

Hypertension specific patient-reported outcome measure. Part II: validation survey and item selection process

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Aim. Improvement of the health-related quality of life (HRQoL) is one of the basic principles of value-based medicine. HRQoL could be assessed by the patient reported outcome measures (PROMs) also in case of arterial hypertension (HTN). However for HTN patients only generic PROMs are still used. Previously the group of experts had created the primary version of HTN-specific PROM. The purpose of the second part was to conduct a validation survey and to select the items in a statistically-based manner.

Material and methods. Validation survey was conducted in a large multidisciplinary center among patients with HTN stages 1-3 and healthy volunteers. Inclusion criteria were age >18 years old, ability to understand or complete the scale themselves, absence of significant illness requiring hospitalization. The items were selected according to the principles of classical test theory (CTT) and item response theory (IRT). The criteria for CTT were sensitivity (standard deviation and coefficient of variation with corresponding confidence intervals), representativeness (item-total Pearson's correlation coefficient), internal consistency (Cronbach's α coefficient). In IRT analysis two methods were adopted — value of four degrees of difficulty and the discrimination estimate. Each question was evaluated according to 8 criteria. An item was considered for selection when it was retained by ≥ 4 criteria. The expert panel considered practical significance of each item.

Results. A total of 430 questionnaires were distributed and 407 (94,7%) of them were returned completed (from 359 hypertensive patients, mean age $62,3 \pm 11,7$ y.o.; 48 healthy volunteers, mean age $38,8 \pm 10,5$ y.o.). The average time for PROM filling was $24 \pm 4,2$ minutes. Of 163 questions, 27 met all 8 criteria and 3 questions did not match any of the 36 HTN-specific questions, 11 matched ≥ 5 criteria and in the generic part there were 87 questions (33 in the PHY domain, 35 for PSY, 8 for SOC, 11 for THER). The symmetric distribution of criteria was seen in 25 questions, of which 11 were evaluated by experts and then retained. For 40 questions, < 4 eligibility

criteria were recorded, of which 9 were retained after expert review. The PROM draft contained 80 questions (19 questions in the physiology domain, 22 in psychology, 6 in social, 13 in therapy, 20 items are HTN-specific).

Conclusion. The methods of CTT and IRT allowed to reduce the PROM volume without losing the semantic richness and the need to reorganize the conceptual structure. The next step is the validation of the scale.

Key words: arterial hypertension, patient-reported outcome measures, health related quality of life, questionnaire, classical test theory, item response theory.

Conflicts of interest: nothing to declare.

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Hypertension (HTN) as the leading cause of premature mortality and disability [1], is predicted to maintain a leading position until 2040 [2]. Undoubtedly, the main aim of health care is to save and prolong life. However, improving of life quality (reduce the severity of symptoms, lighten the psychological and social burden of diseases) is equally important. Like most chronic pathologies, HTN affects the quality of life (QOL) associated with health in the range from insignificant to quite significant [3]. This fact is of particular interest since there are more than a billion HTN patients around the world, the effectiveness of treatment in most of which is insufficient [4].

Recent scientific evidence detects a decrease in QOL of patients with uncontrolled HTN; however, even with undoubted effectiveness of some antihypertensive drugs and rational treatment regimens, it can also negatively affect QOL [5]. To “measure” the symptoms and influence of the disease on the psychological, social fields of the patient’s life is possible due to patient-reported outcome measures (PROMs) — a highly effective tool for translating subjective perception into an objective assessment.

Since the use of PROMs in routine clinical practice allows you to change the paradigm of decision taking, making it more personalized, it is expected that medical care can be better also at population level. Thus, international and Russian guidelines for the management of HTN patients are general in nature and are based on the “crude” stratification of patients according to the main objective parameters [6]. In turn, PROMs is a more holistic and comprehensive assessment of QOL and the treatment effect from the patient’s point of view. PROMs analysis can provide the doctor with valuable information for implementing the precision medicine. It is also worth noting that sometimes the results of PROMs analysis are the primary endpoints of clinical trials, replacing or complementing the “conventional” objective and laboratory goals.

Detailed algorithms for developing tools of QOL assessing are given in the international guidelines. However, many researchers have noted the difficulties in choosing a suitable PROM, since it often depends on a specific pathology, clinical trial and goals of the authors/experts. As with many chronic pathologies, patients with HTN are in a certain conditions’ continuum, determined by the degree of severity (which can be significantly alleviated in a short time) and stage (almost unman-

ageable). Therefore, it is important to have reliable and concise questionnaires for patients with a certain pathology. In addition, using adequate data obtained with the help of disease-specific PROMs, it becomes possible to carry out cost-utility analysis [7]. It is one of the most complex and sophisticated methods of economic analysis, which is most important in the value-based healthcare (clinical, economic and patient-oriented benefits).

At first stage, the process of creating a multidimensional and multivariate disease-specific PROM for HTN patients was described [8]. As the first part of study, Interviewing and pilot questioning of patients were carried out, followed by assessment of the questionnaire structure, which greatly reduced it. The current stage is aimed at use of special statistical methods for the analysis of psychological tests, which complement the qualitative examination.

Material and methods

The study was conducted in accordance with the Good Clinical Practice standards and Declaration of Helsinki principles. The study protocol was approved by the local Ethics Committee. Prior to inclusion in the study, all participants gave written informed consent. The guidelines and documents of Food and Drug Administration (FDA) [9], the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) [10], and the International Society for Quality of Life Research (ISO-QOL) were used for PROM creation and validation [11]. The study was supported by a grant from the Russian Science Foundation (project № 17-15-01177).

Validation study. The survey with the primary PROM version [8] was conducted in an outpatient department of a large multidisciplinary medical center.

The main group consisted of patients with stage 1-3 HTN who were first seen by a hypertensiologist (one of the authors), while the antihypertensives’ status was not taken into account. The second group of participants was conditionally healthy volunteers.

The general inclusion criteria were at least 18 years of age, the ability to understand the purpose and instructions for filling out, independently read and answer the questions in the print PROM form.

The main exclusion criteria were a cognitive deficit assessed by a physician subjectively or a diagnosis of grade 2 or higher encephalopathy, a serious somatic pathology (cardiovascular or non-

