ORIGINAL ARTICLE

European Journal of Cancer Care WILEY

Associations between sex, age and spiritual well-being scores on the EORTC QLQ-SWB32 for patients receiving palliative care for cancer: A further analysis of data from an international validation study

Gudrun Elin Rohde[1] [iD] | Teresa Young[2] | Julie Winstanley[3] | Juan I. Arraras[4] |
Kath Black[5] | Fran Boyle[6] | Anne Bredart[7] [iD] | Anna Costantini[8] | Jingbo Guo[9] |
Maria E. Irarrazaval[10] | Kunihiko Kobayashi[11] | Renske Kruizinga[12] | Mariana Navarro[13] |
Sepideh Omidvari[14] | Samantha Serpentini[15] | Nigel Spry[16] | Hanneke van Laarhoven[17] |
Grace Yang[18] | Bella Vivat[19] [iD]

[1]Department of Clinical Research Sorlandet Hospital, Faculty of Health & Sport Sciences, University of Agder, Kristiansand, Norway

[2]Supportive Oncology Research Team, East & North Hertfordshire NHS Trust Including Mount Vernon Cancer Centre, Northwood, Middlesex, UK

[3]Osman Consulting Pty Ltd, Cheshire, UK

[4]Department of Oncology, Complejo Hospitalario de Navarra, Pamplona, Spain

[5]St Gemma's Hospice, Leeds, UK

[6]Patricia Ritchie Centre for Cancer Care, University of Sydney, North Sydney, NSW, Australia

[7]Psycho-Oncology Unit, Institute Curie, Paris, France

[8]Psychoncology Unit, Faculty of Medicine and Psychology, Sant'Andrea Hospital, Sapienza University of Rome, Rome, Italy

[9]Palliative Ward, Shengjing Hospital, China Medical University, Shenyang, China

[10]Centro Los Junco, Santiago, Chile

[11]Department of Respiratory Medicine, Saitama Medical University International Medical Centre, Saitama, Japan

[12]Medical Oncology Academic Medical Centre, Amsterdam, The Netherlands

[13]Division de Investigación Clínica, Coordinadora del Centro de Apoyo para la Atención Integral, Instituto Nacional de Cancerologia, Mexico DF, Mexico

[14]Cancer Research Center, Cancer Institute of Iran, Tehran University of Medical Sciences, Tehran, Iran

[15]Unit of Psychoncology, Veneto Institute of Oncology IOV – IRCCS, Padua, Italy

[16]Oncology Department, Faculty of Medicine Dentistry and Health Sciences, University of Western Australia, Crawley, WA, Australia

[17]Department of Medical Oncology, Amsterdam University Medical Centers, Cancer Center Amsterdam, Location Academic Medical Center, Amsterdam, The Netherlands

[18]National Cancer Centre Singapore 2, Lien Centre for Palliative Care, Singapore City, Singapore

[19]Division of Psychiatry, Marie Curie Palliative Care Research Department, Faculty of Medical Sciences, University College London, London, UK

Correspondence
Gudrun Elin Rohde, Department of Clinical Research Sorlandet Hospital, Faculty of Health & Sport Sciences, University of Agder, Kristiansand, Norway.
Email: gudrun.e.rohde@uia.no

Abstract

Objective: The EORTC QOL Group has recently completed the cross-cultural development and validation of a standalone measure of spiritual well-being (SWB) for cancer patients receiving palliative care: the EORTC QLQ-SWB32. The measure includes four scales: Relationships with Others, Relationship with Self, Relationship with

Someone or Something Greater, and Existential, plus a Global-SWB item. This paper reports on further research investigating relationships between sex, age and SWB for patients receiving palliative care for cancer—adjusting for other socio-demographic, clinical and function variables, including WHO performance status and EORTC QLQ-C15-PAL emotional and physical function scores.

Methods: Cross-sectional data from the validation study were used, and chi-square, independent *t* tests, Mann–Whitney *U* tests and multiple regression analyses applied.

Results: The study included 451 participants with advanced and incurable cancer, from 14 countries. Adjusted analyses found better scores for female participants than males on three of the four EORTC QLQ-SWB32 subscales; Relationship with others, Relationship with Someone or Something Greater and Existential plus Global-SWB. Older age was positively associated with better Relationship with Self.

Conclusion: The findings from our participants suggest that it might be beneficial if healthcare providers seeking to address patients' spiritual needs pay particular attention to male patients, younger patients and those with poor emotional functioning.

K E Y W O R D S
age, EORTC, sex, spiritual health, spiritual well-being, spirituality

1 | INTRODUCTION

Spirituality is an integral part of a person's existence (Hermann, 2007), it is a broad concept with room for many perspectives and no universally agreed definition. In general, it includes a sense of connection to something greater than ourselves, and it typically involves a search for meaning in life (Cobb, Puchalski, & Rumbold, 2012). In this study, we have defined spirituality as the search for meaning in one`s life and the living of one`s life on the basis of one`s understanding of that meaning. It may involve some or all of the following: having or finding (a) sustaining relationship with self and others; (b) meaning beyond one`s self; (c) meaning beyond immediate events; and (d) explanation for events and/or experiences (Vivat, 2008). Spirituality is an important dimension of quality of life (QOL) (Chaar et al., 2018; Schwartz et al., 2006; Sprangers et al., 2000; Sprangers & Schwartz, 1999; Wilson & Cleary, 1995), where QOL is defined as having four domains: physical well-being, psychological well-being, social well-being and spiritual well-being (Ferrell, Dow, & Grant, 1995). Spirituality is important in all phases of the disease trajectory for those with an illness. However, issues included in spirituality often become more prominent when people experience life-threatening diseases such as cancer, especially in the palliative phase (Cobb, Puchalski, et al., 2012). Palliative health care is not just about medical care and medical unmet need, but also quality of life issues, which for some may include spirituality, so spiritual assessment and intervention should be considered important in palliative cancer care (Cobb, Dowrick, & Lloyd-Williams, 2012; Cobb, Puchalski, et al., 2012; Hermann, 2006). Thus, to improve a patient's QOL, healthcare professionals (HCPs) should pay particular attention to this dimension in palliative care (Schwartz et al., 2006; Sprangers et al., 2000; Sprangers & Schwartz, 1999; Wilson & Cleary, 1995).

