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Original Article

Validation and Factor Analysis of the Lithuanian Version of the Dizziness Handicap Inventory

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OBJECTIVES: This study aimed to validate the Lithuanian version of the Dizziness Handicap Inventory (DHI-L), investigate its reliability, and perform factor analysis.

MATERIALS and METHODS: A standard protocol of translation was followed for psychometric instruments. A total of 108 patients (75.9% women), mean age 51.9 years, with peripheral or central dizziness and vertigo participated in our cross-sectional study. The internal consistency was measured by Cronbach's alpha coefficient and corrected item-total correlations (CI-TCs). After a week, 65 of the recruited patients were again asked to fill out Dizziness Handicap Inventory (DHI)-L to ascertain test-retest reliability (intraclass correlation, ICC). Concurrent validation was performed using Pearson correlation between the total score and subscales of DHI-L and the eight scales of Short Form-36 Health Survey (SF-36). Finally, the factor structure of the DHI was assessed by principal component analysis (PCA).

RESULTS: The Cronbach's alpha coefficient was very high (0.91). CI-TCs for DHI-L total scale ranged from 0.33 to 0.67. The correlations between DHI and SF-36 were high to weak. The ICC was excellent for the total score and its subscales. Our proposed two-factor model explained 44.5% of the variance. The first factor indicated disability in daily activities and psychological effect of handicap. The second factor comprised of items that pertained to postural instability.

CONCLUSION: The DHI-L has shown good reliability and validity. Results did not support the original subscale structure of the DHI. As more studies need to be done to restructure DHI, we recommend only using the total DHI score as a measure of dizziness handicap.

KEYWORDS: Dizziness, quality of life, factor analysis

INTRODUCTION

Epidemiological studies estimate that the prevalence of dizziness is between 17% and 30% in the general adult population [1]. Dizziness is even more common among the elderly as its prevalence significantly increases with age [2, 3], and has a negative impact on patients' everyday activities [4]. Given the recognized dissociation between clinical tests of vestibular function and clinical outcome [5], and that dizziness is ultimately a percept, objective assessments are inadequate to measure the effects these symptoms have on a person's functional well-being [6].

Various self-perceived questionnaires have been designed to measure the Quality of life (QoL) in general or because of a specific condition. One of the latter is the Dizziness Handicap Inventory (DHI), which was developed by Jacobson and Newman in 1990 as an

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instrument for patients with vestibular and/or balance impairment [7]. The DHI is a validated, self-reported questionnaire that is widely used to evaluate balance dysfunction and its handicapping impact on a person [8].

The DHI was originally developed in English and has already been translated into many languages, including Dutch [9], Chinese [10], Japanese [11], and German [12]. However, to date, there has been no validated Lithuanian language questionnaire to measure the QoL specifically for patients with dizziness. The primary aim of this study was to examine the validity, internal consistency, and test-retest reliability of our Lithuanian translation of the DHI. A further objective was to assess the factor structure of the translated Lithuanian DHI.

MATERIALS AND METHODS

Translation

To translate the questionnaire and adapt it to the Lithuanian population, we received permission from Prof. G.P. Jacobson, who developed the original DHI scale [7]. We opted to translate and adapt the scale in accordance with the good practice guidelines [13]. Two translators-an otoneurologist (K.R.) and a professional translator (L.V.)-independently made their individual translations from the original English to Lithuanian. Two neurologists (R.M. and A.U.) compared the translated versions and resolved the disparities. Two bilingual native speakers of English and Lithuanian with no previous medical background did back-translation of the revised version separately. When the two back-translated versions were compared, no major discrepancies were found. So, we performed a pilot study with the synthesized draft. Ten target population patients were given the translated DHI questionnaire and consequently debriefed for possible conceptual errors or difficulties in understanding the questions. As no discrepancies were reported, the translation was considered complete and ready for further validation.

Design

The study received approval from the local ethical committee conforming to the Declaration of Helsinki. We employed a cross-sectional study design to test the reliability in terms of internal consistency as well as concurrent validation. Longitudinal design was used to measure test-retest reliability. The study took place in a tertiary hospital between January and March 2017. Patients were recruited from outpatient ear, nose, and throat (ENT) and inpatient neurology clinics. Included were patients who complained of and were diagnosed with dizziness or vertigo, resulting from either peripheral or central pathology, at least 18 years old, and spoke Lithuanian as a native language. Patients were excluded from the study if they had one of the following conditions: any speech or language impairment, dementia, psychiatric disorders, musculoskeletal diseases, cerebellar ataxia, severe paresis, spasticity, or extrapyramidal diseases. One patient's data were excluded from the final analysis because of incomplete profile. All of participants' written consents were collected before including them in the study.

