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The association between excess weight and self-rated health and psychological distress in women in Spain

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Abstract

Objective: To investigate the associations between obesity and self-rated health and psychological well-being in Spanish women.
Design: Cross-sectional study. Three dependent variables were defined: self-rated health; self-declared diagnosis of psychiatric disorders or use of psychiatric drugs; and General Health Questionnaire-12 (GHQ-12) score. A set of variables (sociodemographic, morbidity and lifestyle) were used to adjust for possible confounding effects.
Setting: The National Health Survey was conducted in Spain in 2006.
Subjects: A total of 15 099 women aged ≥18 years. Participants were classified into groups according to their BMI.
Results: In all, 55·4 % of the women had normal weight, 29·4 % were overweight and 15·2 % were obese. Self-perception of poor health in obese women was 57·8 %, a significantly higher value than in women of normal weight (28·8 %). Prevalence of psychiatric disease was 35·5 % in obese women and 18·9 % in women of normal weight. In multivariate analysis, obese women had 34 % higher odds of declaring poor self-perception of health (OR = 1·34; 95 % CI 1·12, 1·61), 18 % higher odds of self-reporting psychiatric disease (OR = 1·18; 95 % CI 1·02, 1·38) and 26 % higher odds (OR = 1·26; 95 % CI 1·02, 1·55) of having an abnormal outcome (≥3) on the GHQ-12 than women of normal weight.
Conclusions: The present study highlights that obese Spanish women have worse self-rated health and psychological health than those with normal weight. These aspects are relevant because of the growing importance placed on the functionality of patients and their mental health within the obesity epidemic.

Keywords
Obesity and overweight
Self-rated health
Psychological distress
Psychiatric diseases
General Health Questionnaire-12

WHO has defined obesity as a 21st century epidemic because of its proportions over recent decades and its overwhelming impact on morbidity and mortality and quality of life. Thus, obesity presents a significant challenge to public health[1–4].

Obesity is associated with many factors aside from the purely biological ones. Previous studies have shown demographic and socio-economic influences on the prevalence of weight problems[5]. The greater prevalence of obesity in groups with a lower socio-economic status and those with associated comorbidity[5,6] is noteworthy.

In Europe, the prevalence of obesity ranges from 5 % to 23 % among men and between 7 % and 36 % among women[7]. In Spain, overall, prevalence is estimated at 15·5 % in adults, higher in women (17·5 %) than in men (13·2 %)[1]. In previous studies, it has been described that obesity is more prevalent in women[5,6,8]. In addition, it has been found that women suffer more psychiatric disorders[9,10], musculoskeletal disorders[8] and CVD[11] than do men, with this difference being even greater when the women are also obese[4,12]. Furthermore, scientific literature reports poor self-rated health more frequently in women than in men[13].

Obesity has considerable impact on poor physical health, increasing morbidity as well as CVD, type 2 diabetes, musculoskeletal disorders, respiratory diseases and even some types of tumour such as colon, breast and endometrial tumours[7].

However, it has become increasingly clear that the problems associated with obesity are not restricted to merely causing or exacerbating medical conditions; obesity also appears to have a substantial impact on a person's quality of life[14–16] and psychological well-being[13,17–23]. In order to study these areas, some measuring instruments are necessary, such as self-rated health, which is an indicator of well-being and quality of life[24,25]. Furthermore, self-rated

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health has been shown to be a strong predictor of morbidity and mortality[26,27]; however, its main determinant is physical health rather than psychological health[28–30]. For this reason, we intend to use self-declared diagnosis of psychiatric disease or the use of psychiatric drugs in the general adult population and the General Health Questionnaire-12 (GHQ-12) in the present paper to assess the association between obesity and mental status in women[31]. The GHQ-12 is an easy, short, reliable and valid instrument. Muñoz *et al.*[32] and Sánchez-López[33] have shown that the Spanish version of the GHQ-12 displays adequate reliability and validity for use on the Spanish population.

Methods

The present study is of cross-sectional design based on data from a population of women (*n* 17 607; aged ≥18 years), obtained from the Spanish National Health Survey (SNHS) 2006. The SNHS is an ongoing, home-based personal interview examining a nationwide representative sample of the civilian non-institutionalized population in Spain. The SNHS was conducted by the National Statistics Institute under the aegis of the Spanish Ministry of Health. Study participants were selected using probabilistic multistage sampling. The data collection period started in June 2006 and ended in June 2007. More details of SNHS methodology are described elsewhere[34].