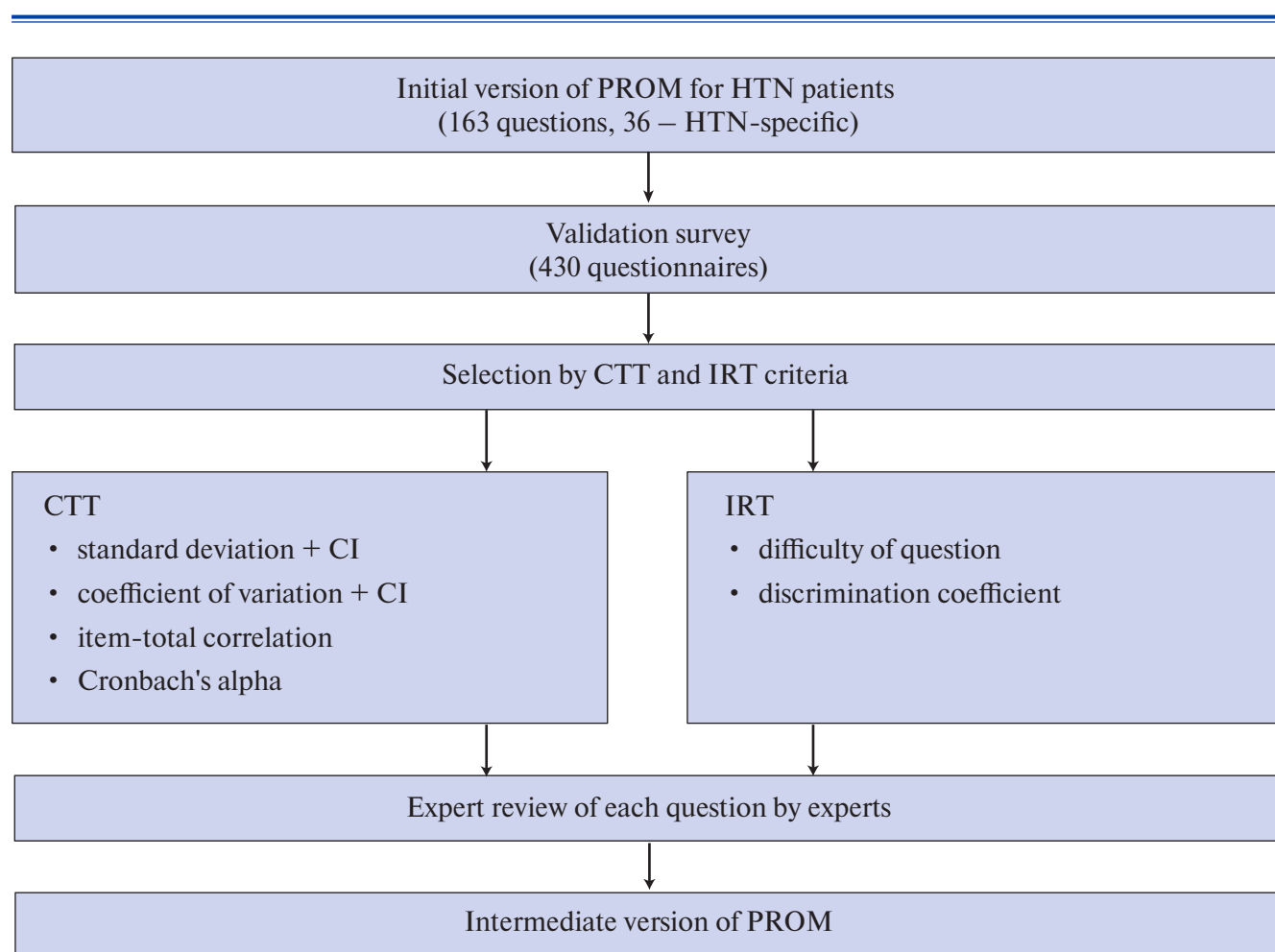


Fig. 1. The design of the second stage of the PROM development for HTN patients.

Abbreviations: PROM — patient-reported outcome measure, HTN — hypertension, CTT — classical test theory, IRT — item response theory, CI — confidence interval.

cardiac), which required hospital (including surgical) treatment in the near future. All participants were asked to fill out a questionnaire after talking with a doctor and completing an informed consent form.

Statistical analysis. The selection of questions was based on the classical test theory (CTT) and item response theory (IRT).

When selecting questions by CTT, the following 6 criteria were used:

1. The sensitivity of the item was determined by standard deviation (SD). A question considered inappropriate if SD was $<1,0$.

- 1.1. Values of 95% confidence interval (CI) of SD $>1,0$ was the criterion of acceptability. Preferably, the lower confidence limit meets these requirements.

2. A question sensitivity was also evaluated using the coefficient of variation (CV) of responses;

CV >20 units was required to remain question in the intermediate questionnaire version.

- 2.1. Similar to the CI for SD, the same requirements were used on the 95% CI for CV; the lower confidence limit was supposed to be >20 units.

3. Question representativeness was evaluated based on the item-total correlation. A question was considered appropriate if the Pearson's correlation coefficient between the mean value of the responses of a question and its area exceeded the CV=0,5.

4. Internal consistency was determined by Cronbach's alpha, which should have exceeded 0,5.

When selecting questions by IRT, 2 criteria were used, the values of which were estimated by maximum likelihood method:

1. Discrimination estimate (coefficient a). The key principle was as follows: the higher the coefficient a, the higher the item informative value. If

the coefficient value exceeded the $a > 0,5$, then a question was remained in the questionnaire.

2. Value of difficulty degree, determined by four coefficients b_1 , b_2 , b_3 and b_4 and satisfying the inequality $b_1 < b_2 < b_3 < b_4$. In this case, the values of b_1 and b_4 should have been in the range from -3 to +3. Questions where the values of these items fell outside this range, was removed from the questionnaire, since the distribution of answers to them would be shifted to one of the extremes (responses with points 1 or 5).

Each question was evaluated based on the eight criteria described above. If an item meets with four or more ones, then it could be maintain in the questionnaire. In addition, the significance and semantic richness of a question were reassessed by expert group. Thus, with the both use of statistical analysis and expert review, the logic and informative value of the second intermediate PROM version were formed (Fig. 1).

Statistical processing of the results was performed using the non-profit open source software package R Statistics (ver. 3.1.0, The R Foundation for Statistical Computing, Vienna, Austria) and the SPSS software package (ver. 23.0, IBM, Chicago, IL, USA). The level of statistical significance for differences was set as $p < 0,05$. The following specialized programs were also used: IRTShiny Version 1.1 (<http://kylehamilton.net/shiny/IRT-Shiny/>); Classical Test Theory (Item Analysis) – <http://kylehamilton.net/shiny/CTTShiny>. The jamovi software (<https://www.jamovi.org/>) was used for the reliability analysis.

Results

The questionnaire survey involved 430 people. Overall 407 participants completed PROM forms: 359 – HTN patients: mean age – $62,3 \pm 11,7$ years, 56,8% – women; stage 1 HTN – 139 patients, stage 2 HTN – 136 patients, stage 3 HTN – 84 patients; 48 – healthy volunteers (mean age – $38,8 \pm 10,5$ years, 70,8% – women). The questionnaire completion rate was 94,7%, and the average completion time was $24 \pm 4,2$ minutes (for HTN patients, since healthy volunteers did not answer questions regarding treatment). All respondents who completed the questionnaire and who were able to conduct a post-test interview ($n=128$), informed the clinical investigator that the questions and response options were correctly formulated and did not cause difficulties.

Analysis of the frequency distribution showed that there were 11,4% of unanswered questions.

The missing data was analyzed by the Little's Test of Missing Completely at Random: $\chi^2=347$, $p=0,39$. Results showed that the distribution is consistent with normal, and omissions are random. Missing data was recovered by multiple imputation method.

The initial version of the questionnaire, formed by conceptual framework, consisted of a general ("non-specific") part, which included areas of "physiology" (PHY) with 43 questions (5 sub-areas: physical symptoms, general well-being and vitality, self-assessment, the limiting effect of physical health, dynamics of physical health), "psychology" (PSY) with 42 questions (5 sub-areas: emotional and behavioral symptoms, cognitive symptoms, psychological well-being, the limiting effect of mental health, dynamics of mental health). General part also included "social" area (SOC), which contained 15 questions (4 sub-area: social frustration, social resources, the effect of physical and mental health on social activity), and the "therapy" domain (THER) with 27 items (6 sub-areas: therapy satisfaction, therapy-related physical changes, therapy-related psychological changes, the effect of the treatment regimen on daily life, adherence to treatment). HTN-specific part included 13 questions in PHY and THER sub-domains similar to the general part, 4 questions in PSY and 6 in SOC subdomains).

Thus, a total of 163 questions were assessed (36 questions regarded only HTN). For each question, the CTT and IRT criteria values are presented in Table 1. Twenty seven questions met all 8 criteria (2 questions of HTN-specific, 20 in the PHY area, 4 in the PSY area, 1 in the SOC area). Despite satisfactory values, questions PHY_4_3, PHY_4_5, and PHY_4_8 were removed due to low practical significance, questions PHY_4_10 and PHY_4_12 – due to duplication. PHY_4_14 and PHY_4_17 questions were not included in the intermediate version because similar questions were in the HTN-specific part (HTN_SOC_5, HTN_SOC_7, respectively). The following three questions did not meet any of the criteria: THER_6_7 "How often do you take medicine on friend recommendations or on your own without prescription?", THER_7_1 "How often do you miss scheduled appointments with a doctor?", HTN_THER_14 "How often do you eat fast food. These questions were excluded from the intermediate version of the questionnaire.

Eleven questions of the HTN-specific part met ≥ 5 criteria; there were 87 such items in the gen-

eral part (33 were in the PHY domain, 35 — in the PSY area, 8 — in the SOC area, 11 — in the THER domain). After consistent expert review, 3 questions were removed from the HTN-specific part (HTN_SOC_4, HTN_THER_10, HTN_THER_11) due to low practical significance. In addition to the already mentioned items, 28 following ones were excluded from the general part: 7 PHY questions (practical insignificance, duplication of the HTN-specific part, discrepancy with the HTN concept), 15 PSY questions (low reliability, practical insignificance), 3 SOC questions (practical insignificance, duplication of the HTN-specific part); 3 THER questions (practical insignificance, duplication of the HTN-specific part).

