

Supplementary Information

Primary breast cancer and health related quality of life in Spanish women: The EpiGEICAM case-control study

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Supplementary methods. Description of the instruments and scoring criteria used to measure outcomes

SF-36

The SF-36 is a generic multidimensional HRQL instrument^{1,2} that has been translated and validated in several languages, including Spanish³. It explores eight domains -physical functioning (PF, 10 items), role-physical (RP, four items), bodily pain (BP, two items), general health (GH, five items), vitality (VT, four items), social functioning (SF, two items), role-emotional (RE, three items), and mental health (MH, five items)- which draw a health profile. In addition, the instrument allows to calculate two summary scores (Physical and Mental Component Summary measures (PCS and MCS)), through specific weighted combinations of the scores in the eight scales. In this case we used the weights recommended for the Spanish population⁴. For each scale, after taking into account^{4,2} missing items in accordance with the SF-36 scoring manual⁵, we transformed the scores into a 0-100 scale, and then normalised them according to the Spanish general female population values by age group⁶. To obtain these Norm-Based Scores (NBS), we subtracted with the mean score of female reference population in the corresponding age-group the score obtained from each woman, and then divided the result by the population standard deviation (SD). In order to homogenise the result to the desired mean and SD (i.e. 50 and 10, respectively), it was multiplied by 10 and summed up 50. This way, values higher than 50 represent better health states than their pairs in the general population and scores under 50 represent poorer health states.

GHQ-28

The GHQ-28 is an instrument designed to screen for non-psychotic psychiatric conditions in the general population. It has also been applied to screen cancer patients for psychological distress, showing good sensitivity and specificity⁷. It has been translated into Spanish and validated^{8,9}. This instrument has 28 items with four alternative answers. Different processing methods have been reported to classify respondents. We codified as 0 the first two response options in each item ("Better than usual" and "Same as usual") and as 1 the other two ("Worse than usual" and "Much worse than usual"), and calculated the overall score as

the sum of the items, leading to a range of 0-28. According to criteria previously defined^{8,9}, we classified as psychologically distressed those women scoring more than five points.

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Supplementary Table S1. Psychometric properties of the SF-36 and GHQ-28 questionnaires in breast cancer cases and controls (EpiGEICAM study)

Scale / Item	Controls					Cases				
	N	Missing (%)	Ceiling effect (%)	Floor effect (%)	Cronbach's α	N	Missing (%)	Ceiling effect (%)	Floor effect (%)	Cronbach's α
SF-36										
Physical functioning	997	2.0	14.9	1.1	0.916	990	2.7	6.2	0.6	0.877
Role-physical	973	4.3	68.2	11	0.889	964	5.2	22	59.1	0.928
Bodily pain	1008	0.9	24.5	1.3	0.819	1001	1.6	16.3	3.1	0.875
General health	973	4.3	2.9	0	0.779	974	4.2	0.9	0	0.717
Vitality	991	2.6	2	0.5	0.830	984	3.2	2.9	1.1	0.847
Social functioning	1010	0.7	51.1	0.5	0.813	1001	1.6	26.2	2.3	0.848
Role-emotional	960	5.6	76.4	10.4	0.870	944	7.2	59	26	0.910
Mental health	990	2.7	4.5	0.1	0.859	983	3.3	3.1	0.1	0.872
GHQ-28	1005	1.2	0	40.0	0.922	992	2.5	0.1	12.5	0.913

Supplementary Table S2. Association of sociodemographic, lifestyle, and clinical factors with low scores^a in the SF-36 scales in breast cancer cases and controls in the EpiGEICAM study.

