

# A QUESTIONNAIRE FOR RATING HEALTH-RELATED QUALITY OF LIFE VPRAŠALNIK ZA MERJENJE KAKOVOSTI ŽIVLJENJA, POVEZANEGA Z ZDRAVJEM

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Received: Mar 17, 2021

Accepted: Jul 26, 2021

Original scientific article

## ABSTRACT

### Keywords:

health-related  
quality of life,  
generic instrument,  
questionnaire,  
psychometric  
properties

**Background.** Translations of instruments for measuring quality of life developed in certain, mostly more developed, parts of the world usually do not cover regionally specific aspects of health-related quality of life, even after transcultural validation. The aim of this study was to develop and validate a reliable questionnaire in Serbian, Croatian, Bosnian, and Montenegrin languages suitable for measuring health-related quality of life in adults.

**Methods.** The study was of a cross-sectional type, assessing the reliability and validity of a newly developed questionnaire for measuring health-related quality of life (HRQoL) in adults residing in western Balkan states (WB-HRQoL). It was conducted on a sample of 489 adults from Serbia, Croatia, Bosnia & Herzegovina, and Montenegro, with a mean age of 52.2±14.4 years and a male/female ratio of 195/294 (39.9%/60.1%).

**Result.** The definitive version of the WB-HRQoL scale with 19 items showed very good reliability, with Cronbach's alpha 0.905. The scale was temporally stable, and satisfactory results were obtained for divergent and convergent validity tests. Exploratory factorial analysis brought to the surface four domains of health-related quality of life, namely the physical, psychological, social, and environmental.

**Conclusion.** The WB-HRQoL scale is a reliable and valid generic instrument for measuring HRQoL that takes into account the cultural specifics of the western Balkan region.

## IZVLEČEK

### Ključne besede:

z zdravjem povezana  
kakovost življenja,  
splošni inštrumenti,  
vprašalniki,  
psihometrične lastnosti

**Uvod:** Prenos instrumentov za merjenje kakovosti življenja, razvitih v nekaterih, večinoma razvitejših delih sveta, zahteva transkulturno validacijo. Kljub temu tovrstni instrumenti običajno ne zajemajo regionalno specifičnih vidikov kakovosti življenja, povezanih z zdravjem. Namen študije je bil razviti in potrditi zanesljiv vprašalnik v srbskem, hrvaškem, bosansko-hrvaško-srbskem in črnogorskem jeziku, primeren za merjenje kakovosti življenja, povezanega z zdravjem odraslih.

**Metode:** V presečni študiji smo ocenili zanesljivost in veljavnost novo razvitega vprašalnika za merjenje kakovosti življenja, povezanega z zdravjem (HRQoL) pri odraslih, ki prebivajo v državah zahodnega Balkana (WB-HRQoL). V študijo smo vključili 489 odraslih iz Srbije, Hrvaške, Bosne in Hercegovine ter Črne gore s povprečno starostjo 52,2 ± 14,4 let in razmerjem med moškimi in ženskami 195 : 294 (39,9 : 60,1 %).

**Rezultat:** Dokončna različica lestvice WB-HRQoL z 19 elementi je pokazala zelo dobro zanesljivost (koeficient Cronbach alfa 0,905). Lestvica je bila stabilna, tako za divergentne kot konvergentne teste veljavnosti smo pridobili zadovoljive rezultate. Raziskovalna faktorska analiza je pokazala štiri področja zdravstvene kakovosti, povezane z zdravjem: fizično, psihično, socialno in okoljsko.

**Zaključek:** Lestvica WB-HRQoL je zanesljiv in veljaven generični instrument za merjenje HRQoL, ki upošteva kulturne posebnosti regije zahodnega Balkana

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## 1 BACKGROUND

The World Health Organization (WHO) defines quality of life as “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (1). It is essential for physicians to understand a disease’s effects on their patients’ quality of life, in order to choose optimal therapeutic method and follow the patients’ response to this method. There are already a number of generic health-related quality of life (HRQoL) instruments, developed and validated in various countries and languages, which could be used to measure the effects of almost any disease on quality of life. Among the most frequently used are the following generic instruments (2): (i) the Medical Outcomes Study 36-Item Short Form; (ii) the Nottingham Health Profile; (iii) the Sickness Impact Profile; (iv) the Dartmouth Primary care Cooperative Information Project - COOP Charts; (v) the Quality of Well-Being - QWB Scale; (vi) the Health Utilities Index; (vii) WHOQOL-BREF, and (viii) EuroQol Instrument (EQ-5D). Each of the mentioned instruments has its advantages and disadvantages that are more or less apparent in various circumstances (3). Some of these instruments were translated into Serbian, Croatian, Bosnian, or Montenegrin and then transculturally validated. However the translations of instruments developed in other, mostly more developed, parts of the world never cover all aspects of quality of life specific for western Balkan nations, implying the need to develop of new, regionally specific, generic instrument for measuring HRQoL (4). A review of the cross-cultural utility of the most frequently used instruments showed that translated and validated versions are rarely equivalent to the original instrument in all aspects: conceptual, item, semantic, operational, and measurement equivalence (5).