Measures

The DHI is comprised of 25 discrete items. Each item is answered with the responses: No (0 points), Sometimes (2 points), or Yes (4 points). Scores on the DHI can be further subdivided into physical (DHI-P, 28 points), functional (DHI-F, 36 points), and emotional (DHI-E, 36 points) subscales. The higher the score, the greater is the perceived handicap, with 100 being the highest possible. The original DHI was reported to have high internal consistency (Cronbach's alpha: 0.72-0.89) and test-retest reliability (r=0.92-0.97) [7].

To perform concurrent validation, we chose the Medical Outcomes Study Short Form - Health Survey (SF-36), which has already been adapted and validated for the Lithuanian population [14]. The SF-36 is a generic QoL questionnaire, not pertinent to a specific condition. Lithuanian version of SF-36 is comprised of 36 items divided into eight scales: physical functioning (10 questions), physical role (4 questions), body pain (2 questions), and general health (5 questions), comprised of vitality (4 questions), social functioning (2 questions), emotional role (4 questions), and mental health (5 questions). All of the scales are scored from 0 to 100 (a higher score implies better health outcomes).

Reliability was assessed by measuring internal consistency and test-retest reliability. Internal consistency was assessed by calculating Cronbach's alpha coefficient for the total score and for the three subscales. The frequency distribution of each item was evaluated for possible floor or ceiling effects. The strength of association between the items was evaluated by corrected item-total correlation (CI-TC). Test-retest reliability was assessed by computing the agreement between the test and retest by means of the interclass correlation coefficient (ICC). We chose the two-way random effects, single measure, absolute agreement model (ICC 2/1).

Because several studies have proposed alternative factor structures and the factor structure is not established, an exploratory factor analysis was performed for the DHI Lithuanian version[15,16]. We used principal component analysis (PCA), which is suitable to confirm the structure of the data in questionnaires of a multidimensional nature, such as the DHI-L [17]. Some assumptions had to be met so that PCA could be performed: Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy had to be above 0.75; in addition, the data had to be suitable for reduction as measured by highly statistically significant Bartlett's test of sphericity ($p<0.001$) [18]. We used parallel analysis (a statistical method that identifies the break in the scree plot) as it is considered to be the most accurate method to determine factor retention [17]. For the factor to be stable, it should contain a minimum of at least four variables, and at least four factor loadings should be >0.6 [17]. A sample of 100-200 subjects is sufficient for communalities in the 0.5 range [19].

Concurrent validation was carried out by examining the linear link between the DHI-L total score and its subscales with the eight scales of Lithuanian SF-36 using the Pearson product-moment correlation coefficient (r). We assessed the strength of the correlations as recommended by Cohen et al. [20]: r=0.10-0.29=small (low correlation); r=0.30-0.49=medium (moderate correlation); r=0.50-1.0=large (high correlation). Bonferroni adjustments for statistical significance were made for multiple comparisons.

Statistical Analysis

We performed descriptive statistics on patient demographic characteristics. The Kolmogorov-Smirnov Test was used to check the data for normality. Statistical analysis was performed with the Statistical

Package for Social Sciences version 23.0 (IBM Corp.; Armonk, NY, USA) computer software. Sample size was reduced for some analyses in cases where data were missing.

RESULTS

The Participants

We recruited 108 patients with a mean age (standard deviation, SD) of 51.9 (16.1) years. Table 1 lists the patient demographic characteristics. A subgroup of 65 patients were retested one week later, either by answering the DHI-L questions by phone (56.9%) or by filling out the questionnaire online (43.1%). One week interval was chosen to lower the risk of recall bias, while preserving the clinical condition [10, 12, 21].

Reliability

Patient scores ranged from 0 to 86 points. No single item had a predominant answer (0, 2, 4) chosen more than 75% of the time, thus, excluding a floor or ceiling effect. The Cronbach's alpha coefficient for the total scale was very high (0.91) and acceptable (0.82, 0.70, 0.83) for the functional, physical, and emotional subscales, respectively. The value coefficients were comparable to previously translated versions as well as to the original DHI [7, 21, 22]. The CI-TCs) for DHI-L total scale ranged from 0.33 (item P13) to 0.67 (item E9) (Table 2), which is comparable to the original DHI version. The functional subscale CI-TC values ranged from 0.40 (items F5, F12, F19) to 0.68 (item F14), the physical subscale CI-TC values ranged from 0.27 (item P8) to 0.50 (items P4 and P17), while the emotional subscale values ranged from 0.32 (item E2) to 0.65 (item E9).

