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Mental health among adults with asthma and chronic bronchitis. A population-based study in Spain

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Summary

Objectives: To analyze the conditions of psychological dysfunction and positive mental health in patients with asthma and chronic bronchitis (CB), as compared to healthy individuals, and to identify the factors associated with these mental health indicators.

Methods: Cross-sectional study based on data obtained from the European Health Interview Survey for Spain (EHIS, 2009). We identified individuals with asthma and CB using a specific questionnaire. In order to assess mental health, two indicators extracted from questionnaire SF-36 were used: psychological dysfunction and positive mental health status.

Results: Out of 19,598 subjects included in the study, 8.3% were classified as asthmatic and 7.4% as CB. Healthy individuals had significantly higher psychological dysfunction scores than those with asthma and CB. The same occurred with positive mental health. The variables independently associated with lower scores out of these variables were gender female, a greater number of chronic diseases and obesity. On the contrary, alcohol consumption and physical exercise were associated with a higher score in the aforementioned variables.

Conclusions: Healthy individuals have significantly higher scores in psychological dysfunction and positive mental health than patients with asthma and CB. This suggests that their mental health is much better. The variables related with lower scores out of these variables, and therefore with worse mental health, are: being female, having a greater number of chronic diseases and obesity. On the contrary, alcohol consumption and the practicing of physical exercise are associated with a higher score in the aforementioned variables, thus indicating a greater degree of mental health.

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Introduction

Asthma and chronic obstructive pulmonary disease (COPD) are two of the most significant respiratory problems today. Their prevalence in our country is high; with numbers ranging from 1 to 15% of the population for asthma^{1,2} and around 10% for COPD in adult individuals aged 40–80.³

Psychiatric disorders, including anxiety and depression, are common among these patients; however, they frequently go undetected. Among patients with asthma, prevalence rates for anxiety ranging from 16 to 52% and depression from 14 to 41% have been observed.^{4–10} On the other hand, among COPD patients, depression symptoms have been identified in 16–74% of cases^{11–14}, and the existence of anxiety has been detected in 2–96% of patients.^{15–17} Discrepancies between the results obtained in different studies may be due to various factors, including methodological variations and differences in the criteria used to establish the diagnosis of these psychiatric diseases. Furthermore, many of the studies that have investigated this association have been performed based on clinical or convenience samples, thus limiting the conclusions that could be drawn in regard to the generalization of the results. Therefore, the impact of psychological disorders is not well described in terms of the health of the population with asthma and COPD. In this sense, in two recent population-based studies performed by our group, the prevalence numbers for depression and anxiety among patients with asthma were shown to be 9% and 9.7%, respectively,¹⁸ and in patients with chronic bronchitis, they were 15.9% and 9.4%, respectively.¹⁹

The presence of psychiatric diseases in patients with asthma and COPD is associated with a worse prognosis and contributes to an increase in the use of health resources and the costs associated with the treatment of both diseases.^{11,16–22} Thus, the detection of depression and anxiety is very important in patients with obstructive airway diseases. This has led to the establishment of certain recommendations for their systematic detection in these patients, as a part of their clinical examinations.

In literature, various screening tests and diagnosis tools have been used to assess the existence of depression and anxiety. However, in order to identify the presence of these psychiatric disorders on a clinical level, structured interviews should be performed, thus making their application difficult in population-based studies. Certain authors have resorted to the generic SF-36 quality of life questionnaire in order to differentiate between patients with and without psychological disorders.²³

The main objectives of the present study were, on the one hand, to analyze the conditions of psychological dysfunction and positive mental health in patients with asthma and COPD, when compared to healthy individuals and, on the other hand, to identify the factors associated with these mental health indicators.