Although divided into four independent states (Serbia, Croatia, Bosnia & Herzegovina, and Montenegro), the western Balkan nations that speak languages created after the dissolution of the pluricentric Serbo-Croatian (or Croato-Serbian) to Serbian, Croatian, Bosnian, and Montenegrin share many cultural elements and easily understand both the language and cultural context of their neighbours (6). We still do not have an original generic instrument for measuring HRQoL that was developed in Serbian, Croatian, Bosnian, or Montenegrin and that could cover all aspects of HRQoL that are recognized as such (physical, mental, social function, self-integrity, safety, harmony, and spiritual well-being) by inhabitants of the western Balkans (6-8). Such an instrument would be of great help to medical researchers, practicing physicians, and patients from the region, and could lead to more precise estimates of quality of life.

The aim of this study was to develop and validate a reliable questionnaire in Serbian, Croatian, Bosnian, and Montenegrin suitable for measuring HRQoL in adults.

## 2 MATERIALS AND METHODS

### 2.1 Design

The study was designed as multicentric and cross-sectional.

### 2.2 Construction and validation of the new questionnaire

The new questionnaire (WB-HRQoL) was developed following the guidelines set by Robert F. DeVellis (8), through eight steps: (A) HRQoL in adults was determined as object of measurement, being one of the main treatment outcomes in both clinical research and clinical practice; (B) the item pool with completely new items was generated during two brainstorming sessions, one week apart; only the authors participated in the sessions and creation of the item pool, taking care to cover the domains of quality of life encompassed in the majority of other generic instruments: physical, psychical, social and environmental (members of the group that generated the items had the following profiles: two specialists of clinical pharmacology, one specialist of general surgery, a professor of Biochemistry, a professor of Social Pharmacy, five internal medicine specialists, a specialist of infectious diseases, a specialist of epidemiology, three community pharmacists, a specialist of anaesthesiology and reanimation, a specialist of clinical pharmacy and a general practitioner); (C) the Likert’s scale was chosen as format of measurement, with the following offered answers to statements reflecting quality of life: “I do not agree completely”, “I do not agree partially”, “I neither agree, nor do not agree”, “I agree partially”, and “I agree completely” (the answers were rated from 1 [“I do not agree completely”] to 5 [“I agree completely”]); (D) the initial pool of items was revised and corrected by the three-member expert committee composed of a general surgeon, an internal diseases specialist, and a clinical pharmacology specialist (these profiles were chosen to broadly cover both surgical and non-surgical aspects of health, since the scale was intended for use primarily at the secondary and tertiary health care levels); (E) in order to determine the level of respondents’ socially desirable behaviour, one validation item was included in the questionnaire that read “I always try to be good to other people.”; (F) the initial pool of items was tested in each study centre on 3-5 PhD students for clarity and comprehension, and after the pilot and a few minor changes final versions of the questionnaire were copied in Serbian, Croatian, Bosnian, and Montenegrin (the investigators from respective language areas adapted the items’ formulation to their language preferences), and

prepared for reliability testing (Supplementary file); (G) evaluating the items and (H) optimizing the questionnaire length were then made as described below. A visual analogue scale for assessing HRQoL was also offered to the study patients for validation purposes.

Cognitive status of the study subjects was assessed by the Mini-Cog screening test (9). For the purpose of convergent validation of the WB-HRQoL the study subjects were offered short form (26 items) of the World Health Organization's generic questionnaire for measuring HRQoL (WHOQoL BREF) in Bosnian (10), as well as Visual Analogue Scale (VAS) with a ruler from 0 to 100. Divergent criteria validation was made by the 10-item Emotional Regulation Questionnaire (ERQ) in Serbian (minimally adapted for Croatian, Bosnian, and Montenegrin), which measures two strategies of emotional regulation: cognitive reappraisal and emotion suppression (11). Permissions to use these supplementary questionnaires were granted before the start of the study.