		Physical Functioning		Role-Physical	
		Controls	Cases	Controls	Cases
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (per 5 years)		0.82 (0.73; 0.92)	0.77 (0.68; 0.87)	0.87 (0.76; 1.00)	0.99 (0.87; 1.13)
Country of birth	Spain	1.00	1.00	1.00	1.00
	Other	0.91 (0.29; 2.87)	0.90 (0.32; 2.57)	0.24 (0.03; 2.02)	1.27 (0.42; 3.83)
Marital status	Married/with partner	1.00	1.00	1.00†	1.00†
	Divorced	1.90 (1.04; 3.46)	0.74 (0.40; 1.38)	3.49 (1.81; 6.74)	0.59 (0.31; 1.15)
	Single	1.33 (0.69; 2.58)	0.78 (0.41; 1.49)	1.19 (0.53; 2.67)	0.97 (0.49; 1.91)
	Widow	0.99 (0.50; 1.93)	0.81 (0.39; 1.69)	1.40 (0.64; 3.05)	0.63 (0.29; 1.37)
Perceived social support	Very satisfactory	1.00	1.00	1.00	1.00
	Satisfactory	1.26 (0.78; 2.02)	1.05 (0.71; 1.56)	0.78 (0.43; 1.41)	0.75 (0.49; 1.16)
	Unsatisfactory	1.79 (1.10; 2.93)	0.90 (0.56; 1.44)	1.04 (0.57; 1.90)	0.76 (0.46; 1.26)
	Very unsatisfactory	1.68 (1.04; 2.70)	1.46 (0.85; 2.51)	1.84 (1.06; 3.20)	0.97 (0.52; 1.81)
Education	No studies or primary school	1.00*	1.00*	1.00	1.00
	Secondary school	0.90 (0.53; 1.51)	0.55 (0.34; 0.89)	0.68 (0.37; 1.26)	0.89 (0.52; 1.51)
	University	0.50 (0.28; 0.90)	0.42 (0.25; 0.74)	0.59 (0.30; 1.17)	1.03 (0.56; 1.89)
Working status	Active work without nightshifts	1.00†	1.00†	1.00	1.00
	Active work with nightshifts	1.16 (0.67; 2.02)	1.65 (0.76; 3.59)	1.84 (0.98; 3.46)	1.44 (0.55; 3.75)
	Retired	1.74 (0.82; 3.72)	0.73 (0.33; 1.61)	1.06 (0.42; 2.67)	0.83 (0.35; 1.94)
	Housewife	1.40 (0.91; 2.16)	0.98 (0.63; 1.51)	1.39 (0.82; 2.37)	0.91 (0.56; 1.47)
	Others	0.72 (0.37; 1.42)	2.53 (1.24; 5.16)	2.03 (0.99; 4.15)	0.98 (0.48; 2.01)
Caring for someone	No	1.00	1.00	1.00	1.00
	Yes, without severe disability	0.71 (0.49; 1.01)	0.77 (0.53; 1.11)	0.75 (0.49; 1.16)	1.18 (0.79; 1.78)
	Yes, with severe disability	1.42 (0.57; 3.54)	1.40 (0.62; 3.18)	1.45 (0.52; 4.04)	1.20 (0.46; 3.13)
No. comorbidities	None	1.00*	1.00	1.00*	1.00
	1	1.59 (1.07; 2.35)	1.04 (0.69; 1.58)	1.58 (0.98; 2.54)	1.56 (0.97; 2.50)
	2	2.49 (1.49; 4.15)	1.50 (0.83; 2.71)	2.14 (1.18; 3.89)	0.98 (0.52; 1.88)
	>2	2.34 (1.25; 4.40)	1.48 (0.69; 3.18)	4.78 (2.43; 9.38)	2.30 (0.94; 5.62)
Smoking	Never smoker	1.00	1.00	1.00	1.00
	Former smoker	0.81 (0.53; 1.24)	0.70 (0.47; 1.06)	1.20 (0.72; 1.99)	0.78 (0.50; 1.22)
	Current smoker/Former<6 months	1.17 (0.80; 1.72)	0.78 (0.52; 1.17)	1.28 (0.80; 2.05)	1.18 (0.75; 1.87)
Adherence to the WCRF/AICR recommendations	[6-9]	1.00	1.00	1.00	1.00
	[4-5]	0.90 (0.62; 1.31)	1.32 (0.86; 2.02)	1.43 (0.90; 2.28)	1.14 (0.70; 1.84)
	[0-3]	0.94 (0.56; 1.58)	1.20 (0.71; 2.02)	1.35 (0.71; 2.58)	0.92 (0.52; 1.63)
Nulliparous	No	1.00	1.00	1.00	1.00
	Yes	0.72 (0.41; 1.25)	0.95 (0.57; 1.58)	0.74 (0.38; 1.44)	0.70 (0.41; 1.21)
BC family history	None	1.00	1.00	1.00*	1.00
	Only SDR	1.05 (0.63; 1.78)	0.83 (0.51; 1.33)	1.03 (0.55; 1.93)	0.85 (0.51; 1.42)
	First degree relatives	1.18 (0.66; 2.13)	0.95 (0.57; 1.58)	2.39 (1.29; 4.44)	1.02 (0.58; 1.79)
Tumour type	HER2-/HR+	NA	1.00	NA	1.00
	HER2+	NA	0.72 (0.48; 1.10)	NA	1.13 (0.71; 1.79)
	Triple negative	NA	1.32 (0.79; 2.19)	NA	0.81 (0.48; 1.38)
TNM stage	0/I	NA	1.00*	NA	1.00
	II	NA	1.67 (1.14; 2.46)	NA	0.82 (0.53; 1.27)
	III	NA	1.89 (1.10; 3.22)	NA	0.73 (0.41; 1.32)
	IV	NA	4.29 (1.32; 13.94)	NA	1.08 (0.34; 3.37)
Surgery	No operated	NA	1.00	NA	1.00
	Operated	NA	2.17 (1.36; 3.45)	NA	3.30 (2.06; 5.29)
Radiation therapy	No	NA	1.00	NA	1
	Ongoing RT	NA	0.65 (0.38; 1.12)	NA	0.72 (0.40; 1.30)
	Finished RT	NA	0.81 (0.44; 1.48)	NA	0.66 (0.35; 1.28)
Chemotherapy	No	NA	1.00	NA	1.00
	Ongoing CT	NA	1.09 (0.73; 1.62)	NA	0.95 (0.61; 1.48)
	Finished CT	NA	1.61 (0.86; 3.02)	NA	0.81 (0.41; 1.59)