Symmetric distribution of criteria was observed in 25 questions (9 — HTN-specific). These questions were reassessed by the authors, as a result of which 11 ones (HTN — 5, PSY — 1, THER — 5 questions) were remained in the intermediate version (due to the semantic richness and practical significance).

Forty questions did not meet at least 4 criteria (except for the three questions described above); 9 of them were remained after an expert review due to practical significance (7 — HTN-specific, questions PSY_5_5 and SOC_1_1 in the relevant areas).

Forty six questions (21 — HTN-specific) did not meet both basic statistical criteria of CTT and IRT (reliability and difficulty, respectively). Only 16 of them were remained in the intermediate version of the questionnaire (11 — HTN-specific, 2 — PSY and THER, 1 — SOC) due to their practical significance and semantic richness.

Due to significant reduction of question pool and to facilitate the validation, HTN-specific questions were integrated into the relevant areas of the general part. Thus, the questions HTN_PHY_1-12 remained in the sub-area “physical symptoms”; items HTN_PSY_1-4 constituted an additional sub-area of “hypo- and hypernosognosia” in the PSY domain; HTN_SOC_3 were added to the sub-area “social resources in the HTN treatment”, and questions HTN_SOC_5,7 — to the sub-area “the effect of physical health on social activity”; questions HTN_THER_1,2 were included in the subdomain “therapy satisfaction”, HTN_THER_3-5 were included in the subdomain “adherence to treatment”. The sub-areas “dynamics of physical health”, “the effect of mental health on social activity” were removed from the interme-

diated version of PROM. As a result, the intermediate version included 80 questions (19 — PHY, 22 — PSY, 6 — SOC, 13 — THER, and 20 HTN-specific items) (Annex 1).

Discussion

Expert selection, creating a conceptual framework and developing a questionnaire are some of the most important and difficult steps. However, when these steps are taken, it becomes necessary to select meaningful, practically significant, most reliable questions. An important step in the second part of the study was the need to obtain a sufficient amount of data for statistical analysis.

The most common method of social and psychological research is a mass survey. This is particularly important when developing new PROM or adapting well-known foreign-language ones, since the contribution of patients and the subsequent interviewing is one of the ways to confirm content validity [9]. Therefore, HTN patients, especially ambulatory ones, were broadly covered in the conditions close to the real clinical practice. Nevertheless, the mass survey inevitably leads to incomplete data, which is often associated with the unattainability, fatigue or inattention (when completing large questionnaires), cultural, ethnic and social characteristics of individuals [12]. The main reason for the loss of a tenth of the required data, according to the Little's MCAR test, was the fatigue or inattention of the respondents.

The resulting data pool of responses became the basis for evaluating each unit of the HTN-specific PROM according to both CTT and IRT.

CTT methods, also called true score theory, are clear and readily available for use. The main criteria of CTT in this work were considered SD and reliability. It should be noted that the authors did not evaluate the factor loading due to the large number of questions, areas and sub-areas. So, the probability of unreliable distribution by factors was rather high. For the Hyper-PRO questionnaire, an exploratory factor analysis was carried out within the initial selection of questions [13]. That was reasonable due to small initial pool.

It should be noted that despite the CTT recognition, it does not take into account latent traits and abilities of the respondents, and therefore the reliability assessment may be inadequate. In addition to CTT, an IRT method was used, based on item characteristics curves and difficulty of questions. CTT has three advantages over IRT: the

assessment of respondent's capacity does not depend on a specific question; the assessment does not depend on the study population; the accuracy of capacity assessment can also be determined. When using CTT, it is possible to determine the nonlinear relationship between the respondent's response and its potential quality, or to describe the relationship between the response and the factor underlying the question. However, CTT principles are rather difficult to understand and therefore the application is limited mainly by the teaching tests [14].

Reliability, size and content are important characteristics affecting the CTT application for PROM development. There is a growing understanding among specialists that combinations of quality questions can contribute to the development of the most valid and concise PROMs that would reduce the "respondent burden". Therefore, attempts are being made not to evaluate the PROM as a holistic concept, but to determine the reliability and importance of questions based on the characteristics of the patients' response. The active introduction of CTT and computer programs for adaptive testing made it possible to create a PROMIS system (Patient-Reported Outcomes Measurement Information System). From a large database of questions, a small number of the most informative items are selected based on the patient's characteristics. [15].

Most of the questions were removed on the basis of CTT and IRT combination. However, the items that were significant for the overall structure,

despite that some of them did not meet the criteria, were remained based on the expert review. For example, most of the inappropriate questions of the HTN-specific part were remained, and the questions of the last THER subdomain (in the general and HTN-specific parts) were excluded; the sub-area "adherence to treatment" was significantly reduced. Items of this area were developed based on the clinical judgment of the authors and the theoretical problems of treating HTN patients. Probably, cultural, sociological and age-related characteristics, along with sample bias could be associated with the insufficient compliance with the selection criteria.

Conclusion

The development of a disease-specific questionnaire based on the outcomes reported by HTN patients passed the second stage using the CTT and IRT methods and expert review. The results obtained led to its twofold reduction due to the exclusion of inappropriate (duplicate, unreliable, difficult to understand) items. In addition, the prior structure and conceptual framework have been remained in the intermediate PROM version. The next step is to analyze validity, reliability and sensitivity.

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Conflicts of Interest: nothing to declare.

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Table 1
Summary of question selection according to the criteria of classical test theory and item response theory

Question	SD	Lower confi- dence limit	Upper confi- dence limit	Coefficient of variation	Lower confi- dence limit	Upper confi- dence limit	TT3_b1	TT3_b4	TT3_ discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_PHY_1	1,01	0,94	1,08	27,2	24,8	29,5	-6,00	1,50	0,25	0,15	0,41	3	5	✓	practical significance
HTN_PHY_2	1,02	0,95	1,08	27,8	25,6	30,0	-6,50	1,40	0,27	0,21	0,44	3	5	✓	practical significance
HTN_PHY_3	1,04	0,97	1,10	27,9	25,7	30,1	-8,30	1,50	0,24	0,06	0,30	3	5	✓	practical significance
HTN_PHY_4	1,13	1,06	1,20	31,8	29,2	34,3	-3,80	1,00	0,63	0,40	0,55	6	2	✓	
HTN_PHY_5	1,21	1,11	1,30	32,6	29,1	36,0	-4,50	0,72	0,39	0,32	0,30	4	4	✗	practical insignificance
HTN_PHY_6	0,68	0,57	0,77	14,8	12,3	17,1	0,90	0,72	0,46	0,20	0,44	1	7	✗	
HTN_PHY_7	0,99	0,91	1,08	24,1	21,4	26,6	-2,23	0,09	1,01	0,44	0,57	5	3	✓	
HTN_PHY_8	0,98	0,91	1,05	24,5	22,3	26,8	-3,00	0,30	0,93	0,46	0,62	4	4	✓	practical significance
HTN_PHY_9	1,10	0,98	1,20	28,2	25,0	31,2	-2,86	0,43	0,85	0,47	0,61	6	2	✓	
HTN_PHY_10	1,09	1,01	1,16	34,9	32,0	37,8	-1,10	1,30	1,30	0,51	0,67	8	0	✓	
HTN_PHY_12	1,06	0,99	1,13	39,4	36,2	42,7	0,56	3,20	0,89	0,37	0,50	4	4	✓	practical significance
HTN_PHY_13	0,94	0,85	1,03	23,7	21,1	26,3	-1,90	0,70	0,33	0,30	0,41	3	5	✗	
HTN_PHY_14	0,91	0,85	0,97	24,4	22,6	26,2	-4,60	1,14	0,36	0,29	0,35	2	6	✗	

Question	SD	Lower confi- dence limit	Upper confi- dence limit	Coefficient of variation	Lower confi- dence limit	Upper confi- dence limit	TT3_b1	TT3_b4	TT3_ discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_PSY_1	1,14	1,05	1,21	29,8	27,0	32,5	-4,50	-1,70	0,16	0,20	0,44	4	4	✓	practical significance
HTN_PSY_2	1,42	1,35	1,49	42,5	39,1	45,9	-2,52	2,80	0,08	0,20	0,74	2	6	✗	practical insignificance
HTN_PSY_3	1,32	1,25	1,39	45,1	41,8	48,4	-0,63	1,75	0,67	0,38	0,82	7	1	✓	
HTN_PSY_4	1,35	1,29	1,42	43,6	40,5	46,9	-1,49	1,12	0,54	0,50	0,43	7	1	✓	

