



## Research Papers

# The relationship between chronic physical conditions, multimorbidity and anxiety in the general population: A global perspective across 42 countries



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## ABSTRACT

**Objective:** This cross-sectional study assessed the association of chronic physical conditions and multimorbidity with anxiety among community-dwelling adults in 42 countries.

**Method:** Data were analyzed from the World Health Survey including 181,845 adults aged  $\geq 18$  years. Anxiety in the past 30 days and nine chronic physical conditions (angina, arthritis, asthma, chronic back pain, diabetes, edentulism, hearing problem, tuberculosis, and visual impairment) were assessed. Multivariable logistic regression analyses were conducted to explore the associations between chronic physical conditions or the number of them and anxiety.

**Results:** After adjustment for confounders, most of the individual chronic physical conditions were significantly associated with anxiety. Compared to those with no physical health conditions, one condition was associated with an almost twofold increased odds of anxiety symptoms (OR = 1.94; 95%CI = 1.76–2.13), while this figure rose to 5.49 (3.73–8.09) in those with  $\geq 5$  conditions.

**Conclusions:** Our data suggest that increasing numbers of chronic physical conditions are associated with higher odds for anxiety. Health care providers should consider the presence of anxiety symptoms especially in individuals with physical multimorbidity.

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## 1. Introduction

Anxiety is a common and disabling mental health condition [1]. It can greatly impair a person's functioning, quality of life and well-being [2]. Anxiety is characterized by excessive and persistent (yet often unrealistic) worry which can inhibit one's ability to carry out activities of daily living, and which, if left untreated can develop into an anxiety disorder [3]. In a systematic review of prevalence studies across 44 countries, the global point prevalence of anxiety disorders was estimated at 7.3% (95% confidence interval, CI = 4.8–10.9), suggesting that one in 14 people around the world at any given time has an anxiety disorder, while roughly one in nine (11.6%, 95% CI = 7.6–17.7) has an anxiety disorder in any given year [4]. Anxiety disorders are the sixth leading global cause of years lived with disability [5]. Moreover, the global financial

burden of anxiety is substantial, owing to lost work productivity and high medical resource use [6,7].

There is growing recognition that numerous mental health conditions are associated with an increased physical health burden. For example, it is well established that anxiety is associated with several chronic physical co-morbidities [1]. Of particular concern are cardiovascular diseases [8], diabetes [9], pulmonary diseases [10], chronic pain [11], infectious diseases such as tuberculosis [12], arthritis [13], edentulism [14], and mainly in older people, visual impairment [15] and hearing problems [16]. Given the increasing prevalence of chronic conditions worldwide [17], a further understanding of the determinants, consequences and management of the comorbidity between anxiety and chronic physical conditions should be a research priority. While progress has been made, most studies to date have however, examined the co-occurrence of anxiety with a single comorbid physical health condition. For example, in a recent cross-sectional household survey of community-dwelling adults conducted in 17 countries (47,609

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participants) [18], 9 out of the 10 investigated chronic physical health conditions (only the risk for cancer was not increased) were associated with higher odds for generalized anxiety disorder with odds ratios (OR) ranging from 1.3 (95% CI = 1.0–1.6) for diabetes to 2.5 (95% CI = 1.8–3.5) for a chronic lung disease.

While investigating single chronic conditions is important, there is increasing recognition that many people may have multiple comorbidities. Multimorbidity (i.e. the presence of multiple chronic conditions) is relatively common in the general population with reported prevalence figures as high as 72% [19]. The heightened prevalence of multimorbidity is mainly due to the growing incidence of chronic conditions [17] and increasing life-expectancies, and it is undoubtedly one of the most significant challenges faced by health care providers and governments across the globe [20,21]. Multimorbidity is associated with a marked lower quality of life [22], increased health-care utilization [23], and ultimately, a higher risk for premature mortality [24]. Despite this, there is a paucity of studies on the associations between anxiety and multimorbidity. Only one population study to date among 4219 participants 65 years or older in the US [25] found that two and  $\geq$  three medical conditions yielded a 1.96-fold (95% CI = 1.13–3.41) and 3.49-fold (95% CI = 2.05–5.95) increased odds of elevated anxiety respectively, compared to those with no medical conditions. While helpful, the relatively modest sample size, restriction to a single country and focus only on older adults, limits the generalizability of the findings. Thus, more research on the prevalence of anxiety in people with multimorbidity, in particular across increasing number of co-morbidities, is essential to identify high risk subgroups, which would preferentially benefit from tailored preventative and therapeutic strategies.

