Thus, our methodology of eliciting lifetime disorders could be less sensitive to detecting mental disorders in less psychologized cohorts of older people. This is an issue deserving of more rigorous examination by anthropologically enhanced research (Kleinman, 2004).

With the above caveats, we believe that the examination of age-of-onset distributions of mental disorders and inter-cohort differences is of special interest in China. This is because decades of rapid social change have resulted in several cohorts of people growing up under a very different kind of Chinese socialization (Lee, 1997;Jiang & Ashley, 2000). Thus, the late 1970s marked the end of the tumultuous Cultural Revolution (1966–1976) and earlier national disasters that brought much needed mental relief to Chinese people. Nevertheless, the same period also marked the beginning of an open-door policy and uneven market reforms that have triggered the growth of social and health problems not previously witnessed during the collective epoch of Chinese communism (Perry & Selden, 2003). Despite the higher standard of living enjoyed by recent cohorts of younger people, they could still be adversely affected by the long-term impact of past political upheavals, such as a delegitimation crisis and interpersonal alienation that China scholars have described (Kleinman & Kleinman, 1999;Jiang & Ashley, 2000). For these reasons, they could be more ready to report the symptoms of mental disorders. Of course, other explanations may admittedly account for the same pattern of findings. For example, it is possible that some of the older generation of people simply did not survive political trauma and were not studied in the survey.

Implications for public health

A number of modeling and prospective studies have indicated that cross-sectional surveys like the present one under-estimate lifetime risks (Andrews et al. 2005). They suggest that higher future rates of depression may be a real phenomenon in at least some societies. If rigorous evaluation of longitudinal trends by conducting surveys based on a similar methodology confirms the cohort effects we demonstrated, the public health implications are enormous (Kessler et al. 2005). Based on 12-month prevalence estimates from the same survey, we showed in an earlier paper that 96.6% of Chinese people with any disorder and 80.2% of those with moderate and severe disorders received no treatment in the previous one year. This was despite the fact that Beijing and Shanghai have a higher than average concentration of health-care resources including trained psychiatrists (Shen et al. 2006). Because of China's huge population, the increased prevalence estimate in this study suggest an urgent need for interventions to reduce the treatment gap of mental disorders and to prevent their progression into more sinister forms among younger generations of Chinese people.

Acknowledgements

The Chinese World Mental Health Survey Initiative is supported by the Pfizer Foundation in conjunction with the World Health Organization World Mental Health (WMH) Survey Initiative. We thank the staff of the WMH Data

Collection and Data Analysis Coordination Centres for assistance with instrumentation, fieldwork, and consultation on data analysis. These activities were supported by the National Institute of Mental Health (R01 MH070884), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, and R01 DA016558), the Pan American Health Organization, Eli Lilly and Company, and GlaxoSmithKline. A complete list of WMH publications can be found at http://www.hcp.med.harvard.edu/wmhcidi.

References

Alonso J, Angermeyer MC, Bernert S, Bruffaerts R, Brugha TS, Bryson H, de Girolamo G, de Graaf R, Demyttenaere K, Gasquet I, Haro JM, Katz SJ, Kessler RC, Kovess V, Lé pine JP, Ormel J, Polidori G, Russo LJ, Vilagut G. Prevalence of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders(ESEMeD) project. Acta Psychiatrica Scandinavia 2004;109:21–27.

Andrews A, Poulton R, Skoog I. Lifetime risk of depression:restricted to a minority or waiting for most? British Journal of Psychiatry 2005;187:495–496. [PubMed: 16319399]

Burke KC, Burke JD, Regier DA, Rae DS. Age at onset of selected mental disorders in five community populations. Archives of General Psychiatry 1990;47:511–518. [PubMed: 2350203]

Chen CN, Wong J, Lee N, Chan-Ho MW, Lau JTF, Fung M. The Shatin community mental health survey in Hong Kong: II. Major Findings. Archives of General Psychiatry 1993;50:125–133. [PubMed: 8427552]