Measurements of spiritual well-being (SWB) have been used as indicators of an individual's spirituality (Hermann, 2006). However, there is no consensus of how to define SWB, nor is there a 'gold standard' instrument to measure it (Vivat, 2008). In line with the definition of spirituality used in this study, we define SWB to include four dimensions: relationships with self, relationship with others, existential issue and specifically religious and/or spiritual issues (Vivat, 2008).

The majority of the most widely used SWB measures have been developed and validated in a single cultural context (mostly in the United States), and translating and applying them in different cultural settings may not be simple (Cobb, Puchalski, et al., 2012; Vivat, 2008). The authors of this paper have recently completed a validation study of a measure of SWB for people receiving palliative care for cancer, the European Organisation for Research and Treatment of Cancer (EORTC) QLQ-SWB32 (QLQ-SWB32). The study was conducted in a cross-cultural setting with collaborators from 4 continents, 14 countries, in 10 languages and included 451 participants (Vivat et al., 2012, 2017). The initial validation analysis of the QLQ-SWB32 identified four scales: Relationships with Others, Relationship with Self, Relationship with Someone or Something Greater, and Existential, plus a Global-SWB item. In the validation study, a broad-brush analysis of associations between socio-demographic, clinical and function data and the QLQ-SWB32 scales was conducted (Vivat et al., 2017). This paper reports on further analysis of that data and explores the associations in more depth. This knowledge might be used in palliative care to identify people who might have lower SWB, have unmet needs and therefore in need of more customised spiritual care.

Studies using measurements of spirituality or SWB with some similarities to our new measure, for example Spiritual Interests Related to Illness Tool (SpIRIT) (Taylor, 2006) and the Spiritual Needs Inventory (SNI) (Hermann, 2007), have found associations with socio-demographic and/or clinical variables: Women had better spirituality or SWB than men (Hermann, 2007; Peterman, Fitchett, Brady, Hernandez, & Cella, 2002; Taylor, 2006). There was a weak positive association of SWB with increasing age (Harding et al., 2014; Peterman et al., 2002). In general, married and widowed participants and people living with others had the best scores on spirituality and SWB (Peterman et al., 2002; Taylor, 2006). Furthermore, patients with a high level of education reported better SWB than patients with less education. Studies also suggest that increased physical burden of disease was associated with lower SWB (Lo, Burman, et al., 2011; Lo, Zimmermann, Gagliese, Li, & Rodin, 2011; Zimmermann et al., 2014). Finally, previous studies have identified a relationship between depression and worse spirituality and/or SWB (Costanzo, Ryff, & Singer, 2009; Gonzalez et al., 2014; Johnson et al., 2011) and low emotional and physical well-being and decreased spirituality (Harris et al., 2010).

Health-related quality of life is a multidimensional construct that includes the individuals` subjective perspective on their physical, psychological, social and functional health (Fayers et al., 1997). Participants in the QLQ-SWB32 validation study also completed the EORTC QLQ-C15-PAL (QLQ-C15-PAL), a health-related quality of life questionnaire for palliative care research developed from the EORTC QLQ-C30 (Groenvold et al., 2006). The exploration of construct, convergent and divergent validity for the validation study examined univariate relationships between the four QLQ-SWB32 scales plus Global-SWB and patient sex, WHO performance status, QLQ-C15-PAL emotional function and the QLQ-C15-PAL global QOL. In the validation study, positive associations between being female and having a high score on the Relationship with Someone or Something Greater; between QLQ-C15-PAL and Relationship with Self, Relationships with Others and Existential; and between the WHO performance score and Relationship with Self, Existential and Relationship with Someone or Something Greater were identified. Furthermore, moderate positive correlations were found between QLQ-C15-PAL Global QOL and Existential and Relationship with Someone or Something Greater (Vivat et al., 2017).

The main validation analysis did not explore relationships between the QLQ-SWB32 scale scores and age (as a continuous variable) and relationships between the QLQ-SWB32 scale scores and sex adjusted for QLQ-C15-PAL physical functioning, QLQ-C15-PAL emotional functioning and other variables such as education, marital status and performance status, which have been identified as associates of spirituality or SWB in previous studies. Thus, the aim of this paper was to report on further multivariate analysis, to investigate relationships between sex, age and spiritual well-being for patients receiving palliative care for cancer, using QLQ-SWB32.

2 | METHODS

2.1 | Patient recruitment and data collection

The validation study recruited participants from Australia (n = 22), Austria (n = 7), Chile (n = 50), China (n = 22), France (n = 30), Iran (n = 45), Italy (n = 30), Japan (n = 65), Mexico (n = 37), the Netherlands (n = 51), Norway (n = 41), Singapore (n = 15), Spain (n = 21) and the UK (n = 15). All participants had advanced and incurable cancer—solid tumour or haematological malignancy, were aged 18 years or more and spoke and understood the native language in their respective country (except for Singapore, where the study was administered in the participants' second language, English). The most common cancer diagnosis was lung cancer, comprising 118 (26.2%) of the participants, followed by 81 (18.0%) breast cancer and 37 (8.2%) participants with gynaecological cancer. The majority (83.4%) had metastatic disease, while 16.6% had only locally advanced disease.

Just over half the participants (54%) had few or no restrictions to their mobility—that is, they scored 0 or 1 on the WHO performance scale. We recruited participants at any time in their palliative pathway, including those who were currently receiving anticancer treatment. We collected participants' socio-demographic information: sex, age, marital status, living arrangement, presence of dependent adults or children, working status and education (less than compulsory, compulsory, post-compulsory, university or postgraduate) and clinical data: diagnosis, current treatment if any, and WHO performance status. Ethics approval in England and Wales was given by the SW London Rec 4 (Surrey Borders) ethics committee (Ref: 11/LO/0692), and local and/or national ethical approval was given, as required, in all other participating countries. The participants provided written informed consent.