Supplementary Table S2 (cont.)

		Bodily Pain		General Health	
		Controls	Cases	Controls	Cases
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (per 5 years)		0.81 (0.72; 0.91)	0.72 (0.63; 0.81)	0.58 (0.50; 0.68)	0.67 (0.59; 0.76)
Country of birth	Spain	1.00	1.00	1.00	1.00
	Other	0.32 (0.07; 1.56)	0.75 (0.26; 2.13)	0.46 (0.09; 2.22)	0.49 (0.17; 1.44)
Marital status	Married/with partner	1.00	1.00	1.00	1.00
	Divorced	1.33 (0.70; 2.51)	0.99 (0.53; 1.85)	1.18 (0.57; 2.45)	0.81 (0.42; 1.54)
	Single	1.25 (0.63; 2.46)	0.88 (0.46; 1.70)	0.70 (0.32; 1.53)	1.29 (0.65; 2.56)
	Widow	1.36 (0.67; 2.73)	0.41 (0.18; 0.91)	1.04 (0.39; 2.72)	1.69 (0.78; 3.64)
Perceived social support	Very satisfactory	1.00	1.00	1.00	1.00*
	Satisfactory	1.22 (0.75; 2.00)	1.23 (0.82; 1.83)	1.70 (0.93; 3.11)	1.00 (0.66; 1.51)
	Unsatisfactory	1.22 (0.73; 2.05)	1.11 (0.69; 1.78)	1.51 (0.79; 2.89)	1.71 (1.06; 2.76)
	Very unsatisfactory	1.64 (1.00; 2.69)	1.05 (0.61; 1.81)	3.20 (1.76; 5.83)	2.50 (1.42; 4.41)
Education	No studies or primary school	1.00	1.00*	1.00	1.00
	Secondary school	1.30 (0.73; 2.33)	0.51 (0.32; 0.84)	0.74 (0.37; 1.48)	0.77 (0.47; 1.27)
	University	0.94 (0.50; 1.76)	0.38 (0.22; 0.66)	0.54 (0.25; 1.14)	1.02 (0.58; 1.78)
Working status	Active work without nightshifts	1.00	1.00	1.00	1.00
	Active work with nightshifts	0.88 (0.50; 1.57)	0.82 (0.38; 1.77)	0.86 (0.44; 1.69)	1.51 (0.69; 3.28)
	Retired	1.02 (0.45; 2.31)	0.51 (0.22; 1.18)	1.06 (0.36; 3.06)	0.99 (0.42; 2.33)
	Housewife	0.76 (0.48; 1.23)	0.68 (0.44; 1.05)	0.77 (0.44; 1.33)	1.23 (0.79; 1.93)
	Others	1.80 (0.96; 3.39)	1.22 (0.63; 2.38)	1.34 (0.65; 2.76)	1.14 (0.58; 2.24)
Caring for someone	No	1.00	1.00	1.00	1.00
	Yes, without severe disability	0.95 (0.65; 1.38)	0.81 (0.56; 1.17)	0.82 (0.53; 1.27)	0.76 (0.52; 1.11)
	Yes, with severe disability	2.66 (0.99; 7.14)	0.94 (0.41; 2.18)	0.89 (0.25; 3.17)	0.28 (0.10; 0.77)