BMI was calculated from self-declared height and weight. Participants were classified into groups in terms of their BMI according to the WHO-endorsed international classification: normal weight (18·5–24·9 kg/m^2), overweight (25·0–29·9 kg/m^2) and obese (≥30·0 kg/m^2)[35]. All women with BMI <18·5 kg/m^2 or incomplete data on height and weight were excluded from the analysis (*n* 2508).

For the present study, we selected three different dependent variables:

1. 'Self-rated health' was recorded as the answer to the question 'How would you rate your general health condition over the last 12 months?', with five possible responses: 'very good', 'good', 'fair', 'poor' and 'very poor'. These responses were grouped into two categories: 'very good' and 'good' as 'good'; 'fair', 'poor' and 'very poor' as 'poor'.
2. Self-declared diagnosis of psychiatric disorders (depression or anxiety) or use of psychiatric drugs. This variable was attained from the following questions: 'Has your doctor told you that you are currently suffering from depression or anxiety?' and 'Have you taken any medicine to treat depression or anxiety in the last 2 weeks?' A diagnosis of psychiatric disorders or use of psychiatric drugs was considered present when at least one of both questions was answered 'yes'.
3. GHQ-12 score for assessing mental health status, which is a preliminary screening phase for psychological distress[31]. The GHQ-12 is an easy, short, reliable and valid instrument, which does not indicate severity or the type of disorder[31] and is included within the SNHS questionnaire. Thus, we excluded women who were currently suffering from psychiatric disease from the present analysis. The answer categories from the GHQ-12 scale were scored according to the method proposed by Goldberg, with the first two response options having a score of 0 and the last two having a score of 1 (0–0–1–1) to establish the final score; a cut-off of ≥3 points was used to indicate risk for psychiatric distress[31–33].

A set of variables, such as sociodemographic variables including age, marital status, educational level and monthly income, were used to adjust for the possible confounding effect between dependent variables and BMI. Educational level was classified into 'primary or lower', 'secondary' and 'university' education, and monthly income was divided into '<€1200', '€1200–€1800' and '>€1800'.

Self-reported chronic diseases included CVD (high blood pressure, heart disease, myocardial infarction or stroke), diabetes, respiratory diseases (asthma or chronic bronchitis), psychiatric and musculoskeletal disorders. 'Psychiatric disorders' was used as the independent variable and 'self-rated health' and 'GHQ-12 score' were used as dependent variables for assessing mental health status.

Lifestyle behaviours included smoking, physical activity and dieting. Among lifestyle habits, those using tobacco were categorized as current smokers, former smokers and non-smokers. 'No physical exercise' was deemed to apply to cases in which the individuals in question acknowledged having no physical activity in their leisure time. We considered all women who answered 'yes' to the question 'Are you on a diet?' to be on a diet, regardless of the reason.

Statistical analysis

First, we described the study population by study variables according to weight categories. The association between BMI and the study variables was assessed using the χ^2 test. Three multivariate logistic regression models, one for each dependent variable, were constructed.

The logistic regression multivariate model was built using the 'enter modelling' method of STATA software. To build the model we followed five consecutive steps:

1. Univariate analysis of each variable.
2. Selection of variables for the multivariate analysis. We included all variables whose bivariate test was significant and those we considered scientifically relevant according to the revised references reviewed[5,6].
3. In order to fit the multivariate model, the importance of each variable included in the model was verified. This included examination of the Wald statistic for each variable and comparison of each estimated coefficient with the coefficient from the bivariate

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model containing only that variable. Variables that did not contribute to the model on the basis of these criteria were eliminated and a new model was fitted. The new model was compared with the old model using the likelihood ratio test. Furthermore, estimated coefficients for the remaining variables were compared with those from the full model. This process of deleting, refitting and verifying continued until all the important variables were included in the model.

4. Once the model was obtained, we considered the variables included (linearity) more closely and checked for interactions in the model.
5. Results of the model are shown as adjusted OR and their corresponding 95 % CI.