Question	SD	Lower confi- dence limit	Upper confi- dence limit	Coefficient of variation	Lower confi- dence limit	Upper confi- dence limit	TT3_b1	TT3_b4	TT3_ discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_SOC_1	0,97	0,89	1,06	25,1	22,4	27,6	-4,30	1,98	0,43	0,49	0,54	3	5	✗	
HTN_SOC_2	0,97	0,89	1,04	26,1	23,5	28,5	-3,38	1,64	0,37	0,44	0,68	3	5	✗	
HTN_SOC_3	0,90	0,81	0,98	22,6	20,0	25,0	-4,14	1,40	0,37	0,36	0,55	3	5	✓	practical significance
HTN_SOC_4	1,30	1,21	1,38	35,3	31,9	38,7	-3,30	0,88	0,20	0,17	0,43	5	3	✗	practical insignificance
HTN_SOC_5	1,11	1,03	1,18	29,7	27,0	32,3	-1,36	0,57	2,58	0,50	0,66	8	0	✓	
HTN_SOC_7	1,03	0,96	1,11	30,0	27,4	32,6	-1,29	1,06	2,99	0,52	0,68	6	2	✓	

Question	SD	Lower confi- dence limit	Upper confi- dence limit	Coefficient of variation	Lower confi- dence limit	Upper confi- dence limit	TT3_b1	TT3_b4	TT3_ discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_THER_1	0,82	0,76	0,89	21,9	20,0	23,8	-3,34	2,08	0,48	0,43	0,52	3	5	✓	practical significance
HTN_THER_2	0,90	0,79	0,99	21,5	18,7	24,2	-4,14	0,08	0,18	0,14	0,65	2	6	✓	practical significance
HTN_THER_3	0,85	0,77	0,92	22,3	20,2	24,5	-3,04	2,59	0,29	0,24	0,57	3	5	✓	practical significance
HTN_THER_4	1,05	0,92	1,15	24,7	21,3	27,9	-1,55	3,66	0,19	0,24	0,71	4	4	✓	practical significance
HTN_THER_5	1,01	0,91	1,10	24,9	21,9	27,6	-3,46	-0,40	0,23	0,33	0,65	4	4	✓	practical significance
HTN_THER_6	1,11	1,01	1,19	27,4	24,3	30,2	-4,97	-0,84	0,31	0,34	0,35	4	4	✗	practical insignificance
HTN_THER_7	0,96	0,88	1,03	24,0	21,7	26,2	-5,85	0,64	0,46	0,39	0,43	2	6	✗	
HTN_THER_9	1,23	1,13	1,31	33,4	29,8	36,7	-3,30	2,66	0,17	0,10	0,24	4	4	✗	practical insignificance
HTN_THER_10	1,25	1,14	1,34	59,2	56,0	62,6	2,40	2,80	0,12	0,03	0,30	5	3	✗	practical insignificance
HTN_THER_11	1,09	0,99	1,19	27,3	24,0	30,5	-2,82	-0,87	0,17	0,22	0,29	5	3	✗	practical insignificance
HTN_THER_12	1,16	1,09	1,23	34,4	31,9	36,9	-5,40	4,80	0,28	0,35	0,48	4	4	✗	practical insignificance
HTN_THER_13	1,02	0,93	1,10	26,5	23,8	29,1	-5,37	1,64	0,19	0,13	0,45	3	5	✗	
HTN_THER_14	0,73	0,66	0,80	16,4	14,6	18,2	-5,80	2,20	0,25	0,03	0,12	0	8	✗	

Abbreviations: SD — standard deviation, CV — coefficient of variation, Pearson's r — Pearson's item-total correlation coefficient, CI — confidence interval, CBC_b1, CBC_b4 — the degree of question's difficulty (b1<b4).

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PHY_1_1	0,94	0,85	1,01	25,8	23,1	28,3	-8	2,3	0,39	0,44	0,56	3	5	✗	
PHY_1_2	1,03	0,92	1,12	26,5	23,3	29,7	-3	0,2	0,75	0,59	0,67	7	1	✓	
PHY_1_3	0,99	0,87	1,04	24,4	21,6	26,8	-4,4	-0,4	1,00	0,59	0,68	5	3	✗	discrepancy with the HTN concept
PHY_1_4	0,99	0,91	1,06	24,5	22,0	26,8	-4,1	-0,8	1,18	0,64	0,73	5	3	✓	
PHY_1_5	1,19	1,11	1,26	34,9	32,0	37,7	-3	7,9	0,62	0,54	0,64	7	1	✗	discrepancy with the HTN concept
PHY_1_6	1,17	1,05	1,23	30,4	26,8	33,1	-1,9	-0,4	0,60	0,54	0,62	8	0	✓	
PHY_1_7	1,33	1,24	1,42	45	41	48	-1,5	6,5	0,73	0,69	0,71	7	1	✗	discrepancy with the HTN concept
PHY_1_9	0,77	0,67	0,86	16,7	14,6	18,2	-3,6	1,77	1,10	0,51	0,59	3	5	✗	
PHY_1_10	1,15	1,03	1,25	29,0	25,4	32,5	-2	-0,72	0,86	0,63	0,70	8	0	✓	
PHY_1_11	1,21	1,12	1,27	31,9	29,1	34,7	-3,4	-0,6	0,72	0,61	0,63	7	1	✓	
PHY_1_13	1,15	1,06	1,23	32,3	29,0	35,5	-2,5	0,56	0,65	0,53	0,62	8	0	✓	
PHY_1_16	1,10	1,02	1,18	27,2	23,6	30,4	-2,3	0,6	0,79	0,54	0,62	8	0	✓	
PHY_1_20	0,76	0,66	0,84	17,6	15,1	19,8	-3,3	-0,1	0,53	0,46	0,55	2	6	✗	
PHY_1_21	0,91	0,83	1,00	22,1	20,0	24,5	-4,43	-0,23	0,68	0,57	0,63	4	4	✗	
PHY_1_25	1,04	0,90	1,09	26,7	23,9	30,4	-3,76	-0,27	0,53	0,48	0,55	6	2	✗	low reliability
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PHY_2_1	1,07	0,98	1,15	32,0	29,1	35,0	-2,6	1,47	0,89	0,69	0,80	7	1	✓	
PHY_2_2	1,10	1,02	1,18	35,0	32,1	38,15	-3,20	2,0	0,60	0,61	0,82	7	1	✓	
PHY_2_7	1,32	1,24	1,42	40,4	35,9	43,1	-2,65	0,80	0,60	0,60	0,72	8	0	✓	
PHY_2_9	0,90	0,82	0,99	22,0	20,0	25,0	-6,10	0,01	0,47	0,46	0,59	3	5	✗	
PHY_2_10	1,03	0,95	1,11	31,0	28,1	33,9	-5,05	4,60	0,24	0,37	0,59	4	4	✗	
PHY_2_12	0,97	0,84	1,07	24,1	21,3	26,3	-4,54	-0,16	0,60	0,51	0,62	4	4	✗	
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PHY_3_3	1,35	1,24	1,42	41,7	39,8	46,2	-2,70	0,58	0,77	0,629	0,79	8	0	✓	
PHY_3_4	1,05	0,97	1,14	34,5	31,6	37,5	-2,63	0,99	1,11	0,657	0,82	7	1	✗	duplication of the HTN-specific part
PHY_3_5	1,19	1,10	1,28	45,8	42,7	49,1	-1,81	1,58	1,00	0,686	0,83	8	0	✓	
PHY_3_6	1,03	0,95	1,11	36,2	32,7	39,5	-2,30	2,45	0,72	0,567	0,76	7	1	✗	practical insignificance
PHY_3_8	1,20	1,13	1,28	44,4	41,3	47,8	-1,63	1,56	1,21	0,735	0,88	8	0	✓	