Methods

The present study is a cross-sectional study based on data obtained from the European Health Interview Survey for Spain (EHIS, 2009). The European Health Interview Survey

(EHIS) was proposed by the European Commission to the European Union (EU) Member States in order to create a health information system using a comprehensive and coordinated set of surveys performed within the European Statistical System under the responsibility of Eurostat. Therefore, all EU States would share common guidelines for the survey modules (Health determinants, Health status, Health care, Background variables) and design, and be based on a common questionnaire. The EHIS is to be implemented every five years with the first wave completed between 2007 and 2009.²⁴

The European Health Interview Survey for Spain (EHIS, 2009) was conducted by the National Statistics Institute (*Instituto Nacional de Estadística*, INE) under the aegis of the Spanish Ministry of Health & Social Affairs. The EHIS is a computer-aided home-based personal interview examining a nationwide representative sample of the civilian, non-institutionalized population, aged 16 years or over and residing in primary family dwellings (households) in Spain. Study subjects were selected by means of probabilistic multistage sampling, with the first-stage units being census sections, and the second-stage units being primary family dwellings. More details of EHIS methodology are described elsewhere.²⁵ The data collection period began in April 2009 and ended in March 2010. The analysis was performed in January 2011.

For study purposes, subjects aged 18 years and over were selected. We identified individuals suffering from asthma as those that answered “yes” to both of the following questions, “Have you suffered from asthma over the previous 12 months?” and “Has your medical doctor confirmed the diagnosis of asthma?”. We identified individuals suffering from chronic bronchitis as those that answered “yes” to the question, “Has your doctor told you that you are currently suffering from chronic bronchitis?”. The presence of depression or anxiety was assessed using the following questions: 1) “Have you suffered from depression or anxiety over the previous 12 months? 2) “Has your medical doctor confirmed the diagnosis?” 3) “Have you consumed antidepressants prescribed by your physician over the last two weeks?” and, 4) “Have you consumed anxiolytics prescribed by your physician over the last two weeks?” Those who answered yes to questions 1, 2 and 3 or to all the questions were considered “Depression sufferers”, and those who answered yes to questions 1, 2 and 4 were considered “Anxiety sufferers”.

In order to assess mental health, two indicators extracted from the SF-36 quality of life questionnaire were used: psychological dysfunction and positive mental health state. Both indicators are obtained through 9 items and are scored from 0 to 100, where 100 represents optimal mental health.²⁶

The following were analyzed as independent variables: 1) socio-demographic characteristics (i.e. sex, age); 2) health-related variables; including, number of diagnosed concomitant chronic diseases and lifestyle-related habits.

We considered as comorbidity the self-reported, medically-diagnosed presence of any of the following associated chronic diseases: diabetes, high blood pressure, chronic bronchitis, heart disease, myocardial infarction, cancer and stroke. We analyzed the number of comorbid diseases in three categories, namely: “None”, “One or two” and “Three or more”.

Within lifestyle habits, smoking status was distinguished between current/ex-smokers and non-smokers. Alcohol consumption was measured using the question, "Have you consumed any alcoholic drinks during the last two weeks?". "No physical exercise" was deemed to apply to cases where the individuals in question acknowledged doing no physical activity in their free time.

Finally, the body mass index (BMI) was calculated from the self-reported body weight and height. Individuals with a BMI ≥ 30 were classified as obese.

Statistical analysis

Firstly, the distribution according to the study variables was described and compared for the individuals with and without asthma or chronic bronchitis and healthy individuals.

Secondly, we estimated the prevalence, with a 95% confidence interval of depression and anxiety for adults with and without asthma or chronic bronchitis and healthy adults, according to the study variables.

Thirdly, we analyzed the mean scores for psychological dysfunction using socio-demographic characteristics and lifestyle variables among adults with and without asthma or chronic bronchitis and healthy adults.

Finally, to assess variables associated with psychological dysfunction and positive mental health among adults suffering from asthma or chronic bronchitis, we conducted a multivariate lineal regression model.

Bivariate comparison of proportions was made using the "chi-square test". The multivariate lineal regression analysis was performed including variables that were statistically significant in the bivariate analysis and variables, which, although they did not achieve statistical significance, were of interest from epidemiological and health care viewpoints. Variables were eliminated, one at each step, according to their significance in the model used and considering the model's goodness-of-fit in terms of the previous step. The effects of possible interaction among the variables included in the final model were also examined. The interaction terms tested included, among others, sex and age with tobacco and alcohol use and obesity. Also the interactions of the chronic conditions studied with unhealthy lifestyles and study variables measuring mental health were tested.

Estimates were made using the STATA program and statistical significance was set as two-tailed $\alpha < 0.05$.