### 2.3 Data collection

The final Serbian, Croatian, Bosnian, and Montenegrin versions of the both new (WB-HRQoL) and supplementary (Mini-Cog, WHOQoL BREF and ERQ) questionnaires were tested for reliability on convenient sample of adults who were healthy, outpatients, or hospital patients, respectively, at the five study centres: Belgrade, Kragujevac (Serbia), Zagreb (Croatia), Sarajevo (Bosnia & Herzegovina) and Podgorica (Montenegro). The surveys took place from September 2019 to July 2020. The inclusion criteria were full consciousness, literacy, and age over 18. The exclusion criteria were pregnancy, lactation, major psychiatric diseases (mood disorders, psychoses, mental retardation), psychotropic drugs abuse, chronic alcoholism, and emergency conditions. The sample of the subjects was of consecutive nature, i.e. all subjects who came into the contact with an investigator on the survey day (satisfied inclusion and did not have exclusion criteria) were offered the questionnaires. During the first encounter one copy the questionnaires was completed by the investigators who were questioning the study subjects, and another copy was given to the subjects to complete it next day by themselves, at their homes, and send it back to the investigators. The second encounter was 15-30 days later, and on that occasion both HRQoL and supplementary scales were completed by the investigators who were questioning the patients, in order to test for temporal stability. The study was approved by the Ethics Committees of Clinical Center Kragujevac, Serbia (No 01-19-3041, date 19 July 2019.), Clinical Hospital Center, Zagreb, Croatia (No 02/21 AG, date 02 July 2019.), Clinical Center of Sarajevo University, Sarajevo, Bosnia & Herzegovina (No 10-01-58803, date 18 November 2019.), Medical Faculty, University of Montenegro, Podgorica,

Montenegro (No 2240/3, date 15. November 2019.), and University of Belgrade - Faculty of Pharmacy, Belgrade, Serbia (No 1122/2, date 11 July 2019.). The patients signed an informed consent before the study onset and were treated with due respect and care, according to the principles stated in Declaration of Helsinki.

### 2.4 Data analysis

The reliability of the WB-HRQoL was tested threefold. First, internal consistency was assessed by calculating Cronbach's alpha for the whole questionnaire. Second, the questionnaire was randomly split to two halves with the same number of questions, and Cronbach's alpha for each of the parts was calculated. Based on the alphas of both parts, the number of questions, and the average correlation between questions in the two parts, the Spearman-Brown coefficient for the questionnaire as a whole was calculated by the "prediction" formula (12). Third, for each question the mean score and its variances were calculated, in order to check for the ability to measure the whole extent of possible answers.

Exploratory factorial analysis of the questionnaire was made in order to discover principal factors (13). Principal axis factoring (14) groups the items of a scale to a smaller number of factors describing majority of the variance of the responses to the scale items. Factors covering maximal variance are kept, and others are discarded. The amount of variance covered by each factor is measured by its eigenvalue. Assumptions of the factorial analysis were tested on the sample by the Kaiser-Meyer-Olkin measure of sampling adequacy and by the Bartlett's test of sphericity. Then, the factors were extracted at first without rotation, conditional on Eigenvalues >1.0, and with the Scree-plot. Second, the referent axes were rotated obliquely by the Promax method, and another extraction was made, using the same criteria as for the unrotated solution. The extracted factors were than given names. The calculations were performed by the SPSS statistical software, version 18.0.

Content validity of the questionnaire was evaluated by an independent panel of three experienced clinicians at Clinical Center Kragujevac, Serbia: a general surgeon, an internal diseases specialist, and a clinical pharmacology specialist.

The criterion validity was tested by three methods: (1) comparing the WB-HRQoL score with the Visual Analogue Scale (VAS), (2) comparing the WB-HRQoL score with the WHOQoL BREF domains, 1st and 2nd item scores (convergent validity testing), and (3) comparing the WB-HRQoL score with the score of the Emotional Regulation Questionnaire (ERQ) (divergent validity testing). The correlations between scores of the questionnaires and/or VAS values were calculated. The calculations were

performed by the SPSS statistical software, version 18.0. External validity was tested by comparing the WB-HRQoL scores between study subjects having at least one chronic disease and the healthy subjects. The comparison was made by Mann-Whitney U test.

Temporal stability of the WB-HRQoL results was tested by second session of completing questionnaires by the investigators who repeatedly interviewed the study subjects 15-30 days after the first encounter. The study subjects were scheduled for the second encounter at the end of the first one.

