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Translation and validation of the EORTC QLQ-C30 for use among Turkish and Moroccan ethnic minority cancer patients in the Netherlands

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ABSTRACT

The purpose of this study was to validate the core EORTC quality of life questionnaire, the QLQ-C30 (version 3.0), for use among Turkish and Moroccan cancer patients in the Netherlands. The questionnaire was translated into two oral Moroccan languages, and the existing Turkish version was culturally adapted for use in the Netherlands. Ninety Turkish and 79 Moroccan patients completed the questionnaire. Administration of the questionnaire proved feasible, with low levels of missing questionnaires (4%) and missing items (on average, 1.5–2.4%). With one minor exception, the evidence of convergent validity was strong for all multi-item scales. Internal consistency reliability was above 0.70 for all scales except the cognitive functioning scale in the Turkish sample. The questionnaire was able to distinguish clearly between subgroups formed on the basis of performance status and comorbidity, and was moderately responsive to change over time in performance status. These data support the use of the QLQ-C30 among Turkish and Moroccan cancer patients residing in the Netherlands. Additional studies are needed to confirm the psychometrics of the questionnaire when used among these ethnic minority groups residing in other Western European countries.

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1. Introduction

There are currently approximately 2.8 million Turkish and 1.2 million Moroccan immigrants living in West-Europe.¹ Turkish and Moroccan migrants came in large numbers in the 1960s and 1970s, and were later followed by their family members. The original cohort of immigrants was relatively young at the time of migration. However, it is now reaching the age at which the incidence of chronic diseases, including cancer, rises sharply. Although, in general, interest in assessing the

perceived health status and health-related quality of life (HRQL) of patients with cancer has increased dramatically in recent years, this has lagged behind in the case of Turkish and Moroccan patients. This can be attributed primarily to the fact that the majority of first generation Turkish and Moroccan immigrants do not speak the language of their host countries, and thus they are not able to complete HRQL questionnaires in the available Western European translations. Additionally, high levels of illiteracy among these immigrant populations necessitates careful consideration of the

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feasibility of collecting HRQL data, both with regard to the content of the questions being posed, and the mode of administration of questionnaires (oral versus written).

The European Organization for Research and Treatment of Cancer (EORTC) has been at the forefront in developing HRQL questionnaires for use in cross-cultural oncology. The core EORTC HRQL questionnaire, the QLQ-C30, has been internationally validated,^{2,3} and is currently available in more than 48 languages (www.eortc.be). However, the QLQ-C30 has not been translated into Moroccan languages, and the Turkish version⁴ has not been investigated among Turkish immigrants living in Western Europe. This is important in that the majority of Turkish immigrants came from rural areas of Turkey where educational and literacy levels are lower than those in the country as a whole.

The aims of the current study were: (1) to translate the English language version of the QLQ-C30 (version 3.0)³ into two oral Moroccan languages (Moroccan-Arabic and Tarifit) for use among Moroccan cancer patients living in the Netherlands; (2) to culturally adapt the Turkish language version of the QLQ-C30 for use among Turkish cancer patients living in the Netherlands; and (3) to assess the psychometric properties of these translations, specifically in terms of the replicability of the original scale structure, internal consistency reliability, known groups validity, and responsiveness to change over time.

2. Patients and methods

2.1. Translation and cultural adaptation of the EORTC QLQ-C30

The EORTC QLQ-C30 is a 30-item questionnaire composed of nine multi-item scales and six single items that reflect the multidimensionality of the quality-of-life construct.^{2,3} We followed the EORTC guidelines for the forward-backward translation of the English language version of the QLQ-C30 into two Moroccan languages.⁵ As only well-educated Moroccans have a good command of the official language in Morocco, Standard-Arabic, we translated the questionnaire into two oral languages commonly spoken among Moroccans in the Netherlands: Moroccan-Arabic and Tarifit. The Moroccan-Arabic translation was generated in phonetic Arabic script. As the Tarifit language (spoken by Rifberbers in northern Morocco) has an original ancient script that is not well known and rarely used, we generated the translation in the more commonly used Latin script. The Moroccan language versions were developed for oral administration. For both Moroccan versions we produced a male and a female version, as the grammar in these languages depends on the sex of the respondent. Finally, audiotaped versions of the two Moroccan translations were produced for purposes of interviewer training.

Due to the high level of illiteracy among the first generation of Moroccans in the Netherlands⁶ it was necessary to modify several of the questions slightly. Item 20, which queries about 'difficulty in concentrating on things like reading a newspaper or watching television' was changed to '...listening to the radio or watching television'. Some words could not be translated literally into the Moroccan languages; nor could

they be replaced with a proxy equivalent or a short description. For example, there are no Moroccan-Arabic equivalents for the words 'hobby' or 'quality' (as in 'quality of life'). In these cases, a Standard-Arabic word was used.