2.2 | Measures

The QLQ-SWB32 includes 32 items, with 22 items forming four multi-item scales: Relationships with Others (six items); Relationship with Self (five items); Relationship with Someone or Something Greater (five items), and Existential (six items). The remaining ten items comprise a Global-SWB item, two items that screen for current or past belief in someone or something greater, three items that are only answered by those responding positively to the screening items and four non-scoring clinically relevant items. The Global- SWB scores range from 1 (very poor) to 7 (excellent). The other 31 items are scored from 1 (not at all) to 4 (very much). Sum scores from the four QLQ-SWB32 scales and Global-SWB are transformed into scores from 0 to 100, with 100 as the best possible score (Vivat et al., 2017).

The QLQ-C15-PAL contains 15 items with two multi-item functional scales (physical and emotional functioning), two multi-item symptom scales (fatigue and pain), five single symptom items (nausea and vomiting, dyspnoea, insomnia, appetite loss and constipation) and a Global QOL item (Groenvold et al., 2006). The responses are scored on a 1–4-point Likert scale for all items, except for the Global QOL, which has a 1–7 range. The scores are

	All		Women		Men		
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**p-values**
Age	60	13	58.0	13.5	61.7	12.6	.002
	N	**%**	**N**	**%**	**N**	**%**	
Living together	269	83	182	76	187	92	<.001
Marital status							
Single	41	9	28	12	13	6	<.001
Married	305	68	134	56	171	83	
Living with a partner	21	5	15	6	6	3	
Separated/divorced	47	11	37	15	10	5	
Widowed	34	8	27	11	7	3	
Dependent children	83	18	57	24	26	13	.009
Presence of dependent adults or children	116	24	71	30	45	22	.061
Working status							
No, retired	204	45	99	41	105	51	.020
No, not working at present	169	38	108	45	61	29	
Yes, part-time	38	8	17	7	21	10	
Yes, full-time	36	8	17	7	19	9	
Missing	4	1					
Education							
Less than compulsory	70	16	37	16	33	16	.943
Compulsory	111	25	59	25	52	25	
Post-compulsory	128	29	66	28	62	30	
University	105	24	58	25	47	23	
Postgraduate	25	6	15	6	10	5	
WHO score							
Fully active	56	13	29	12	27	13	.772
Restricted	188	42	102	42	86	42	
Ambulatory >50%	116	26	59	25	57	28	
Limited self-care <50%	55	12	33	14	22	11	
Completely disabled	30	7	18	7	12	6	

[a]Using independent sample t test for age and chi-squared tests for the categorical variables.

transformed to 0–100 according to the EORTC QLQ scoring manual (Groenvold et al., 2006). For QLQ-C15-PAL symptom scales, 100 indicates a high degree of symptom burden. For functional scales and Global QOL, 100 indicates good functioning/QOL with no problems. The physical and emotional functioning scales and the global QOL item were included in the multivariate analyses.

2.3 | Statistical analyses

We performed statistical analyses using IBM SPSS Statistics (IBM Corp., version 25), using chi-squared tests for categorical variables, independent t tests (for age) and Mann–Whitney U tests for continuous variables, and analyses of variance (ANOVA) tests to compare differences between subgroups also for continuous variables. To identify correlations between continuous variables, we used Spearman rank correlation, taking a correlation coefficient (r) of >.5 to indicate a strong correlation, .3–.5 a moderate correlation, .2–.29 a weak correlation and <.2 a negligible correlation (Altman, 2006).

We used linear regression analyses (general linear model (GLM) in SPSS) to calculate univariate associations between demographic characteristics, WHO performance status, QLQ-C15-PAL physical and emotional functioning and scores on the four QLQ-SWB32 scales plus the Global-SWB. Independent variables for a final multivariate model were then chosen based on the univariate associations

with scores on at least one of the four QLQ-SWB32 scales and the Global-SWB using $p < .10$ and associates of spirituality or SWB reported in previous studies. Based on these assumptions, the final multivariate model included the demographic variables sex, age, education, presence of dependent adults or children, working status, WHO performance score and QLQ-C15-PAL physical and emotional functioning as independent variables. In the multiple regression analyses, the adjusted beta (adj β) (and the coefficient intervals) indicated the adjusted associations between each independent and dependent variable. The adj β coefficient indicates one unit of change on the regression line. Thus, for dichotomous variables (e.g. sex), we can expect β to be large, whilst for continuous variables, β will be small (e.g. age, with one-year increments) (Altman, 2006). For robustness, we also tested the models by backward multiple regression analyses. The level of significance was set at $p < .05$. Continuous variables (i.e. age and scale scores) are presented as the mean with standard deviation (SD, in parenthesis), and categorical variables are presented as numbers and proportions (%).

3 | RESULTS

Characteristics of the 451 participants are listed in Table 1. The mean age of the participants was 59.7 years (SD = 13.2); the median age was 61, with a range of 18–89. Eighty-three per cent of the participants were married or living with a partner. A small percentage (15%) worked part- or full-time. The sample comprised slightly more females than males; 242 (54%) versus 208 (46%). Female study participants were more likely than males to be living alone, 24% versus 8%, $p = .001$; to have dependent children, 24% versus 13%, $p = .009$; and less likely to be working, 14% versus 19%, $p = .020$ (Table 1).

Female participants were younger than males, 58 (SD = 14) years versus 62 (SD = 13) years, $p = .002$. Participants with a WHO performance score of 2 (ambulatory >50%) were older, 61.3 (SD = 12.8) years than the other performance groups (fully active, 59.1 (SD = 13.5) years; restricted, 60.7 (SD = 12.6) years; limited self-care < 50%, 57.4 (SD = 13.9) years; or completed disabled, 52.4 (SD = 15.7) years), $p = .008$ (Table 2).