### 3 RESULTS

The WB-HRQoL questionnaire that was composed of 20 questions and, after the pilot and minor adjustments, it was tested on the sample of 489 study subjects: mean age  $52.2 \pm 14.4$  years, mean body weight  $77.5 \pm 15.5$  kg, male/female ratio 195/294 (39.9%/60.1%), education: elementary school or less/high school/university=67/240/182 (13.7%/49.1%/37.2%), living alone/in a family=188/301 (38.4%/61.6%). There were 278 (56.9%) study subjects with at least one chronic noncommunicable disease in the sample, and 211 (43.1%) healthy participants. The following habits were recorded in the study sample: active smoking/

stopped smoking 150/78 (30.7%/16.0%), drinking alcohol 195 (39.9%), and drinking coffee 409 (83.6%). The average total Mini-Cog score in the sample was  $4.0 \pm 1.3$ ; there were 431 (88.1%) participants with Mini Cog total score  $\geq 3$  (compatible with unimpaired cognition). A Mini-Cog score may range from 0 (maximum cognitive impairment) to 5 (no cognitive impairment at all).

#### 3.1 Reliability testing

After testing original 20 items from the questionnaire, and reviewing results of correlation matrix, mean values, variance, skewness and kurtosis of response distributions for each of the items, 1 item was removed, leaving final version of the WB-HRQoL questionnaire with 19 items. The removed item had a low correlation with other items (the Spearman's correlation coefficients were between -0.15 and 0.15) and with the total score of the remaining 19 items (the correlation coefficient was 0.092). Cronbach's alpha of the final version with 19 items was 0.905 when the scale was rated by the investigators. The intraclass correlation coefficient (single measures) was 0.301 (95% confidence interval 0.273-0.333;  $F=9.627$ ,  $df_1=486$ ,  $df_2=9234$ ,  $p<0.001$ ). Mean values of responses, standard deviations, skewness, and kurtosis for each item are shown in the Table 1.

Table 1. Mean values, standard deviation, skewness and kurtosis of responses to items of WB-HRQoL.

Independent variables	Mean response	Standard deviation	Skewness	Kurtosis
I do not feel any pain (Q1)	3.350	1.376	-.426	-1.210
I can perform any physical activity without limitation (Q2)	3.572	1.311	-.579	-.774
I fall asleep easy and I sleep long enough; when I wake up, I feel rested (Q3)	3.523	1.297	-.468	-.710
I take care of myself completely (Q4)	4.482	.964	-1.067	3.607
My physical condition is excellent (Q5)	3.382	1.267	-1.350	-.857
I am always in a good mood (Q6)	3.631	1.063	-.887	-.373
I feel upset very rarely (Q7)	3.631	1.128	-1.547	-.667
I feel good in my skin (Q8)	4.040	1.119	-1.070	.352
Life is beautiful (Q9)	4.169	1.087	-1.137	1.143
The world is beautiful (Q10)	3.883	1.145	-.711	.023
My family relations are excellent (Q11)	4.306	1.008	-1.221	1.783
I am doing excellently at my job (Q12)	4.016	1.091	-.606	.763
I regularly meet my friends and enjoy their company (Q13)	4.047	1.040	-1.124	.816
I may say that my sex life is very good (Q14)	3.668	1.333	-.708	-.622
My relations with colleagues at job are good (Q15)	4.207	.948	-1.308	1.626
I am content with my finances (Q16)	3.511	1.199	-.426	-.479
I feel completely safe (Q17)	4.130	1.055	-.579	.499
I easily adapt to environmental temperature (Q18)	3.656	1.251	-.468	-.516
I do not have problem with breathing where I live or work (Q19)	4.190	1.124	-1.067	.716

The responses are rated from 1 to 5 on a Likert scale (1 ["I do not agree completely"] and 5 ["I agree completely"]); Q - question

After dividing the questionnaire by the split-half method the Spearman-Brown coefficient for the questionnaire as a whole was calculated by the Spearman-Brown "prediction" formula, and its value was 0.861. Since the Spearman-Brown coefficient did not drop below 0.7 after the split-half method, the satisfactory reliability of the questionnaire is further confirmed (theoretically this coefficient may take any value between 0 and 1). When the scale was rated by the patients themselves (at the first encounter), Cronbach's alpha was 0.900.