Sixty-five participants (60.7%) completed the follow-up questionnaire. Table 3 shows the scores and their differences between the test and retest. Questionnaire's test-retest reliability was satisfactory as the intraclass correlation coefficient was shown to be high for the total score (ICC 1/2 0.90) and for each of the three subscales separately.

Table 1. Demographic characteristics of participants of DHI-L validation

	Study population	Test-retest subgroup
	(n=108)	(n=65)
Gender, n (%)		
Female	82 (75.9)	52 (80.0)
Male	26(24.1)	13 (20.0)
Mean age, years (SD)	51.9 (16.1)	50.4 (15.3)
Duration of dizziness or unsteadiness (n [%])		
<1 month	14 (13.5)	3 (4.6)
>1 mo and maximum 6 mo	16 (15.4)	10 (15.4)
>6 mo and maximum 12 mo	17 (16.3)	12 (18.5)
>12 months	57 (52.7)	38 (58.5)
Diagnostic groups, n (%)		
Peripheral vestibular disorder	90 (83.3)	59 (90.8)
Central vestibular disorder	18 (16.7)	6 (9.2)

DHI-L: Lithuanian adaptation of the Dizziness Handicap Inventory; SD: Standard Deviation

Validation

Table 4 shows the correlation coefficients between the SF-36 subscales, DHI-L total score, and its subscales. The total score of DHI as well as functional, physical, and emotional subscales correlated statistically significantly with physical functioning, physical and emotional role, and body pain scales of SF-36. As the SF-36 score has an opposite direction than DHI (higher score means better health condition), all the correlation coefficients are negative.

Factor Analysis

Data were suitable for factor analysis as Bartlett's test was highly statistically significant ($p<0.0001$), and the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.83. Eighteen measures were above 0.80, and seven were above 0.65, which showed that the data were adequately sampled. We performed parallel analysis that provided a two-factor solution. It explained 44.5% of the variance. Most commonalities were in the 0.5 range, the lowest of which (0.23) was for the item P8 (ambitious activities like sports). Table 5 shows all the factor loadings.

The first factor in the two-factor solution had most of the DHI items, 18 in all, 11 of these had factor loadings higher than 0.6. Almost all of the items from the emotional and functional subscales were part of this factor. Only two items P8 (ambitious activities like sports), P4 (walking down a supermarket aisle) from the original physical scale were part of the first component. The second factor was mainly comprised of the items from the original physical scale, also items F5 (getting into or out of bed), E2 (feeling frustrated), F12 (avoid heights), four of the seven had factor loadings higher than 0.6. Item E22 loaded into first and second factors almost equally, 0.41 and 0.40, respectively.

DISCUSSION

The primary aim was to provide a tool for Lithuanian physicians and researchers to measure the effects of vertigo and dizziness on a person's well-being. Even though the SF-36 is available to measure QoL, disease-specific QoL instruments are more sensitive and, therefore, more useful in clinical practice [23]. The DHI-L showed adequately high internal consistency, which was above the threshold value of 0.7, recommended by Nunnally for the scale and its subscales [24]. All of CI-TCs were above the minimum recommended value of 0.20 [25]. The test-retest reliability (as measured by ICC) was higher than the recommended value (0.70) for the DHI-L total score and each of the subscales. Altogether, we found DHI-L to be highly reliable. As in numerous previous translation studies, our study has shown that the DHI is highly cross-culturally adaptable [8]. Since the items are parsimonious and easily understood by a variety of cultures, the DHI items seem to have inherent conceptual equivalence. This could be the reason why most of the translation studies have measurement equivalence with the original DHI.