All estimates were made using the STATA statistical software package version 9·1 (StataCorp LP, College Station, TX, USA).

Results

In the end, the sample included 15 099 women, of whom 55·4 % were of normal weight, 29·4 % were overweight and 15·2 % were obese. Tables 1 and 2 describe the distribution of study variables according to weight categories: Table 1 concerns sociodemographic characteristics and Table 2 is with regard to comorbidity and lifestyle habits. Among obese women, the largest age group consisted of those between 50 and 67 years, whereas among those with

Table 1 Distribution of BMI according to sociodemographic variables in women in Spain

	Normal weight		Overweight		Obesity	
	%	95 % CI	%	95 % CI	%	95 % CI
Age (years)*						
<37	48·9	47·4, 50·4	22·9	21·2, 24·8	17·5	15·3, 20·0
37–49	27·0	25·8, 28·3	25·7	24·1, 27·5	23·4	21·1, 25·8
50–67	15·0	14·0, 16·0	29·6	27·9, 31·3	35·0	32·5, 37·6
>67	9·1	8·4, 9·9	21·8	20·3, 23·3	24·1	22·0, 26·3
Marital status*						
Single	34·6	33·1, 36·1	15·7	14·2, 17·3	13·6	11·5, 16·0
Married	54·2	52·7, 55·7	67·1	65·3, 68·9	66·7	64·0, 69·3
Divorced/separated	5·3	4·7, 5·9	4·6	3·9, 5·4	4·5	3·5, 5·8
Widow	5·9	5·3, 6·6	12·6	11·5, 13·8	15·2	13·5, 17·0
Level of education*						
Primary	5·3	4·7, 6·0	14·3	13·1, 15·6	23·2	21·0, 25·5
Secondary	70·3	69·0, 71·7	74·3	72·6, 76·0	69·6	67·1, 72·1
University	24·4	23·1, 25·7	11·4	10·2, 12·7	7·2	5·8, 8·9
Monthly income (€)*						
<1200	37·5	36·0, 39·1	50·5	48·4, 52·6	57·4	54·5, 60·3
1200–1800	27·8	26·4, 29·3	26·1	24·3, 28·0	24·1	21·6, 26·7
>1800	34·7	33·1, 36·2	23·4	21·7, 25·2	18·5	16·1, 21·1

*P value for χ^2 test <0·001.

Table 2 Distribution of BMI according to chronic diseases, lifestyle, self-rated health, psychiatric disease and GHQ-12 in women in Spain

	Normal weight		Overweight		Obese	
	%	95 % CI	%	95 % CI	%	95 % CI
CVD*	13·9	12·9, 14·9	30·6	28·9, 32·4	47·6	44·9, 50·3
Diabetes mellitus*	2·3	1·9, 2·8	6·5	5·7, 7·5	13·1	11·3, 15·1
Musculoskeletal disease*	35·3	33·9, 36·7	54·2	52·3, 56·2	60·7	58·0, 63·4
Respiratory disease*	7·2	6·5, 8·0	8·2	7·2, 9·3	13·5	11·8, 15·5
Smoking habit*						
Smoker	31·0	29·6, 32·4	20·6	19·1, 22·3	16·0	14·0, 18·2
Ex-smoker	15·1	14·1, 16·2	14·5	13·2, 15·9	12·0	10·3, 14·0
Non-smoker	53·9	52·4, 55·4	64·9	63·0, 66·7	72·0	69·4, 74·4
Physical activity*	59·5	58·8, 60·9	56·4	54·5, 58·3	53·2	50·4, 55·9
Diet*	9·0	8·3, 9·9	19·1	17·7, 20·7	26·6	24·2, 29·8
Self-rated health*						
Good	71·2	69·9, 72·5	54·4	52·4, 56·3	42·2	39·5, 45·0
Poor	28·8	27·5, 30·2	45·6	43·7, 47·6	57·8	55·0, 60·5
Psychiatric disease*	19·0	17·9, 20·1	28·9	27·2, 30·7	35·6	33·0, 38·2
GHQ-12*†						
<3	77·4	76·1, 78·6	70·6	68·8, 72·4	67·2	64·5, 69·8
≥3	22·6	21·4, 23·9	29·4	27·6, 31·2	32·8	30·3, 35·5

GHQ-12, General Health Questionnaire-12.
*P value for χ^2 test <0·001.
†Women with psychiatric diseases or who used psychiatric drugs were excluded from this analysis.

