

Anxiety disorders: 12-months prevalence, psychiatric comorbidities, and quality of life in old age

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Abstract

Objectives: Strong discrepancies in prevalence rates of anxiety disorders in late life persist due to the lack of reliable diagnostic tools. The MentDis_ICF65+ study assessed twelve-month prevalence rates of anxiety disorders and age- and sex-related differences in comorbidities, as well as impact on quality of life. **Design:** The study used a cross-sectional multi-centre survey. **Participants:** The age-stratified, random sample included 3142 older men and women aged 65 to 84 years, living in five European countries and Israel. **Measurements:** Anxiety disorders were assessed in computer assisted face-to-face interviews with an age-sensitive diagnostic interview (CIDI65+). **Results:** The prevalence of anxiety disorders was 17.2%. Agoraphobia was the most frequent disorder 4.9%, followed by panic disorder (PD) 3.8%, general anxiety disorder 3.1%, specific phobia 2.9%, post-traumatic stress disorder 1.4%, social phobia 1.3%, and obsessive-compulsive disorder 0.8%. Women are more likely to present agoraphobia or PD compared to men. The rates of agoraphobia, PD and social phobia significantly drop in 75-84 year olds compared to 65-74 years olds. Anxiety disorders were significantly associated with comorbid major depression and reduced quality of life. **Conclusions:** The age-sensitive CIDI65+ led to higher prevalence rates of anxiety disorders in the elderly than previous studies. Age- and sex-specific differences in prevalence, and associations with comorbid depression and quality of life, differ across specific anxiety disorders.

Keywords: anxiety, old age, quality of life, depression

Introduction

Lifespan approaches have shown that neurobiological and psychosocial aspects as well as each individual's subjective perception of anxiety evolve in aging (1-4). Prevalence rates of diagnosed anxiety disorders have been shown to be lower for older than for younger adults (4,5). However, the prevalence of disorders largely varies across cultures, living environments, studies and assessment tools (2-9). Standardized diagnostic assessment tools such as the World Health Organisation's Composite International Diagnostic Interview (CIDI, 10), known to be reliable in younger adults, have been applied in old age to establish international comparisons across various cultural contexts. These studies showed a large variation in the 12-month prevalence of anxiety disorders, ranking from 4.4% to 11.6% in adults aged 55+ years (11-13). Uncertainty remains whether lower rates in old age reflect a true decline in anxiety disorders, or whether they result from methodological biases or the insufficiency of current diagnostic instruments in detecting and diagnosing anxiety disorders in old age (1-5, 14, 15).

Furthermore, evidence on the relationship of comorbid anxiety and depression, often reported in older populations, has to face methodological problems including improper definitions and diagnostic criteria, enhancing the risk for diagnostic confusion (1,4). In younger adults, the use of alcohol to reduce emotional distress (self-medication) was given as an explanation for comorbidity between anxiety and alcohol disorders (16). In old age, this association yet remains to be confirmed. Finally, anxiety disorders consistently impaired subjective quality of life in younger age (17), and some authors reported the same negative relationship between quality of life and anxiety disorder in older adults too (18,19, 20). Studies of DSM disorders showed that quality of life impairments were mainly associated with generalized anxiety disorders (21). But again, the limited number of studies does not allow for drawing solid conclusion with regard to elderly adults.

Aims of the study

To meet the need for greater standardisation of methods to assess prevalence of anxiety disorders in elderly populations and allow for comparability of epidemiological data across cultures, the present study used a structured and standardized diagnostic interview based on international diagnostic criteria, the CIDI. This large multi-centre study relied on an adapted age-specific version of the CIDI (CIDI 65+, 22, 23) to assess the prevalence of anxiety disorders in 3142 community-dwelling adults aged 65-84 years living in 5 European cities plus Israel. Comorbid major depression disorder, alcohol dependency and alcohol abuse were explored, as well as impact of anxiety disorders on participants' subjective quality of life.