Demyttenaere K, Bruffaerts R, Posada-Villa J, Gasquet I, Kovess V, Lepine JP, Angermeyer MC, Bernert S, Girolamo G, Morosini P, Polidori G, Kikkawa T, Kawakami N, Ono Y, Takeshima T, Uda H, Karam EG, Fayyad JA, Karam AN, Mneimneh ZN, Medina-Mora ME, Borges G, Lara G, Graaf R, Ormel J, Gureje O, Shen Y, Huang Y, Zhang M, Alonso J, Haro JM, Vilagut G, Bromet EJ, Gluzman S, Webb C, Kessler RC, Merikangas KR, Anthony JC, Korff MRV, Wang PS, Alonso J, Brugha TS, Aguilar-Gaxiola S, Lee S, Heeringa S, Pennell BE, Zaslavsky AM, Ustun TB, Chatterji S. Prevalence, severity and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. Journal of the American Medical Association 2004;291:2581–2590. [PubMed: 15173149]

Efron B. Logistic regression, survival analysis, and the Kaplan-Meier curve. Journal of the American Statistical Association 1988;83:414–425.

First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Non-patient Edition (SCID-I/NP). New York State Research Institute; New York: 2002.

Giuffra LA, Risch N. Diminished recall and the cohort effect of major depression: a simulation study. Psychological Medicine 1994;24:375–383. [PubMed: 8084933]

Halli, SS.; Rao, KV. Advanced Techniques of Population Analysis. Plenum; New York: 1992.

Ho, YFD. Filial piety and its psychological consequences. In: Bond, MH., editor. The Handbook of Chinese Psychology. Oxford University Press; Oxford: 1996. p. 155-165.

Huang, YQ.; Dang, WM.; Yuan, YB. Reliability and validity of the Chinese version of Composite International Diagnostic Interview (CIDI). Paper presented at the Congress of the Chinese Psychiatry Association; Wuhan, PRC. 2005. in Chinese

Hwu HG, Yeh EK, Chang LY. Prevalence of psychiatric disorders in Taiwan defined by the Chinese Diagnostic Interview Schedule. Acta Psychiatrica Scandinavica 1989;79:136–147. [PubMed: 2923007]

Jiang, YR.; Ashley, D. Mao's Children in the New China: Voices from the Red Guard Generation. Routledge; New York: 2000.

Kaplan EL, Meier P. Nonparametric estimation from incomplete observations. Journal of American Statistical Association 1958;53:457–481.

Kendler KS, Gallagher TJ, Abelson JM, Kessler RC. Lifetime prevalence, demographic risk factors, and diagnostic validity of nonaffective psychosis as assessed in a US community sample: the National Comorbidity Survey. Archive of General Psychiatry 1996;53:1022–1031.

Kessler RC, Berglund P, Chiu WT, Demler O, Heeringa S, Hiripi E, Jin R, Pennell BE, Walters EE, Zaslavsky A, Zheng H. The US National Comorbidity Survey Replication (NCS-R): design and field

procedures. International Journal of Methods in Psychiatric Research 2004;13:69–92. [PubMed: 15297905]

Kessler RC, Berglund P, Demler O, Jin R, Walters E. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey replication. Archive of General Psychiatry 2005;62:593–602.

Kessler RC, Üstün TB. The World Mental Health (WMH) Survey Initiative Version of the World Mental Health Organization (WHO) Composite International Diagnostic Interview (CIDI). International Journal of Methods in Psychiatric Research 2004;13:93–121. [PubMed: 15297906]

Kish L, Frankel MR. Inferences from complex samples. Journal of the Royal Statistical Society 1974;36:1–37.

Kleinman A. Culture and depression. New England Journal of Medicine 2004;351:951–953. [PubMed: 15342799]

Kleinman A, Kleinman J. The transformation of everyday social experience: what a mental and social health perspective reveals about Chinese communities under global and local change. Culture, Medicine and Psychiatry 1999;23:7–24.

Knauper B, Cannell CF, Schwarz N, Bruce ML, Kessler RC. Improving the accuracy of major depression age of onset reports in the US National Comorbidity Survey. International Journal in Methods of Psychiatric Research 1999;8:39–48.

Lee S. Unity and hybridity : the transformation of mental health problems in Chinese society. Transcultural Psychiatry 1997;34:265–286.