The EORTC procedure for cultural adaptation⁵ was applied to adapt the Turkish language version of the QLQ-C30 for use in the Netherlands. This involved using slightly different wording, where appropriate. For example, the description of vomiting in the Turkish version of the questionnaire 'kustunuz mu?' or 'Did you throw up?' was changed to 'istifra ettiniz mi?' "Did you vomit".

2.2. Patient recruitment

Between May 2000 and September 2002 Turkish and Moroccan cancer patients were recruited from seven outpatient oncology clinics in four cities in the Netherlands. Consecutive patients were eligible if they were at least 18 years old, had a life expectancy greater than 6 months, were diagnosed with cancer after 1985, and were still under medical supervision. Patients or one of their parents had to have been born in Turkey or Morocco. Finally, they had to be proficient in Moroccan-Arabic, Tarifit or Turkish, irrespective of their proficiency level in Dutch.

Eligible patients were invited to participate by a bilingual letter followed by a personal invitation (by phone or in the waiting room) by one of the bilingual, female research assistants. The study was approved by the local ethical committees of the seven participating hospitals.

2.3. Instruments and procedures

Patients completed the QLQ-C30 questionnaire together with three other HRQOL questionnaires (the SF-36, the COOP/WONCA Charts, and the Rotterdam Symptom Checklist) in random order. For Turkish patients the questionnaires were either self-administered or administered in the form of an interview, depending on the preference of the patient. For Moroccan patients the questionnaires were administered orally. The research assistants made notes when patients had any comments or clarification of an item was needed. The QLQ-C30 was assessed twice with an interval of 3 months.

Data on diagnosis, stage of disease, and treatment were retrieved from the hospital medical records. Demographic data and information on comorbidity, literacy, experience with surveys, and patient's judgement of their proficiency in Dutch was obtained from the patients. Performance status was assessed by the research assistant using the Karnofsky performance status scale (KPS).⁷⁻⁹

2.4. Statistical analysis

Scores on the items and scales were linearly transformed to a scale from 0 to 100. A higher score on the functional scales (PF, RF, CF, EF, SF, GQL) corresponds to a higher level of functioning, while a higher score on the symptom scales or items (FA, NV, PA, DY, SL, AP, CO, DI, FI) correspond to more symptoms.

Descriptive statistics were generated to evaluate missing data, items for which explanations were provided, score

distributions (i.e. mean, range, floor and ceiling effects). For items with many missings, the pattern of missingness was examined in relation to various patient characteristics, including sex, age (<50 versus >50), performance status (KPS 30–70 versus 80–100), previous experience with surveys (yes versus no), literate (yes versus no) and education (primary school or less versus secondary school or higher). Additionally, items were identified that required explanation by the research assistants (for the orally administered versions of the questionnaire).

Multitrait scaling analysis were employed to examine item-convergent validity (item-scale correlations should be >0.40) and item-discriminant validity (items should correlate significantly higher (2 standard errors or greater) with their own scale than with other scales). The magnitude of the standard error is heavily influenced by the sample size (i.e. the larger the sample, the smaller the standard error). Thus, given the relatively small sample size in the current study, one standard error was also used as a more liberal criterion for evaluating item-discriminant validity.¹⁰

Internal consistency reliability of the multi-item scales was assessed by Cronbach's coefficient α . A value of 0.70 or greater was considered as adequate for group comparisons.¹¹

Interscale correlations were calculated to determine if the correlations between scales were lower than the internal consistency estimates of the scales, indicating that each scale was assessing a unique concept.¹⁰

Known groups validity was evaluated by comparing subgroups of patients known to differ on clinical variables.^{12–14} It was hypothesized that those patients with a higher performance status, with no comorbid conditions, with local/locoregional disease, and in follow-up would report better functioning and less symptoms than patients with a lower performance status, with comorbidity, with metastatic disease, and under active treatment.

Finally, responsiveness was evaluated by comparing changes over time in QLQ-C30 scores in subgroups of patients formed on the basis of changes in performance status (KPS score improved, stable or deteriorated). It was hypothesized that changes in QLQ-C30 scores would covary significantly with changes in KPS over time.

Due to sample size limitations, it was not possible to analyse the two Moroccan language groups separately, with the exception of the internal consistency reliability analyses and the interscale correlation analyses.