### 3.2 Factor analysis

The principal axis factoring method was used for exploratory factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.918 and the Bartlett's test of sphericity was significant ( $p < 0.001$ ). Using oblique rotation (Promax), four factors were extracted, explaining in total 46.7% of variance. The first factor bears 4.946 eigenvalues (11.96% of variance), the second 4.818 (11.66% of variance), the third 5.644 eigenvalues (13.66% of variance), and the fourth 3.889 eigenvalues (9.41% of variance). The rotated pattern matrix is shown in the Table 2. The items 1-3, 5, and 14 belong to the first factor, which reflects physical aspects of quality of life. The items 9-11 belong to factor 2, which describes environmental aspects of quality of life, and the items 4, 6-8, and 16-19 describe the psychical aspects of quality of life. Social

aspects of quality of life are described by the questions 12, 13, and 15, which belong to the fourth factor. The four-factor structure is common to other generic HRQoL instruments, due to conceptual similarity of four facets of health: physical, psychic, social life, and life in relation to environment (15).

### 3.3 Validity

The questionnaire's construct validity was assessed and endorsed by the panel of experts; a few questions were slightly re-phrased by the panel.

Non-parametric correlations between scores of the WB-HRQoL scale (when it was rated by investigators and by the patients themselves) and scores of the ERQ scale (when it was rated by investigators and by the patients themselves) were calculated to test the divergent criterion validity of the WB-HRQoL. Non-parametric correlations between scores of the WB-HRQoL scale (when it was rated by investigators and by the patients themselves), scores of the domains, the 1st and 2nd item of the WHOQoL BREF scale (when it was rated by investigators and by the patients themselves), and the VAS score were used to test convergent criterion validity of the WB-HRQoL. Non-parametric correlation was chosen due to non-normal distribution of majority of the scores. Spearman's correlation coefficients are shown in the Multi-trait, multi-method matrix (Table 3). The Spearman correlation

Table 2. The rotated pattern matrix of the WB-HRQoL scale.

Item	Factor 1 (Physical aspect of quality of life)	Factor 2 (Environmental aspects of quality of life)	Factor 3 (Psychical aspects of quality of life)	Factor 4 (Social aspects of quality of life)
Q1	.743			
Q2	.991			
Q3	.531			
Q4			.291	
Q5	.544			
Q6			.377	
Q7			.565	
Q8			.391	
Q9		.926		
Q10		.709		
Q11		.495		
Q12				.703
Q13				.234
Q14	.304			
Q15				.688
Q16			.573	
Q17			.767	
Q18			.587	
Q19			.450	

An item belongs to the factor where its loading is listed. \*Insignificant loadings are not listed for the sake of clarity; Q - question

coefficient is a measure of the strength and direction of association between two variables, based on the rank of individual values instead of actual values; it is non-

parametric correlation coefficient, and its administration does not assume normal distribution of data within the variables.

**Table 3.** Multi-trait, multi-method correlation matrix (non-parametric Spearman’s coefficients).

Item	WB-HRQoL score, rated by investigators	VAS scale	WB-HRQoL score, rated by patients	WHO-QoL Bref, 1st item, rated by investigators	WHO-QoL Bref, 2nd item, rated by investigators	WHO-QoL Bref, Physical health, rated by investigators	WHO-QoL Bref, Psychic health, rated by investigators	WHO-QoL Bref, Social relations, rated by investigators	WHO-QoL Bref, Environment, rated by investigators	WHO-QoL Bref, 1st item, rated by patients	WHO-QoL Bref, 2nd item, rated by patients	WHO-QoL Bref, Physical health, rated by patients	WHO-QoL Bref, Psychic health, rated by patients	WHO-QoL Bref, Social relations, rated by patients	WHO-QoL Bref, Environment, rated by patients	ERQ score, rated by investigators	ERQ score, rated by patients
WB-HRQoL score, rated by investigators	1.000																
VAS scale	.537**	1.000															
WB-HRQoL score, rated by patients	.857**	.490**	1.000														
WHOQoL Bref, 1st item, rated by investigators	.519**	.523**	.477**	1.000													
WHOQoL Bref, 2nd item, rated by investigators	.524**	.575**	.503**	.539**	1.000												
WHOQoL Bref, Physical health, rated by investigators	.709**	.595**	.650**	.483**	.589**	1.000											
WHOQoL Bref, Psychic health, rated by investigators	.714**	.521**	.632**	.571**	.429**	.689**	1.000										
WHOQoL Bref, Social relations, rated by investigators	.641**	.426**	.639**	.466**	.376**	.555**	.592**	1.000									
WHOQoL Bref, Environment, rated by investigators	.576**	.237**	.549**	.456**	.282**	.442**	.564**	.476**	1.000								
WHOQoL Bref, 1st item, rated by patients	.518**	.524**	.607**	.669**	.483**	.501**	.503**	.486**	.433**	1.000							
WHOQoL Bref, 2nd item, rated by patients	.448**	.583**	.517**	.483**	.769**	.529**	.375**	.367**	.247**	.571**	1.000						
WHOQoL Bref, Physical health, rated by patients	.620**	.580**	.656**	.411**	.594**	.869**	.558**	.431**	.299**	.527**	.588**	1.000					
WHOQoL Bref, Psychic health, rated by patients	.593**	.411**	.656**	.412**	.344**	.588**	.840**	.489**	.457**	.551**	.400**	.591**	1.000				
WHOQoL Bref, Social relations, rated by patients	.616**	.371**	.693**	.410**	.345**	.441**	.530**	.829**	.413**	.565**	.427**	.471**	.572**	1.000			
WHOQoL Bref, Environment, rated by patients	.583**	.259**	.646**	.482**	.261**	.381**	.545**	.508**	.843**	.515**	.345**	.386**	.574**	.562**	1.000		
ERQ score, rated by investigators	.264**	-.005	.269**	.115*	.022	.116*	.228**	.119**	.334**	.079	-.010	.062	.215**	.146*	.312**	1.000	
ERQ score, rated by patients	.310**	-.068	.293**	.128*	.036	.156**	.201**	.205**	.363**	.113	.077	.099	.205**	.225**	.367**	.832**	1.000