3.1 | Sex, age and SWB

For all participants, the lowest QLQ-SWB32 mean score was 59.3 (SD = 22.7) on the Relationship with Self-scale, and the highest was 72.3 (SD = 21.8) on the Relationships with Others scale (Table 3). The mean score for Global-SWB was 66.5 (SD = 31.9). Using univariate analyses to compare the SWB32 scales between women and men, women's scores were higher for Relationship with Someone or Something Greater (66.4 (SD = 25.6) versus 52.4 (SD = 26.1), $p < .001$) and for Global-SWB (69.9 (SD = 23.8) versus 62.6 (SD = 26.1), $p = .004$).

In regard to age, we found a weak positive correlation between age and Relationship with Self ($r = .288$, $p < .001$) and negligible

negative correlations between age and Relationship with Someone or Something Greater ($r = −.183$, $p < .001$) and Global-SWB ($r = −.155$, $p = .001$).

3.2 | Sex and Health-Related quality of Life

Using univariate analyses to compare health-related quality of life between women and men (Table 4) found that female participants' scores for physical functioning were significantly worse than those for males: 54.3 (SD = 30.5) versus 61.8 (SD = 30.9), $p = .010$. For the symptom

TABLE 2 Differences between study participants' demographic and clinical characteristics and age[a]

	Mean age	SD	p-values
Women	61.7	12.6	.002
Men	58.0	12.5	
Living together	58.6	13.4	<.001
Living alone	65.0	11.2	
Marital status			
Single	52.2	16.5	<.001
Married	60.1	12.7	
Living with a partner	52.7	10.6	
Separated/divorced	58.9	11.1	
Widowed	71.2	9.8	
No presence of dependent adults or children	62.9	12.0	<.001
Presence of dependent adults or children	50.5	12.1	
Working status			
No, retired	68.3	8.4	<.001
No, not working at present	51.4	12.5	
Yes, part-time	55.1	9.1	
Yes, full-time	63.6	12.0	
Education			
Less than compulsory	60.2	14.6	.776
Compulsory	59.2	14.7	
Post-compulsory	60.4	12.4	
University	60.6	12.4	
Postgraduate	59.9	9.8	
WHO score			
Fully active	59.08	13.5	.008
Restricted	60.7	12.6	
Ambulatory >50%	61.3	12.8	
Limited self-care <50%	57.4	13.9	
Completely disabled	52.4	15.7	

[a]Using independent sample t tests and ANOVA to compare age between the groups.

TABLE 3 SWB measured by EORTC QLQ-SWB32 in all participants and comparison between women (N = 242) and men (N = 208)[a]

	All mean	SD	Median	Women mean	SD	Median	Men mean	SD	Median	p-values
Relationship with Self	59.3	22.7	61.0	57.4	23.4	60.0	61.5	21.7	66.7	.072
Relationship with Others	72.3	21.8	75.3	73.5	21.0	77.8	71.1	22.5	72.2	.346
Relationship with Someone/something Greater	59.8	26.7	60.9	66.4	25.6	70.0	52.4	26.1	46.7	<.001
Existential	61.2	23.3	62.6	61.8	22.1	63.9	60.7	24.6	61.1	.676
Global-SWB	66.5	25.2	66.7	69.9	23.8	66.7	62.6	26.1	66.7	.005

Note: The items in the different scales are scored on a Likert scale range from 1—not at all to 4—very much. Global-SWB range from 1—very poor to 7—excellent. The scale scores are transformed from 0 to 100, with 100 as the best score.
[a]Using Mann–Whitney U tests.

TABLE 4 Health-related quality of life measured by EORTC QLQ-C15-PAL in all participants and comparison between women (N = 242) and men (N = 208)[a]

	All mean	SD	Median	Women mean	SD	Median	Men mean	SD	Median	p - values
EORTC QLQ-C15-PAL[b]										
Global quality of life	58.9	26.5	66.7	58.1	26.4	66.7	59.9	26.6	66.7	.385
Functional scales[c]										
Physical function	57.7	30.8	60.0	54.3	30.5	60.0	61.8	30.9	73.3	.004
Emotional function	68.3	28.1	66.7	66.5	27.7	66.7	70.5	28.6	66.7	.075
Symptoms scales[d]										
Dyspnoea	25.1	29.5	33.3	22.8	28.9	0.0	27.5	29.7	33.3	.054
Pain	38.0	34.7	33.3	41.4	34.9	33.3	34.0	33.4	16.7	.026
Insomnia	35.9	35.0	33.3	37.6	36.0	33.3	34.0	33.7	33.3	.352
Fatigue	50.2	30.3	44.4	51.6	31.1	44.4	48.5	29.3	44.4	.267
Loss of appetite	36.5	36.5	33.3	39.4	36.9	33.3	33.0	35.8	33.3	.056
Nausea and vomiting	19.6	29.3	0.0	22.5	31.5	16.7	15.9	26.1	0.0	.010
Constipation	30.1	33.9	33.3	30.3	35.4	33.3	30.0	32.3	33.3	.742

Abbreviation: SD, Standard deviation.
[a]Using Mann–Whitney U tests.
[b]The responses are on a 1–4-point Likert scale for all items ranging from 1 (not at all) to 4 (very much), except for global QOL ranging from 1 (very poor) to 7 (excellent). The scale scores are transformed from 0 to 100.
[c]For functioning scales and the global QOL, 100 represents good functioning/QOL.
[d]For symptom scales, 100 represents a high degree of symptom burden.

scales, women's scores were significantly worse than men for pain: 41.4 (SD = 34.9) versus 34.0 (SD = 33.4), p = .022, and for nausea and vomiting: 22.5 (SD = 31.5) versus 15.9 (SD = 26.1), p = .017.