Lee S, Tsang A, Kwok K. Twelve-month prevalence, correlates, and treatment preference of adults with DSM-IV major depressive episode in Hong Kong. Journal of Affective Disorders. 200610.1016/j.jad.2006.07.009Published online: 23 August 2006

Parker G, Gladstone G, Kuan TC. Depression in the planet's largest ethnic group: the Chinese. American Journal of Psychiatry 2001;158:857–864. [PubMed: 11384889]

Perry, E.; Selden, M. Introduction: reform and resistance in contemporary China. In: Perry, EJ.; Selden, M., editors. Chinese Society: Change, Conflict and Resistance. 2. Routledge Curzon; New York: 2003. p. 1-19.

Phillips MR, Li XY, Zhang YP. Suicide rates in China, 1995–99. Lancet 2002;359:835–840. [PubMed: 11897283]

SAS Institute Inc. SAS/STAT Software: Changes and Enhancements, Release 8.2. SAS Institute Inc; Cary, NC: 2001.

Shen YC, Zhang MY, Huang YQ, He YL, Liu ZR, Cheng H, Tsang A, Lee S, Kessler RC. Twelve month prevalence, severity, and unmet need for treatment of mental disorders in metropolitan China. Psychological Medicine 2006;26:257–267. [PubMed: 16332281]

Simon GE, Von Korff M. Recall of psychiatric history in cross-sectional surveys: implications for epidemiologic research. Epidemiologic Reviews 1995;17:221–227. [PubMed: 8521941]

Takeuchi DT, Chung RCY, Lin KM, Shen H, Kurasaki K, Chun CA, Sue S. Lifetime and twelve-month prevalence rates of major depressive episodes and dysthymia among Chinese Americans in Los Angeles. American Journal of Psychiatry 1998;155:1407–1414. [PubMed: 9766773]

Twelve Region Psychiatric Epidemiological Study Work Group. A national 12-region psychiatric epidemiological study – methodology and results. Chinese Journal of Nervous and Mental Diseases 1986;19:65–69.in Chinese

Wang J, Wang D, Shen Y, Zhang W, Li S, Chen C, Huang Y, Tu J, Ning Z, Fu L, Ji L, Liu Z, Wu H, Luo K, Zhai S, Yan H, Meng G. Epidemiological survey on affective disorder in 7 areas of China. Chinese Journal of Psychiatry 1998;31:75–78.in Chinese

Wolter, KM. Introduction to Variance Estimation. Springer- Verlag; New York: 1985.

Zhang WX, Shen YC, Li SR, Chen CW, Huang YQ, Wang JR, Wang DP, Tu J, Ning ZX, Fu LM, Ji LP, Liu ZG, Wu HM, Luo KL, Zhai ST, Yan H, Meng GR. Epidemiological investigation on mental disorders in 7 areas of China. Chinese Journal of Psychiatry 1998;31:69–71.in Chinese

Table 1

Lifetime Prevalence of DSM-IV/WMH-CIDI Disorders in the total sample (Part I, II) by Age