3. Results

3.1. Sample sociodemographic and clinical characteristics

A bilingual letter of invitation was sent to 140 Turkish and 175 Moroccan patients. Of these letters, 21 addressed to the Turkish patients and 34 to the Moroccan patients were not deliverable and up-to-date addresses and telephone numbers could not be obtained. Two Turkish and three Moroccan patients were excluded because they did not speak the language under study. Of the remaining patients who were traceable and eligible, 90 Turkish and 79 Moroccan patients (48 of whom spoke Moroccan-Arabic and 31 Tarifit) participated, representing a 77% and 57% response rate, respectively.

Reasons for non-participation included lack of interest, feeling too ill, and not being allowed to participate by the family. Table 1 shows the sociodemographic and clinical characteristics of the study sample. It is of interest to note that approximately three-quarters of the Turkish patients and two-thirds of the Moroccan patients did not speak Dutch or indicated that they had low levels of proficiency, thus supporting the need for translated versions of the QLQ-C30.

At the time of the second assessment, 82 Turks and 71 Moroccans were still potentially available for continued study participation. Sixteen patients (eight Turks and eight Moroccans) had died, were terminally ill, or had returned to Turkey or Morocco. Of the remaining patients, 58 Turks and 46 Moroccans completed the second assessment, representing a 71% and 65% response rate, respectively. Reasons for not participating were similar to those for the first assessment.

3.2. Descriptive statistics and qualitative results

The majority of both Turkish (71%) and Moroccan (87%) patients were administered the questionnaire in an interview (Table 1). The average time to complete the QLQ-C30 was 10 (range 2–30) min (Turkish 8.6 and Moroccans 11.5 min). One Turkish and six Moroccan patients did not complete the questionnaire (i.e. more than half of the items) because they did not understand the response categories (4) felt too ill (2), were not motivated (1). These patients were all older than 55 years and were illiterate. These cases were excluded from further analysis.

On average, 2.4% (range 0–11.2%) of the individual questionnaire items were missing in the Turkish group, and 1.5% (range 0–5.5%) in the Moroccan group (Table 2). In the Moroccan group a higher number of items had to be explained. The items PF1, RF1, RF2, SF1, SF2, FI, GQL1 and GQL2 were problematic in both groups for four main reasons: (1) The words 'limit', 'interfere', 'hobby', 'quality', 'social activities' (Turkish only), 'medical' and 'financial' were difficult to understand; (2) The item PF1 was considered to be 'not applicable' by many patients because they could not perform 'strenuous activities like carrying a heavy shopping bag or a suitcase' or because their husband or children did these activities for them; (3) Negatively formulated questions PF1, RF1, RF2, SF1, SF2 were difficult to understand and some patients provided an initial response that was the opposite of what they had intended; and (4) Patients did not understand the numeric response options of items GQL1 and GQL2 (i.e. response scales ranging from 1 to 7, with descriptive anchors only for the two extreme response options).

The items GQL2 and SF2 had particularly high numbers of missing responses. Missing GQL2 scores were significantly more likely among older patients ($p = 0.002$), those with lower educational levels ($p = 0.003$) and with lower KPS scores ($p = 0.001$). Missing SF2 scores were not found to be associated significantly with any specific patient characteristics.

The full range of scores was observed for all nine scales and the six individual items, with the exception of the PF scale in the Turkish group (range 8.3–91.7). Relatively high ceiling or floor effects were observed for the RF, CF and SF scales, and for most of the single item symptom scales (Table 3).

Table 1 – Patients' sociodemographic and clinical characteristics

	Turkish (n = 90)		Moroccan (n = 79)	
	N	(%)	N	%
Gender				
Female	47	(52)	31	(39)
Male	43	(48)	48	(61)
Age ^a				
22–49	44	(49)	34	(43)
50–74	46	(51)	45	(57)
Education				
No education	15	(17)	36	(45)
Low education	40	(44)	13	(16)
Middle	24	(27)	18	(23)
High	11	(12)	10	(13)
Missing			2	(3)
Literate				
Yes	77	(86)	54	(68)
No	12	(13)	23	(29)
Missing	1	(1)	2	(3)
Proficiency (speaking) Dutch				
Not/weak/poor	66	(73)	50	(63)
Good/excellent	22	(25)	27	(34)
Missing	2	(2)	2	(3)
Mode of administration ^b				
Interview	64	(71)	69	(87)
Self-administered	25	(28)	10 ^c	(13)
Combination	1	(1)		
Primary cancer diagnosis				
Breast	21	(23)	18	(23)
Head and neck	21	(23)	14	(18)
Colorectal	7	(8)	8	(10)
Urogenital	7	(8)	9	(11)
Gynaecological	9	(10)	3	(4)
Lung	8	(9)	5	(6)
Other	17	(19)	22	(28)
Stage at first assessment				
Local/locoregional	70	(78)	66	(83)
Metastases	20	(22)	11	(14)
Missing			2	(3)
Treatment or under control ^d				
Under control	65	(72)	64	(81)
Treatment	25	(28)	15	(19)
Time since primary diagnosis				
0–1 year	43	(48)	30	(38)
2–5 year	26	(29)	29	(37)
6–17 year	21	(23)	20	(25)
Comorbidity ^e				
None	28	(31)	26	(33)
1	24	(27)	10	(13)
2 or more	38	(42)	43	(54)
KPS score ^f				
30–70	41	(46)	37	(47)
80–100	48	(53)	38	(48)
Missing	1	(1)	4	(5)