Material and methods

The MentDis_ICF65+ study is a cross-sectional multicentre survey conducted in six countries (Germany, Italy, England, Spain, Switzerland and Israel). A random sample, stratified by age and gender, living in selected catchment areas included at least 500 participants from each country. Inclusion criteria were the ability to provide informed consent, living in the catchment area and ages between 65 and 84 years. The exclusion criteria were moderate cognitive impairment as assessed by the Mini-Mental State Examination (MMSE > 18) or an insufficient level of corresponding language.

Each study centre defined a catchment community area representative of the region's population with regard to social classes (equal inclusion of working, middle and upper social class populations), specific living conditions of our age cohort (e.g. no exclusion of nursing homes) and population structure (urban/rural), as has been described in detail elsewhere (24, 25). A harmonised procedure in contacting each participant and conducting the survey was realised, including initial contact by phone and mail, standardised interview training, implementation of a standardised interviewer training and a standardised study protocol for all test centres, and using stringent, high-quality data-control procedures. The overall response

rate of the study was 20%. Non-responder analyses showed significant differences in the response rate between the centres ($p < 0.001$) and age groups ($p < 0.001$), but not between genders ($p = 0.738$). The age effect indicates that the response rate was significantly higher (7%) for younger participants (65-74 years) than for older participants (75-84 years). Representativeness analysis showed small differences between catchment areas, in comparison to catchment areas of the overall population of the participating countries with regard to socio-demographic characteristics (such as work status, marital status and education) according to the effect sizes by Somers' d (all $d > 0.01$).

Sample

A random sample of $N = 3,142$ older men and women (65 – 84 years) living in the selected catchment areas of each participating country, was drawn from population registries in Hamburg (Germany) and Ferrara (Italy), and from postal addresses of market research companies in London/Canterbury (England), Madrid (Spain), Geneva (Switzerland) and Jerusalem (Israel). All participants signed an informed consent prior to study inclusion, after acceptance of the study design by the local ethics committees in all six participating countries (24,25).

Measures

Assessment of anxiety disorders

Computer assisted face-to-face interviews with an adapted, age-specific version of the Composite International Diagnostic Interview (CIDI65+, 23) were carried out by trained lay interviewers with household residents. The CIDI65+ was adapted to the social, cognitive and psychological needs of people aged 65 to 84 years, including adding words, alternative questions and detailed section introductions, breaking down long questions into less complicated questions, sensitising scales upfront and embedding a fuller spectrum of syndromes. A pre-testing phase was conducted in Germany and the UK to evaluate feasibility and verify the acceptability of the CIDI65+ to respondents. To evaluate the usability and

reliability of the CIDI65+, a pilot phase was conducted. Reliability was good for most diagnosis (such as depression ($k=0.79$) and anxiety disorders ($k=0.69$)). Lower k -scores were found for less frequent disorders such as panic disorders ($k=0.37$), similar to other diagnostic instruments that also report lower reliability scores (23), or have less precise classification systems (22). This structured interview allows assessment of the following seven DSM-IV anxiety disorders: panic disorder (PD), generalized anxiety disorder (GAD), agoraphobia, social and specific phobias, obsessive-compulsive disorders (OCD) and posttraumatic stress disorder (PTSD). 12-month prevalence rates were estimated as the percentage of participants having an anxiety disorder in the year prior to the interview. Comorbid major depression disorders as well as alcohol abuse or dependency disorders, as diagnosed by the DSM-IV, were equally assessed with the CIDI 65+.

Assessment of quality of life

Subjective quality of life was assessed with a brief version of the WHOQOL-BREF (26). The instrument uses a five-point Likert scale to assess the individual's perceptions in the context of their culture and value systems, and their personal goals, standards and concerns. The questionnaire measures dimensions including physical and psychological well-being, environmental factors and social support. Naumann and Byrne (27) provided evidence for successful administration of this tool to older adults.

Statistical analyses

To assess 12-months prevalence rates of anxiety disorders in all six countries, the data from all the participating centres were analysed in a comprehensive statistical model. Mixed generalised linear models, with country as a random effect and stratum (age*sex) as a fixed effect, were used to estimate prevalence. In addition, the best linear unbiased prediction (BLUP) estimators returned by the model were used to analyse differences between the participating centres. For all estimators, the corresponding confidence intervals were denoted.