	Prevalence, % (SE) Age					
	Total	**18–34**	**35–49**	**50–64**	**□65**	χ^2
Anxiety Disorders						
Panic disorder	0.4 (0.1)	0.5(0.3)	0.3(0.1)	0.4 (0.2)	1.0 (0.6)	3.2
Agoraphobia without panic	0.0 (0.0)	0.1 (0.1)	0 (0)	0 (0)	0.1 (0.1)	2.1
Specific phobia	2.6 (0.3)	2.7 (0.5)	2.2 (0.4)	3.1 (0.7)	3.4 (0.8)	2.2
Social phobia	0.5 (0.1)	0.8 (0.2)	0.4 (0.1)	0.4 (0.3)	0.1 (0.1)	10.7*
Generalized anxiety disorder	0.8 (0.1)	0.4 (0.2)	0.8 (0.2)	1.1 (0.4)	1.4 (0.7)	3.4
Posttraumatic stress disorder[1]	0.3 (0.1)	0.3 (0.2)	0.2 (0.1)	0.4 (0.2)	0 (0)	7.7
Separation anxiety disorder[2]	0.7 (0.2)	1.7 (0.6)	0.2 (0.1)	-	-	8.9*[a]
Any anxiety disorder[3]	4.8 (0.7)	4.7 (1.2)	3.9 (0.8)	6.7 (1.8)	4.5 (1.5)	2.5
Mood Disorders						
Major depressive disorder	3.5 (0.4)	4.1 (0.8)	2.9 (0.4)	3.9 (0.7)	2.6 (0.7)	3.5
Dysthymia	0.1 (0)	0 (0)	0.2 (0.1)	0.3 (0.2)	0 (0)	8.4
Bipolar I-II disorders	0.1 (0)	0.1 (0.1)	0.1 (0.1)	0 (0)	0 (0)	3.8
Any mood disorder	3.6 (0.4)	4.2 (0.8)	3.1 (0.4)	4.0 (0.7)	2.7 (0.7)	3.7
Impulse-Control Disorders						
Conduct disorder[2]	0.5 (0.2)	0.5 (0.2)	0.7 (0.7)	-	-	0.1[a]
Intermittent explosive disorder	1.9 (0.3)	3.1 (0.7)	1.6 (0.3)	0.7 (0.3)	0 (0)	37.9*
Any impulse-control disorder	4.3 (0.9)	3.3 (1.1)	7.3 (1.8)	-	-	3.6[a]
Substance Use disorders						
Alcohol abuse	4.7 (0.4)	5.4 (0.8)	5.7 (0.7)	2.2 (0.5)	0.9 (0.5)	36.4*
Alcohol dependence	1.0 (0.2)	1.0 (0.3)	1.5 (0.4)	0.3 (0.2)	0 (0)	25.3*
Drug abuse	0.5 (0.2)	0.6 (0.5)	0.4 (0.2)	0.5 (0.5)	0 (0)	9.6*
Drug dependence	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1.1
Any substance use disorder	4.9 (0.7)	6.0 (1.2)	5.9 (1.0)	2.4 (0.7)	1.8 (1.6)	15.8*
Any Disorder						
Any disorder[3]	13.2 (1.3)	14.2 (2.7)	13.7 (1.4)	13.2 (2.2)	8.2 (2.2)	4.5
Two or more disorders[3]	3.7 (0.5)	4.5 (1.1)	4.1 (0.8)	3.0 (1.3)	1.4 (0.4)	16.7*
Three or more disorders[3]	1.2 (0.3)	1.3 (0.5)	0.9 (0.2)	2.0 (1.3)	0.4 (0.4)	3.1
Sample Sizes						
Part I	5201	1209	2261	1184	574	
Part II	1628	379	726	357	166	
Part II ages 18–39	570	379	191	0	0	

[1] PTSD was assessed only in the Part II sample (n=1628).

[2] SAD and CD were assessed only among Part II respondents in the age range 18–39 (n=570).

[3] These summary measures were analyzed in the full Part II sample (n = 1628). SAD and CD were coded as absent among respondents who were not assessed for these disorders.

* Significant age difference (p□0.05).

[a] df = 1

Table 2

Age at selected Percentiles on the standardized Age of Onset distributions of DSM-IV/WMH-CIDI Disorders, with Projected Lifetime Risk at Age 75 Years

		Age at Selected Age-of-Onset Percentiles, y							
	Projected Lifetime Risk at Age 75 y, % (SE)	**5**	**10**	**25**	**50**	**75**	**90**	**95**	**99**
				Anxiety Disorders					
Panic disorder	-	-	-	-	-	-	-	-	-
Agoraphobia without panic	-	-	-	-	-	-	-	-	-
Specific phobia	2.8 (0.3)	5	5	5	13	17	36	41	59
Social phobia	-	-	-	-	-	-	-	-	-
Generalized anxiety disorder	1.7 (0.3)	18	23	34	44	54	57	58	61
Posttraumatic stress disorder	-	-	-	-	-	-	-	-	-
Separation anxiety disorder	-	-	-	-	-	-	-	-	-
Any anxiety disorder[1]	6.0 (0.8)	5	5	10	17	36	55	57	60
				Mood Disorders					
Major depressive disorder	7.2 (0.9)	18	21	28	43	54	67	68	68
Dysthymia	-	-	-	-	-	-	-	-	-
Bipolar I-II disorders	-	-	-	-	-	-	-	-	-
Any mood disorder	7.3 (0.9)	18	21	28	43	53	67	68	68
				Impulse-Control Disorders					
Conduct disorders	-	-	-	-	-	-	-	-	-
Intermittent explosive disorder	2.1 (0.4)	8	9	13	15	23	29	40	44
Any impulse-control disorder[1]	4.9(0.9)	8	10	13	18	23	29	29	29
				Substance Use Disorders					
Alcohol abuse	5.9 (0.5)	18	19	21	26	33	41	46	49
Alcohol dependence	1.2 (0.2)	20	21	22	29	33	36	43	49
Drug abuse	-	-	-	-	-	-	-	-	-
Drug dependence	-	-	-	-	-	-	-	-	-
Any substance use disorder	6.1 (0.8)	18	19	21	25	31	39	51	53
				Any disorder					
Any disorder	18.0 (1.5)	5	10	17	25	43	56	64	68

