ADAPTATION AND EVALUATION OF THE BULGARIAN VERSION OF HEALTH EDUCATION IMPACT QUESTIONNAIRE (HEIQ-BG) FOR THE EVALUATION OF SELF-MANAGEMENT EDUCATION INTERVENTIONS

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Introduction

The number of people suffering from chronic diabetes Type B disease has been increasing in recent years across all countries, including Bulgaria. To manage this aggravating problem, within the national policy of targeting diabetes, a system has been developed of specific health consultation provided to people who have been identified as having DT2, offering as an element the annual inpatient check to balance risk factors as well as weekly self-management training.

The cause of many chronic diseases are related to diet, physical activity, and other lifestyle factors, where self-management and self-monitoring behaviors often determine the symptoms and the prognosis of the disease (Kawaguchi, 1993). To address this challenge, many countries have adopted self-management education programs for rehabilitation patients, using their potential to improve the health of chronic disease people and at the same time to reduce medical costs. Back in 1999 in Bulgaria a unified large-scale program was introduced for the education of patients, supported by the Danish government and the Bulgarian Ministry of Health. As an outcome, 56 centers for education, 4 University centers and 4 Centers for education of children started working. Twenty years later, only 10 of those centers provide education, although the official instruction for dealing with diabetes includes five-day education and training within the mandatory annual hospital stay of patients with DT2.

Evaluation of the educational tools rarely concern self-management programs. Most evaluations look at clinical outcomes. As stated in the literature, such effects are not necessarily observed due to weak intervention and study design, short follow-up periods, and problematic evaluation tools (Avorn,

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&Salomon, 2004). On the other hand, self-management programs and patient education programs promise self-management competencies, empowerment, and participant's acceptance of their chronic conditions. This is achieved through health professionals imparting knowledge and insight, and providing participants with training on how to incorporate new behaviors into their lives (Barlow; Osborne; Faller Knai; Rogers). The choice of Bulgaria as a partner in the EC project EUWISE opened the way to use self-management programs for patients with DT2 in several areas in the country. The need of precise evaluation of self-management programs made Osborn and colleagues from Deakon University, Australia develop in 2007 the Health Education Impact Questionnaire (heiQ) as a measurement of outcomes of self-management education interventions. The most prominent feature of the heiQ is its breadth and its capability of evaluation individuals' ability to manage their chronic condition irrespective of the type of underlying disease. That reason lays in core of the interest of preparing a validated Bulgarian version of heiQ – to find and propose a widely applicable across asymptomatic and symptomatic conditions questionnaire. The aim of the current study, therefore was to adapt and validate a Bulgarian version of the heiQ.

Methods

The research was undertaken in two parts. First, the heiQ was translated and culturally adapted to Bulgarian, and its comprehensibility was tested. Second, heiQ-BG was delivered to respondents in two areas – more or less affluent. Furthermore, a concurrent validity of some of the heiQ scales was done, using early data received from the inclusion of 4 heiQ scales in EUWISE questionnaire, used in 2014-2015 to compare self-management practices in six EU countries.

Translation and cultural adaptation

The translation and cultural adaptation of the heiQ was undertaken using a strict protocol conforming to international standards (Hawkins, Osborne, 2007). After the translation and cognitive interviews with three DT2 patients for semantic equivalence, comprehensibility, and content validity, the heiQ-BG was delivered to a sample of 300 respondents, diagnozed with DT2. Of the respondents 150 were living in the capital of the country – Sofia and 150 in a small town Slivniza, near the capital. Most of them were recruited through the Regional Offices of the Bulgarian Association of Diabetes, namely in Sofia and Slivniza.

The translation process used the "HeiQ Translation support document -item intent guide" proposed by the author and included one forward and one backward translation. The latter was compared with the original heiQ by a bilingual researcher from the University of Southhampton, based in Great Britain, the

Australian-based author of heiQ, three Bulgarian researchers, fluent in both Bulgarian and English, and a trained social worker. The consensus meeting was held at an Internet Conference and took 3 hours.