No. comorbidities	None	1.00*†	1.00*†	1.00*†	1.00*†
	1	1.62 (1.08; 2.44)	2.27 (1.48; 3.48)	1.56 (0.96; 2.54)	1.93 (1.26; 2.97)
	2	2.79 (1.64; 4.72)	1.33 (0.74; 2.41)	3.67 (1.99; 6.74)	1.42 (0.75; 2.68)
	>2	6.88 (3.54; 13.38)	3.38 (1.57; 7.27)	9.38 (4.49; 19.61)	4.16 (1.91; 9.03)
Smoking	Never smoker	1.00	1.00	1.00	1.00
	Former smoker	1.32 (0.86; 2.01)	0.83 (0.55; 1.25)	0.97 (0.59; 1.61)	0.68 (0.45; 1.04)
	Current smoker/Former<6 months	0.86 (0.57; 1.30)	0.68 (0.44; 1.03)	1.04 (0.65; 1.67)	0.88 (0.58; 1.35)
Adherence to the WCRF/AICR recommendations	[6-9]	1.00	1.00	1.00	1.00*
	[4-5]	1.25 (0.84; 1.86)	1.52 (0.99; 2.33)	0.93 (0.58; 1.49)	1.01 (0.65; 1.57)
	[0-3]	1.09 (0.63; 1.89)	1.39 (0.82; 2.36)	1.17 (0.62; 2.19)	2.03 (1.18; 3.48)
Nulliparous	No	1.00	1.00	1.00	1.00
	Yes	0.77 (0.44; 1.36)	0.62 (0.37; 1.04)	0.90 (0.47; 1.72)	0.48 (0.28; 0.84)
BC family history	None	1.00	1.00	1.00†	1.00†
	Only SDR	0.57 (0.32; 1.03)	1.03 (0.64; 1.65)	1.02 (0.54; 1.92)	1.31 (0.8; 2.12)
	First degree relatives	1.56 (0.86; 2.83)	1.57 (0.93; 2.62)	2.22 (1.12; 4.40)	0.69 (0.4; 1.18)
Tumour type	HER2-/HR+	NA	1.00	NA	1.00
	HER2+	NA	0.79 (0.51; 1.20)	NA	0.8 (0.52; 1.23)
	Triple negative	NA	0.72 (0.42; 1.20)	NA	1.18 (0.7; 1.99)
TNM stage	0/I	NA	1.00	NA	1.00*
	II	NA	0.99 (0.67; 1.45)	NA	1.42 (0.95; 2.11)
	III	NA	1.48 (0.86; 2.55)	NA	1.60 (0.92; 2.78)
	IV	NA	1.50 (0.51; 4.38)	NA	3.54 (1.12; 11.22)
Surgery	No operated	NA	1.00	NA	1.00
	Operated	NA	3.39 (2.08; 5.53)	NA	1.08 (0.68; 1.73)
Radiation therapy	No	NA	1.00	NA	1.00
	Ongoing RT	NA	1.26 (0.73; 2.16)	NA	0.91 (0.52; 1.62)
	Finished RT	NA	0.59 (0.33; 1.08)	NA	1.10 (0.59; 2.04)
Chemotherapy	No	NA	1.00	NA	1.00
	Ongoing CT	NA	1.02 (0.68; 1.52)	NA	0.89 (0.59; 1.35)
	Finished CT	NA	0.96 (0.52; 1.76)	NA	0.78 (0.42; 1.47)

Supplementary Table S2 (cont.)