Question	SD	Lower confi- dence limit	Upper confi- dence limit	Coefficient of variation	Lower confi- dence limit	Upper confi- dence limit	TT3_b1	TT3_b4	TT3_ discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PHY_4_2	1,25	1,17	1,32	32,9	30,0	35,7	-2,9	-0,88	1,24	0,74	0,80	8	0	✓	
PHY_4_3	1,18	1,10	1,26	32,1	29,0	34,9	-2,73	-0,7	1,11	0,65	0,72	8	0	✗	practical insignificance
PHY_4_4	1,07	0,96	1,16	25,4	22,2	28,3	-2,47	-2,19	1,00	0,62	0,70	7	1	✗	practical insignificance
PHY_4_5	1,22	1,11	1,32	30,9	27,2	34,2	-2,26	-1,58	0,94	0,63	0,71	8	0	✗	practical insignificance
PHY_4_7	1,26	1,16	1,36	32,4	28,9	35,9	-2,28	-1,44	1,07	0,68	0,76	8	0	✓	
PHY_4_8	1,20	1,10	1,29	30,0	26,5	33,2	-2,47	-1,6	1,14	0,69	0,78	8	0	✗	practical insignificance
PHY_4_9	1,33	1,25	1,42	38,1	34,7	41,4	-1,93	-0,05	1,79	0,80	0,85	8	0	✓	
PHY_4_10	1,32	1,24	1,39	40,1	36,8	43,3	-2,14	0,626	1,40	0,78	0,82	8	0	✗	duplication
PHY_4_12	1,26	1,18	1,34	35,2	32,1	38,4	-2,2	0,05	1,64	0,75	0,82	8	0	✗	duplication
PHY_4_13	1,20	1,12	1,28	36,6	33,4	39,7	-2,26	0,64	1,16	0,75	0,75	8	0	✓	
PHY_4_14	1,22	1,14	1,28	33,2	30,6	36,0	-2,41	-0,17	1,85	0,80	0,84	8	0	✗	duplication of the HTN- specific part
PHY_4_15	0,80	0,65	0,83	17,1	14,8	20,0	-4,67	-3,09	0,75	0,42	0,54	2	6	✗	duplication of the HTN- specific part
PHY_4_17	1,17	1,07	1,27	29,2	25,7	32,4	-2,3	-0,8	2,00	0,73	0,81	8	0	✗	duplication of the HTN- specific part
PHY_4_19	0,96	0,86	1,05	22,5	20,0	25,1	-2,13	-1,12	1,20	0,57	0,67	5	3	✓	
PHY_4_20	1,16	1,05	1,25	29,1	25,6	32,2	-2,66	-0,7	1,16	0,61	0,71	8	0	✓	

Question	SD	Lower confi- dence limit	Upper confi- dence limit	Coefficient of variation	Lower confi- dence limit	Upper confi- dence limit	TT3_b1	TT3_b4	TT3_ discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PHY_5_1	1,10	0,98	1,15	32,3	28,8	35,7	-5,46	6,11	0,10	0,03	0,03	4	4	✗	
PHY_5_2	1,05	0,91	1,10	40,9	35,9	43,1	-2,74	3,5	0,40	0,44	0,44	4	4	✗	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PSY_1_1	1,12	1,03	1,21	34,5	31,1	37,8	-3,10	1,68	0,68	0,61	0,75	7	1	✓	
PSY_1_2	1,02	0,91	1,11	24,4	21,2	27,4	-3,87	-0,76	0,80	0,61	0,75	6	2	✓	
PSY_1_3	1,07	0,97	1,16	27,5	24,1	30,7	-4,48	0,17	0,78	0,65	0,73	6	2	✓	
PSY_1_5	1,09	0,99	1,19	28,7	25,3	32,0	-3,48	0,95	0,89	0,68	0,80	6	2	✗	practical insignificance
PSY_1_6	1,04	0,92	1,15	24,9	21,4	28,1	-6,30	-1,94	0,58	0,55	0,69	6	2	✗	practical insignificance
PSY_1_8	0,88	0,75	0,98	19,8	16,5	22,7	-4,49	-2,69	0,55	0,49	0,53	2	6	✗	
PSY_1_13	1,32	1,18	1,45	34,0	28,9	38,8	-1,26	-0,12	0,48	0,53	0,61	7	1	✗	practical insignificance
PSY_1_14	1,06	0,98	1,15	30,7	27,6	33,6	-3,97	1,84	0,68	0,62	0,68	6	2	✗	practical insignificance
PSY_1_20	0,97	0,84	1,08	22,5	19,0	25,9	-2,90	-1,77	0,75	0,58	0,71	5	3	✗	practical insignificance
PSY_1_23	1,07	0,96	1,17	27,1	23,6	30,4	-4,14	0,05	0,98	0,67	0,78	6	2	✓	
PSY_1_24	0,95	0,84	1,05	24,8	21,5	28,0	-3,08	0,77	0,96	0,64	0,66	5	3	✗	practical insignificance
PSY_1_25	1,05	0,94	1,15	27,7	24,1	31,2	-3,07	0,58	0,99	0,69	0,77	6	2	✓	
PSY_1_28	1,09	1,00	1,17	28,7	25,6	31,7	-3,84	0,40	1,21	0,75	0,75	7	1	✓	
PSY_1_29	1,09	0,99	1,18	27,2	23,9	30,4	-3,53	-0,49	0,76	0,61	0,59	6	2	✗	practical insignificance
PSY_1_30	1,26	1,15	1,35	35,2	31,3	39,1	-2,31	0,32	0,92	0,70	0,63	8	0	✓	
PSY_1_33	1,16	1,05	1,26	30,5	26,7	34,1	-2,66	0,19	1,36	0,78	0,86	8	0	✓	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PSY_2_1	1,08	0,99	1,17	31,6	28,2	34,9	-3,10	1,85	0,95	0,66	0,85	6	2	✓	
PSY_2_2	1,13	1,05	1,21	32,4	29,4	35,3	-3,48	0,43	1,01	0,70	0,88	7	1	✓	
PSY_2_5	1,04	0,95	1,13	28,3	25,0	31,5	-2,99	0,65	1,44	0,76	0,89	7	1	✓	
PSY_2_7	1,13	1,04	1,21	30,8	27,7	33,8	-3,31	0,33	1,52	0,78	0,87	7	1	✓	
PSY_2_12	0,99	0,90	1,08	24,7	21,7	25,7	-3,45	-0,04	1,32	0,71	0,80	5	3	✗	practical insignificance

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PSY_4_2	1,09	1,01	1,17	31,8	28,8	34,7	-2,90	1,42	1,33	0,74	0,81	8	0	✓	
PSY_4_3	1,01	0,93	1,09	26,5	23,8	29,1	-4,11	0,28	1,54	0,72	0,78	6	2	✗	practical insignificance
PSY_4_5	1,10	1,01	1,19	32,8	29,7	36,0	-2,59	1,53	1,51	0,74	0,79	8	0	✓	
PSY_4_6	1,02	0,92	1,11	26,1	23,0	29,0	-3,53	0,26	1,33	0,71	0,80	6	2	✗	practical insignificance
PSY_4_7	1,08	1,00	1,15	29,2	26,4	32,0	-3,64	0,58	1,44	0,76	0,85	7	1	✗	practical insignificance
PSY_4_8	1,01	0,92	1,09	25,6	22,8	28,2	-4,08	0,10	1,48	0,72	0,81	6	2	✓	
PSY_4_9	1,08	1,00	1,16	30,9	28,1	33,6	-3,33	1,21	1,56	0,75	0,80	7	1	✓	
PSY_4_10	0,96	0,88	1,04	23,9	21,3	26,3	-2,12	0,61	1,21	0,70	0,77	6	2	✗	practical insignificance
PSY_4_11	1,07	0,96	1,17	26,9	23,3	30,3	-3,17	0,03	1,19	0,68	0,78	6	2	✓	
PSY_4_13	0,96	0,86	1,05	22,9	19,9	25,6	-4,98	-0,67	0,81	0,58	0,71	4	4	✗	
PSY_4_14	1,04	0,93	1,14	25,6	22,2	28,9	-4,03	0,42	0,78	0,59	0,77	6	2	✓	
PSY_4_18	0,99	0,89	1,09	22,4	21,1	27,2	-3,50	-0,27	1,82	0,76	0,83	5	3	✗	
PSY_4_21	0,91	0,81	1,01	21,5	18,5	24,3	-3,44	-0,26	1,58	0,73	0,81	4	4	✗	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
PSY_5_4	0,94	0,85	1,03	34,3	30,8	37,8	-5,59	3,82	0,33	0,34	0,92	3	5	✗	
PSY_5_5	0,95	0,85	1,04	33,1	29,6	36,7	-5,88	3,83	0,31	0,35	0,93	3	5	✓	practical significance
PSY_5_6	0,84	0,74	0,94	30,6	27,0	34,1	-4,96	1,84	0,50	0,46	0,87	4	4	✓	practical significance