As this investigation was conducted using de-identified public-use databases, it was not necessary to have the approval of an ethics committee, as per Spanish legislation.

Results

22,697 individuals were eligible for this study. Table 1 shows the socio-demographic characteristics and lifestyle variables among adult subjects (aged ≥ 18) with and without asthma or chronic bronchitis and healthy adults included in the 2009 European Health Interview Survey for Spain.

Asthmatic individuals were more frequently men and their age was significantly higher than that of healthy subjects. Additionally, patients with asthma presented a greater number of comorbid chronic diseases. On the

other hand, the prevalence of smoking, alcohol consumption and physical exercise were significantly lower among adults with asthma, in comparison with healthy individuals, while the prevalence of obesity was greater.

Adults suffering from chronic bronchitis were significantly older than healthy subjects. Furthermore, they suffered from a greater number of comorbid chronic diseases. On the other hand, the prevalence of ex-smokers was significantly lower among the adults with chronic bronchitis, in comparison with healthy individuals, while the prevalence of obesity was comparatively greater.

Table 2 show the prevalence of depression among Spanish adults (age ≥ 18 years) with or without asthma or chronic bronchitis and in healthy individuals, according to the study variables. The prevalence of anxiety by socio-demographic characteristics and lifestyle variables among adults (≥ 18 years) with and without asthma or chronic bronchitis, and healthy individuals included in the 2009 European Health Interview Survey for Spain are detailed in Supplementary Table 2. Generally speaking, prevalence numbers were significantly lower in healthy individuals, when compared to those with asthma or chronic bronchitis.

Table 3 show the average scores obtained in the variable "Positive mental health" by socio-demographic characteristics and lifestyle variables among adults (≥ 18 years) with and without asthma or chronic bronchitis and healthy adults included in the 2009 European Health Interview Survey for Spain. The mean scores in "Psychological dysfunction" are detailed in Supplementary Table 3. Healthy individuals had significantly higher psychological dysfunction scores (75.8; 95% CI: 75.5–76.1) than those with asthma (70.8; 95% CI: 69.8–71.8) and chronic bronchitis (67.4; 95% CI: 66.4–68.5). The same occurred with positive mental health, the average score being significantly higher among healthy subjects (67.3%; 95% CI: 67.0–67.6) than those with asthma (60.3; 95% CI: 59.3–61.3) and in patients with chronic bronchitis (55.7; 95% CI: 54.6–56.8).

Study participants with depression had a mean score for psychological dysfunction of 44.16 (SD 22.46) and positive mental health mean score of 37.42 (SD 23.13). Subjects with anxiety had psychological dysfunction mean score of 48.45 (SD 23.43) and a positive mental health mean score of 42.38 (SD 24.36). Subjects without depression or anxiety had psychological dysfunction mean score of 76.91 (SD 18.77) and a positive mental health mean score of 68.05 (SD 21.09). Persons suffering either depression or anxiety had significantly lower scores than healthy subjects ($p < 0.001$).

Variables associated in an independent manner with mental health indicators, namely, "Psychological dysfunction" and "Positive mental health", in adults with asthma or chronic bronchitis, both overall and by gender, are shown in Table 4. In regard to asthma, variables that were independently and significantly associated with a lower score (and therefore, worse mental health) in "Psychological dysfunction" were: being female, having a greater number of chronic diseases and having a higher BMI, whereas physical exercise was associated with a higher score (indicating better mental health) in this variable. Similar results were obtained for the "Positive mental health" component in subjects with asthma. Additionally, in this case, both age (more advanced ages were associated

Table 1 Socio-demographic characteristics and lifestyle variables among adults (≥ 18 years) with and without asthma or chronic bronchitis, and healthy individuals included in the 2009 European Health Interview Survey for Spain.