a Mean age Turkish: 49.5 (s.d. = 12.0) years; Mean age Moroccans: 50.4 (s.d. = 13.3) years.

b Including the seven questionnaires that could not be fully administered; all seven were intended to be orally administered.

Table 1 – continued

c The translated QLQ-C30 version for the Moroccan group was intended to be orally administered, but ten highly educated patients were able to and preferred to complete the Moroccan-Arabic version in written form.

d Under treatment = under active treatment with chemotherapy, radiotherapy or completed <2 months ago. Under control = no current treatment.

e Comorbidity = one or more of the self-reported conditions: diabetes, kidney disease, cardiovascular disease, high blood pressure, COPD, arthritis, back pain.

f KPS = Karnofsky performance status; Mean KPS score Turkish: 71.6 (range 40–100); median score = 80; Mean KPS score Moroccans (73.5 (range 30–100)); median score = 80.

3.3. Multitrait scaling analyses

All items exceeded the 0.4 criterion for convergent validity on all scales, except item PF5 in the Turkish group (Table 4). When employing the more stringent criterion of two standard errors, item-discriminant validity was 100% successful only for the RF scale in the Moroccan group, and for none of the scales in the Turkish group. In general, more problems with item-discriminant validity were observed in the Moroccan group than the Turkish group. Using the criterion of one standard error, the large majority of scales had more than 90% scaling success in both groups, with the exception of the CF scale for the Turkish group (56%) and the PF, CF, FA, NV scale for the Moroccan group (varying from 81% to 87%).

3.4. Internal consistency reliability

Internal consistency reliability estimates (Cronbach's α) for the nine QLQ-C30 scales were all above 0.70, with the exception of the CF scale in the Turkish group ($\alpha = 0.57$) (Table 3). For the Moroccan language groups separately, all scales met the 0.70 criterion, with the exception of the CF scale ($\alpha = 0.68$) and the NV scale ($\alpha = 0.57$) in the Moroccan-Arabic language (not shown in the table).

3.5. Interscale correlations

The large majority of the interscale correlations were lower than the internal consistency estimates of the separate scales, indicating that each scale is measuring a relatively unique concept. Exceptions were the CF and EF scale in the Turkish group, and the PF and FA scale in the Moroccan group. In both Moroccan language subgroups, the PF and FA scale were highly correlated; the CF and EF scales were highly correlated in the Tarift group only. For these latter exceptions, the correlation between the scales was equal to/or differed at most 0.04 from the internal consistency of one of the scales.

3.6. Known groups validity

The strongest and most consistent evidence of known groups validity was found for the KPS (in both the Turkish and Moroccan sample), and for comorbidity (in the Moroccan sample) as grouping variables (Table 5). Contrary to expectations, few statistically significant differences were observed in QLQ-C30 scores as a function of disease stage (local/locore-