\*\* . p<0.01; \* . p<0.0

When the WB-HRQoL scores were compared between healthy study subjects and those having at least one chronic disease, they were significantly higher in the former: 79 [16] vs. 73 [19] (Mann Whitney U test,  $p < 0.001$ ). This confirms the instrument's discriminative ability.

### 3.4 Temporal stability

The WB-HRQoL scale showed excellent temporal stability: when the rating (by the investigators) was repeated on the same patients 15-30 days later, the correlation between the scores (Spearman's coefficient) was 0.842 ( $p < 0.001$ ). Cronbach's alpha after the repeated rating was 0.898.

## 4 DISCUSSION

### 4.1 Main finding of this study

The definitive version of the WB-HRQoL scale with 19 items showed very good reliability, with Cronbach's alpha at 0.905. The scale was also temporally stable, and satisfactory results were obtained for divergent and convergent validity tests. Factor analysis showed four domains of HRQoL, physical, psychical, social, and environmental. This questionnaire can help identify patients with a low quality of life, and it can be used for better therapy monitoring and improving quality of life.

### 4.2 What is already known on this topic

Physicians need insight into the effects of a disease on their patients' quality of life to choose the best therapeutic method and follow the patient's response thereto. There is no original generic instrument for measuring HRQoL developed in Serbian, Croatian, Bosnian, or Montenegrin that could cover all aspects of regional understanding of HRQoL. However, the translations of instruments developed in other, mostly more developed, parts of the world never cover all aspects of quality of life specific for western Balkan nations.

### 4.3 What this study adds

Physical domain is present in almost all generic instruments for measuring HRQoL, and is valued even in circumstances when other domains are put aside, like emergency care situations (16). Key components of the physical aspect of quality of life are absence of pain and other discomforts, and the ability to have autonomous physical activity (17). The physical domain of our questionnaire has items that cover these key components, but also has two additional items covering quality of sleep and sex life, present in other quality of life scales like the WHOQoL BREF, too (10). Because of the major influence that items measuring pain, discomfort, and ability to move or work have on quality of life, some instruments minimize the effects of sleep and sex life (18); this was not the case with our

questionnaire, which showed that in this domain questions about influence of sleep, sex life, mobility, and absence of pain or discomfort are equally important (similar loadings), underlining the importance of all these aspects in regional context. The mean values of the responses on items reflecting physical aspects of quality of life in our study were close to mean of the range of possible answers, variance was of acceptable size, and skewness and kurtosis suggested minor (but significant) detachment from normal distribution (see Table 1). Such results show good discriminative ability of the items from physical domain, and suggest their capacity to capture both mild, moderate, and severe decrease in health-related quality of life (8).