The correlations between SF-36 and DHI-L was high to weak, comparable to the results from previous studies [22, 26]. Previous studies that compare a general and a disease-specific questionnaire have shown that they usually correlate moderately to poorly, and the strongest correlation is often with the physical functional part of the general scale [27]. Our study confirms this as the strongest correlation was

Table 2. Corrected item-total correlation coefficients (CI-TCs) of the DHI-L and the original version of the Dizziness Handicap Inventory

Item	DHI questions	DHI-US (n=106)	DHI-L (n=107)	DHI-L Functional subscale	DHI-L Physical subscale	DHI-L Emotional subscale
P1	Does looking up increase your problem?	0.54	0.38		0.43	
E2	Because of your problem, do you feel frustrated?	0.34	0.35			0.32
F3	Because of your problem, do you restrict your travel for business or recreation?	0.76	0.54	0.54		
P4	Does walking down the aisle of a supermarket increase your problem?	0.39	0.53		0.50	
F5	Because of your problem, do you have difficulty getting into or out of bed?	0.50	0.46	0.40		
F6	Does your problem significantly restrict your participation in social activities such as going out to dinner, going to movies, dancing, or to parties?	0.69	0.60	0.60		
F7	Because of your problem, do you have difficulty reading?	0.44	0.53	0.51		
P8	Does performing more ambitious activities like sports, dancing, household chores such as sweeping or putting dishes away increase your problem?	0.54	0.36		0.27	
E9	Because of your problem, are you afraid to leave your home without having someone accompany you?	0.43	0.67			0.65
E10	Because of your problem, have you been embarrassed in front of others?	0.46	0.56			0.53
P11	Do quick movements of your head increase your problem?	0.51	0.41		0.47	
F12	Because of your problem, do you avoid heights?	0.49	0.45	0.40		
P13	Does turning over in bed increase your problem?	0.43	0.33		0.30	
F14	Because of your problem, is it difficult for you to do strenuous housework?	0.58	0.65	0.68		
E15	Because of your problem, are you afraid people may think you are intoxicated?	0.30	0.42			0.43
F16	Because of your problem, is it difficult for you to go for a walk by yourself?	0.62	0.68	0.62		
P17	Does walking down a sidewalk increase your problem?	0.58	0.58		0.50	
E18	Because of your problem, is it difficult for you to concentrate?	0.49	0.57			0.48
F19	Because of your problem, is it difficult for you to walk around your house in the dark?	0.48	0.50	0.40		
E20	Because of your problem, are you afraid to stay home alone?	0.27	0.63			0.62
E21	Because of your problem, do you feel handicapped?	0.41	0.51			0.54
E22	Has your problem placed stress on your relationship with your family or friends?	0.46	0.62			0.62
E23	Because of your problem, are you depressed?	0.41	0.59			0.61
F24	Does your problem interfere with your job or household responsibilities?	0.56	0.57	0.59		
P25	Does bending over increase your problem?	0.57	0.46		0.43	

DHI-Dizziness Handicap Inventory; DHI-L-Lithuanian adaptation of the DHI; DHI-US-the original DHI

Table 3. Distribution of the DHI-L test and DHI-L retest investigation scores (n=65)

	DHI-L test		DHI-L retest				
	n	Median (range)	Mean (SD)	Median (range)	Mean (SD)	Mean difference (SD), (95% CI)	ICC 2/1 (95% CI)
DHI-L total scale	65	32 (4-86)	36.7 (19.6)	30 (0-86)	32.3 (19.0)	−4.43 (11.3), [−7.24; −1.62]	0.90 [0.81; 0.94]
Functional subscale	65	14 (0-34)	14.0 (8.4)	10 (0-34)	12.5 (8.6)	−1.5 (6.82), [0.15; 2.80]	0.88 [0.81; 0.93]
Physical subscale	65	10 (0-24)	11.1 (5.6)	10 (0-22)	9.6 (5.8)	−1.4 (5.0), [0.41; 2,42]	0.84 [0.72; 0.90]
Emotional subscale	65	10 (0-34)	11.7 (8.0)	8 (0-32)	10.1 (7.4)	−1.5 (5.8), [0.25; 2,83]	0.86 [0.77; 0.92]

HI-L-Lithuanian adaptation of the Dizziness Handicap Inventory; SD: Standard Deviation; CI-confidence interval; ICC 2/1-Intraclass correlation, two-way random effects model, single measure model.

Table 4. Correlations between SF-36 subscales, DHI-L total score, and DHI-L functional, emotional, and physical subscales

	Physical	Emotional	Functional	DHI-L Total
Physical Functioning	–0.543	–0.453	–0.438	–0.522
Physical Role	–0.511	–0.464	–0.453	–0.526
Role Emotional	–0.390	–0.462	–0.415	–0.474
Social Functioning	0.125	0.147	0.013	0.099
Body Pain	0.396	0.365	0.351	0.410
General Health	0.078	0.243	0.198	0.204
Vitality	0.047	–0.034	0.003	0.002
Mental Health	–0.007	–0.122	–0.064	–0.077

Pearson correlations surviving Bonferroni corrected threshold for significance p=0.0015 are bolded; SF-36-Medical Outcomes Study 36-Item Short Form Health Survey; DHI-L-Lithuanian adaptation of the DHI

found between the physical DHI subscale and the physical functioning scale (r=–0.54). Overall, concurrent validation was successful as the DHI correlated with the SF-36.