[1] These summary measures were analyzed in the full Part II sample (n = 1628). SAD and CD were coded as absent among respondents who were not assessed for these disorders.

Disorders with respondents fewer than 30 were too small to be estimated and were put as empty, but they were counted in the class of disorders and overall disorder.

Table 3

Cohort (Age at Interview) as a Predictor of Lifetime Risk of DSM-IV Disorders

	Lifetime Risk by Age at Interview (Years) Compared With Respondents Age □ 65 y (born earlier than 1936), Odds Ratio (95% CI)			
	18–34 (born at 1967 or later)	**35–49 (born 1952–1966)**	**50–64 (born 1937–1951)**	**χ^2(3)**
Anxiety Disorders				
Panic disorder	-	-	-	-
Specific phobia	0.9 (0.5–1.8)	0.7 (0.4–1.3)	0.9 (0.5–1.6)	2.7
Social phobia	-	-	-	-
Generalized anxiety disorder	3.4 (0.8–15.0)	1.5 (0.3–6.5)	0.9 (0.5–1.6)	2.7
Posttraumatic stress disorder	-	-	-	0.8
Separation anxiety disorder	-	-	-	-
Any anxiety disorder	1.7 (0.6–4.4)	1.1 (0.5–2.5)	1.6 (0.7–3.9)	3.3
Mood Disorders				
Major depressive disorder	22.4 (9.8–51.0)*	4.4 (2.3–8.6)*	2.5 (1.4–4.5)*	76.4*
Dysthymia	-	-	-	-
Bipolar I-II disorders	-	-	-	-
Any mood disorder	20.8 (9.4–45.8)*	4.4 (2.3–8.4)*	2.5(1.4–4.4)*	76.5*
Impulse-Control Disorders				
Conduct disorder	-	-	-	-
Intermittent explosive disorder	5.9 (2.3–15.3)*	2.5 (1.0–6.2)*	1.0 (1.0–1.0)	20.3*b
Any impulse-control disorder	0.5 (0.2–1.3)*	1.0 (1.0–1.0)	1.0 (1.0–1.0)	1.9a
Substance use disorders				
Alcohol abuse with/without dependence	17.0 (4.5–63.8)*	8.4 (2.2–31.9)*	2.9 (0.7–11.2)	47.5*
Alcohol dependence with abuse	10.4 (2.8–38.8)*	5.8(1.6–20.8)*	1.0 (1.0–1.0)	12.8*b
Drug abuse with/without dependence	-	-	-	-
Drug dependence with abuse	-	-	-	-
Any substance use disorder	8.2 (1.1–67.2)*	4.0 (0.6–28.2)	1.5 (0.2–11.2)	31.9*
Any Disorders				
Any disorder	4.7 (2.0–10.9)*	2.7 (1.2–5.8)*	2.0 (1.0–4.2)*	15.2*

*Significant at the 0.05 level, two-sided test

-Abbreviations: CI, confidence interval

-Based on discrete-time survival models with person-year as the unit of analysis, controls are time-intervals.

-Disorders with respondents fewer than 30 were too small to be estimated and were put as empty, but they were counted in the class of disorders and overall disorder.

a df = 1

b df = 2