Main items within the psychic domain are addressing mood, anxiety, and overall feeling of balance, well known facets of mental health. However, it is interesting that this domain encompassed also certain items that are traditionally linked to environmental aspect: adjustment to environmental temperature, air, and feeling of financial or safety in general. This is probably caused by specificity of western Balkan countries, which are extremely low-trust societies, where inhabitants either lack or have minimal trust in their governments and fellow citizens (19, 20). In such cultural contexts people do not expect that their environment will be taken care of by institutions or other individuals, therefore HRQoL will depend on how they feel about their personal ability to cope with supposedly polluted air, inappropriate ambient temperature, crime, or financial instability. In other words, individual perception of the environmental aspect of quality of life will depend more on resiliency and mood than on the real situation in the external world.

Citizens of western Balkan societies frequently have a feeling of isolation (both personal and national) and are reluctant to admit their psychological difficulties, because they are aware of their stigmatizing potential (21). Such an attitude leads to perception of the world and life as something independent of the person itself (actually environmental), i.e. they principally see the world and life in general as beautiful or not, according to the prevailing public opinion. Accordingly, the items "life is beautiful" and "the world is beautiful" in our questionnaire slipped from psychical (what was expected when the items were constructed) to the environmental domain. Traditionally, also the social item "family relations" was attached to the environmental domain, probably reflecting emerging feeling of alienation within families; however, this speculation has yet to be confirmed. Three items within the social domain are oriented towards relations with friends and colleagues at work. The participants perceive two main areas of social interaction - work and entertainment.

From demographic and data about habits within the study sample we could see that smoking, drinking alcohol and coffee were widespread and could have influenced the study participants' perception of HRQoL. Although the process of Europeanization is taking place in countries of Western Balkans, and has already led to a decrease in alcohol consumption (22, 23), these habits are still following patterns from the past and making up one of the target population's important specifics, further stressing the need for region-specific instruments for measuring HRQoL.

Although the convergent criteria validation of the WB-HRQoL showed very good results (see Table 3), divergent validation with the ERQ was less successful, since scores of the WB-HRQoL and ERQ showed a weak, but still significant correlation. However, significant correlation was also found between scores of the social and environmental domains of the WHOQoL BREF and that of the ERQ, while VAS, the 1st and 2nd items of the WHOQoL BREF were not correlated with the ERQ score. Probably the choice of ERQ for divergent validation purpose was not the best option; the ERQ rates how the control a person has over the expression of their emotions, which could affect social and environmental relations, and therefore quality of life. Since the WB-HRQoL does have social and environmental domains, a certain degree of correlation with the ERQ score is inevitable.

#### 4.4 Limitations of this study

The main limitation of this study was use of convenience instead of a random sample for validating the questionnaire, which reduced potential to generalize conclusions to the whole studied populations. Second, in order to validate a scale, it is beneficial to include participants having whole spectrum of a phenomenon, which is measured, if possible, confirmed by a "gold standard". However, the "gold standard" for HRQoL is still lacking, creating a space for uncertainty."

## 5 CONCLUSION

The WB-HRQoL scale is a reliable and valid generic instrument for measuring HRQoL, including the four aspects: physical, psychical, social, and environmental. It could be used not only for research purposes, but for following individual patients' quality of life, which is one of the important outcomes of treatment in clinical practice.

## CONFLICT OF INTEREST

None of the authors has any conflict of interest in regards to the content of this manuscript.

## FUNDING

This study was financially supported in part by grant No 175007 from the Ministry of Education, Science and Technological Development, Republic of Serbia.

## ETHICAL APPROVAL

The study was approved by the Ethical Committees of the authors' institutes.

## ACKNOWLEDGEMENTS

The authors of this study are grateful to the authors of the Mini-Cog, WHOQoL BREF, and ERQ questionnaire for their permission to use them for screening and validation purposes.