Variable	Categories	Asthma N = 1632	Chronic bronchitis N = 1467	Health N = 19,598
Sex ^a	Female	61.5 (59.1–63.8)	52.8 (50.2–55.3)	54.4 (53.7–55.1)
	Male	38.4 (36.1–40.8)	47.1 (44.6–49.7)	45.5 (44.8–46.2)
Age ^{a,b}	18–49	52.1 (49.6–54.5)	25.3 (23.1–27.6)	50.3 (15.2–16.2)
	50–59 years	11.8 (10.3–13.5)	12.8 (11.2–14.6)	15.7 (15.2–16.2)
	60–69 years	13.0 (11.4–14.7)	19.5 (17.5–21.6)	14.0 (13.5–14.5)
	≥ 70 years	23.0 (21.0–25.2)	42.2 (39.7–44.8)	19.9 (19.4–20.5)
Number of chronic conditions ^{a,b}	None	49.4 (47.0–51.8)	29.1 (26.8–31.4)	70.0 (69.3–70.6)
	1–2	40.8 (38.4–43.2)	56.8 (54.3–59.3)	27.6 (27.0–28.3)
	≥ 3	9.7 (8.4–11.2)	14.0 (12.3–15.9)	2.3 (2.1–2.5)
Smoking habit ^{a,b}	Smoker	24.5 (22.4–26.7)	27.1 (24.8–29.6)	28.2 (27.5–28.8)
	Ex-smoker	21.8 (19.8–23.9)	28.2 (25.9–30.7)	20.5 (20.0–21.1)
	No-smoker	53.6 (51.1–56.1)	44.5 (41.9–47.2)	51.2 (50.4–51.9)
Alcohol consumption ^a	Yes	23.2 (21.2–25.4)	26.5 (24.2–28.9)	26.6 (26.0–27.2)
	No	76.7 (74.5–78.7)	73.4 (71.0–75.7)	73.3 (72.7–73.9)
Physical exercise ^a	Yes	43.2 (40.8–45.6)	35.7 (33.3–38.2)	45.5 (44.7–46.1)
	No	56.7 (54.3–59.1)	64.2 (61.7–66.6)	54.5 (53.8–55.2)
BMI Kg/sq.m ^{a,b}	≥ 30	22.0 (19.9–24.1)	27.5 (25.1–30.0)	15.7 (15.2–16.2)
	< 30	77.9 (75.8–80.0)	72.4 (69.9–74.8)	84.2 (83.7–84.7)
TOTAL		7.6 (7.3–8.0)	6.9 (6.6–7.3)	

^a $p < 0.05$ (asthmatic vs. healthy).^b $p < 0.05$ (having chronic bronchitis vs. healthy).

with lower scores) and smoking and alcohol consumption (in both cases, consumption was associated with a higher score in the variable, which indicates better mental health) were also positive.

In patients with chronic bronchitis, similar results were obtained. Thus, the variables associated in a significant way with “Psychological dysfunction” in these subjects were gender, the number of chronic diseases, alcohol

Table 2 Prevalence of depression by socio-demographic characteristics and lifestyle variables among adults (≥ 18 years) with and without asthma or chronic bronchitis, and healthy individuals included in the 2009 European Health interview survey for Spain. Adjusted by age and sex.

Variable	Categories	Asthma % (CI 95%)	Chronic bronchitis % (CI 95%)	Health % (CI 95%)
Sex	Female ^{a,b}	10.7 (8.8–12.6)	14.5 (11.9–17.1)	6.5 (6.1–7.0)
	Male ^b	3.4 (1.9–5.0)	4.4 (2.6–6.2)	2.1 (1.8–2.4)
Age	18–49 ^b	3.0 (1.9–4.1)	6.0 (3.6–8.4)	2.1 (1.8–2.4)
	50–59 years ^b	9.1 (4.9–13.3)	13.9 (9.1–18.7)	5.4 (4.6–6.2)
	60–69 years ^{a,b}	14.0 (9.8–18.3)	16.5 (12.2–20.8)	7.2 (6.2–8.1)
	≥ 70 years ^{a,b}	12.4 (9.1–15.7)	11.8 (9.1–14.6)	8.1 (7.2–9.0)
Number of chronic conditions	None ^b	3.6 (2.0–5.3)	5.7 (3.6–7.9)	2.9 (2.7–3.2)
	1–2 ^{a,b}	11.5 (8.9–14.0)	11.8 (9.5–14.1)	7.9 (7.1–8.6)
	≥ 3 ^b	15.1 (9.7–20.4)	20.5 (14.9–26.2)	11.5 (8.6–14.4)
Smoking habit	Smoker ^{a,b}	6.1 (3.6–8.7)	8.0 (5.2–10.8)	3.5 (3.0–4.0)
	Ex-smoker ^{a,b}	4.1 (2.1–6.0)	5.5 (2.7–8.4)	2.8 (2.2–3.3)
	No-smoker ^{a,b}	8.2 (6.4–10.0)	11.4 (8.7–10.1)	5.3 (4.8–5.7)
Alcohol consumption	Yes ^b	3.1 (1.4–4.9)	4.0 (1.8–6.2)	2.1 (1.7–2.5)
	No ^{a,b}	7.9 (6.4–9.5)	11.2 (9.1–13.4)	5.1 (4.7–5.4)
Physical exercise	Yes ^{a,b}	6.1 (4.3–7.9)	6.8 (4.7–8.8)	3.3 (3.0–3.7)
	No ^{a,b}	8.4 (6.7–10.1)	12.3 (9.9–14.8)	5.5 (5.1–5.9)
BMI Kg/sq.m	≥ 30 ^{a,b}	9.6 (6.8–12.5)	12.9 (9.2–16.6)	6.8 (5.9–7.7)
	< 30 ^{a,b}	6.1 (4.7–7.5)	8.3 (6.5–10.1)	3.7 (3.4–4.0)
TOTAL^{a,b}		7.4 (6.1–8.6)	9.9 (8.3–11.5)	4.5 (4.2–4.8)