Sample

As already stated, 300 DT2 respondents from two areas – Sofia (150) and Slivniza (150) took part in the study in 2017 (June – October). All of them were able to complete the questionnaire independently. For representative reasons we used typological sample following three criteria – concern, awareness and accessibility of the source. All respondents were interested in taking part in the survey being diagnosed with diabetes type 2 or other chronic disease; they had been trained to use EUGENIE education program and had followed standardized one-week inpatient education during their annual mandatory stay at medical diabetes or cardio-vascular centers. Finally, they are members of the Regional offices of the Bulgarian Diabetes Association having access to different sources of information concerning dieting and activities for diabetics (See Table1).

Table 1. Demographic characteristics of participants (n=300)

	Subgroups	COUNT	%			COUNT	%
Sex	Male	123	41.0%	City	Small town	150	50.0%
	Female	177	59.0%		Big city	150	50.0%
Education	Primary education	71	23.7%	Marital	Married	151	50.5%
	Secondary education	152	50.7%	Status	Divorced	35	11.7%
	Tertiary education	2	0.7%		Widow	87	29.1%
	Higher education	64	21.3%		Not married	26	8.7%
	Early childhood education	10	3.3%	You are?	Worker	119	39.7%
	No education	1	0.3%		Pensioner	165	55.0%

Chronic illnesses	Diabetes	169	56.3%		Unemployed	7	2.3%
	Hypertension	120	40.0%		Retired worker	6	2.0%
	Lupus	1	0.3%		Student	3	1.0%
	Hyperlipidemia	2	0.7%	Age	from 36 until 39	5	1.7%
	Thyroid	0	0.0%		from 26 until 30	7	2.3%
	Migraine	1	0.3%		from 20 until 25	4	1.3%
	Gastritis	1	0.3%		from 31 until 35	0	0.0%
	Cancer	1	0.3%		from 40 until 45	10	3.3%
	Hyperlactomy	1	0.3%		from 46 until 50	14	4.7%
	Allergic rhinitis	1	0.3%		from 51 until 55	22	7.3%
	Hyperhydrogenia	0	0.0%		from 56 until 60	50	16.7%
	Epilepsy	1	0.3%		from 61 until 65	45	15.0%
	Arthritis	0	0.0%		from 66 until 70	53	17.7%
	Gone	0	0.0%		from 71 until 75	36	12.0%
	Psoriasis	0	0.0%		from 76 until 80	30	10.0%
	Heart failure	2	0.7%		from 81 until 85	17	5.7%
					from 86 until 90	7	2.3%

The comparison of the sociodemographic characteristics of the respondents demonstrated a two-cluster status based image: that of the working women, aged 55-60, having high school education, and living in the capital, and that of the retired widows, aged 66-70, having high school education, and living in the small town, near Sofia (See table 2).

Table 2. Cluster comparison

CRITERIA FOR PROFILING	Profile of the respondents	
Sex	Female	
Education	Secondary education	
Chronic illnesses	Diabetes	
City	Big City	Small Town
Marital Status	Married	Widow
You are?	Worker	Pensioner
Age	from 56 until 60	from 66 until 70
CLUSTER	CLUSTER 1 (60%)	CLUSTER 2 (40%)

Factorial validity and reliability

Explanatory factor analysis (EFA) were initially conducted for each scale. Reliability of each scale was estimated using Cronbach's alpha and Standardized alpha. To determine the factor validity after condensing the results in the items, the inter-correlation matrices of the tests were transformed into a structure matrix by using the method of principal components in the factor analysis. The number of significant principal components was determined using the Eigenvalue criterion which extracts the principal components with values of 1 or greater (eigenvalues determine the number of latent factors) (See Table 3).