## REFERENCES

1. The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization. *Soc Sci Med*. 1995;41(10):1403-9. doi: 10.1016/0277-9536(95)00112-k.
2. Coons SJ, Rao S, Keininger DL, Hays RD. A comparative review of generic quality-of-life instruments. *Pharmacoeconomics*. 2000;17(1):13-35. doi: 10.2165/00019053-200017010-00002.
3. Longworth L, Yang Y, Young T, Mulhern B, Hernández Alava M, Mukuria C, et al. Use of generic and condition-specific measures of health-related quality of life in NICE decision-making: a systematic review, statistical modelling and survey. *Health Technol Assess Winch Engl*. 2014;18(9):1-224. doi: 10.3310/hta18090.
4. Matanov A, Giacco D, Bogic M, Ajdukovic D, Franciskovic T, Galeazzi GM, et al. Subjective quality of life in war-affected populations. *BMC Public Health*. 2013; 13:624. doi: 10.1186/1471-2458-13-624.
5. Schmidt S, Bullinger M. Current issues in cross-cultural quality of life instrument development. *Arch Phys Med Rehabil*. 2003;84(4, Suppl 2):S29-34. doi: 10.1053/apmr.2003.50244.
6. Bugarski R. Language, identity and borders in the former Serbo-Croatian area. *J Multiling Multicult Dev*. 2012;33(3):219-35.
7. Kuspinar A, Mayo NE. A review of the psychometric properties of generic utility measures in multiple sclerosis. *Pharmacoeconomics*. 2014;32(8):759-73. doi: 10.1007/s40273-014-0167-5.
8. Kagawa-Singer M, Padilla GV, Ashing-Giwa K. Health-related quality of life and culture. *Semin Oncol Nurs*. 2010;26(1):59-67. doi: 10.1016/j.soncn.2009.11.008.
9. DeVellis RF. *Scale development, theory and applications*. 2nd ed. London: SAGE publications, 2003.
10. Borson S, Scanlan JM, Chen P, Ganguli M. The Mini-Cog as a screen for dementia: validation in a population-based sample. *J Am Geriatr Soc*. 2003;51(10):1451-4. doi: 10.1046/j.1532-5415.2003.51465.x.
11. Skevington SM, Lotfy M, O'Connell KA, WHOQOL Group. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial: a report from the WHOQOL group. *Qual Life Res Int J Qual Life Asp Treat Care Rehabil*. 2004;13(2):299-310. doi: 10.1023/B:QU RE.0000018486.91360.00.
12. Popov S, Janičić B, Dinić B. Validation of the Serbian adaptation of the Emotion Regulation Questionnaire (ERQ). *Primenj Psihol*. 2016;9(1):63-81.



13. Streiner DL, Norman GR. *Health Measurement Scales - a practical guide to their development and use*. 1st ed. Oxford: Oxford University Press, 2008.
14. Badia X, Arribas F, Ormaetxe JM, Peinado R, de Los Terreros MS. Development of a questionnaire to measure health-related quality of life (HRQoL) in patients with atrial fibrillation (AF-QoL). *Health Qual Life Outcomes*. 2007;5:37. doi: 10.1186/1477-7525-5-37.
15. Hooper D. Exploratory factor analysis. In: Chen H, ed. *Approaches to quantitative research - theory and its practical application: a guide to dissertation students*. Cork, Ireland: Oak Tree Press, 2012.
16. Coons SJ, Rao S, Keininger DL, Hays RD. A comparative review of generic quality-of-life instruments. *Pharmacoeconomics*. 2000;17(1):13-35. doi: 10.2165/00019053-200017010-00002.
17. Dresden SM, McCarthy DM, Engel KG, Courtney DM. Perceptions and expectations of health-related quality of life among geriatric patients seeking emergency care: a qualitative study. *BMC Geriatr*. 2019;19(1):209. doi: 10.1186/s12877-019-1228-6.
18. Connell J, O’Cathain A, Brazier J. Measuring quality of life in mental health: are we asking the right questions? *Soc Sci Med*. 2014;120:12-20. doi: 10.1016/j.socscimed.2014.08.026
19. Vozel D, Steiner N, Božanić Urbančič N, Mladenov D, Battelino S. Slovenian cross-cultural adaptation and validation of health-related quality of life measures for chronic otitis media (COMQ-12), vertigo (DHI, NVI) and tinnitus (THI). *Zdr Varst*. 2020;59(3):120-27. doi: 10.2478/sjph-2020-00016.
20. Krastev I. The Balkans: democracy without choices. *J Democr*. 2002;13(3):39-53.
21. Dimitrov M. Balkan countries most vulnerable to ‘fake’ news, report. *Balkan Insight*. Accessed Aug 25, 2020 at: <https://balkaninsight.com/2018/03/30/report-balkan-countries-most-vulnerable-to-adverse-effects-of-fake-news-03-29-2018/>.
22. Jones L, Kafetsios K. Assessing adolescent mental health in war-affected societies: the significance of symptoms. *Child Abuse Negl*. 2002;26(10):1059-80.
23. Tresa E, Benmarhnia T, Clemens T, Burazeri G, Czabanowska K. Europeanization process impacts the patterns of alcohol consumption in the Western Balkans. *Eur J Public Health*. 2018;28(3):516-521. doi: 10.1093/eurpub/ckx175.