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Table 3 Variables associated with a poor self-rated health among Spanish women†

	OR	95 % CI	*P*
BMI (kg/m^2)			
Normal weight	1·00	–	
Overweight	1·08	0·95, 1·23	0·062
Obese	1·34	1·12, 1·61	0·035
Age group (years)			
<37	1·00	–	
37–49	1·38	1·18, 1·62	0·037
50–67	1·79	1·52, 2·12	0·022
>67	2·12	1·72, 2·60	0·010
Level of education			
University	1·00	–	
Secondary	1·40	1·16, 1·68	0·029
Primary	2·30	1·83, 3·06	0·011
Monthly income (€)			
>1800	1·00	–	
1200–1800	1·29	1·10, 1·53	0·043
<1200	1·36	1·16, 1·60	0·039
CVD			
No	1·00	–	
Yes	1·60	1·38, 1·85	0·031
Diabetes mellitus			
No	1·00	–	
Yes	1·84	1·39, 2·46	0·026
Musculoskeletal disease			
No	1·00	–	
Yes	3·60	3·19, 4·05	0·016
Respiratory disease			
No	1·00	–	
Yes	2·36	1·90, 2·94	0·021
Psychiatric disease			
No	1·00	–	
Yes	3·61	3·17, 4·12	0·007
Physical activity			
Yes	1·00	–	
No	1·42	1·26, 1·60	0·027
Diet			
No	1·00	–	
Yes	1·30	1·12, 1·59	0·035

Variables included in the final model are shown. Variables excluded in the fitting process included marital status and smoking habit.
†Results of the multivariate logistic regression model.

Table 4 Variables associated with a diagnosis of psychiatric disease and/or use of psychiatric drugs among Spanish women†

	OR	95 % CI	*P*
BMI (kg/m^2)			
Normal weight	1·00	–	
Overweight	1·08	0·95, 1·22	0·065
Obese	1·18	1·02, 1·38	0·045
Age group (years)			
<37	1·00	–	
37–49	1·67	1·41, 1·97	0·030
50–67	2·14	1·80, 2·55	0·021
>67	2·19	1·76, 2·72	0·019
Marital status			
Single	1·00	–	
Married	0·99	0·84, 1·16	0·072
Divorced/separated	1·39	1·08, 1·79	0·042
Widow	1·24	1·00, 1·55	0·049
Level of education			
University	1·00	–	
Secondary	1·35	1·15, 1·60	0·039
Primary	1·78	1·42, 2·23	0·028
CVD			
No	1·00	–	
Yes	1·68	1·38, 1·85	0·031
Diabetes mellitus			
No	1·00	–	
Yes	1·84	1·47, 1·90	0·018
Musculoskeletal disease			
No	1·00	–	
Yes	2·79	2·49, 3·13	0·019
Respiratory disease			
No	1·00	–	
Yes	1·59	1·34, 1·88	0·023
Smoking habit			
Smoker	1·00	–	
Ex-smoker	0·87	0·73, 1·03	0·059
Non-smoker	0·72	0·63, 0·84	0·036
Physical activity			
Yes	1·00	–	
No	1·13	1·02, 1·26	0·042

Variables included in the final model are shown. Variables excluded in the fitting process included monthly income, diet and self-rated health.
†Results of the multivariate logistic regression model.

normal weight the greatest percentage comprised those in the younger age group (<37 years). Only 7·2% of obese women had university education and 57·4% reported low monthly income.

Comparisons of the unadjusted prevalences between obese, overweight and normal weight women are shown in Table 2. All chronic diseases analysed were higher among obese women, specifically CVD and musculoskeletal disease affecting over 50%. The prevalence of self-reported non-smokers and those on a diet was higher among obese women than in normal or overweight women. Nevertheless, the prevalence of engaging in physical activity was lower in obese women. It should be emphasized that self-perception of poor health in obese women was 57·8%, a significantly higher value than that reported by overweight women (45·6%) and women of normal weight (28·8%). The results when the dependent variable was a diagnosis of a psychiatric disease were along similar lines, with the prevalence of psychiatric disease being 35·5% in obese women, 28·9% in overweight women and 18·9% in women of normal weight. With regard to the GHQ-12, following exclusion of women with a psychiatric illness for the present analysis, we observed that obese women had a poor score (≥3) significantly more frequently than those who were of normal weight or overweight (32·8% *v.* 22·6% and 29·4%, respectively).