Table 3. Anti-image correlation coefficients

item	Anti-image Correlation	corr coef	item	Anti-image Correlation	corr. coeff
A1	On most days of the week I do at least one activity to improve my health	0,92	A21	If I think about my health, I get depressed	0,88
A2	Most days I am doing some of the things I really enjoy	0,91	A22	If I need help, I have plenty of people I can rely on	0,92
A3	As well as seeing my doctor, I regularly monitor changes of my health	0,91	A23	I have effective ways to prevent my symptoms limiting my life	0,91

A4	I often worry about my health	0,77	A24	I have very positive relationship with my healthcare services that take care of my life	0,88
A5	I try to make the most of my life	0,91	A25	I have a very good idea of how to manage my health problems.	0,88
A6	I know what things can trigger my health problems	0,89	A26	When I have symptoms, I have the skills that help me cope.	0,92
A7	My health problems make me very dissatisfied with life	0,87	A27	I try not to let my health problems stop me from enjoying life.	0,94
A8	I am doing interesting things in my life	0,90	A28	I have enough friends who help me cope with my health problems.	0,92
A9	I do at least one type of physical activity every day for 30 minutes	0,87	A29	I communicate very confidently with my doctor about my health problems	0,90
A10	I have plans to do enjoyable things for myself in the coming days	0,88	A30	I am very good at using aids and devices to relieve my life	0,92
A11	I have a very good understanding of when and why I have to take medicine	0,83	A31	When I feel ill, my family and carers really understand what I am going through	0,88
A12	I often feel angry when I think about my health	0,84	A32	I confidently give healthcare professionals the information to help me	0,88
A13	On most days of the week I set aside time for healthy activities	0,91	A33	I get my needs met from available healthcare resources	0,90
A14	I feel hopeless because of my health	0,86	A34	My health problems do not ruin my life	0,91
A15	I feel like I am actively involved in life	0,93	A35	Overall, I feel well looked after by friends and family	0,91
A16	When I have health problems, I have a clear understanding of what to do to control them	0,89	A36	I feel I have a very good life even when I have health problems	0,86

A17	I carefully watch my health and do what is necessary to keep it	0,94	A37	I get enough chances to talk about my health with people who understand me	0,91
A18	I get upset when I think about my health	0,89	A38	I work in a team with my doctors and other healthcare professionals.	0,85
A19	I walk for exercise, for at least 15 min per day, most days of the week	0,93	A39	I do not let my health problems control my life	0,93
A20	With my health in mind, I have realistic expectations of what I can or can't do	0,92	A40	If others can cope with problems like mine, I can too	0,94

Since none of the values is lower than 0.50, we find no reason to exclude any of the variables thus stating the existence of good sampling adequacy.

To check the identity of the correlation matrix we use Bartlett's test of sphericity to show that variables are unrelated and therefore unsuitable for structure detection. The registered small values (less than 0.05) of the significance level are indicating that the use of factor analysis is possible (See Table 4).

Table 4 Bartlett's test of sphericity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.901
Bartlett's Test of Sphericity	Approx. Chi-Square	5717.796
	df	780
	Sig.	.000

The Keiser-Meyer-Olkin Measure of Sampling Adequacy determines the matrix character. In this case its value of 0.901 demonstrates "very good" matrix character and |excellent sampling adequacy. The value allows us to state that all 40 explicit variables are associated with at least one implicit variable, i.e. with at least one latent factor (Goev, et al, 2018).

The number of latent factors is determined on the basis of Eigenvalue criteria mentioned before (See Table 5).