3.3 | Correlations between Health-related Quality of Life and SWB

In Table 5, moderate correlations are shown between QLQ C15-PAL emotional functioning and Relationship with Self (r = .440, p < .001); Global QOL and Existential (r = .501, p < .001); QLQ-C15-PAL emotional functioning and Existential (r = .409, p < .001) and finally, QLQ-C15-PAL physical functioning and Existential (r = .317, p < .001). For the symptom scales, we identified a significant moderate negative

correlation between pain and Existential (r = −.304, p < .001) and between fatigue and Existential (r = −.318, p < .001). Other significant (but weak or negligible) negative correlations were identified, especially between the EORTC QLQ-C15-PAL symptoms scores and Relationship with Self and Existential scores (see Table 5).

3.4 | Adjusted associations between sex, age and SWB

In adjusted analyses (Table 6), we found that high Relationship with Self scores were positively associated with older age (p = .002) and better QLQ-C15-PAL emotional functioning (p < .001) and negatively associated with less than compulsory education

TABLE 5 Univariate correlation analyses (Spearman rank) between EORTC QOL-C15-PAL and the EORTC QLQ-SWB32 scale scores

EORTC QLQ-SWB32					
	Relationship with Self	**Relationship with Others**	**Relationship with Someone or something Greater**	**Existential**	**Global-SWB**
EORTC QLQ-C15-PAL					
Global quality of life	0.277**	0.157	0.027	0.501**	0.276**
Functional scales					
Physical function	0.250**	0.033	−0.124**	0.317**	0.078
Emotional function	0.400**	0.128**	−0.074	0.409**	0.163**
Symptoms scales					
Dyspnoea	−0.104	−0.056	−0.049	−0.193**	−0.084
Pain	−0.299**	0.072	0.085	−0.304**	−0.084
Insomnia	−0.206**	−0.108	−0.001	−0.263**	−0.170**
Fatigue	−0.240**	0.028	0.012	−0.318**	−0.150**
Loss of appetite	−0.263**	0.030	0.083	−0.300**	−0.072
Nausea and vomiting	−0.268**	0.022	0.076	0.209**	−0.059
Constipation	−0.17538**	−0.117	−0.018	−0.284**	−0.139**

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

(p = .034) and with restricted and ambulatory > 50% performance scores (WHO score 1, p = .023 and WHO score 2, p = .032). High Relationships with Others scores were positively associated with being female (p = .033) and better QLQ-C15-PAL emotional functioning (p = .021). High Relationship with Someone or Something Greater scores were positively associated with being female (p < .001) and presence of dependent adults or children (p = .030) and were negatively associated with performance score fully active (p = .046). High Existential scores were positively associated with being female (p = .014), better QLQ-C15-PAL physical functioning (p < .001) and better QLQ-C15-PAL emotional functioning (p < .001). Finally, Global-SWB was positively associated with being female (p < .001) and better QLQ-C15-PAL emotional functioning (p < .001) and was negatively associated with post-compulsory education (p = .026) and good performance score (WHO score 0, p = .029 and WHO score 1, p = .015). The same pattern of associations was seen when the multivariate model was run using the multiple regression backwards procedure (data not shown). The independent variables included in the multiple analyses explained 24.2% of the variance in Relationship with Self scores and 21.3% in the Existential scores but a smaller percentage in Relationship with Someone or Something Greater scores (12.7%), Relationships with Others scores (4.5%) and Global-SWB (6.7%).

4 | DISCUSSION

Our further analysis of data from the validation study found additional differences related to sex, with female participants scoring better on Relationships with Others, Relationship with Someone

or Something Greater, Existential and Global-SWB in our adjusted analyses. The previous known group comparison analysis from our validation study found only the association between female participants and high Relationship with Someone or Something Greater scores (Vivat et al., 2017). Our new findings are consistent with studies using SWB measures with some similarities to our new one, where better SWB was observed among women in a palliative phase, using measures such as SpIRIT (Taylor, 2006), SNI (Hermann, 2007), and FACIT-Sp (Peterman et al., 2002). However, it should be noted that our measure and each of these other instruments have their own distinct conceptualisation of spirituality or SWB (Vivat, 2008).

The Relationship with Self-scale showed a different pattern of associations with sex and with age when compared to the other three scales of the QLQ-SWB32. It was the only scale associating positively with older age and not associating with sex. This finding was present in both univariate and multivariate analyses. One explanation might be that, in general, people tend to feel more comfortable and have higher self-esteem with increasing age (Orth, Erol, & Luciano, 2018). This findings for sex and age resonate with the wider literature on spirituality in palliative care (Cobb, Puchalski, et al., 2012) and also with other studies using different measures with their inherent subscales (Peterman et al., 2002; Zimmermann et al., 2011). The association between age and SWB is not as clear and consistent as the association with sex, but has none the less been reported; with increased age associated with better scores on some subscales or domains using other measures (Peterman et al., 2002; Zimmermann et al., 2011).

When we explored the adjusted relationship between age, sex and the QLQ-SWB32 scale scores, we found that clinical and socio-demographic variables included as independent variables

TABLE 6 Regression analyses of demographic, clinical, function and EORTC QLQ-SWB32 scale scores using the multiple regression analyses procedure general linear model (GLM)