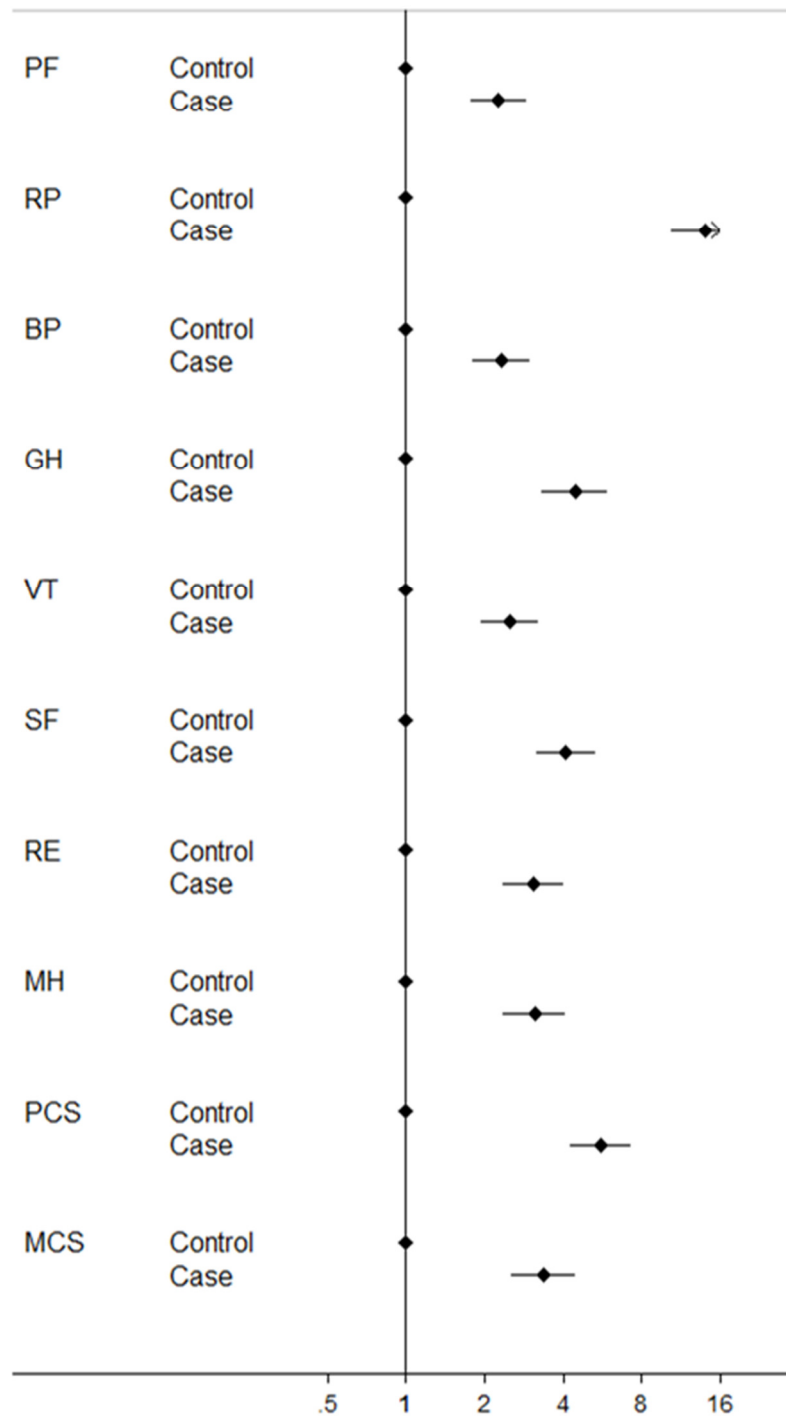
		Vitality		Social Functioning	
		Controls	Cases	Controls	Cases
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
		0.67 (0.59; 0.76)[†]	0.86 (0.77; 0.97)[†]	0.75 (0.66; 0.85)	0.81 (0.72; 0.91)
Age (per 5 years)					
Country of birth	Spain	1.00	1.00	1.00	1.00
	Other	1.05 (0.32; 3.44)	0.87 (0.33; 2.32)	1.46 (0.46; 4.61)	1.96 (0.68; 5.64)
Marital status	Married/with partner	1.00	1.00	1.00[†]	1.00 [†]
	Divorced	1.57 (0.83; 2.95)	0.97 (0.53; 1.79)	2.55 (1.36; 4.81)	0.72 (0.39; 1.32)
	Single	1.55 (0.75; 3.22)	1.01 (0.54; 1.92)	1.21 (0.62; 2.38)	1.39 (0.74; 2.63)
	Widow	1.99 (0.95; 4.17)	0.87 (0.42; 1.82)	1.93 (0.91; 4.12)	0.78 (0.38; 1.60)
Perceived social support	Very satisfactory	1.00*	1.00*	1.00*[†]	1.00*[†]
	Satisfactory	2.27 (1.32; 3.90)	1.03 (0.70; 1.52)	2.42 (1.38; 4.24)	1.11 (0.75; 1.63)
	Unsatisfactory	2.61 (1.48; 4.60)	1.89 (1.20; 2.97)	2.75 (1.54; 4.91)	2.34 (1.45; 3.77)
	Very unsatisfactory	5.51 (3.21; 9.47)	2.26 (1.32; 3.85)	6.79 (3.88; 11.87)	1.94 (1.12; 3.35)
Education	No studies or primary school	1.00	1.00	1.00 [†]	1.00[†]
	Secondary school	0.77 (0.43; 1.37)	0.50 (0.31; 0.80)	1.37 (0.74; 2.53)	0.59 (0.37; 0.94)
	University	0.59 (0.31; 1.11)	0.57 (0.33; 0.97)	1.17 (0.60; 2.29)	0.78 (0.45; 1.33)
Working status	Active work without nightshifts	1.00	1.00	1.00[†]	1.00 [†]
	Active work with nightshifts	0.87 (0.48; 1.58)	1.43 (0.69; 2.99)	0.45 (0.23; 0.87)	1.48 (0.67; 3.25)
	Retired	0.81 (0.32; 2.03)	0.63 (0.28; 1.41)	0.54 (0.19; 1.51)	0.88 (0.41; 1.92)
	Housewife	1.03 (0.65; 1.65)	0.92 (0.60; 1.41)	1.29 (0.80; 2.08)	0.75 (0.49; 1.14)
	Others	0.92 (0.47; 1.78)	1.41 (0.74; 2.69)	1.13 (0.58; 2.20)	0.79 (0.42; 1.51)
Caring for someone	No	1.00	1.00	1.00[†]	1.00[†]
	Yes, without severe disability	0.86 (0.58; 1.26)	0.79 (0.55; 1.13)	1.10 (0.75; 1.62)	0.66 (0.46; 0.95)