^a $p < 0.05$ (asthmatic vs. healthy).^b $p < 0.05$ (having chronic bronchitis vs. healthy).

Table 3 Mean scores in positive mental health by socio-demographic characteristics and lifestyle variables among adult (≥ 18 years) with and without asthma or chronic bronchitis, and healthy individuals included in the 2009 European Health interview survey for Spain.

Variable	Categories	Asthma % (CI 95%)	Chronic bronchitis % (CI 95%)	Health % (CI 95%)
Sex	Female ^{a,b}	55.3 (54.0–56.7)	50.8 (49.2–52.4)	63.2 (62.8–63.6)
	Male ^{a,b}	66.7 (65.2–68.3)	61.1 (59.6–62.6)	72.3 (71.8–72.7)
Age	18–49 ^{a,b}	66.7 (65.4–68.0)	61.9 (60.0–63.9)	70.7 (70.3–71.1)
	50–59 years ^{a,b}	59.9 (56.9–63.0)	52.9 (49.9–56.0)	67.8 (67.0–68.5)
	60–69 years ^{a,b}	56.5 (53.5–59.6)	53.9 (51.3–56.5)	67.1 (66.2–67.9)
	≥ 70 years ^{a,b}	48.0 (45.6–50.4)	46.9 (45.0–48.8)	59.0 (58.2–59.7)
Number of chronic conditions	None ^{a,b}	68.2 (66.9–69.6)	61.8 (60.0–63.7)	70.6 (70.2–70.9)
	1–2 ^{a,b}	54.3 (52.5–56.0)	52.4 (50.8–53.9)	61.6 (60.6–61.9)
	≥ 3 ^{a,b}	43.4 (39.5–47.3)	41.2 (37.8–44.5)	48.9 (46.6–51.2)
Smoking habit	Smoker ^{a,b}	63.1 (61.1–65.2)	59.1 (57.0–61.3)	69.0 (68.5–69.6)
	Ex-smoker ^{a,b}	63.1 (61.0–65.2)	58.1 (56.1–60.2)	69.8 (69.2–70.5)
	No-smoker ^{a,b}	59.1 (57.7–60.6)	54.0 (52.2–55.7)	66.3 (65.9–66.8)
Alcohol consumption	Yes ^{a,b}	65.6 (63.6–67.6)	62.3 (60.3–64.3)	71.3 (70.7–71.8)
	No ^{a,b}	59.6 (58.4–60.9)	54.4 (53.0–55.7)	66.6 (66.2–66.9)
Physical exercise	Yes ^{a,b}	64.5 (63.0–65.9)	60.6 (59.0–62.3)	70.4 (70.0–70.8)
	No ^{a,b}	57.3 (55.9–58.7)	52.7 (51.3–54.2)	64.7 (64.3–65.1)
BMI Kg/sq.m	≥ 30 ^{a,b}	54.5 (52.1–56.9)	52.3 (50.0–54.6)	63.8 (63.0–64.6)
	< 30 ^{a,b}	63.6 (62.4–64.8)	58.3 (56.9–59.6)	68.8 (68.5–69.1)
TOTAL ^{a,b}		60.3 (59.3–61.3)	55.7 (54.6–56.8)	67.3 (67.0–67.6)

^a $p < 0.05$ (asthmatic vs. healthy).