Table 3 shows a logistic regression model studying the association between the dependent variable 'self-rated health' and the different weight categories. Women with a BMI in the obese range had 34% more probability of having a poor perception of their health (OR = 1·34; 95% CI 1·12, 1·61) than women who had a normal weight after adjusting for other potentially confounding variables. However, in the case of overweight women, a non-significant association was found. Among the adjustment variables, higher age and a lower socio-economic level had an influence on a worse perception of health. On the

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other hand, having certain chronic illnesses also contributed to a greater probability of poor perception of health; this being more notable in those who had musculoskeletal and psychiatric disorders. Likewise, it should be noted that not engaging in physical activity in leisure time was associated with a greater probability of declaring poor health (OR = 1·42; 95 % CI 1·26, 1·60). We also found that being on a diet was associated with poor self-rated health (OR = 1·30; 95 % CI 1·12, 1·59).

Upon analysis of the relationship between BMI and having a diagnosis of a psychiatric illness or having used antidepressant drugs or sedatives, we also found that obesity was associated with a greater probability of psychiatric disorders (OR = 1·18; 95 % CI 1·02, 1·38; Table 4). Suffering from psychiatric illness or using antidepressant drugs or sedatives was also independently associated with higher age and a lower level of education (adjusted OR = 2·19 and 1·78). Among health-related variables, musculoskeletal disorders (OR = 2·79; 95 % CI 2·49, 3·13) and, to a lesser extent, CVD and diabetes were positively associated with suffering from psychiatric disorders. Declaring the practice of healthy habits, specifically, being a non-smoker or ex-smoker and engaging in physical activity in leisure time, acted as a protective factor against suffering from psychiatric disorders. No statistically significant association was found between overweight and having a diagnosed psychiatric disorder in these women. Using a logistic regression model, the association between being obese and having an abnormal outcome (≥3) on the GHQ-12 was analysed (Table 5) with regard to psychological well-being. This also showed statistical significance, with obese women more likely to have psychological distress (OR = 1·26; 95 % CI 1·02, 1·55). In this case, being overweight was associated with an abnormal outcome on the questionnaire (OR = 1·17; 95 % CI 1·01, 1·38).

Women with diabetes mellitus, those who suffered from CVD and those who did not engage in physical exercise in their free time had greater probability of showing a score of ≥3 in the GHQ-12.

Table 5 Variables associated with a GHQ-12 score ≥3 among Spanish women†

	OR	95 % CI	*P*
BMI (kg/m^2)			
Normal weight	1·00	–	
Overweight	1·17	1·01, 1·38	0·048
Obese	1·26	1·02, 1·55	0·045
Age group (years)			
<37	1·00	–	
37–49	0·90	0·75, 1·07	0·054
50–67	0·79	0·65, 0·96	0·039
>67	0·99	0·79, 1·24	0·062
CVD			
No	1·00	–	
Yes	1·43	1·20, 1·46	0·033
Diabetes mellitus			
No	1·00	–	
Yes	1·40	1·07, 1·82	0·038
Physical activity			
Yes	1·00	–	
No	1·27	1·20, 1·46	0·041

GHQ-12, General Health Questionnaire-12.
Variables included in the final model are shown. Variables excluded in the fitting process included marital status, level of education, monthly income, musculoskeletal disease, respiratory disease and smoking habit.
†Results of the multivariate logistic regression model.