Independent variables	Relationship with Self-scale			Relationship with Others scale			Relationship with Someone or Something Greater-scale			Existential-scale			Global-SWB		
	Adj β	95% CI	Sig	Adj β	95% CI	Sig	Adj β	95% CI	Sig	Adj β	95% CI	Sig	Adj β	95% CI	Sig
Demographic factors															
Male	0.48	−3.47, 4.42	.813	−4.64	−8.91, −0.37	.033	−14.37	−19.51, −9.22	<.000	−5.21	−9.36, −1.06	.014	−8.99	−13.72, −4.27	<.001
Female	Ref			Ref			Ref			Ref					
Age	0.31	0.11, 0.50	.002	−0.11	−0.32, 0.11	.324	−0.22	−0.47, 0.03	.086	−0.04	−0.24, 0.17	.720	−0.11	−0.11, −0.34	.354
Less than compulsory	−10.07	−19.36, −0.78	.034	−2.89	−12.89, 7.11	.570	1.29	−10.67, 13.24	.832	−1.60	−11.30, 8.09	.745	−2.61	−13.39, 8.17	.635
Compulsory	0.11	−8.80, 9.03	.980	−7.67	−17.27, 1.93	.117	−7.78	−19.29, 3.72	.184	−7.39	−16.74, 1.95	.121	−6.12	−16.46, 4.21	.245
Post-compulsory	−3.61	−12.31, 5.09	.416	−3.77	−13.11, 5.57	.428	−5.74	−16.94, 5.47	.315	−2.79	−11.90, 6.32	.548	−11.27	−21.19, −1.36	.026
University	−3.61	−12.39, 5.17	.419	1.49	−7.97, 10.96	.756	−6.19	−17.51, 5.13	.283	−0.25	−9.43, 8.93	.958	−8.76	−18.77, 1.24	.086
Postgraduate	Ref			Ref			Ref			Ref					
Presence of dependent adults or children	−1.91	−6.73, 2.91	.437	1.35	−3.83, 6.52	.610	6.88	0.67, 13.09	.030	3.81	−1.19, 8.81	.135	0.96	−4.61, 6.52	.736
No presence of dependent adults or children	Ref			Ref			Ref			Ref					
Physician-reported performance															
Retired	7.02	−0.99, 15.03	.086	1.20	−7.43, 9.83	.785	0.46	−9.87, 10.78	.931	3.30	−5.09, 11.68	.440	2.15	−7.24, 11.53	.653
No, not working at present	2.79	−4.83, 10.39	.472	−3.19	−11.38, 5.00	.444	−1.47	−11.25, 8.31	.767	0.40	−7.57, 8.36	.922	−1.67	−10.61, 7.27	.713
Yes, part-time	6.86	−2.68, 16.40	.158	8.04	−2.40, 18.48	.131	1.71	−10.75, 14.17	.787	7.07	−2.91, 17.04	.165	3.86	−7.31, 15.03	.497
Yes, full-time	Ref			Ref			Ref			Ref					
WHO score = 0 (fully active)	−8.69	−19.73, 2.36	.123	−8.63	−20.74, 3.49	.162	−14.63	−2.02, −0.24	.046	−6.63	−18.24, 4.98	.262	−14.73	−27.94, −1.53	.029
WHO score = 1 (restricted)	−11.26	−20.93, −1.60	.023	−9.20	−19.72, 1.33	.087	−12.04	−24.57, 0.48	.059	−10.10	−20.23, 0.02	.050	−14.14	−25.46, −2.82	.015
WHO score = 2 (ambulatory >50%)	−10.05	−19.23, −0.88	.032	−1.03	−11.00, 8.94	.839	−2.78	−14.63, 9.09	.646	−5.23	−14.81, 4.34	.283	−9.13	0.09, −19.72	.091

(Continues)

TABLE 6 (Continued)

Independent variables	Relationship with Self-scale			Relationship with Others scale			Relationship with Someone or Something Greater-scale			Existential-scale			Global-SWB		
	Adj β	95% CI	Sig	Adj β	95% CI	Sig	Adj β	95% CI	Sig	Adj β	95% CI	Sig	Adj β	95% CI	Sig
WHO score = 3 (limited self-care <50%)	−8.14	−17.37, 1.09	.084	−1.50	−11.61, 8.61	.771	−3.87	−15.90, 8.17	.528	−5.12	−14.88, 4.63	.302	−7.91	−18.75, 2.93	.152
WHO score = 4 (Completely disabled)	Ref			Ref			Ref			Ref					
Self-reported function															
EORTC QLQ-C30 physical function	0.09	−0.001, 0.18	.053	0.06	−0.04, 0.16	.241	0.01	−0.11, 0.13	.911	0.20	0.10, 0.30	<.000	0.09	−0.02, 0.20	.097
EORTC QLQ-C30 emotional function	0.29	0.22, 0.37	<.000	0.10	0.02, 0.18	.021	0.03	−0.07, 0.13	.520	0.29	0.20, 0.37	<.000	0.17	0.08, 0.26	<.001
R^2	24.2%			4.5%			12.7%			21.3%			6.7%		

Note: Key: Adj., adjusted unstandardised regression coefficients with 95% confidence interval (CI) and P values; WHO, World Health Organization. Relationship with self, Relationship with others, Relationship with someone or something greater, Existential issues, Global spiritual well-being; all range from 0 to 100, where 100 is the best score.

in the final model associated independently with the SWB scale scores. Most of these variables have also been shown to associate with spirituality or SWB among palliative cancer patients in other studies (Cobb, Puchalski, et al., 2012; Hermann, 2006; Hermann, 2007; Lo, Zimmermann, et al., 2011; Peterman et al., 2002; Taylor, 2006). For instance in both the univariate and adjusted analyses, we found high QLQ-C15-PAL emotional functioning was positively associated with high scores on three of the four SWB scales and with Global-SWB. The univariate association with QLQ-C15-PAL emotional functioning was previously observed in the known group comparison for our validation study (Vivat et al., 2017) and is similar to that by Gonzalez et al. (2014, who investigated the relationship between depressive symptoms and Functional Assessment of Chronic Illness Therapy-Spiritual Well-being (FACIT-Sp) scales. Similar findings are reported by Johnson using both FACIT-Sp and the Spiritual History Scale (Johnson et al., 2011). Previous studies also indicate an association between self-reported physical functioning as measured by the Functional Assessment of Cancer Therapy-General (FACT-G) and spirituality and/or SWB (Harding et al., 2014; Lo, Zimmermann, et al., 2011; Peterman et al., 2002; Taylor, 2006; Zimmermann et al., 2011). Our adjusted analysis found only a significant positive association between QLQ-C15-PAL physical functioning and Existential; however, WHO performance status was positively associated with Relationship with Self and Global-SWB. WHO performance status includes one item about ambulation and self-care, whereas QLQ-C15-PAL physical functioning includes three items about activity of daily living and being able to go for a short walk outdoors. Scores on the two tools are therefore not necessarily related and capture different aspects of physical functioning. We found no associations between marital status and any of the SWB32 scales, which other studies, using other tools, have found (Taylor, 2006).