To assess secondary comorbid psychiatric symptoms of anxiety disorders, logistic regression models were run with episodes of major depression as dependent variable, and all seven anxiety disorders as independent predictors. Next we repeated these regression models to analyse the association of alcohol abuse or dependency as secondary diagnosis of the seven anxiety disorders. All models were adjusted for age, sex and centre. Linear regressions were run to predict quality of life by the seven anxiety disorders after adjustment for effects of age (four groups: 65-69, 70-74, 75-79, > 80), sex and centre. Prevalence was presented as adjusted for differences between the centres, sex, and the four age groups, as well as for the interaction between sex and age groups, whenever this interaction was significant. (This interaction revealed to be significant only for the generalized anxiety disorder, as illustrated in Figure 1.)

All statistical analyses were performed with Stata xxxx

Results

Sample characteristics

The sample of 3142 participants included an equal number of male and female as well as young-old (65-74 years) and old-old (75-84 years) participants without significant differences between centres. For a detailed description of population characteristics, please refer to Andreas et al. (25).

12-month prevalence rates of anxiety disorders

Table 1a details the 12-month prevalence for the entire sample as well as for each country, as expressed by raw, unadjusted prevalence. In Table 1b, these prevalence rates are adjusted for differences between gender and the four age groups as well as the interaction between gender and age groups, whenever this interaction is significant. Overall, the adjusted prevalence for any anxiety disorder is 17.2%. The most prevalent anxiety disorders are agoraphobia 4.9%, panic disorder 3.8%, general anxiety disorder 3.1% and specific phobia

2.9% (if estimated by the mean of specific phobia of any types: animal, environmental, blood-injection, situational, table 2). The following disorders are less predominant: posttraumatic stress disorder 1.4%, social phobia 1.3%, and obsessive-compulsive disorder (OCD) 0.8%. Centres show significant differences for the overall prevalence of anxiety disorders ($p = 0.031$), as well as for some 4 of the 7 disorders: agoraphobia ($p < 0.001$), specific phobias ($p < 0.05$), PTSD ($p = 0.001$) and social phobia ($p < 0.001$). The London centre showed the highest overall prevalence of disorders. Strikingly, London or Jerusalem centres both showed the highest prevalence for the 6 out of 7 anxiety disorders. Notably, the prevalence of specific phobia was highest in the London or Madrid centre.

Regarding gender differences, regression analyses revealed that women show significantly higher overall levels of anxiety disorder compared to men (please refer to table 3). Women were three times more likely to present any of the anxiety disorders (OR = 2.96, 95%-CI [2.45; 3.58], $p < 0.001$), and twice more likely to present agoraphobia (OR = 2.44, 95%-CI [1.77; 3.37], $p < 0.001$) or PD (OR = 1.68, 95%-CI [1.10; 2.57], $p = 0.018$) than men. Interestingly, no gender differences emerged for PTSD, social phobia or OCD.

With respect to age differences, the rates of the four age groups significantly differed for the overall prevalence of anxiety disorders ($p < 0.001$). Compared to 65-69 years old, the 70-74 years group showed a similar risk (OR = 0.92, 95%-CI [0.65; 1.29]), however, this risk diminished at 75+ years (75-79 years OR = 0.60, 95%-CI [0.46; 0.78] and 80-84 years OR = 0.53, 95%-CI [0.37; 0.77]). Regarding the specific diagnosis, this pattern was identical for agoraphobia ($p = 0.023$). Indeed, compared to age 65-69 years, the odds ratio remained stable with 70-74 years (OR = 1.03, 95%-CI [0.69; 1.54]), before it significantly declined after age 75 (75-79 years OR = 0.52, 95%-CI [0.32; 0.84]), and stabilized again at age 80-84 years no longer significantly pursuing its decline (OR = 0.52, 95%-CI [0.25; 1.10]). This prevalence decline was more drastically for social phobia ($p = 0.004$). Compared to 65-69 years old, no change for the 70-74 years old participants OR = 0.91, 95%-CI [0.52; 1.60], but reaching age

75-79 years, the risk continuously lowers (75-79 years OR = 0.13, 95%-CI [0.04; 0.46] and 80+ years OR = 0.09, 95%-CI [0.02; 0.52]) showing that 4th age old participants are clearly less likely to present social phobia. In contrast, the likelihood for panic disorder already drops at age 70-74 years (OR = 0.52, 95%-CI [0.25; 1.09], before levelling out (75-79 years OR = 0.36, 95%-CI [0.14; 0.91] and 80+ years OR = 0.44, 95%-CI [0.22; 0.89]) ($p = 0.032$). No significant age differences emerged for PTSD and OCD.