Table 2 – Missing values and items of the QLQ-C30 requiring explanation

Item	Description	Turkish (N = 89) missing (%)	Turkish interviews (N = 61) not missing but explained (%) ^a	Moroccan (N = 73) missing (%)	Moroccan interviews (N = 62) Not missing but explained (%) ^a
PF1	Strenuous activities	5 (5.6%)		4 (5.5%)	
PF2	Long walk	1 (1.1%)		1 (1.4%)	1 (1.6%)
PF3	Short walk	1 (1.1%)		1 (1.4%)	
PF4	In bed or chair	4 (4.4%)		1 (1.4%)	
PF5	Help with dressing	–		1 (1.4%)	
RF1	Limited in daily activities	3 (3.4%)	1 (1.6%)	3 (4.1%)	5 (8.1%)
RF2	Limited in hobby	4 (4.5%)	2 (3.2%)	1 (1.4%)	9 (14.5%)
CF1	Concentrate	2 (2.2%)		2 (2.7%)	5 (8.1%)
CF2	Remember things	–	1 (1.6%)	–	2 (3.2%)
SF1	Interfered family life	5 (5.6%)		–	6 (9.7%)
SF2	Interfered social activities	8 (9.0%)	1 (1.6%)	1 (1.4%)	2 (3.2%)
GQL1	General health	5 (5.6%)		2 (2.7%)	3 (4.8%)
GQL2	Quality of life	10 (11.2%)		3 (4.1%)	9 (14.5%)
EF1	Tense	3 (3.4%)	1 (1.6%)	1 (1.4%)	3 (4.8%)
EF2	Worry	–	1 (1.6%)	1 (1.4%)	1 (1.6%)
EF3	Irritable	1 (1.1%)		1 (1.4%)	
EF4	Depressed	–		2 (2.7%)	3 (4.8%)
FA1	Need to rest	–		–	1 (1.6%)
FA2	Felt weak	–		–	
FA3	Tired	–		–	1 (1.6%)
NV1	Nausea	–		–	1 (1.6%)
NV2	Vomiting	–		–	
PA1	Pain	–		–	1 (1.6%)
PA2	Pain limited daily activities	1 (1.1%)		2 (2.7%)	
DY	Dyspnoea	1 (1.1%)		2 (2.7%)	1 (1.6%)
SL	Difficulty sleeping	1 (1.1%)		–	
AP	Loss appetite	1 (1.1%)	1 (1.6%)	–	1 (1.6%)
CO	Constipation	2 (2.2%)	1 (1.6%)	1 (1.4%)	1 (1.6%)
DI	Diarrhoea	2 (2.2%)		2 (2.7%)	1 (1.6%)
FI	Financial difficulties	4 (4.5%)	1 (1.6%)	–	4 (6.5%)
	Average	2 (2.4%)	0 (0.5%)	1 (1.5%)	2 (3.3%)

PF, physical functioning; RF, role functioning; CF, cognitive functioning; EF, emotional functioning; SF, social functioning; GQL, global quality of life; FA, fatigue; NV, nausea and vomiting; PA, pain; DY, dyspnoea; SL, sleep disturbance; AP, appetite loss; CO, constipation; DI, diarrhoea; FI, financial impact.

Bold, more than 3%.

^a Refer to the interviews where research assistants made notes of items that needed to be explained (or where other comments of patients were made that are not included in this table). In the column only the items are included where research assistants explained an item and the item is non-missing.

gional versus metastatic) or treatment status (active treatment versus medical follow-up).

3.7. Responsiveness

Statistically significant differences in the expected direction were observed between the three subgroups (worsened, stable, or improved KPS) for changes in the PF, CF, QL, FA, PA, DY scores in the Turkish group, and for changes in the RF, FA and AP scores in the Moroccan group (Table 6). Significant differences over time between the KPS subgroups were also found for sleep disturbance (SL) in both ethnic groups, but in the opposite direction to that which had been hypothesized.

4. Discussion

In this paper, we have reported the results of a study of the psychometric properties of the EORTC QLQ-C30 (version 3.0) questionnaire when employed among Turkish and Moroccan

ethnic minority cancer patients in the Netherlands. In carrying out the study, we encountered several challenges in patient recruitment. First, a relatively high number of patients could not be contacted initially due to invalid addresses and telephone numbers. Second, once contacted, the response rate in the Moroccan patient group was substantially lower (57%) than that of the Turkish patient group (77%), and that which we have typically had in similar studies conducted among native Dutch populations (75–85%). Although lower response rates among ethnic minority groups in health research in Europe is not uncommon,^{15–19} two specific reasons might have contributed to the low response rate in the Moroccan group in the current study. First, many patients were no longer under active treatment, so that up-to-date contact details were often not available. Second, we suspect that the primary aim of the study – validation of questionnaires – may have been too abstract and thus may have been perceived as not particularly relevant to the patients asked to participate. Motivation to participate may be higher in

Table 3 – Median, mean, standard deviation, percentage floor and ceiling, and Cronbach's α of the QLQ-C30 scales and items