^b $p < 0.05$ (having chronic bronchitis vs. healthy).

consumption and physical exercise. In the case of “Positive mental health”, age and BMI also proved to be significant. No interaction terms yield significant values in the multivariate analyses.

Discussion

The present study demonstrates that the prevalence of psychiatric disorders, both anxiety and depression, is greater in patients with asthma and chronic bronchitis than in healthy subjects. The same happens with psychological dysfunction and positive mental health, the scores for which are higher in healthy individuals, when compared to those with asthma and chronic bronchitis, thus suggesting that their mental health is much better. Among the variables associated with lower scores out of these variables, and therefore worse mental health, are being female, having a greater number of chronic diseases and obesity. On the contrary, alcohol consumption and the practicing of physical exercise are associated, generally speaking, with a higher score in the aforementioned variables, thus indicating a greater degree of mental health.

In regard to gender, it has previously been proven that the prevalence of depression and anxiety symptoms is higher among women. Additionally, gender can be a predictive factor for depression, following the manifestation of a primary anxiety disorder.²⁷ Other studies have found a high prevalence of psychiatric disorders in women with asthma, in comparison with men who have this disease.^{28,29} In this sense, it has been suggested that the gender discrepancies in this population could be due to the

existence of different asthma phenotypes in men and women. This hypothesis has been suggested by Sundberg et al.,³⁰ after detecting that women begin to show asthma symptoms later and have a less probability of suffering from allergic asthma. In this sense, it has been suggested that non-allergic asthma may have a lesser response to treatment with inhaled corticoids and, therefore, could be more difficult to treat.³¹ In the case of COPD, it has also been demonstrated that women have greater psychological distress rates, as well as less perceived control over symptoms and a greater degree of functional worsening than men.³² In our study, we found that patients with asthma and chronic bronchitis also have lower scores in psychological dysfunction and positive mental health variables, when compared to healthy individuals, thus indicating that their mental health is worse. The results were even worse in women with asthma and chronic bronchitis, compared to men with these diseases. Variables associated with lower scores on mental health indicators in women included the presence of comorbidities, a higher BMI and not practice of physical exercise.

In regard to associated comorbidity, it has been previously suggested that the stress associated with the presence of chronic diseases increases the possibility of developing a psychiatric disorder.³³ In this sense, adults with one or more chronic disorders have a greater probability of suffering from severe psychological distress than subjects with no chronic diseases.³⁴ Along these same lines, Oraka et al. found that, after adjusting for all the covariables, adults with asthma who suffered from three or more comorbid conditions had a significantly greater risk of experiencing severe psychological distress.³⁵ In this regard,

Table 4 Results of the multivariate linear regression model to assess variables associated with psychological dysfunction and positive mental health among adults suffering from asthma or chronic bronchitis (CB).