A significant interaction between age and gender was found for GAD as shown in Figure 1. Prevalence first significantly increased with age for women before it dropped ($p = 0.020$), while the pattern of prevalence remained stable in time for men. Gender and age effects were not analysed for specific phobia, given the high variability according to types of phobia.

Regarding the medical treatment of those participants with anxiety disorders, xxx

Comorbidities of anxiety disorders

Adjusted logistic regression models showed that agoraphobia (OR = 2.02, 95%-CI [1.28; 3.19], $p = 0.004$), PD (OR = 3.03, 95%-CI [2.02; 4.52], $p < 0.001$), and social phobia (OR = 3.14, 95%-CI [1.31; 7.53], $p = 0.013$) are significantly associated with comorbid major depressive disorder. Likewise, GAD (OR = 3.74, 95%-CI [1.77; 7.90], $p = 0.001$) are significantly related to major depression diagnosis as defined by the CIDI 65+. In contrast, no significant relationship was found between anxiety disorders and alcohol dependency or alcohol abuse. Regarding comorbidity patterns between the different anxiety disorders XXXXX

Anxiety disorders and quality of life

Linear regression analyses adjusted for age, gender and centres showed that agoraphobia ($\beta = -9.46$, $p < 0.001$), PD ($\beta = -4.60$, $p < 0.05$), social phobia ($\beta = -7.82$, $p < 0.05$) as well as GAD ($\beta = -10.92$, $p < 0.001$) significantly predict lower levels of quality of life as assessed by the

WHOQOL-Bref. In contrast, no significant relationship was found between quality of life and OCD, PTSD, and specific phobias.

Discussion

12-months prevalence of anxiety disorders

This large European multi-centre study, using the standardized age-specific assessment CIDI 65+ interview to assess 12-month prevalence rates of anxiety disorders, reveals that 17.2% of community-dwelling adults of the general population aged 65 to 84 years present with anxiety disorders according to the DSM-IV diagnostic criteria. In comparison to previous studies, using the adult version of the CIDI to assess anxiety disorders in adults aged 55+ years living in the United States with comparable socio-economical background (11,12) our study revealed a higher prevalence rate. Indeed, the 17.2% of anxiety disorder surpass the 11% reported by several studies (11,12), and the 7% reported by Gum et al. (13). Keeping in mind that these differences may be due to study discrepancies in cultural aspects and age differences, results of the present study show that an age-specific assessment tool may allow for higher sensitivity in detecting anxiety disorders in old age populations. Previous studies have stressed the importance of taking into account unique features of anxiety disorders in later life. Albeit symptom presentations in older and younger adults show similarity, the level of anxiety related to elderly-specific social situations (e.g. retirement, loss of partner), or sub-threshold and different expression of anxiety in the elderly may impair diagnostic quality (4). For example, late-life panic disorders may be confounded with cognitive dysfunction that is presented as fearfulness and hyper-arousal. Anxiety may be experienced and described as more somatic in nature with complaints, such as dizziness or shakiness. In general, older adults may experience the same symptoms, but use different terminologies to express them, leading to under- and misdiagnosis (2).