	Yes, with severe disability	1.65 (0.62; 4.42)	1.13 (0.50; 2.55)	5.55 (2.01; 15.32)	1.41 (0.60; 3.30)
No. comorbidities	None	1.00	1.00	1.00	1.00
	1	1.24 (0.81; 1.89)	1.16 (0.78; 1.74)	1.06 (0.69; 1.64)	1.28 (0.85; 1.93)
	2	2.04 (1.18; 3.51)	0.97 (0.54; 1.75)	1.43 (0.81; 2.53)	1.01 (0.56; 1.80)
	>2	3.65 (1.86; 7.16)	2.33 (1.11; 4.91)	1.97 (0.97; 4.00)	2.08 (0.98; 4.40)
Smoking	Never smoker	1.00	1.00	1.00	1.00
	Former smoker	0.92 (0.59; 1.42)	0.94 (0.63; 1.40)	0.93 (0.59; 1.45)	0.93 (0.63; 1.39)
	Current smoker/Former<6 months	1.05 (0.70; 1.58)	1.04 (0.69; 1.55)	1.22 (0.80; 1.84)	1.11 (0.74; 1.65)
Adherence to the WCRF/AICR recommendations	[6-9]	1.00	1.00	1.00	1.00
	[4-5]	0.82 (0.55; 1.23)	1.15 (0.76; 1.75)	1.34 (0.88; 2.05)	1.24 (0.82; 1.88)
	[0-3]	0.86 (0.50; 1.50)	1.50 (0.90; 2.51)	1.17 (0.66; 2.09)	1.54 (0.92; 2.58)
Nulliparous	No	1.00	1.00	1.00 [†]	1.00[†]
	Yes	0.42 (0.22; 0.78)	0.63 (0.38; 1.05)	1.10 (0.62; 1.93)	0.45 (0.27; 0.75)
BC family history	None	1.00	1.00	1.00*	1.00
	Only SDR	0.85 (0.49; 1.49)	1.17 (0.74; 1.86)	1.24 (0.73; 2.12)	0.98 (0.61; 1.56)
	First degree relatives	1.13 (0.60; 2.13)	0.92 (0.56; 1.51)	2.12 (1.12; 4.00)	1.02 (0.62; 1.68)
Tumour type	HER2-/HR+	NA	1.00	NA	1.00
	HER2+	NA	0.61 (0.41; 0.93)	NA	0.98 (0.65; 1.46)
	Triple negative	NA	0.92 (0.56; 1.51)	NA	0.65 (0.40; 1.08)
TNM stage	0/I	NA	1.00	NA	1.00
	II	NA	1.31 (0.90; 1.91)	NA	1.03 (0.71; 1.51)
	III	NA	1.29 (0.77; 2.18)	NA	1.01 (0.60; 1.71)
	IV	NA	2.72 (0.93; 7.91)	NA	0.81 (0.29; 2.29)
Surgery	No operated	NA	1.00	NA	1.00
	Operated	NA	1.17 (0.75; 1.83)	NA	1.16 (0.74; 1.82)
Radiation therapy	No	NA	1.00	NA	1.00
	Ongoing RT	NA	1.01 (0.60; 1.70)	NA	0.89 (0.52; 1.52)
	Finished RT	NA	0.65 (0.36; 1.17)	NA	0.90 (0.50; 1.62)
Chemotherapy	No	NA	1.00	NA	1.00
	Ongoing CT	NA	0.95 (0.64; 1.40)	NA	1.00 (0.68; 1.48)
	Finished CT	NA	1.27 (0.70; 2.30)	NA	1.04 (0.57; 1.91)