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
SOC_1_1	1,17	1,09	1,25	39,5	35,9	43,1	-3,15	5,43	0,30	0,40	0,68	3	5	✓	practical significance
SOC_1_2	0,85	0,75	0,95	20,4	17,5	23,1	-0,80	0,34	0,86	0,52	0,63	4	4	✗	
SOC_1_7	1,08	0,98	1,17	29,2	25,7	32,6	-3,04	1,73	0,75	0,60	0,72	6	2	✗	practical insignificance
SOC_1_8	1,14	1,06	1,23	33,8	30,3	37,2	-2,30	1,91	0,82	0,65	0,81	8	0	✓	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
SOC_2_1	0,77	0,65	0,88	17,6	14,7	20,6	-3,69	0,35	0,83	0,43	0,67	2	6	×	
SOC_2_3	0,91	0,82	0,98	21,9	19,4	24,2	-1,92	0,42	1,08	0,60	0,76	5	3	✓	
SOC_2_5	0,90	0,82	0,97	23,3	20,8	25,7	-3,75	1,27	1,08	0,58	0,75	5	3	✓	
SOC_2_8	0,90	0,79	0,99	21,2	18,3	23,9	-1,10	0,08	1,19	0,56	0,76	5	3	✓	
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
SOC_3_1	0,85	0,76	0,94	20,9	18,2	23,5	-4,00	1,07	0,89	0,53	0,66	3	5	×	
SOC_3_3	1,06	0,96	1,16	28,0	24,6	31,3	-2,75	1,33	0,74	0,57	0,71	7	1	✓	
SOC_3_4	0,87	0,78	0,96	22,4	19,7	24,9	-3,31	1,72	0,60	0,42	0,65	3	5	×	
SOC_3_5	0,82	0,70	0,92	19,2	16,1	22,1	-2,67	0,25	0,80	0,50	0,62	4	4	×	
SOC_3_7	0,99	0,86	1,11	23,8	20,0	27,3	-3,80	-0,05	0,49	0,42	0,50	2	6	×	
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
SOC_4_1	0,99	0,92	1,07	26,0	23,6	28,3	-6,43	0,27	0,52	0,51	0,96	5	3	×	duplication of the HTN-specific part
SOC_4_2	0,98	0,90	1,04	24,9	22,4	27,0	-2,12	0,26	0,65	0,55	0,96	6	2	×	duplication of the HTN-specific part
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
THER_1_1	0,77	0,67	0,92	20	16	23	-2,1	0,5	1,7	0,57	0,82	5	3	✓	
THER_1_2	0,72	0,68	0,85	20	17	22	-2,8	0,9	1,5	0,57	0,85	5	3	×	duplication of the HTN-specific part
THER_1_3	0,58	0,61	0,80	16	14	19	-2,0	0,0	2,3	0,61	0,82	4	4	×	duplication of the HTN-specific part
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
THER_2_1	0,88	0,78	0,99	25	21	28	-3,10	1,80	0,80	0,47	0,70	4	4	✓	practical significance
THER_2_2	0,78	0,68	0,91	21	17	24	-1,10	1,43	1,13	0,52	0,65	5	3	✓	
THER_2_3	1,01	0,82	1,04	25	22	29	-3,90	1,50	0,74	0,54	0,63	7	1	✓	
THER_2_7	0,78	0,59	0,90	25,1	19,3	30,1	-2,45	3,10	0,45	0,35	0,56	2	6	×	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
THER_3_1	0,65	0,56	0,74	19,1	16,7	21,4	-2,60	2,60	1,35	0,51	0,82	4	4	✓	practical significance
THER_3_2	0,65	0,49	0,70	19,1	16,0	22,1	-5,00	4,80	0,48	0,33	0,76	1	7	✗	
THER_3_4	0,70	0,63	0,86	22,2	18,3	25,6	-0,67	3,08	0,81	0,41	0,84	3	5	✗	practical significance
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
THER_5_1	0,89	0,79	0,98	22,3	19,5	25,3	-2,14	0,57	1,12	0,58	0,61	5	3	✓	
THER_5_2	0,73	0,63	0,83	18,2	15,3	20,8	-2,11	0,87	1,89	0,67	0,67	4	4	✓	practical significance
THER_5_3	0,79	0,63	0,93	18,8	14,7	22,6	-2,35	-0,04	1,81	0,69	0,66	4	4	✓	practical significance
THER_5_5	1,09	0,97	1,20	30	26	34	-4,80	0,73	0,62	0,57	0,60	6	2	✗	practical insignificance
THER_5_6	0,95	0,84	1,05	23,3	19,9	26,4	-1,64	-0,50	0,72	0,51	0,62	5	3	✓	
THER_5_7	1,06	0,93	1,17	27,0	22,8	30,8	-4,76	-0,27	0,54	0,47	0,55	5	3	✓	
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
THER_6_1	0,63	0,54	0,72	15,0	12,6	17,3	-4,60	1,45	0,45	0,37	0,58	1	7	✗	
THER_6_2	0,78	0,64	0,91	20	16	23	-5,67	3,37	0,29	0,33	0,46	1	7	✗	
THER_6_3	0,79	0,63	0,93	19	14	22	-4,65	0,34	0,35	0,34	0,52	1	7	✗	
THER_6_4	0,95	0,76	1,11	23	18	28	-1,60	-0,05	0,47	0,43	0,65	3	5	✗	
THER_6_6	0,70	0,55	0,81	15	12	18	-2,08	-0,98	0,92	0,54	0,57	4	4	✓	practical significance
THER_6_7	0,77	0,63	0,90	17	14	21	-6,90	-0,23	0,35	0,32	0,42	0	8	✗	
THER_6_8	0,85	0,66	1,02	19,1	14,2	23,3	-8,30	-5,27	0,16	0,33	0,59	1	7	✗	
Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
THER_7_1	0,71	0,60	0,80	16,1	13,2	18,4	-6,70	-1,17	0,31	0,29	0,34	0	8	✗	
THER_7_2	1,17	1,07	1,28	34,7	30,6	38,8	-6,26	1,65	0,39	0,53	0,78	6	2	✓	
THER_7_3	1,09	0,97	1,21	31,9	27,4	36,3	-5,55	2,85	0,39	0,50	0,80	5	3	✓	
THER_7_5	1,19	1,01	1,33	31,1	25,2	36,3	-4,47	0,23	0,14	0,22	0,57	5	3	✗	practical insignificance