As in all of the previous studies, the original structure of the three subscales did not hold under scrutiny when we performed the factor analysis and resulted in our dismissal of the subscales [11, 15, 16, 28]. This is not surprising as the subscales were constructed primarily by clinical intuition, not by data analysis [7].

As suggested by parallel analysis, our two-factor solution is both clinically intuitive and reliable as determined by Cronbach's alpha of 0.91 and 0.76 for the first and second factors, respectively. Both factors had more than four items with loadings above 0.6. In addition, the factor structure was "clean" as there was only one item (E22) that cross-loaded substantially, and all the factor loadings were above the recommended threshold value of 0.36 [29].

Table 5. The two-factor solution of the DHI-L, compared to previous literature

	DHI-L		Tamber et al. [15]		Asmundson et al. [28]		Vereeck et al. [9]		Goto et al. [11]	
	1	2	1	2	1	2	1	2	1	2
E9 afraid of leaving home alone	0.93		0.43		0.57	0.37	0.71		0.72	
F16 walking by yourself	0.85		0.35	0.37	0.64	0.38	0.65		0.75	
F24 job/house responsibilities	0.77		0.71		0.81		0.48	0.41	0.65	
E20 afraid to stay home alone	0.76		0.31		0.5	0.36	0.55		0.54	
E18 difficulties in concentrating	0.71		0.69		0.7			0.56	0.68	
F14 strenuous housework	0.69		0.43		0.81		0.54	0.49	0.62	0.48
E10 embarrassed in front of others	0.67				0.73		0.71		0.75	
F7 difficulties in reading	0.65			0.4	0.64			0.52	0.70	
F3 restriction of travel	0.64		0.61		0.75		0.67		0.64	
F6 restriction of social activities	0.62		0.79		0.81		0.70		0.73	
P17 walking down a sidewalk	0.61			0.3	0.54	0.44	0.46	0.45	0.57	
E23 feeling depressed	0.56		0.61		0.75		0.70		0.64	
P8 ambitious activities like sports	0.49			0.53	0.59			0.71	0.42	0.60
E15 afraid of appearing intoxicated	0.46			0.35	0.46		0.52		0.40	
P4 walking down a supermarket aisle	0.46				0.74	0.37	0.34	0.54	0.49	
F19 walking around in dark	0.45			0.52	0.59		0.36	0.46	0.65	
E21 feeling handicapped	0.43		0.79		0.75		0.80		0.63	
E22 stressed relationships	0.41	0.40	0.74	–0.39	0.71				0.59	
P13 turning over in bed		0.90		0.55		0.75		0.55		0.63
P1 looking up		0.65		0.73	0.48			0.55		0.81
P11 quick head movements		0.62		0.58	0.58			0.75		0.75
F5 getting into or out of bed		0.60		0.64		0.64	0.40	0.36		0.51
P25 bending over		0.47		0.76	0.58			0.63		0.79
E2 feeling frustrated		0.47	0.55		0.63		0.63		0.466	
F12 avoid heights		0.42		0.3	0.43		0.49	0.40	0.476	

DHI-L-Lithuanian adaptation of the DHI. Absolute values are shown. Loadings with absolute values of 0.6 or more are bolded. Factor loadings <0.3 are omitted.