Our results are consistent with lifespan observations in anxiety disorders, except for PD. We found the lowest prevalence rates (< 1.5%) for PTSD, social phobia, and OCD, whereas

agoraphobia, PD, GAD, and specific phobia, emerged as more frequent disorders. Lenze and Wetherell (2) explained how different forms of anxiety disorders might predominate at different stages of the lifespan. Phobias (particularly social and specific phobias) may predominate in childhood; panic disorder and PTSD may be at their highest prevalence in adulthood; while worry disorders (i.e. GAD) may be most common in old age. Neurodevelopmental processes affect symptom presentations in later life: GAD are most common in old age, while anxiety disorders with a strong autonomic nervous system component resulting in panic-like symptoms (such as social phobia and panic disorder) are more common in early adulthood (2). Confirming this hypothesis, the inclusion of four age groups in the present study allowed for distinguishing the progressive decline with age of the overall prevalence rate of anxiety disorders, mainly after age 75, and especially so for social phobia. As mentioned, psychosocial changes in late life may explain the decline in social phobia. Being less exposed to social and professional situations, older people may tend to avoid social situations that provoke anxiety. Our results are globally consistent with this line of hypotheses.

Regarding the more frequent disorders in this study, several previous studies have suggested that GAD is the most frequent anxiety disorder in old age (9,28). However, Byers et al. (11) found only 2% of GAD in adults 55+ years when using the adult CIDI. Due to the increased cognitive decline in the aged, some authors have suggested that GAD may represent a form of agitation revealing underlying dementing processes (29). The systematic exclusion of cognitive deficits in the current sample (by means of the MMSE) may explain the lower rate of GAD. Agoraphobia reaches the highest prevalence in this study, contrary to previous studies using the adult age CIDI (11, 13). It may be particularly difficult to determine prevalence of these disorders in the elderly, because of the difficulty to distinguish between excessive and unreasonable fears and concerns associated with normal aging (30). Fear of falling, marked by fear and avoidance, might manifest as agoraphobia in its most severe form (2). Indeed, fear of situations (e.g. fear of taking the bus, being in a crowd, crossing the street or fear of falling) and objects may be excessive in younger adults yet perfectly reasonable in elderly, given their

reduced mobility, vision and hearing. The CIDI 65+ may indeed be more adapted to distinguish agoraphobia from normal aging worries. Regarding PD, we found in our study a 3.8% 12-month prevalence rate, which is much higher than what was recorded by previous community studies in old age: 0.84% in Canada (19), 0.7% in the United States (13), 1.4% in African Americans (6), 1.0% in the Netherlands (28), and 0.3% in France (8). In our study, the 12-month prevalence rates significantly differed depending on the investigated country, ranging from 1.1% in Madrid to 5.4% in London. These results show that it is worth calling into question social and cultural differences when addressing PD occurrence. Lewis-Fernandez et al. (31) indeed suggested that the low prevalence usually found in non-Western countries could be due to methodological biases in the cultural adaptation of panic disorder's DSM-IV criteria.

Generally, the multi-centric study design results revealed that the prevalence of anxiety disorders differs according to different cities. Overall prevalence rates are higher in large urban areas (London, Madrid and Hamburg) than in smaller ones (Geneva, Jerusalem and Ferrara). These results are in line with Prina et al. (7), who noticed a stronger anxiety among urban than rural populations in Latin American and Asian countries. Participants from the London centre suffer most from anxiety disorders, independently of their diagnosis, while prevalence of specific phobia was particularly high in Madrid, another big city. These findings could be explained by the presence of a more stressful environment in large urban areas, as pointed out by the literature (7), high prevalence rates in Jerusalem may be related to the tense political situation in Israel and the occupied territories. Indeed, previous studies have associated prevalence of PTSD with the political situation in Israel-occupied territories (32).

With respect to gender differences, the present study confirms that the higher prevalence rate of anxiety disorders in women holds throughout the age spectrum. As for previous studies (4, 7, 8, 11, 13), women showed higher overall prevalence compared to men. However, this relationship differed according to anxiety disorder diagnosis. In this study, women showed

higher rates of agoraphobia and PD than men independently of their age, contrary to PTSD, social phobia or OCD. For GAD, prevalence significantly drops in women after age 70, while men present constant levels of GAD throughout the age groups. As for younger adults (33) these results stress the importance to take into account gender characteristics when assessing specific anxiety diagnosis in older adults.