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_PHY_1	1,01	0,94	1,08	27,2	24,8	29,5	-6,00	1,50	0,25	0,15	0,41	3	5	✓	practical significance
HTN_PHY_2	1,02	0,95	1,08	27,8	25,6	30,0	-6,50	1,40	0,27	0,21	0,44	3	5	✓	practical significance
HTN_PHY_3	1,04	0,97	1,10	27,9	25,7	30,1	-8,30	1,50	0,24	0,06	0,30	3	5	✓	practical significance
HTN_PHY_4	1,13	1,06	1,20	31,8	29,2	34,3	-3,80	1,00	0,63	0,40	0,55	6	2	✓	
HTN_PHY_5	1,21	1,11	1,30	32,6	29,1	36,0	-4,50	0,72	0,39	0,32	0,30	4	4	✗	practical insignificance
HTN_PHY_6	0,68	0,57	0,77	14,8	12,3	17,1	0,90	0,72	0,46	0,20	0,44	1	7	✗	
HTN_PHY_7	0,99	0,91	1,08	24,1	21,4	26,6	-2,23	0,09	1,01	0,44	0,57	5	3	✓	
HTN_PHY_8	0,98	0,91	1,05	24,5	22,3	26,8	-3,00	0,30	0,93	0,46	0,62	4	4	✓	practical significance
HTN_PHY_9	1,10	0,98	1,20	28,2	25,0	31,2	-2,86	0,43	0,85	0,47	0,61	6	2	✓	
HTN_PHY_10	1,09	1,01	1,16	34,9	32,0	37,8	-1,10	1,30	1,30	0,51	0,67	8	0	✓	
HTN_PHY_12	1,06	0,99	1,13	39,4	36,2	42,7	0,56	3,20	0,89	0,37	0,50	4	4	✓	practical significance
HTN_PHY_13	0,94	0,85	1,03	23,7	21,1	26,3	-1,90	0,70	0,33	0,30	0,41	3	5	✗	
HTN_PHY_14	0,91	0,85	0,97	24,4	22,6	26,2	-4,60	1,14	0,36	0,29	0,35	2	6	✗	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_PSY_1	1,14	1,05	1,21	29,8	27,0	32,5	-4,50	-1,70	0,16	0,20	0,44	4	4	✓	practical significance
HTN_PSY_2	1,42	1,35	1,49	42,5	39,1	45,9	-2,52	2,80	0,08	0,20	0,74	2	6	✗	practical insignificance
HTN_PSY_3	1,32	1,25	1,39	45,1	41,8	48,4	-0,63	1,75	0,67	0,38	0,82	7	1	✓	
HTN_PSY_4	1,35	1,29	1,42	43,6	40,5	46,9	-1,49	1,12	0,54	0,50	0,43	7	1	✓	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_SOC_1	0,97	0,89	1,06	25,1	22,4	27,6	-4,30	1,98	0,43	0,49	0,54	3	5	✗	
HTN_SOC_2	0,97	0,89	1,04	26,1	23,5	28,5	-3,38	1,64	0,37	0,44	0,68	3	5	✗	
HTN_SOC_3	0,90	0,81	0,98	22,6	20,0	25,0	-4,14	1,40	0,37	0,36	0,55	3	5	✓	practical significance
HTN_SOC_4	1,30	1,21	1,38	35,3	31,9	38,7	-3,30	0,88	0,20	0,17	0,43	5	3	✗	practical insignificance
HTN_SOC_5	1,11	1,03	1,18	29,7	27,0	32,3	-1,36	0,57	2,58	0,50	0,66	8	0	✓	
HTN_SOC_7	1,03	0,96	1,11	30,0	27,4	32,6	-1,29	1,06	2,99	0,52	0,68	6	2	✓	

Question	SD	Lower confidence limit	Upper confidence limit	Coefficient of variation	Lower confidence limit	Upper confidence limit	TT3_b1	TT3_b4	TT3_discriminant_A	Cronbach's α	Pearson's r	Met the criteria	Did not meet the criteria	Selected	Comments
HTN_THER_1	0,82	0,76	0,89	21,9	20,0	23,8	-3,34	2,08	0,48	0,43	0,52	3	5	✓	practical significance
HTN_THER_2	0,90	0,79	0,99	21,5	18,7	24,2	-4,14	0,08	0,18	0,14	0,65	2	6	✓	practical significance
HTN_THER_3	0,85	0,77	0,92	22,3	20,2	24,5	-3,04	2,59	0,29	0,24	0,57	3	5	✓	practical significance
HTN_THER_4	1,05	0,92	1,15	24,7	21,3	27,9	-1,55	3,66	0,19	0,24	0,71	4	4	✓	practical significance
HTN_THER_5	1,01	0,91	1,10	24,9	21,9	27,6	-3,46	-0,40	0,23	0,33	0,65	4	4	✓	practical significance
HTN_THER_6	1,11	1,01	1,19	27,4	24,3	30,2	-4,97	-0,84	0,31	0,34	0,35	4	4	✗	practical insignificance
HTN_THER_7	0,96	0,88	1,03	24,0	21,7	26,2	-5,85	0,64	0,46	0,39	0,43	2	6	✗	
HTN_THER_9	1,23	1,13	1,31	33,4	29,8	36,7	-3,30	2,66	0,17	0,10	0,24	4	4	✗	practical insignificance
HTN_THER_10	1,25	1,14	1,34	59,2	56,0	62,6	2,40	2,80	0,12	0,03	0,30	5	3	✗	practical insignificance
HTN_THER_11	1,09	0,99	1,19	27,3	24,0	30,5	-2,82	-0,87	0,17	0,22	0,29	5	3	✗	practical insignificance
HTN_THER_12	1,16	1,09	1,23	34,4	31,9	36,9	-5,40	4,80	0,28	0,35	0,48	4	4	✗	practical insignificance
HTN_THER_13	1,02	0,93	1,10	26,5	23,8	29,1	-5,37	1,64	0,19	0,13	0,45	3	5	✗	
HTN_THER_14	0,73	0,66	0,80	16,4	14,6	18,2	-5,80	2,20	0,25	0,03	0,12	0	8	✗	

Health-related Quality-of-Life Questionnaire for Patients with Hypertension

Please answer questions regarding your general state, mood and treatment. Your answers will help your doctor work to improve the quality of care. Answer each question by marking the answer you have chosen as stated. If you are not sure how to answer the question, please choose the answer that most accurately reflects your view.

COMBINED_PHY

How often <u>OVER THE LAST 4 WEEKS</u> have you noticed the following disorders?						
		5	4	3	2	1
HTN_PHY_1	Ripple in the head	Never	Rarely	At times	Often	Permanently
HTN_PHY_2	Dull pressing or aching pain in the back or other part of the head	Never	Rarely	At times	Often	Permanently
HTN_PHY_3	Rush of blood, fever sensation	Never	Rarely	At times	Often	Permanently
HTN_PHY_4	Muscae volitantes, visual snow	Never	Rarely	At times	Often	Permanently
HTN_PHY_7	Nausea with pressure increase	Never	Rarely	At times	Often	Permanently
HTN_PHY_8	Feeling of pressure on the head	Never	Rarely	At times	Often	Permanently
HTN_PHY_9	Trembling in the arms and/or legs	Never	Rarely	At times	Often	Permanently
HTN_PHY_10	How worried were you of the symptoms of high blood pressure?	Did not worry	A bit	Moderately	Highly	Very worried
HTN_PHY_12	How often have you noticed high blood pressure?	Never	Very rarely (1-2 times a month)	At times (1-2 times a week)	More than 3 times a week	Every day
PHY 1_2	Vertigo	Never	Rarely	At times	Often	Permanently

PHY 1_4	Tightness in the chest	Never	Rarely	At times	Often	Permanently
PHY 1_6	Numbness in limbs	Never	Rarely	At times	Often	Permanently
PHY 1_10	Swelling of the legs	Never	Rarely	At times	Often	Permanently
PHY 1_11	Frequent night urination	Never	Rarely	At times	Often	Permanently
PHY 1_13	Increased sweating	Never	Rarely	At times	Often	Permanently
PHY 1_16	Sudden turbidity, blurriness, grey-out	Never	Rarely	At times	Often	Permanently

How often <u>OVER THE LAST 4 WEEKS</u> have you noted the following disorders?						
		5	4	3	2	1
PHY 2_1	Poor general state	Never	Rarely	At times	Often	Permanently
PHY 2_2	Weakness, lethargy	Never	Rarely	At times	Often	Permanently
PHY 2_7	Frequent night awakenings	Never	Rarely	At times	Often	Permanently

Annex 1

Please answer the following questions about your health status now.						
		5	4	3	2	1
PHY 3_3	Do you feel anxiety or depression because of your health?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
		1	2	3	4	5
PHY 3_5	Are you satisfied with your physical condition, performance?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
PHY 3_8	Do you feel healthy?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
To what extent has your physical and general state limited you in the following activities <u>OVER THE LAST 4 WEEKS</u> ?						
		5	4	3	2	1
PHY 4_2	Lift and/or carry a bag of groceries, weights	Not at al	A bit	Moderately	Rather	Extremely
PHY 4_7	Walk a few blocks	Not at al	A bit	Moderately	Rather	Extremely
Did your physical condition affect your daily activities <u>IN THE LAST 4 WEEKS</u> in such a way that:						
		5	4	3	2	1
PHY 4_9	I had to reduce the amount of time spent on work or other matters	Never	Rarely	At times	Often	Permanently
PHY 4_13	Doing work required extra effort or extra time	Never	Rarely	At times	Often	Permanently
<u>OVER THE LAST 4 WEEKS</u> , to what extent did your physical condition limit you in the following activities:						
		5	4	3	2	1
PHY 4_19	In your favorite activities	Not at al	A bit	Moderately	Rather	Extremely
PHY 4_20	In intimate life	Not at al	A bit	Moderately	Rather	Extremely