Our two-factor solution was similar to some previous studies' factor structures, as shown in Table 5 [11, 15, 28, 30]. The first factor indicated disability in daily activities and the psychological effect of handicap. The items that loaded the most, for example, item E9 (afraid of leaving home alone), F16 (walking by yourself), F24 (job/house responsibilities), and E20 (afraid to stay home alone) were concerned with the lack of independence. These four items, along with the items E18 (difficulties in concentrating), F14 (strenuous housework), E10 (embarrassed in front of others), F3 (restriction of travel), E21 (feeling handicapped), P17 (walking down a sidewalk), F6 (restriction of social activities), E23 (feeling depressed) were present in all the two-factor solutions done in other studies with few exceptions [11, 15, 28, 30]. This suggests that the core items of the first factor are reliable and universally capture the feeling of disability and handicap because of dizziness or vertigo. Some items are problematic in the two-factor solution across the languages, however, like item F7 (difficulties in reading), P8 (ambitious activities like sports), P4 (walking down a supermarket aisle), F19 (walking around in dark), E15 (afraid of appearing intoxicated), E22 (stressed relationships) that either cross-loaded into both factors, did not load into any factor enough or at all, or loaded into the second factor. The items might need to be modified because they could be either too specific (item P4 (walking down a supermarket aisle)), culture-dependent (item E15 (afraid of appearing intoxicated)), or context-dependent (item P8 (ambitious activities like sports) or E22 (stressed relationships)). Even though the first factor could be considered non-specific as the items are diverse in their content, we believe it captures the essential burden of dizziness on daily activities and overall well-being.

The second factor comprised of items that pertained to postural instability and the difficulties associated with it. It was stable in almost all of the published versions of two-factor solutions of the DHI (Asmundson et al. [28] being the exception). The five core items-item P13 (turning over in bed), P1 (looking up), P11 (quick head movements), F5 (getting into or out of bed), and P25 (bending over) appear in every iteration of the second factor [11, 15, 30]. It underlies the phenomenon of postural problems of dizziness or specifically vertigo. This factor could affect the patients with benign positional paroxysmal vertigo (BPPV) the most as they are sensitive to movement and posture changes. These five items were used by Chen et al. [31] to develop and validate a five-item questionnaire as a screening tool for potential BPPV, demonstrating that the scale was more valid than DHI for screening patients with BPPV, though further research is needed [31]. As the diagnosis of BPPV is problematic in Lithuania as detailed by Ulytė at al., this could be a useful measure for Lithuanian doctors and patients [32]. The leftover items (item E2 (feeling frustrated) and E12 (avoid heights)) of the second factor were problematic as they loaded poorly and are not so obvious in how they relate to postural disability. In all other studies, these items loaded into the first factor. As communalities were low for both items (0.289 and 0.350, respectively), it suggests that they could underlie a different unrelated factor.

Most of the two-factor solutions seem to suggest a consistent two-factor structure, with both factors being reliable. However, the variance explained is low in all cases. It could be useful to discard the items with the least correlations and relevance to concepts being measured by the two-factor model of DHI to make the DHI more reliable and responsive. Our two-factor solution, in concordance with similar solutions discussed above, suggests that using two different measures (instead of a single DHI measure) could be reasonable. One could be comprised of the first factor as a general measure of disability and handicap because of dizziness, similar by composition to the already validated Dizziness Handicap Inventory dizziness screening version (DHI-S) by Jacobson and Calder [33]. The other, a five-item version of the second factor of the DHI, could be used as a tool to measure the postural difficulties of dizziness.

One of the limitations of our study was the heterogeneity of etiology of dizziness and vertigo in the study group. However, even though DHI was developed for patients with vestibular dizziness, it had been used before in studies as a measurement tool for patients with other causes of dizziness [26, 34]. Moreover, the etiology of dizziness was not shown to significantly affect DHI score [35]. The change in administration of the scale produced a significant mean difference (-6.59 (CI [-9.72; -3.45])) in patients who took the retest by phone. As the mean difference was close to 0 for the participants who filled in the retest online (-0.75 (CI [-6.14; 4.64])), we speculate that this is because of response bias. Nevertheless, as this was not reflected on the ICC, we consider the test-retest reliability of the DHI-L to be sufficiently demonstrated. Another limitation could be the relatively small sample sizes of both the test group (N=108) and retest subgroup (N=65). However, the sample size is comparable to those used in the other DHI translation studies, and is adequate for a translation and validation study [12, 21, 22].

CONCLUSION

The translated and culturally adapted Lithuanian DHI has good reliability and validity. DHI-L is the first Lithuanian questionnaire to measure the impact of dizziness on the QoL. As in previous studies, we could not support the original subscale structure of the DHI. Our two-factor solution seems to be clinically relevant and stable. As more studies need to be done to restructure DHI, we recommend only using the total DHI score as a measure of dizziness handicap.

Ethics Committee Approval: Ethics committee approval was received for this study from the Vilnius Regional Biomedical Research Ethics Committee affiliated to Vilnius University Faculty of Medicine (Protocol No.: VTF2015).

Informed Consent: Written informed consent was obtained from the patients who participated in this study.

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