4.1 | Strengths and limitations

A strength of our study is the large cross-cultural nature of our sample, which also included participants from East Asia (i.e. Singapore and Japan). So many of our findings have previously only been observed in populations from one culture or country using a tool developed in only one language and with mostly Christians participants. Our findings might be considered to underline that female palliative cancer patients have better SWB also measured in a cross-cultural population and setting. Including patients from 14 countries on four continents, representing different cultures, religions and linguistic origins, increases the external validity of our study.

The study also has its limitations. The cross-sectional nature of the study does not allow any causal associations between the variables included in the present study. Our sample was opportunistic, and we did not select for any socio-demographic characteristics. The patients included in the study were self-selected and mostly relatively well. It is likely that more frail patients were not initially approached, so our findings may not necessarily be

generalised to such patients. Furthermore, the independent variables in the multiple analyses explained a relatively low percentage of the variance of the QLQ-SWB32 scale scores, indicating that there are other socio-demographic and clinical variables associated with SWB for which we did not collect data. Finally, comparisons of our results with other studies are limited because each instrument conceptualises and defines spirituality or SWB in a different way.

4.2 | Implications for health care

Our findings concerning the demographic, performance and functional characteristics that are associated with poorer scores on the QLQ-SWB32 scales may help to indicate which patients could benefit from more attention, care and the offer of interventions in regard to SWB. Healthcare professionals should perhaps pay particular attention to male patients, younger patients and those with poor emotional functioning. Where the attention, care and offer of interventions result in an increase in SWB, QOL may also improve (Sirgy, 2002), although our validation study (Vivat et al., 2017) found only a weak association between QOL and SWB. The act of assessing a person's SWB prompts the patient to reflect and is therefore, of itself, an intervention which directs the respondents' attention to issues such as those included in the QLQ-SWB32 (Vivat et al., 2017). This implies that any use of the QLQ-SWB32 requires targeted follow-up from well-qualified professionals.

5 | CONCLUSION

Female participants in our study scored better on three out of four QLQ-SWB32 scales, Relationships with Others, Relationship with Someone or Something Greater and Existential and Global-SWB. Relationship with Self was the only scale not associated with sex, but also the only scale to be associated positively with older age. High self-reported emotional functioning was associated with three of the four scale scores, Relationship with Self, Relationships with Others and Existential and with Global-SWB. More studies to confirm the validity of the SWB measure, especially prospective interventional studies of palliative cancer patients, would be helpful. Future studies should also consider collecting data on other demographic and clinical variables, such as economic status, and including additional measures of depression and anxiety, to investigate variance in the QLQ-SWB32 scale scores.

ACKNOWLEDGEMENTS

CONFLICT OF INTEREST

ORCID

Gudrun Elin Rohde https://orcid.org/0000-0002-8538-7237

Anne Bredart https://orcid.org/0000-0002-1864-5371

Bella Vivat https://orcid.org/0000-0002-0587-5688

REFERENCES

Altman, D. G. (2006). *Practical statistics for medical research*. London, UK; New York, NY: Chapman and Hall.

Chaar, E. A., Hallit, S., Hajj, A., Aaraj, R., Kattan, J., Jabbour, H., & Khabbaz, L. R. (2018). Evaluating the impact of spirituality on the quality of life, anxiety, and depression among patients with cancer: An observational transversal study. *Supportive Care in Cancer*, *26*(8), 2581–2590. https://doi.org/10.1007/s00520-018-4089-1

Cobb, M., Dowrick, C., & Lloyd-Williams, M. (2012). What can we learn about the spiritual needs of palliative care patients from the research literature? *Journal of Pain and Symptom Management*, *43*(6), 1105–1119. https://doi.org/10.1016/j.jpainsymman.2011.06.017

Cobb, M., Puchalski, C. M., & Rumbold, B. D. (2012). *Oxford textbook of spirituality in healthcare*. Oxford, UK: Oxford University Press.

Costanzo, E. S., Ryff, C. D., & Singer, B. H. (2009). Psychosocial adjustment among cancer survivors: Findings from a national survey of health and well-being. *Health Psychology*, *28*(2), 147–156. https://doi.org/10.1037/a0013221

Fayers, P. M., Hopwood, P., Harvey, A., Girling, D. J., Machin, D., & Stephens, R. (1997). Quality of life assessment in clinical trials–guidelines and a checklist for protocol writers: The U.K. Medical Research Council experience. MRC Cancer Trials Office. *European Journal of Cancer*, *33*(1), 20–28.

Ferrell, B. R., Dow, K. H., & Grant, M. (1995). Measurement of the quality of life in cancer survivors. *Quality of Life Research*, *4*(6), 523–531. https://doi.org/10.1007/BF00634747

Gonzalez, P., Castañeda, S. F., Dale, J., Medeiros, E. A., Buelna, C., Nuñez, A., ... Talavera, G. A. (2014). Spiritual well-being and depressive symptoms among cancer survivors. *Supportive Care in Cancer*, *22*(9), 2393–2400. https://doi.org/10.1007/s00520-014-2207-2

Groenvold, M., Petersen, M. A., Aaronson, N. K., Arraras, J. I., Blazeby, J. M., Bottomley, A., ... Bjorner, J. B. (2006). The development of the EORTC QLQ-C15-PAL: A shortened questionnaire for cancer patients in palliative care. *European Journal of Cancer*, *42*(1), 55–64. https://doi.org/10.1016/j.ejca.2005.06.022

Harding, R., Powell, R. A., Namisango, E., Merriman, A., Gikaara, N., Ali, Z., & Higginson, I. J. (2014). Palliative care-related self-report problems among cancer patients in East Africa: A two-country study. *Supportive Care in Cancer*, *22*(12), 3185–3192. https://doi.org/10.1007/s00520-014-2301-5

Harris, B. A., Berger, A. M., Mitchell, S. A., Steinberg, S. M., Baker, K. L., Handel, D. L., ... Pavletic, S. Z. (2010). Spiritual well-being in long-term survivors with chronic graft-versus-host disease after hematopoietic stem cell transplantation. *The Journal of Supportive Oncology*, *8*(3), 119–125.