COMBINED_PSY

How often <u>OVER THE LAST 4 WEEKS</u> have you noted the following emotional states?						
		5	4	3	2	1
PSY 1_1	Anxiety, emotional stress	Never	Rarely	At times	Often	Permanently
PSY 1_2	Sudden and baseless scare	Never	Rarely	At times	Often	Permanently
PSY 1_3	Tearfulness , low mood	Never	Rarely	At times	Often	Permanently
PSY 1_23	Frequent and baseless change in sentiment	Never	Rarely	At times	Often	Permanently
PSY 1_25	Constant anxiety	Never	Rarely	At times	Often	Permanently
PSY 1_28	Loss of pleasure from what used to afford it	Never	Rarely	At times	Often	Permanently
PSY 1_30	Feeling that you do everything very slowly	Never	Rarely	At times	Often	Permanently
PSY 1_33	Feeling of burnout	Never	Rarely	At times	Often	Permanently

How often <u>OVER THE LAST 4 WEEKS</u> have you noted the following manifestations?						
		5	4	3	2	1
PSY 2_1	Forgetfulness	Never	Rarely	At times	Often	Permanently
PSY 2_2	Difficulties remembering a new	Never	Rarely	At times	Often	Permanently
PSY 2_5	Distraction, difficulty in focusing	Never	Rarely	At times	Often	Permanently
PSY 2_7	Feeling that you began to think slower	Never	Rarely	At times	Often	Permanently
Please answer the following questions about how you satisfy with yourself and life now.						
		1	2	3	4	5
PSY 3_2	Do you feel that your life is meaningful?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
PSY 3_9	Do you feel that you are managing the events of your own life?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes

<u>OVER THE LAST 4 WEEKS</u> , how often your emotional state influenced your daily activities in such a way that:						
		5	4	3	2	1
PSY 4_2	Completed less than desirable	Never	Rarely	At times	Often	Permanently
PSY 4_5	Doing work required extra effort or extra time	Never	Rarely	At times	Often	Permanently
<u>OVER THE LAST 4 WEEKS</u> , did it happen that problems with memory, attention concentration or fast mental fatigue influenced your daily activities in such a way that:						
		5	4	3	2	1
PSY 4_8	Did not do job or other tasks as accurately as usual	Never	Rarely	At times	Often	Permanently
PSY 4_9	Doing work required extra effort or extra time	Never	Rarely	At times	Often	Permanently
<u>FOR THE LAST 4 WEEKS</u> , to what extent did your emotional state limit you in the following activities:						
		5	4	3	2	1
PSY 4_11	In work (in professional activities, training or household chores)	Not at all	A bit	Moderately	Rather	Very much
PSY 4_14	In your hobby, favorite activities	Not at all	A bit	Moderately	Rather	Very much

Please answer the following questions about how you evaluate the change in your mood and mental performance.						
		1	2	3	4	5
PSY 5_5	How do you assess your satisfaction with yourself and life now compared to year earlier?	Significantly worse	A bit worse	No change	A bit better	Significantly better
PSY 5_6	How do you assess your memory, attention and mental performance now compared to year earlier?	Significantly worse	A bit worse	No change	A bit better	Significantly better

Please answer how relevant the following statements consist to your point of view.						
a.		1	2	3	4	5
HTN_PSY_1	Believe that I am healthy, and high blood pressure is not a disease and cannot be a cause for worry	Certainly yes	Probably yes	Tough to tell	Probably not	Certainly not
b.		1	2	3	4	5
HTN_PSY_3	I constantly think about how to fight against with hypertension (high blood pressure)	Certainly yes	Probably yes	Tough to tell	Probably not	Certainly not
HTN_PSY_4	I am depressed and worried by the idea that the treatment of hypertension (high blood pressure) should be constantly carried out	Certainly yes	Probably yes	Tough to tell	Probably not	Certainly not

COMBINED_SOC

Please note how satisfied you are currently with...						
		5	4	3	2	1
SOC 1_1	... your financial situation	Completely satisfied	Rather satisfied	Tough to tell	Rather not satisfied	Completely not satisfied
SOC 1_8	... recreational opportunities	Completely satisfied	Rather satisfied	Tough to tell	Rather not satisfied	Completely not satisfied

Please answer the questions regarding your social environment.						
		1	2	3	4	5
SOC 2_3	Do you always have the opportunity to get the information you need in everyday life?	Never	Rarely	At times	Often	Permanently
SOC 2_5	Do you often get information for everyday life from your friends, relatives (for example, about a good doctor, interesting film, etc.)?	Never	Rarely	At times	Often	Permanently
SOC 2_8	Do you feel that there are enough people around with whom you have a good relationship?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes

a. Please answer the questions regarding medical care availability for you.		1	2	3	4	5
SOC_3_3	Is the medical care you need available for you?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
HTN_SOC_3	Are you satisfied with how your doctor treats hypertension (high blood pressure)?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
Please mark the appropriate answer describing the situation FOR THE LAST 4 WEEKS?						
b.		5	4	3	2	1
HTN_SOC_5	How often did the pressure increase interfere you continuing a normal family, friendly conversation, or professional?	Never	Rarely	At times	Often	Very Often
HTN_SOC_7	How often did you have to put off your household or referral tasks for a while to tackle the blood pressure increase?	Never	Rarely	At times	Often	Very Often

COMBINED_THER

a. Please answer the following questions regarding your satisfaction with the treatment.		1	2	3	4	5
THER_1_1	Are you satisfied with the treatment?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
HTN_THER_1	In your opinion, is the treatment of hypertension (high blood pressure) prescribed for you effective now?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
HTN_THER_2	In your opinion, is the treatment of hypertension (high blood pressure) prescribed for you required now?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
		1	2	3	4	5
THER_2_1	How has your performance changed during/after treatment?	Significantly worsened	Worsened a bit	No change	Improved a bit	Significantly improved
THER_2_2	How has your general state changed during/after treatment?	Significantly worsened	Worsened a bit	No change	Improved a bit	Significantly improved
THER_2_3	The number and intensity of the symptoms during/after treatment...	Significantly increased	Increased a bit	No change	Decreased a bit	Significantly decreased

Annex 1

		1	2	3	4	5
THER 3_1	How has your usual emotional state changed during/after treatment?	Significantly worsened	Worsened a bit	No change	Improved a bit	Significantly improved
		5	4	3	2	1
THER 5_1	Do you find the regimen of your prescribed medication too complicated?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
THER 5_2	Do you find the doctor's recommendations for lifestyle changing too complicated?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
THER 5_3	How difficult is it for you to follow the doctor's recommendations regarding medication and lifestyle changes?	Certainly easy	Rather easy	Tough to tell	Rather difficult	Very difficult
THER 5_6	How often do you have side effects from medications prescribed by your doctor?	Never	Rarely	At times	Often	Permanently
THER 5_7	How worried are you about the side effects of prescribed medications?	Do not worry	A bit	Moderately	Much	Extremely
b.		5	4	3	2	1
HTN_THER_3	How often do you keep from buying antihypertensive drugs prescribed by your doctor?	Never	Rarely	At times	Often	Permanently
HTN_THER_4	How often have you missed taking antihypertensive drugs due to fear of side effects?	Never	Rarely	At times	Often	Very often
HTN_THER_5	Can you independently replace the medications prescribed by your doctor?	Certainly not	Probably not	Tough to tell	Probably yes	Certainly yes
THER 6_6	How often do you independently change the dosage of the prescribed medicine?	Never	Rarely	At times	Often	Permanently
THER 7_2	Do you follow the doctor's recommendations regarding physical activity and exercise?	Yes always	Usually yes	At times	Rarely or selectively	No, never
THER 7_3	Do you follow the doctor's recommendations regarding the diet regimen and composition?	Yes always	Usually yes	At times	Rarely or selectively	No, never