Variable (Reference category)	Asthma		Chronic bronchitis	
	Psychological dysfunction R. Coefficient (CI 95%)	Positive mental health R. Coefficient (CI 95%)	Psychological dysfunction R. Coefficient (CI 95%)	Positive mental health R. Coefficient (CI 95%)
Male				
Age (18–49 years)	–1.49 (–3.25; 0.25)	–2.25 (–4.12; –0.39)	0.75 (–0.70; 2.19)	–2.36 (–4.23; –0.48)
Chronic conditions (none)	–5.74 (–8.87; –2.60)	–8.17 (–11.50; –4.83)	–7.12 (–11.11; –3.12)	–5.16 (–10.30; –0.18)
Smoking habit (current smoker)	2.21 (0.33; 4.08)	2.90 (0.90; 4.89)	0.63 (–1.66; 2.94)	1.02 (–1.63; 3.67)
Alcohol consumption (no)	0.18 (–3.00; 3.54)	1.39 (–1.99; 4.77)	2.14 (–1.15; 5.44)	9.94 (4.11; 15.77)
Physical exercise (no)	1.41 (–1.80; 4.63)	2.74 (–0.69; 6.17)	2.52 (–1.02–6.07)	7.62 (3.70; 11.52)
BMI (<30 kg/sq.m)	–2.19 (–6.19; 1.81)	–1.73 (–5.99; 2.52)	0.05 (–3.72; 3.82)	–5.45 (–9.76; –1.13)
Female				
Age (18–49 years)	–0.03 (–1.54; 1.48)	–1.43 (–3.04; 0.17)	–0.34 (–2.16; 1.46)	–1.24 (–2.80; 0.32)
Chronic conditions (none)	–8.82 (–11.55; –6.09)	–9.55 (–12.44; –6.66)	–6.53 (–11.49; –1.57)	–10.82 (–15.14; –6.50)
Smoking habit (current smoker)	1.07 (–0.82; 2.95)	0.89 (–1.10; 2.89)	0.91 (–1.65; 3.46)	0.82 (–1.67; 3.31)
Alcohol consumption (no)	2.08 (–1.98; 6.15)	4.59 (0.28; 8.90)	7.51 (1.88; 13.13)	3.42 (–0.14; 6.98)
Physical exercise (no)	3.52 (0.70; 6.35)	3.66 (0.67; 6.66)	3.96 (0.19; 7.73)	5.41 (1.58; 9.24)
BMI (<30 kg/sq.m)	–5.03 (–8.44; –1.62)	–6.52 (–10.13; –2.91)	–2.66 (–6.81; 1.49)	–1.52 (–5.61; 2.56)
TOTAL				
Sex (male)	–9.10 (–11.36; –6.85)	–9.84 (–12.24; –7.45)	–9.93 (–12.70; –7.15)	–10.23 (–13.15; –7.30)
Age (18–49 years)	–0.63 (–1.77; 0.50)	–1.90 (–3.11; –0.70)	0.24 (–0.90; 1.37)	–1.76 (–2.96; –0.56)
Chronic conditions (none)	–7.59 (–9.65; –5.53)	–8.93 (–11.11; –6.74)	–6.93 (–10.08; –3.77)	–8.30 (–11.64; –4.96)
Smoking habit (current smoker)	1.54 (–0.21; 2.86)	1.70 (0.29; 3.11)	0.52 (–1.17; 2.21)	0.73 (–1.05; 2.52)
Alcohol consumption (no)	1.10 (–1.46; 3.66)	2.93 (0.21; 5.65)	3.79 (0.85; 6.73)	5.42 (2.31; 8.53)
Physical exercise (no)	2.68 (0.55; 4.82)	3.26 (1.00; 5.52)	3.25 (0.65; 5.84)	6.51 (3.76; 9.25)
BMI (<30 Kg/sq.m)	–4.02 (–6.61; –1.43)	–4.89 (–7.64; –2.14)	–1.63 (–4.43; 1.16)	–3.79 (–6.74; –0.83)

in our study we found a lower score in psychological dysfunction and positive mental health variables in patients with asthma and COPD who have associated chronic diseases. This suggests that their mental health is worse. However, other authors have found no relationship between these variables.³⁶ This has been attributed to the overlapping between the symptoms of somatic and psychiatric diseases, which would thus make it more difficult to detect the latter.

Obesity also has a negative influence on the mental health of patients with respiratory diseases. Thus, it has been demonstrated, for example, that its presence, together with psychological dysfunction, may have a predictive role in the risk of developing asthma exacerbations.³⁷ On the other hand, obesity may also contribute to a decrease in the physical activity of COPD patients. This could lead to a deterioration of the health condition and quality of life of these patients,³⁸ which could contribute to a worsening of their mental health, as demonstrated in our study.