	Turkish							Moroccan						
	N	Median	Mean	s.d.	% Floor	% Ceiling	Cronbach's α (N)	N	Median	Mean	s.d.	% Floor	% Ceiling	Cronbach's α (N)
PF	89	60.0	61.1	22.3	0	0	0.75 (79)	73	66.7	67.3	25.5	2.7	15.1	0.80 (66)
RF	87	83.3	70.5	34.4	11.5	40.2	0.86 (84)	72	83.3	73.6	32.4	8.3	45.8	0.94 (70)
CF	89	83.3	71.0	29.6	3.4	36.0	0.57 (87)	73	83.3	73.1	28.7	5.5	37.0	0.71 (71)
EF	89	66.7	64.5	28.6	3.4	12.4	0.85 (86)	73	66.7	62.7	29.5	6.8	16.4	0.87 (69)
SF	87	83.3	71.8	30.6	3.4	42.5	0.76 (78)	73	66.7	69.9	33.5	9.6	42.5	0.89 (72)
GQL	84	58.3	54.3	27.5	7.1	10.7	0.80 (79)	71	58.3	54.1	26.9	5.6	7.0	0.81 (70)
FA	89	66.7	59.2	29.4	2.2	15.7	0.85 (89)	73	55.6	50.2	30.9	11.0	8.2	0.79 (73)
NV	89	0	20.4	28.6	51.7	3.4	0.76 (89)	73	0	13.0	22.3	60.3	2.7	0.71 (73)
PA	89	50.0	48.3	33.5	12.4	16.9	0.80 (88)	73	33.3	34.2	33.8	31.5	11.0	0.87 (71)
DY	88	0	25.0	34.7	58.0	11.4		71	0	14.1	26.2	71.8	4.2	
SL	88	33.3	43.6	40.5	36.4	26.1		73	33.3	35.6	37.0	41.1	16.4	
AP	88	0	25.0	34.7	56.8	12.5		73	0	27.9	35.6	52.1	13.7	
CO	87	0	17.6	29.1	65.5	6.9		72	0	22.7	33.5	61.1	9.7	
DI	87	0	13.4	25.1	72.4	3.4		71	0	17.8	28.6	63.4	7.0	
FI	85	0	27.5	37.2	58.8	12.9		73	0	19.2	32.4	67.1	9.6	

Scales: PF, physical functioning; RF, role functioning; CF, cognitive functioning; EF, emotional functioning; SF, social functioning; GQL, global quality of life; FA, fatigue; NV, nausea and vomiting; PA, pain.

Single items: DY, dyspnoea; SL, sleep disturbance; AP, appetite loss; CO, constipation; DI, diarrhoea; FI, financial impact.

Table 4 – Multitrait scaling analysis of the EORTC QLQ-C30 in Turkish (N = 81)^a and Moroccan (N = 70)^a cancer patients

Scale		Item convergent validity	Item convergent validity scaling success ^b	Item discriminant validity ^c	Item discriminant validity scaling success ^d
PF	Turkish	0.32–0.71	4/5	52.5 (21/40)	97.5 (39/40)
PF	Moroccan	0.41–0.70	5/5	22.5 (9/40)	87.5 (35/40)
RF	Turkish	0.75–0.75	2/2	75.0 (12/16)	100 (16/16)
RF	Moroccan	0.88–0.88	2/2	100 (16/16)	100 (16/16)
CF	Turkish	0.47–0.47	2/2	18.8 (3/16)	56.3 (9/16)
CF	Moroccan	0.56–0.56	2/2	6.3 (1/16)	87.5 (14/16)
EF	Turkish	0.65–0.76	4/4	68.8 (22/32)	100 (32/32)
EF	Moroccan	0.65–0.76	4/4	43.8 (14/32)	100 (32/32)
SF	Turkish	0.65–0.65	2/2	37.5 (6/16)	100 (16/16)
SF	Moroccan	0.78–0.78	2/2	81.3 (13/16)	100 (16/16)
GQL	Turkish	0.71–0.71	2/2	75.0 (12/16)	100 (16/16)
GQL	Moroccan	0.67–0.67	2/2	37.5 (6/16)	100 (16/16)
FA	Turkish	0.68–0.76	3/3	58.3 (14/24)	100 (24/24)
FA	Moroccan	0.59–0.66	3/3	12.5 (3/24)	87.5 (21/24)
NV	Turkish	0.64–0.64	2/2	81.3 (13/16)	100 (16/16)
NV	Moroccan	0.48–0.48	2/2	25.0 (4/16)	81.3 (13/16)
PA	Turkish	0.67–0.67	2/2	50.0 (8/16)	93.8 (15/16)
PA	Moroccan	0.78–0.78	2/2	68.8 (11/16)	100 (16/16)

a N = number of patients that completed all scales (= more than half of the items for each scale).

b Item convergent validity scaling success = number of item-scale correlations greater than 0.40/total number of item-scale correlations (corrected for overlap).

c Item discriminant validity scaling success = number of correlations of items with own scales significantly higher (≥ 2 standard deviations) than correlations with other scales/total number of correlations.

d Item discriminant validity scaling success = number of correlations of items with own scales significantly higher (≥ 1 standard deviations) than correlations with other scales/total number of correlations.

studies where the benefit to the patient's or to future patients' health is more concrete and transparent.