Supplementary Table S2 (cont.)

		Role-Emotional		Mental Health	
		Controls	Cases	Controls	Cases
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (per 5 years)		0.77 (0.68; 0.88)†	0.95 (0.85; 1.08)†	0.76 (0.66; 0.86)†	0.91 (0.81; 1.03)†
Country of birth	Spain	1.00	1.00	1.00	1.00
	Other	0.70 (0.18; 2.72)	1.02 (0.37; 2.85)	1.16 (0.33; 4.11)	1.97 (0.73; 5.30)
Marital status	Married/with partner	1.00	1.00	1.00	1.00
	Divorced	2.94 (1.56; 5.54)	1.08 (0.59; 2.00)	1.76 (0.90; 3.41)	0.75 (0.40; 1.40)
	Single	0.97 (0.46; 2.05)	1.09 (0.57; 2.10)	1.37 (0.65; 2.90)	0.80 (0.42; 1.53)
	Widow	0.67 (0.24; 1.84)	1.19 (0.58; 2.45)	1.75 (0.80; 3.82)	1.40 (0.68; 2.88)
Perceived social support	Very satisfactory	1.00*	1.00*	1.00*	1.00*
	Satisfactory	1.57 (0.85; 2.93)	1.01 (0.68; 1.52)	1.83 (0.97; 3.46)	1.16 (0.78; 1.72)
	Unsatisfactory	2.38 (1.29; 4.42)	1.78 (1.13; 2.82)	3.22 (1.71; 6.05)	2.90 (1.83; 4.61)
	Very unsatisfactory	4.62 (2.56; 8.37)	3.01 (1.76; 5.15)	7.19 (3.94; 13.14)	2.81 (1.65; 4.81)
Education	No studies or primary school	1.00	1.00	1.00	1.00*
	Secondary school	0.91 (0.47; 1.76)	0.81 (0.50; 1.30)	0.89 (0.49; 1.64)	0.62 (0.39; 0.99)
	University	1.06 (0.52; 2.15)	0.84 (0.49; 1.45)	0.82 (0.42; 1.60)	0.56 (0.33; 0.96)
Working status	Active work without nightshifts	1.00	1.00	1.00	1.00
	Active work with nightshifts	0.93 (0.48; 1.78)	0.95 (0.44; 2.03)	0.74 (0.38; 1.47)	1.21 (0.56; 2.58)
	Retired	0.93 (0.33; 2.62)	0.75 (0.34; 1.67)	1.61 (0.66; 3.92)	1.19 (0.55; 2.60)
	Housewife	1.22 (0.72; 2.05)	0.87 (0.56; 1.34)	1.31 (0.80; 2.15)	0.84 (0.54; 1.29)
	Others	1.62 (0.81; 3.23)	0.92 (0.47; 1.79)	1.75 (0.91; 3.39)	1.68 (0.88; 3.23)
Caring for someone	No	1.00	1.00	1.00†	1.00†
	Yes, without severe disability	0.82 (0.54; 1.26)	0.73 (0.50; 1.05)	0.84 (0.56; 1.26)	0.83 (0.58; 1.20)
	Yes, with severe disability	2.99 (1.11; 8.09)	0.89 (0.38; 2.05)	2.44 (0.93; 6.39)	0.43 (0.17; 1.08)
No. comorbidities	None	1.00	1.00	1.00	1.00
	1	0.75 (0.46; 1.22)	0.92 (0.61; 1.39)	0.96 (0.61; 1.52)	0.87 (0.58; 1.32)
	2	1.16 (0.63; 2.14)	0.78 (0.42; 1.44)	1.28 (0.71; 2.29)	0.71 (0.39; 1.30)
	>2	1.67 (0.81; 3.46)	1.90 (0.92; 3.92)	1.51 (0.73; 3.11)	1.24 (0.60; 2.57)
Smoking	Never smoker	1.00	1.00	1.00	1.00
	Former smoker	0.59 (0.36; 0.98)	1.19 (0.79; 1.80)	0.96 (0.60; 1.54)	1.17 (0.78; 1.76)
	Current smoker/Former<6 m.	1.07 (0.69; 1.65)	1.52 (1.01; 2.29)	1.06 (0.68; 1.64)	1.33 (0.88; 2.00)
Adherence to the WCRF/AICR recommendations	[6-9]	1.00	1.00	1.00	1.00
	[4-5]	1.27 (0.81; 1.98)	1.09 (0.71; 1.66)	0.87 (0.57; 1.34)	1.13 (0.74; 1.73)
	[0-3]	0.81 (0.42; 1.56)	1.14 (0.68; 1.92)	1.01 (0.56; 1.80)	1.30 (0.77; 2.19)
Nulliparous	No	1.00	1.00	1.00	1.00
	Yes	0.87 (0.47; 1.64)	0.62 (0.37; 1.05)	0.71 (0.38; 1.34)	0.82 (0.50; 1.37)
BC family history	None	1.00	1.00	1.00	1.00
	Only SDR	1.00 (0.55; 1.82)	0.75 (0.46; 1.21)	1.00 (0.56; 1.79)	1.14 (0.72; 1.81)
	First degree relatives	1.41 (0.72; 2.74)	0.65 (0.38; 1.09)	1.14 (0.58; 2.22)	0.58 (0.34; 0.98)
Tumour type	HER2-/HR+	NA	1.00	NA	1.00
	HER2+	NA	0.72 (0.47; 1.11)	NA	0.99 (0.66; 1.49)
	Triple negative	NA	1.02 (0.62; 1.67)	NA	0.90 (0.54; 1.49)
TNM stage	0/I	NA	1.00	NA	1.00
	II	NA	1.34 (0.91; 1.96)	NA	1.33 (0.91; 1.95)
	III	NA	0.72 (0.42; 1.25)	NA	1.13 (0.66; 1.93)
	IV	NA	0.34 (0.10; 1.16)	NA	2.06 (0.72; 5.84)
Surgery	No operated	NA	1.00	NA	1.00
	Operated	NA	0.78 (0.49; 1.24)	NA	1.02 (0.65; 1.61)
Radiation therapy	No	NA	1.00	NA	1.00
	Ongoing RT	NA	1.25 (0.73; 2.13)	NA	0.98 (0.57; 1.69)
	Finished RT	NA	0.90 (0.50; 1.64)	NA	0.79 (0.44; 1.43)
Chemotherapy	No	NA	1.00	NA	1.00
	Ongoing CT	NA	1.17 (0.78; 1.75)	NA	1.14 (0.77; 1.70)
	Finished CT	NA	1.06 (0.58; 1.94)	NA	1.07 (0.59; 1.95)