In regard to physical activity, certain authors have observed that chronic diseases and associated severe psychological distress are related to frequent limitations to physical activity.³⁹ It has also been suggested that comorbid mental diseases can have a negative impact on physical activity, in people with chronic diseases, due to an increase in reactivity against somatic symptoms, a decrease in motivation for the care of chronic diseases, maladaptive physical effects and somatic symptoms and a reduction in the capacity for adaptation.⁴⁰ In our study, we have found an association between physical exercise and higher scores in psychological dysfunction and positive mental health variables. However, the relationship between physical exercise and mental health may be a case of reverse causation, when little exercise may result in poorer mental health, or be a result of poorer mental health. A recent study has shown that COPD patients show a lower capacity for exercise, achieving scores that are significantly worse on the scales of the psychiatric disorder assessment.⁴¹ In fact, disability is a predictive factor for the development of depressive symptoms, even among individuals who are not initially depressed.⁴²

It has been previously proven that the consumption of certain substances, such as tobacco or alcohol, may be used as a means of palliating emotional discomfort.⁴³ In regard to smoking, a recent study has demonstrated that a history of smoking is associated with an increase in the risk for depression in patients with obstructive airway diseases.⁴⁴ Behavioral disorders associated with nicotine addiction are usually accompanied by comorbid depression or depressive symptoms,^{45,46} although the reasons for this association are not fully clear. However, in our study we found no clear association between smoking and psychological dysfunction among patients with asthma and chronic bronchitis.

On the other hand, alcohol consumption may contribute to masking or minimizing the degree of depression in patients, thus, becoming an alternative strategy for facing this problem. In this sense, a recent study has demonstrated that alcohol abuse or dependence tends to take place more frequently in individuals with asthma.⁴⁷ In our study, we have found a relationship between alcohol consumption and positive mental health in patients with asthma and chronic bronchitis, having observed that

patients with these diseases have lower scores in this variable than healthy individuals and, therefore, worse mental health. However, further studies are needed to clarify this relationship since the question used in our study to detect alcohol consumption will probably classify alcohol abuse, high alcohol consumption and healthy sporadic users of alcohol as one category, since it is a very broad definition. Therefore, it is not a proper question for alcohol abuse/dependence, which may explain the conflicting results compared to previous studies.

The main strength of this study is the use of a representative sample, on a national level, in order to assess the mental health of patients with asthma and chronic bronchitis. There are, however, certain potential limitations that should be taken into account. First, because it is a cross-sectional survey, causality cannot be inferred. The study thus does not answer whether chronic respiratory conditions cause ill psychological health (which has been shown) or if also the perception of somatic symptoms could be worsened by psychological illness (which is highly likely). Nonetheless, a series of variables independently associated with the existence of depression or anxiety in adults with asthma or chronic bronchitis has been identified. Secondly, the work is based on self-reported information. Using a self report of anxiety/depression with the criteria used in this study is highly likely to result in under-reporting. Moreover, the inclusion of cases treated with psychopharmacology is likely to exclude a high number of true cases without medical treatment. As suggested by previous studies, anxiety and depression are often unidentified and under treated in asthma or COPD patients. Also, certain anxiety disorders such as generalized anxiety disorders, may be treated with antidepressants rather than anxiolytics. Nonetheless, although data from questionnaires are more accurate and reliable, can be more expensive and difficult to organize, especially in large population-based studies like ours. On the other hand, the information that can be obtained from the EHISS may overestimate some chronic conditions.²⁴ Finally, the initial response rate to the EHISS was 64%; therefore, a possible non-response bias should be taken into consideration.²⁵

To conclude, this study demonstrates that patients with asthma and chronic bronchitis have worse scores in terms of psychological dysfunction and positive mental health variables, as compared to healthy individuals and, therefore, worse mental health. The factors associated with worse scores in these variables include: being female and the existence of chronic diseases and obesity. On the contrary, alcohol consumption and the practicing of physical exercise were associated with better scores and, therefore, with better mental health. Health care professionals need to be aware of the increased risk psychological dysfunction and mental disorders in patients with asthma or COPD. We agree with other authors that suggest screening for mental health disorders several times per year, perhaps at each clinical contact, in patients with these respiratory diseases, particularly if they are women, obese and suffer from other associated chronic diseases while presenting limitations for physical activity. It would be important to have longitudinal studies in order to assess the impact of optimizing physiological disorders in these subjects in terms of their mental health and their physical activity.

Conflict of interest

None declared.

Appendix A. Supplementary material

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.rmed.2012.03.021](https://doi.org/10.1016/j.rmed.2012.03.021).

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