For those patients who participated in the study, completion of the Turkish and Moroccan EORTC QLQ-C30 presented relatively few problems. The average time required to complete the questionnaire was similar to that reported in earlier studies.^{3,20,21} Use of phonetic script for the items in the

Moroccan languages facilitated interviewer administration of the questionnaire by trained research assistants. Patients were generally very positive about being interviewed in their native tongue. At the same time, it is important to note that a small minority of patients (4%) was unable to complete the questionnaire, and that for eight items a relatively high number of missing responses were observed or explanation was

Table 5 – Known groups validity of QLQ-C30 scales

	KPS ¹		Comorbidity ²		Stage of disease ³		Status of treatment ⁴	
	T	M	T	M	T	M	T	M
PF	●	●	●	●	○	○	○	○
RF	●	●	○	○	○	○	○	○
CF	●	●	○	○	○	○	○	○
EF	●	●	○	●	○	○	○	○
SF	○	●	○	●	●	○	○	○
GQL	●	●	○	●	○	○	○	○
FA	●	●	○	●	○	○	○	○
NV	●	●	○	○	○	○	●	○
PA	●	●	●	●	○	○	○	○
DY	○	●	○	●	○	○	○	○
SL	●	●	●	○	○	○	○	○
AP	●	●	○	●	○	○	●	●
CO	○	●	○	●	○	○	○	○
DI	●	●	○	●	○	●	○	○
FI	●	●	○	○	○	○	○	○

T, Turkish; M, Moroccan.

● – statistically significant difference (<0.05) between the known groups.

● – p-value between 0.05 and 0.10.

○ – no statistically significant difference between known groups.

1 KPS groups: score 30–70 (T: n = 41; M: n = 34) versus score 80–100 (T: n = 47 and M: n = 38).

2 Comorbidity groups: no comorbidity (T: n = 28; M: n = 23) versus 1 or more comorbidities (T: n = 61; M: n = 50).

3 Stage of disease: local/locoregional (T: n = 69; M: n = 60) versus metastatic (T: n = 20; M: n = 11).

4 Status of treatment: under control (T: n = 64; M: n = 60) versus under treatment (T: n = 25; M = 13).

required. The patient characteristics that were found to be associated significantly with problems in completing the questionnaire – advanced age, poor performance status, and low education – reflect what is known from the published literature.^{21–23} The apparent difficulty experienced by patients in completing the item on perceived quality of life (GQL) has also been reported in previous validation studies of the QLQ-C30.^{4,21}

Overall, the reliability and validity of the Turkish and Moroccan versions of the EORTC QLQ-C30 were satisfactory. The hypothesized scale structure of the questionnaire was largely confirmed, with the exception of the CF and NV scales. Problems with the psychometrics of these two scales have been reported previously.^{3,24} In the Turkish group the CF and EF scale were highly correlated and in the Moroccan group the PF and FA scale were highly correlated, which was also observed in previous studies.^{3,4,14,21,25–27}

The known groups validity exercise was partially successful. Hypothesized differences in QLQ-C30 scores were observed for subgroups of patients formed on the basis of level of performance status and presence of comorbidity, but not for subgroups differing in disease stage or treatment status. These latter findings may be attributed, in part, to the fact that the study sample included relatively few patients with metastatic disease or patients under active treatment. In this sense, it is not entirely surprising that comorbidity was found to be an important factor in distinguishing between patients with better versus worse self-reported quality of life. However, Guzelant and colleagues have also reported that, among Turkish lung cancer patients (residing in Turkey), the

QLQ-C30 did not distinguish clearly between patients differing in disease stage or type of treatment.⁴

The EORTC QLQ-C30 demonstrated moderate responsiveness to change over time in performances status. Limits on responsiveness might be due to: (1) the relatively high percentage of patients with an unchanged performance status; (2) the relatively high percentage of patients in medical follow-up rather than under active treatment; and (3) the relatively high flooring and ceiling effects observed for several items and scales of the questionnaire.

In summary, the adapted Turkish version and the two phonetically translated Moroccan (Tarifit and Moroccan-Arabic) versions of the EORTC QLQ-C30 demonstrate reasonably good psychometric properties when used among Turkish and Moroccan cancer patients in the Netherlands. We would caution researchers that, when including first generation immigrants in quality of life studies, response rates may be somewhat lower than those typically observed among other groups. Also, extra resources need to be allocated for bilingual interviewers. Nevertheless, we believe that even though recruitment of ethnic minority cancer patients into quality of life studies may bring with it some additional logistical challenges and resource requirements, it is ethically unacceptable to systematically exclude these patient populations from our studies. Information on the functional health and well-being of these patients is essential in order to provide them with optimal health care services.