Discussion

The present study highlights the high prevalence of problems with excess weight in women of Spain and the association of obesity with poor self-rated health and worse mental health status or psychological well-being. These aspects are significant because of the growing importance placed on the functionality of patients and their mental health within the framework of the obesity epidemic. Most previous studies have found obesity to be associated with poor quality of life or self-rated health[14–16], although some uncertainties remain regarding these associations. These uncertainties might be related to the different conditions included in the various studies. As an example, because obesity is associated with many chronic diseases, such as diabetes, CVD, musculoskeletal and psychiatric disorders, analysis of the impact of obesity on self-rated health should consider these potential confounders[36,37]. Nevertheless, not all previous investigations examined the impact of these conditions on their analyses; hence, it may be a potential limitation to the outcomes with regard to the association between self-rated health and obesity[36]. We considered these potential confounders in the present study and, consistent with some previous studies[17,18], found that obese women in Spain had a greater tendency to report poor health than women with normal weight. This relationship persisted after additional controls for the effect of sociodemographic and lifestyle variables. However, adjusting for comorbidity and sociodemographic variables eliminated the association between being overweight and self-rated health. With regard to the relationship between obesity and mental health status, we found a statistically significant association, with psychiatric disorders being more frequent in obese women but not so frequent in the case of overweight women. Previous results were also along the same lines and showed a significant association between obesity and psychological disturbances[17–21], specifically a greater probability of suffering from depression[13,22] or anxiety[22,23], and even a high risk of suicide or suicide attempts[13,23,38]. However, we found other studies that did not show any association between obesity and psychological disturbances[18,22]. It should be noted that some authors have also suggested that obesity only affects the psychological health of those persons who suffer other concomitant chronic conditions[17,18]. However, in our study, this association between obesity

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and psychological disturbances remained significant after controlling for the presence of frequent medical chronic conditions, suggesting the independent association of obesity with these psychological disturbances.

Before meeting criteria for psychiatric diseases, people often have to suffer from psychological distress for some time. Already at this stage we could come upon the association between obese and overweight women and a worse score on the test GHQ-12, meaning greater psychological distress in this group. We must be aware that this could imply greater risk of developing more severe diseases in the future.

It remains unclear whether psychological distress leads to weight gain or whether it is obesity that leads and predisposes to psychological disorders. Prospective studies are adequate to answer this question, although in our opinion knowledge of this association is sufficient to take action in either direction depending on the scope that we are working.

On the contrary, we also believe it appropriate to note the beneficial role of physical exercise in leisure time, since, as we have shown, it is positively associated with good self-rated health and is associated with less prevalence of psychiatric illness and psychological distress. The protective effect of physical activity has been previously described in the Spanish general population[39]. Besides this positive effect on mental health, physical exercise will help reduce the weight of obese people as a complementary part of a balanced hypo-energetic diet as a first approach to treating obesity. In our opinion, we also believe that it is worth mentioning the association of diabetes and the dependent variables of the study, as their presence is associated with poor self-rated health, the diagnosis of psychiatric disorders or the use of psychiatric drugs and even with greater psychological distress.

The strengths of our study include its large, population-based sample and our ability to control for a broad range of important covariates, including socio-economic factors and health-related variables. The population-based approach also meant that selection biases arising from using specialist service samples could be minimized. We also consider exploring three dependent variables for the study of some psychological aspects and how obese women feel about their health to be a strength.

However, there are a number of possible study limitations. First, this is a cross-sectional design; hence, we were unable to draw conclusions regarding the causal mechanisms underlying the observed associations between obesity and outcome variables. Another limitation of the present study is that it is based on self-reported information. Another concern is BMI (calculated from self-reported height and weight), although it is widely used in epidemiological studies and, moreover, self-declared height and weight were validated in a Spanish study[40,41]. A problem may also arise from memory bias, and the possibility that the respondents gave socially desirable answers could also affect sociodemographic and lifestyle variables. Another potential limitation to health surveys is the use of non-validated self-reported data regarding tobacco consumption, diet or physical activity. These variables were poorly reflected for physical activity and diet, and the study is restricted by the information that can be obtained from the National Health Survey database used. Therefore, the questions asked may test the patients' perception of their physical activity and diet rather than the physical activity and diet themselves.

Finally, the initial response rate to the National Health Survey was 65 %; therefore, a possible non-response bias should be taken into consideration[42].

Obesity is a major public health problem. Not only is obesity a risk factor for a variety of potentially life-threatening illnesses but it also has a negative impact on health-related quality of life. Obese persons tend to report that they are hampered in their capacity to perform their day-to-day physical activities. Although obesity appears to be associated with substantial decrements to social function and mental health, the magnitude of these decrements may be slightly less than those observed for domains of physical function. Our findings suggest that the effect of obesity on public health goes far beyond its medical consequences; it is also associated with decrements in self-rated health, mental status and subjective psychological well-being that, for many persons, may be of greater relevance than obesity-associated medical comorbidities.