Psychiatric comorbidity of anxiety disorders

As expected, we also added solid evidence for comorbidity between anxiety and depression in old age to previous studies (2). Phobic and panic disorders (agoraphobia, panic disorder, social phobia) as well as GAD were significantly associated with comorbid major depressive disorder. However, no significant relationship could be established between anxiety disorders and alcohol dependency or abuse in our old age sample. These results suggest that the comorbidity of anxiety and alcohol disorders, established in younger adults (16,35) may not apply in later life. However, comprehensive evidence is lacking on this issue, as alcoholism in the elderly has not been the focus of much attention in the literature. Chou reported a significant association between alcohol abuse/dependence in a study on social anxiety disorder, but found no such relationship in a separate study on specific phobia (36). In accordance with our study, Van der Berg et al., (37) did not find significant evidence supporting anxiety as a risk factor for the development of alcohol use/dependency in old age. Thus, the relationship between anxiety disorders and alcohol abuse/dependency seems to be limited to studies performed in the general adult population (38) and cannot be evidenced in a study specifically focusing on older adults. Older adults may tend to rely on benzodiazepines and other drugs to face their anxiety disorder, rather than on alcohol (39). Likewise, old age studies have related alcohol abuse/dependency more strongly with major depression (37). The understanding of comorbid anxiety, mood and alcohol use disorders in old age deserves further attention, yet future studies should focus less on concurrent comorbidities, and focus more on the lag time between the onset of specific disorders, and on the temporal ordering of their onsets, to help clinicians identify potential groups for early intervention.

Anxiety disorders and quality of life

Authors have firmly associated anxiety with a decrease in quality of life in younger adults (17). However, only a few studies investigated and confirm this relationship in older people (40). Results of the present study showed that the impact of anxiety disorders on quality of life depends on the diagnosis. Occurrence of agoraphobia, social phobia, PD or GAD diagnosis predicted lower quality of life, contrary to specific phobia, OCD and PTSD. Regarding PTSD, traumatic experiences have been associated with post-traumatic stress, as well as with post-traumatic growth, explained by problem-focused, acceptance and positive reinterpretation coping, optimism, religion and positive affect (41). Old age has been consistently associated with increased hedonic well-being, positive affect and higher emotional wisdom (42) and one could hypothesize that older adults rely on more efficient appraisal and coping strategies to deal with trauma and post-traumatic stress than younger adults. With respect to OCD, this disorder mostly hits adults in their productive years of life, leading to financial burden, unemployment and adverse impact on social roles. Possibly, the impact of OCD in older adults is less invalidating on their daily quality of life. In previous studies, diminution of quality of life in older adults has been associated mostly with GAD (19, 21). In contrast, in younger adults, lower quality of life has been associated with social phobia, PTSD, PD and OCD (43,44). The present studies shows that the negative impact on subjective QOL is not limited to GAD in old age, but extends to PD, agoraphobia and social phobia, contrary to specific phobia, OCD and PTSD. Future studies would gain from enlarging their focus on age-related difference when studying lifetime evolution of specific disorders.

Strength of the current study was the use of a reliable, structured and standardised instrument that was adapted to the needs of elderly adults. Nevertheless, the study has some limitations. We did not include people with severe cognitive impairment, and due to the nature of the epidemiological studies in old age, we were unable to control for possible recall bias regarding the self-reporting of the past 12 months symptoms.

In summary, utilization of the age-specific standardized CIDI 65+ in a large cross-cultural sample of older adults reveals a higher prevalence rate of anxiety disorders in the general elderly population than previous studies relying on the adult CIDI. Inclusion of stratified gender and age groups as well as multi-centric selection of participants showed that prevalence of old age anxiety disorders is higher in women and large scale cities, and declines after age 75+. Associated age-decline of prevalence was strongest for social phobia. The nature of the relationships with age, gender and study centre largely depend on the specific anxiety diagnosis, except for PTSD. As for younger adults, the reverse relationship between occurrence of anxiety disorders and quality of life holds for agoraphobia, social phobia, PD and GAD, yet not for other anxiety diagnosis. In later life, anxiety disorders are associated with comorbid major depression, but not with alcohol abuse or dependency. These results suggest that anxiety disorders remain prevalent in older adults and gain from being assessed with age-specific diagnostic tools taking into account demographic and cultural specificities.

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