Table 5. Selecting number of factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.884	29.709	29.709	11.884	29.709	29.709	4.448	11.120	11.120
2	4.067	10.167	39.876	4.067	10.167	39.876	4.037	10.093	21.212
3	2.469	6.173	46.049	2.469	6.173	46.049	3.524	8.810	30.022
4	1.721	4.302	50.352	1.721	4.302	50.352	3.135	7.837	37.859
5	1.421	3.552	53.904	1.421	3.552	53.904	3.125	7.812	45.671
6	1.356	3.390	57.293	1.356	3.390	57.293	2.870	7.174	52.844
7	1.171	2.928	60.221	1.171	2.928	60.221	2.760	6.899	59.744
8	1.068	2.669	62.890	1.068	2.669	62.890	1.259	3.147	62.890
9	.999	2.496	65.387						
10	.885	2.213	67.600						
11	...	...	...						
12	...	...	...						
...	...	...	...						
40	.154	.384	100.000						

Factorial rotation with Varimax produced 8 latent factors with a strong first latent factor amounting to 11.12% of the total variance and each consecutive factor corresponding to a smaller fraction of the overall variance (the eighth latent factor being the smallest – 3,15%). After the explicit variables were referred to the latent factors using component matrix, the following summary table was obtained (See Table 6):

Table 6. Affiliation of variables to latent factors

LATENT Factors	VARIABLES
LF1	A1, A3, A9, A13, A15, A19, A27
LF2	A4, A7, A12, A14, A18, A21
LF3	A24, A29, A32, A33, A38
LF4	A16, A25, A26, A30
LF5	A2, A5, A8, A10, A36, A39
LF6	A6, A17, A20, A23, A34, A40
LF7	A22, A28, A31, A35, A37
LF8	A11

All eight HeiQ scales showed good factorial properties. After affiliation of variables to specific latent factor, their naming followed a careful consideration of the essence of what the questions are being addressed and what the hidden factors can express in general. Using the postulated measurements models proposed by the original version of HeiQ we come up with the following scales (See Table 7):

Table 7. Scales (named latent factors)

LATENT FACTORS	NAME
LF1	Health-directed behavior
LF2	Emotional wellbeing
LF3	Direction of the health services
LF4	Skills and management techniques acquisition
LF5	Positive and active participation in life
LF6	Constructive attitudes and approaches
LF7	Social integration and support
LF8	Self-monitoring and self-awareness

Finally, we tried to compare answers given along two scales, namely "Self-monitoring and self-awareness" and "Skills and management techniques

acquisition" in the EUWISE study (in 2015 prior to being enrolled in the education program of EUGENIE) with those, received in this study. The items were: *With my health in mind, I have realistic expectations of what I can and can not do (A20); As well as seeing my doctor, I regularly monitor changes of my health (A3); I know what things can trigger my health problems (A6); When I have health problems, I have a clear understanding of what to do to control them (A16); I have a very good understanding of when and why I have to take medicine (A11); I carefully watch my health and do what is necessary to keep it (A17)* for scale 8 – "Self-monitoring and self-awareness" and *When I have symptoms, I have the skills that help me cope (A26); I am very good at using aids and devices to relieve my life (A30); I have a very good idea of how to manage my health problems (A25); I have effective ways to prevent my symptoms limiting my life (A23)* for scale 4 – "Skills and management techniques acquisition".

For the verification of consistency we used coefficient of concordance – <u>non parametric statistics</u> to assess responses match with ranges from 0 to 1 (zero stating for no consistency at all and 1 – for perfect consistency) (See Table 8).

Table 8. Coefficients of concordance for the variables

	A20	A3	A6	A16	A11	A17	A26	A30	A25	**A23**
W	0,46	0,002	0,010	0,006	0,133	0	0,045	0	0,029	0,169
Sig.	0,0%	49%	8,7%	16,7%	0,0%	87%	0,0%	85,1%	0,4%	0,0%
	0,0%						**0,0%**			

The results clearly show that there is a statistically significant difference in the responses to the same items given prior and after the EUGENIE education program and training. This assesses that heiQ-BG gives relevant outcome of self-management programs in a reliable and valid manner.