We would recommend that additional studies be carried out using larger samples of patients under active treatment in order to further document the validity and responsiveness

Table 6 – Responsiveness analysis with ANOVA comparing groups with better, stable or worse performance status between 1st and 2nd assessment, as measured with KPS score

Scale	KPS Change	Turkish				Moroccan			
		N	Mean T2-T1	SD T2-T1	p-value ^b	N	Mean T2-T1	SD T2-T1	p-value ^b
PF	Worse	17	−4.9	16.5	0.016	12	0.4	17.7	0.576
	Stable	23	−2.4	14.6		20	6.1	15.1	
	Better	17	11.6	21.9		12	8.6	26.9	
RF	Worse	16	−2.1	37.0	0.133	12	−15.3	35.1	0.049
	Stable	22	3.0	27.0		20	3.3	21.4	
	Better	17	20.6	38.4		12	13.9	31.6	
CF	Worse	17	−18.6	27.6	0.004	12	6.9	36.6	0.532
	Stable	22	2.3	19.4		20	4.2	17.8	
	Better	17	11.8	31.0		12	13.9	13.9	
EF	Worse	17	−14.2	27.0	0.053	12	−0.7	21.5	0.625
	Stable	22	−3.5	24.1		20	−3.6	25.5	
	Better	17	8.8	30.4		12	4.2	14.0	
SF	Worse	17	−5.9	33.8	0.226	12	16.7	21.3	0.108
	Stable	20	−7.5	28.3		20	4.2	17.8	
	Better	17	9.8	35.4		12	19.4	26.4	
GQL	Worse	16	−8.3	22.2	0.029	11	−8.3	20.7	0.153
	Stable	21	4.4	30.1		19	0.0	25.3	
	Better	16	18.8	29.4		12	10.4	19.8	
FA	Worse	17	1.3	26.6	0.002	12	11.1	17.7	0.011
	Stable	23	2.7	26.3		20	4.4	22.6	
	Better	17	−28.8	34.7		12	−17.6	29.8	
NV	Worse	17	11.8	38.1	0.076	12	5.6	28.7	0.503
	Stable	23	−3.6	20.7		20	−1.7	7.5	
	Better	17	−13.7	38.3		12	1.4	11.1	
PA	Worse	17	6.9	38.7	0.021	12	16.7	17.4	0.006
	Stable	23	2.2	29.4		20	−3.3	25.1	
	Better	17	−24.5	37.3		12	−19.4	34.0	
DY	Worse	17	16.7	17.4	0.021	12	11.1	25.9	0.239
	Stable	23	−3.3	25.1		19	1.8	7.6	
	Better	17	−19.4	34.0		12	2.8	9.6	
SL	Worse	16	−22.9	35.9	0.006 ^a	12	11.1	32.8	0.040 ^a
	Stable	22	9.1	23.4		19	−17.5	34.0	
	Better	17	−11.8	31.0		12	−5.6	13.0	
AP	Worse	17	7.8	30.1	0.236	12	8.3	28.9	0.012
	Stable	23	2.9	34.7		20	−1.7	13.1	
	Better	17	−11.8	39.0		12	−22.2	32.8	
CO	Worse	17	3.9	23.2	0.449	12	2.8	41.3	0.528
	Stable	21	7.9	25.6		20	−6.7	27.8	
	Better	17	−2.0	22.0		12	5.6	27.8	
DI	Worse	17	−5.9	35.8	0.317	12	8.3	49.5	0.690
	Stable	21	4.8	15.9		19	1.8	23.5	
	Better	17	−3.9	11.1		12	−2.8	17.2	
FI	Worse	17	5.9	35.8	0.181	12	−2.8	17.2	0.163
	Stable	20	0.0	21.6		20	3.3	23.9	
	Better	15	−15.6	41.5		12	−13.9	30.0	

a Statistically significant, but not in the expected direction.

b The p value is based on the group (KPS) by time (T1–T2) interaction term.

of the QLQ-C30. We would also recommend more detailed studies of the cross-cultural equivalence of the Turkish and Moroccan versions of the QLQ-C30 versions to the Dutch and English versions, using modern test theory techniques such as Differential Item Function analysis. Finally, it is important to evaluate these versions of the QLQ-C30 in other Western European countries (e.g. Belgium, France, Germany) that also have large populations of Turkish and/or Moroccan immigrants. This would facilitate inclusion of these patient groups in local, national and international clinical and psychosocial studies in oncology.

Conflict of interest statement

None declared.

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