To the best of our knowledge, there are no multinational representative population studies investigating associations between anxiety and multimorbidity. This is an important research gap, given the increasing prevalence of chronic physical health conditions globally, and especially in low- and middle-income countries [26]. Understanding associations between multimorbidity and anxiety can inform the development of targeted interventions and policies. The aim of the current study therefore was to explore the association between anxiety, chronic conditions and multimorbidity across 42 countries from Africa, Asia, Europe, and Latin-America, and to assess whether the associations are similar across all countries.

## 2. Methods

### 2.1. Procedure and settings

The current paper utilized data from the World Health Survey (WHS), a cross-sectional study undertaken in 2002–2004 in 70 countries worldwide. Data were collected using single-stage random sampling and stratified multi-stage random cluster sampling across 10 and 60 countries respectively. Full details of the WHS are freely available elsewhere (<http://www.who.int/healthinfo/survey/en/>). Briefly, persons aged  $\geq$  18 years with a valid home address were eligible to participate. Each member of the household had equal probability of being selected by utilizing Kish tables. A standardized questionnaire, translated accordingly, was used across all countries. The individual response rate (i.e. ratio of completed interviews among selected respondents after excluding ineligible respondents from the denominator) ranged from 63% (Israel) to 99% (Philippines) [27]. In order to conduct the study, ethical approval was obtained from the ethical boards at each study site. Sampling weights were generated to adjust for non-response and the population distribution reported by the United Nations Statistical Division. Informed consent was obtained from all participants.

### 2.2. Anxiety (outcome variable)

Anxiety was assessed by the question 'Overall in the past 30 days, how much of a problem did you have with worry or anxiety' with

response alternatives: none, mild, moderate, severe, and extreme. In accordance with previous WHS publications, those who answered severe and extreme were considered to have anxiety [28,29].

### 2.3. Chronic physical conditions and numbers of chronic physical conditions (exposure variables)

A total of nine physical conditions were assessed as part of the WHS. Arthritis, asthma, and diabetes were based on self-reported lifetime diagnosis. For angina, in addition to a self-reported diagnosis, a symptom-based diagnosis based on the Rose questionnaire was also used [30]. Chronic back pain was defined as having had back pain (including disc problems) every day during the last 30 days. Visual impairment was defined as having extreme difficulty in seeing and recognizing a person that the participant knows across the road (i.e., from a distance about 20 m) [31]. A validity study showed that this response likely corresponds to World Health Organization definitions of visual impairment [31]. The participant was considered to have hearing problems if the interviewer observed this condition at the end of the survey. Edentulism was assessed by the question "Have you lost all your natural teeth?" Those who responded affirmatively were considered to have edentulism. Finally, a tuberculosis diagnosis was based on past 12-month symptoms and was defined as: 1) having had a cough that lasted for three weeks or longer; and 2) having had blood in phlegm or coughed up blood [32]. We calculated the total number of these conditions while allowing for one missing variable in order to retain a larger sample size. The number of chronic physical conditions was categorized as 0, 1, 2, 3, 4, and  $\geq$ 5.

### 2.4. Co-variables

The selection of the co-variables was based on past literature and included sex, age (18–34, 35–59,  $\geq$ 60), wealth, and depression [25]. Principal component analysis based on 15–20 assets was conducted to establish country-wise wealth quintiles. Past 12-month depression was defined using the DSM-IV algorithm using individual questions of the World Mental Health Survey version of the Mental Health Composite International Diagnostic Interview (CIDI) [33], and was based on duration and persistence of depressive symptoms in the past 12 months using the same algorithms as previous WHS publications [34,35]. Respondents were first asked five questions. Those who answered 'Yes' to four of them were considered as possibly having depression or a major depressive episode. Specifically, respondents were asked: "During the last 12 months have you ever experienced...": (a) A period lasting several days when you felt sad, empty or depressed? (b) A period lasting several days when you lost interest in most things you usually enjoy such as hobbies, personal relationships or work? (c) A period lasting several days when you have been feeling your energy level decreased or that you were tired all the time? (d) Did you lose your appetite? (e) Did you notice any slowing down in your thinking? Among those with possible depression, individuals who further responded 'Yes' to both of the following questions were classified as having depression: (a) Was this period for more than 2 weeks? (b) Was this period most of the day, nearly every day?

### 2.5. Statistical analysis

Of the 70 countries which participated in the WHS, 69 had data which is publically available. Ten countries (Austria, Belgium, Denmark, Germany, Greece, Guatemala, Italy, Netherlands, Slovenia, and UK) were excluded due to lack of data on sampling information. A further 9 countries (Finland, France, Ireland, Israel, Luxembourg, Morocco, Norway, Portugal, Sweden) were deleted as data on anxiety and/or some of the chronic physical conditions were not collected. Turkey was also dropped due to a lack of information on depression. Furthermore, 5 countries (Congo, Mali, Mexico, Slovakia, Swaziland) with more than

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