Hermann, C. (2006). Development and testing of the spiritual needs inventory for patients near the end of life. *Oncology Nursing Forum*, *33*(4), 737–744. https://doi.org/10.1188/06.onf.737-744

Hermann, C. P. (2007). The degree to which spiritual needs of patients near the end of life are met. *Oncology Nursing Forum*, *34*(1), 70–78. https://doi.org/10.1188/07.onf.70-78

Johnson, K. S., Tulsky, J. A., Hays, J. C., Arnold, R. M., Olsen, M. K., Lindquist, J. H., & Steinhauser, K. E. (2011). Which domains of spirituality are associated with anxiety and depression in patients with advanced illness? *Journal of General Internal Medicine*, *26*(7), 751–758. https://doi.org/10.1007/s11606-011-1656-2

Lo, C., Burman, D., Swami, N., Gagliese, L., Rodin, G., & Zimmermann, C. (2011). Validation of the QUAL-EC for assessing quality of life in patients with advanced cancer. *European Journal of Cancer*, *47*(4), 554–560. https://doi.org/10.1016/j.ejca.2010.10.027

Lo, C., Zimmermann, C., Gagliese, L., Li, M., & Rodin, G. (2011). Sources of spiritual well-being in advanced cancer. *BMJ Support Palliat Care*, *1*(2), 149–153. https://doi.org/10.1136/bmjspcare-2011-000005

Orth, U., Erol, R. Y., & Luciano, E. C. (2018). Development of self-esteem from age 4 to 94 years: A meta-analysis of longitudinal studies. *Psychological Bulletin*, *144*(10), 1045–1080. https://doi.org/10.1037/bul0000161

Peterman, A. H., Fitchett, G., Brady, M. J., Hernandez, L., & Cella, D. (2002). Measuring spiritual well-being in people with cancer: The functional assessment of chronic illness therapy–Spiritual Well-being Scale (FACIT-Sp). *Annals of Behavioral Medicine*, *24*(1), 49–58. https://doi.org/10.1207/S15324796ABM2401_06

Schwartz, C. E., Bode, R., Repucci, N., Becker, J., Sprangers, M. A., & Fayers, P. M. (2006). The clinical significance of adaptation to changing health: A meta-analysis of response shift. *Quality of Life Research*, *15*(9), 1533–1550. https://doi.org/10.1007/s11136-006-0025-9

Sirgy, M. J. (2002). *The psychology of quality of life*. Dordrecht, The Netherlands; Boston, MA: Kluwer Academic Publishers.

Sprangers, M. A., de Regt, E. B., Andries, F., van Agt, H. M., Bijl, R. V., de Boer, J. B., ... de Haes, H. C. (2000). Which chronic conditions are associated with better or poorer quality of life? *Journal of Clinical Epidemiology*, *53*(9), 895–907. http://ac.els-cdn.com/S0895435600002043/1-s2.0-S0895435600002043-main.pdf?_txml:id=ad8d5c4a-a5b8-11e6-874c-00000aacb35d&acdnat=1478612508_0697e236d3df8fd3b5b14c0d2469d9ba

Sprangers, M. A., & Schwartz, C. E. (1999). Integrating response shift into health-related quality of life research: A theoretical model. *Social Science and Medicine*, *48*(11), 1507–1515. http://ac.els-cdn.com/S0277953699000453/1-s2.0-S0277953699000453-main.pdf?_txml:id=b0376b8e-a5b8-11e6-ab97-00000aab0f6b&acdnat=1478612513_3f139e7640bbdc4ec66b274ff613443d

Taylor, E. J. (2006). Prevalence and associated factors of spiritual needs among patients with cancer and family caregivers. *Oncology Nursing Forum*, *33*(4), 729–735. https://doi.org/10.1188/06.onf.729-735

Vivat, B. (2008). Measures of spiritual issues for palliative care patients: A literature review. *Palliative Medicine*, *22*(7), 859–868. https://doi.org/10.1177/0269216308095990

Vivat, B., Young, T., Efficace, F., Sigurðadóttir, V., Arraras, J. I., Åsgeirsdóttir, G. H., ... Singer, S. (2012). Cross-cultural development of the EORTC QLQ-SWB36: A stand-alone measure of spiritual wellbeing for palliative care patients with cancer. *Palliative Medicine*, *27*(5), 457–469. https://doi.org/10.1177/0269216312451950

Vivat, B., Young, T. E., Winstanley, J., Arraras, J. I., Black, K., Boyle, F., ... Yang, G. M. (2017). The international phase 4 validation study of the EORTC QLQ-SWB32: A stand-alone measure of spiritual well-being for people receiving palliative care for cancer. *European Journal of Cancer Care*. *26*(6). https://doi.org/10.1111/ecc.12697

Wilson, I. B., & Cleary, P. D. (1995). Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *JAMA*, *273*(1), 59–65. http://jamanetwork.com/journals/jama/article-abstract/385444

Zimmermann, C., Burman, D., Swami, N., Krzyzanowska, M. K., Leighl, N., Moore, M., ... Tannock, I. (2011). Determinants of quality of life in patients with advanced cancer. *Supportive Care in Cancer*, *19*(5), 621–629. https://doi.org/10.1007/s00520-010-0866-1

Zimmermann, C., Swami, N., Krzyzanowska, M., Hannon, B., Leighl, N., Oza, A., ... Lo, C. (2014). Early palliative care for patients with advanced cancer: A cluster-randomised controlled trial. *Lancet*, *383*(9930), 1721–1730. https://doi.org/10.1016/s0140-6736(13)62416-2