Discussion

Overall, the translated heiQ-BG was found to have good factorial validity. Four of the eight scales could be accepted immediately, namely "health-directed behavior", "emotional wellbeing", "direction of the health services" and "social integration and support". Of the remaining four scales two needed minor adjustment (freeing error covariances of distinct items) to achieve good fit indices – "skills and management techniques acquisition" and "positive and active participation in life". Still they matched the majority of the items included in the relevant scales of the original HeiQ version. The other two scales – "constructive attitudes and approaches" and "self-monitoring and self-awareness" and especially the latter need a special attention in the discussion. The scale "constructive attitudes and

approaches" is described mainly by items, which in the original version represent the scale "self-monitoring and self-awareness". The authors presume that the results demonstrate a cultural difference which elsewhere has been established when using the concept of "self-management" (and self-monitoring) in Bulgaria.

One of the possible explanations, discussed in detail in previous papers, is that while the policies of EU governments reflect a growing emphasis on the obligation of individual citizens to maintain and manage their own health self-management is primarily framed within a discourse on individual responsibility and an extension of a more generic notion of healthy lifestyle and an extension of people's everyday life (Kennedy, et al., 2015). Bulgarian respondents use medical descriptors for self-management, thus making the everyday management practice feel more like an extension to an encounter with health professionals and a medication regimen. This is consistent with the stronger medical emphasis adopted in lay accounts of self-management, where the main focus is on its chronicity (being 'for life') rather on its manageability (Vassilev, et al, 2017). Thus, in Bulgaria, self-management is mainly discussed as an extension of the medication regimen and the lack of resources. Here, the main concern of respondents is about accessing the most appropriate and highest quality medications, and the related with that costs and impact on other parts of their life. Individual responsibility for the management of their condition is not a central concern and the socially available discourse is to accept financial difficulties as structurally generated and unrelated to the capabilities of and choices made by individuals. In a dominated medicalized context of management with absence of guidance and existent professional indifference to patients' active participation on the side of medical professionals, the category "self-management" is unloaded from the "self" and reduced to bio-medicalized management. This might explain or at least give some clarity to the fact that items A6, A17, A20, which in the original version represent scale 8 (self-management and self-monitoring) in our result data define scale 6 – Constructive attitudes and approaches.

Conclusion

In this study, the authors completed the translation, cultural adaptation, and validation of the heiQ-BG. The original test is a widely used generic instrument assessing a wide range of outcomes of self-management programs for chronic disease people, including Diabetes Type2. The heiQ-BG was found to be a valid and reliable method for evaluation of health education programs. It is useful for the evaluation of health management ability, to test a range of patient interventions, for general surveys of well-being and for guidance in the development of interventions. The translation was carried out according to international standards, strictly following the TSD-IIG (Translation support

document – Item intent guide) and included forward and backward translations. Comprehensibility and content validity were tested using cognitive interviews. The items of the Bulgarian heiQ were well understood by rehabilitation patients with DT2 and other chronic conditions. The structure of the eight heiQ scales was replicated after minor adjustment. The Bulgarian heiQ assesses relevant outcomes of self-management programs in a reliable and valid manner. Factorial validity was assessed using confirmatory factor analysis; concurrent validity was explored by correlations with comparator scales from EUWISE questionnaire.

The utilization of heiQ-BG makes it possible to compare the outcomes across multiple cultures and language groups, as it was already done with some of its scales in the EC project – EUWISE and after the training with EUGENIE program. Furthermore, heiQ-BG may provide important information about intermediate outcomes from different education programs, given that it is a self-assessed indicator for potential behavioral changes. Such data will raise awareness and improve understanding of the intervention programs for patients with chronic diseases and facilitate improvement in their content.

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Abstract

This paper describes the translation and cultural adaptation of a Bulgarian version of heiQ – a widely used as generic instrument for assessing education interventions in people with chronic diseases. The translation was carried out according to international standards. Comprehensibility, content validity and factorial validity were tested. The items of heiQ-BG were well understood; the structure of the eight scales were replicated. Further studies involving its practical application are warranted.

Key words: self-management, assessment, chronic disease, translation, validation

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