^a Low score: scores ≤45 points, i.e. five or more points under the reference population mean, fixed at 50 points. ORs and 95% confidence intervals derived from multivariable logistic regression models adjusted by all the variables in the table (except tumour-related variables in the analysis of the control group) and by region of residence. Estimates for variables not statistically significantly associated with each scale are depicted in gray. Data in bold represent statistically significant associations. * Statistically significant trend. †Statistically significant interaction between the association in cases and controls. CT: Chemotherapy; HER2: Human epidermal growth factor receptor 2; HR: Hormone Receptor; NA: Not applicable; RT: Radiation therapy; SDR: Second-degree relatives.

Supplementary Figure 1



ORs of low scores in the eight SF-36 scales and the two summary components for breast cancer cases compared to control women (EpiGEICAM study).

ORs adjusted by age, country of birth, region of residence, marital status, perceived social support, education, working status, caregiving, comorbidities, smoking, adherence to the WCRF/AICR recommendations, nulliparity, and family history of breast cancer. Values over 1 indicate higher odds of a low score.

PF: Physical Functioning; RP: Role-Physical; BP: Bodily Pain; GH: General Health; VT: Vitality; SF: Social Functioning; RE: Role-emotional; MH: Mental Health; PCS: Physical Component Summary Score; MCS: Mental Component Summary Score.