In any case, the description of these findings emphasizes the need for effective strategies to improve the care of obese Spanish women, as this would lead to the improved physical and mental health of obese women and increase their functional capacity.

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References

1. Aranceta-Bartrina J, Serra-Majem L, Foz-Salac M *et al.* (2005) Prevalencia de obesidad en España. *Med Clin (Barc)* **125**, 460–466.
2. Peeters A, Barendregt JJ & Willekens F (2003) Obesity in adulthood and its consequences for life expectancy: a life-table analysis. *Ann Intern Med* **138**, 24–32.

3. James WPT, Leach R & Mhurchu CN (2004) Overweight and obesity (high body mass index). In *Comparative Quantification of Health Risks: Global and Regional Burden of Disease Attribution to Selected Major Risk Factors*, vol. 1, pp. 497–596 [M Ezzati, AD Lopez, A Rodgers and CJL Murray, editors]. Geneva: WHO.
4. Muenning P, Lubetkin E, Jia H *et al.* (2006) Gender and the burden of disease attributable to obesity. *Am J Public Health* **96**, 1662–1668.
5. Rubio MA, Salas-Salvadó J, Barbany M *et al.* (2007) Consenso SEEDO 2007 para la evaluación del sobrepeso y la obesidad y el establecimiento de criterios de intervención terapéutica. *Rev Esp Obes* **5**, 135–175.
6. Wardle J, Waller J & Jarvis MJ (2002) Sex differences in the association of socioeconomic status with obesity. *Am J Public Health* **92**, 1299–1304.
7. World Health Organization (2005) *WHO Global NCD InfoBase: WHO Global Comparable Estimates (Online Database)*. Geneva: WHO; available at http://www.who.int/ncd_surveillance/infobase/web/InfoBaseCommon
8. Busija L, Hollingsworth B, Buchbinder R *et al.* (2007) Role of age, sex and obesity in the higher prevalence of arthritis among lower socioeconomic groups: a population-based survey. *Arthritis Rheum* **57**, 553–561.
9. Kessler R, Berglund P, Demler O *et al.* (2003) The epidemiology of major depressive disorder: results from the national comorbidity survey replication (NCS-R). *JAMA* **289**, 3095–3105.
10. Alonso J, Angermeyer MC, Berner S *et al.* (2004) The ESEMeD/MHEDEA 2000 investigators. Prevalence of mental disorders in Europe: results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatr Scand* **109**, 21–27.
11. Dalstra JA, Kunst AE, Borrell C *et al.* (2005) Socioeconomic differences in the prevalence of common chronic diseases: an overview of eight European countries. *Int J Epidemiol* **34**, 316–326.
12. Idler EL (2003) Discussion: gender differences in self-rated health, in mortality, and in the relationship between the two. *Gerontologist* **43**, 372–375.
13. Carpenter KM, Hasin DS, Allison DB *et al.* (2000) Relationships between obesity and DSM-IV major depressive disorder, suicide ideation, and suicide attempts: results from a general population study. *Am J Public Health* **90**, 251–257.
14. Prosper MH, Moczulski VL & Qureshi A (2009) Obesity as a predictor of self-rated health. *Am J Health Behav* **33**, 319–329.
15. Fine J, Colditz GA, Coakley E *et al.* (1999) A prospective study of weight change and health-related quality of life in women. *JAMA* **282**, 2136–2142.
16. Okosun IS, Choi S, Matamoros T *et al.* (2001) Obesity is associated with reduced self-rated general health status: evidence from a representative sample of white, black, and Hispanic Americans. *Prev Med* **32**, 429–436.
17. Fontaine KR, Cheskin LJ & Barofsky I (1996) Health-related quality of life in obese persons seeking treatment. *J Fam Pract* **43**, 265–270.
18. Fontaine KR, Barofsky I & Cheskin LJ (1997) Predictors of quality of life for obese persons. *J Nerv Ment Dis* **185**, 120–122.
19. Palinkas LA, Wingard DL & Barrett-Connor E (1996) Depressive symptoms in overweight and obese older adults: a test of the 'jolly fat' hypothesis. *J Psychosomatic Res* **40**, 59–66.
20. Mathias SD, Williamson CL, Colwell HH *et al.* (1997) Assessing health-related quality-of-life and health state preference in persons with obesity: a validation study. *Qual Life Res* **6**, 311–322.
21. Kolotkin RL, Head S, Hamilton M *et al.* (1995) Assessing impact of weight on quality of life. *Obes Res* **3**, 49–56.
22. Atlantis E & Baker M (2008) Obesity effects on depression: systematic review of epidemiological studies. *Int J Obes (Lond)* **32**, 881–891.
23. Simon GE, Von Korff M, Saunders K *et al.* (2006) Association between obesity and psychiatric disorders in the US adult population. *Arch Gen Psychiatry* **63**, 824–830.
24. Ware JE & Sherbourne CD (1992) The MOS 36-items short form health survey (SF-36). I. Conceptual framework and item selection. *Med Care* **30**, 473–483.
25. Stewart AL, Greenfield S, Hays RD *et al.* (1989) Functional status and well-being of patients with chronic conditions. Results from the Medical Outcomes Study. *JAMA* **262**, 907–913.
26. Idler EL & Benyamini Y (1997) Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav* **38**, 21–27.
27. Sprangers MA, de Regt EB, Andries F *et al.* (2000) Which chronic conditions are associated with better or poorer quality of life? *J Clin Epidemiol* **53**, 895–907.
28. Manderbacka K, Lundberg O & Martikainen P (1999) Do risk factors and health behaviours contribute to self-rating of health? *Soc Sci Med* **48**, 1713–1720.
29. Cott CA, Gignac MA & Badley EM (1999) Determinants of self rated health for Canadians with chronic disease and disability. *J Epidemiol Community Health* **53**, 731–736.
30. Shadbolt B (1997) Some correlates of self-rated health for Australian women. *Am J Public Health* **87**, 951–956.
31. Goldberg D & Williams P (1998) *User's Guide to the General Health Questionnaire*. Berkshire: NFER-Nelson.
32. Muñoz PE, Vázquez JL, Rodríguez F *et al.* (1979) Spanish adaptation of the General Health Questionnaire (GHQ) of Goldberg. *Arch Neurobiol* **42**, 139–158.
33. Sánchez-López MP & Dresch V (2008) The 12-Item General Health Questionnaire (GHQ-12): reliability, external validity and factor structure in the Spanish population. *Psicothema* **20**, 839–843.
34. Instituto Nacional de Estadística (2006) Encuesta Nacional de Salud de España 2006. http://www.msc.es/estadEstudios/estadisticas/encuestaNacional/encuesta2006.htm (accessed March 2010).
35. National Institutes of Health (1998) Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults – the evidence report. http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.pdf (accessed March 2010).
36. Kushner R (2009) Obesity and quality of life. *Nutrition* **16**, 947–952.
37. Molarius A & Janson S (2002) Self-rated health, chronic diseases, and symptoms among middle-aged and elderly men and women. *J Clin Epidemiol* **55**, 364–370.
38. Onyike C, Crum R, Lee BH *et al.* (2003) Is obesity associated with major depression? Results from the third national health and nutrition examination survey. *Am J Epidemiol* **158**, 1139–1147.
39. Gispert R, Rajmil L, Schiaffino A *et al.* (2003) Sociodemographic and health-related correlates of psychiatric distress in a general population. *Soc Psychiatry Psychiatr Epidemiol* **38**, 677–683.
40. Palta M, Prineas RJ, Berman R *et al.* (1982) Comparison of self-reported and measured height and weight. *Am J Epidemiol* **115**, 223–230.
41. Basterra-Gortari FJ, Bes-Rastrollo M, Forga L *et al.* (2007) Validación del índice de masa corporal auto-referido en la Encuesta Nacional de Salud. *An Sist Sanit Navar* **30**, 373–381.
42. Instituto Nacional de Estadística (2009) Evaluación de la falta de respuesta en la Encuesta Nacional de Salud 2006. http://www.msc.es/estadEstudios/estadisticas/encuestaNacional/encuestaNac2006/evaluacionFaltaResp.pdf (accessed March 2010).