Factor Analysis of the English Translation of the Neuropsychological Vertigo Inventory (NVI)

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OBJECTIVES

- Vestibular impairments have been associated with a variety of cognitive deficits, most notably deficits in visuo-spatial memory. The Neuropsychological Vertigo Inventory (NVI) was developed to measure self-reported cognitive deficits in patients with dizziness and/or vertigo.
- The original French-language version of the NVI developed by Lacroix et al. (2016) included 28 items and 7 subscales: space perception, time perception, attention, memory, emotion, vision, motor. Permission was obtained to modify the English-language translation of the original NVI (www.nvi-questionnaire.com/en/).
- It should not be assumed that an instrument's validity is maintained after translation and health status questionnaires need to be validated in the setting and with the sample they are designed to assess.
- The purpose of the present investigation was to assess the construct validity of the NVIe in an unselected sample of dizzy patients seen in a tertiary care vestibular clinic in the United States.

DESIGN

Procedures and Participants:

- Several items from the English translation of the NVI were modified in an effort to improve the clarity of the statement. The modified items are shown in the left column of Table 1.
- The English language adaptation of the NVI (NVIe) is shown in the middle column of Table 1, administered to patients evaluated for dizziness and/or vertigo in a tertiary care dizziness clinic.
- Subjects: 280 total, 169 female
- Age: mean 56.1 years, SD 14.96 years
- The individual item scores from the NVIe were subjected to an exploratory factor analysis (EFA) with Varimax rotation. Eigenvalues were also obtained.

NVI English Translation Items provided to our group which were altered before administration of the NVIe		The Neuropsychological Vertigo Inventory (NVIe) You are being evaluated in the Balance Function Laboratory in the Division of Vestibular Sciences. Please complete this questionnaire if you are currently or have experienced dizziness. For each item you will be asked to read the statement and then decide how strongly you agree that the statement describes you.					
1		1	I have difficulty placing major historical events in chronological order.	Never	Rarely	Sometimes	Very Often	Always	1 - S
2	I find it difficult to locate myself on a map.	2	I rely on others to use maps.	Never	Rarely	Sometimes	Very Often	Always	2 - S
3		3	I am a slow reader.	Never	Rarely	Sometimes	Very Often	Always	3 - A
4	I feel tired.	4	I am tired much of the time.	Never	Rarely	Sometimes	Very Often	Always	4 - A
5	I don't know which season we are in.	5	*I am not certain what season we are in.	Never	Rarely	Sometimes	Very Often	Always	5 ---
6	I forget my appointments.	6	I forget appointments.	Never	Rarely	Sometimes	Very Often	Always	6 – T
7		7	I tend to lose track of what I am reading and have to start over again.	Never	Rarely	Sometimes	Very Often	Always	7 – A
8		8	I have problems with my memory.	Never	Rarely	Sometimes	Very Often	Always	8 – A
9	I find it difficult to organize myself.	9	I find it difficult to get organized.	Never	Rarely	Sometimes	Very Often	Always	9 – A
10		10	My eyes feel tired when I use the computer or watch television.	Never	Rarely	Sometimes	Very Often	Always	10 - V
11		11	Table entries and newspaper columns appear jumbled to me.	Never	Rarely	Sometimes	Very Often	Always	11 - V
12		12	I forget birthdays and anniversaries.	Never	Rarely	Sometimes	Very Often	Always	12 - T
13	I have a poor sense of direction.	13	I rely on others to remember and use directions that I have requested.	Never	Rarely	Sometimes	Very Often	Always	13 - S
14	I don't always know what year we are in.	14	*I am not certain what year this is.	Never	Rarely	Sometimes	Very Often	Always	14 ---
15		15	*I am not very good with my hands when it comes to do it yourself projects.	Never	Rarely	Sometimes	Very Often	Always	15 ---
16	When I go out I have trouble finding my way back.	16	I think I have more trouble than most finding my car in a large parking lot.	Never	Rarely	Sometimes	Very Often	Always	16 – S
17		17	I feel depressed.	Never	Rarely	Sometimes	Very Often	Always	17 – A
18		18	I am moody.	Never	Rarely	Sometimes	Very Often	Always	18 – A
19		19	I find it difficult to concentrate.	Never	Rarely	Sometimes	Very Often	Always	19 – A
20		20	I am clumsy.	Never	Rarely	Sometimes	Very Often	Always	20 – V
21	I find it hard to remember names of people.	21	*It is difficult for me to remember people's names.	Never	Rarely	Sometimes	Very Often	Always	21 ---
22		22	I am absent-minded.	Never	Rarely	Sometimes	Very Often	Always	22 – T
23		23	*My handwriting is sloppy.	Never	Rarely	Sometimes	Very Often	Always	23 ---
24	I tend to go the wrong way when I set off to go somewhere	24	It is easy for me to get lost walking or driving in an unfamiliar area.	Never	Rarely	Sometimes	Very Often	Always	24 – S
25		25	My balance is poor.	Never	Rarely	Sometimes	Very Often	Always	25 – V
26		26	I find it difficult to get myself going in the morning.	Never	Rarely	Sometimes	Very Often	Always	26 – A
27		27	I get easily confused about what day of the week it is.	Never	Rarely	Sometimes	Very Often	Always	27 – T
28		28	*I am distracted.	Never	Rarely	Sometimes	Very Often	Always	28 ---

Table 1. Left column: shows statements prior to modification. Middle column: shows the NVIe statements that were administered to the study participants. *Asterisk on items removed after factor analysis. Right column: shows where each item fell into the 4 constructs (A = affective state, T = temporal memory, S = spatial memory, V = visual-spatial cognition, --- = eliminated item).

RESULTS

- The results of the data analysis supported eliminating 6 items with poor factor loading
- 6 factors were identified that collectively explained 59% of the variability in the data
- 2 of these factors consisted of 2-items each and no unifying construct was identified, so they were eliminated
- The final version of the NVIe included 22-items with the following 4 constructs:
  - Affective state
  - Temporal memory
  - Spatial memory
  - Visual spatial cognition

CONCLUSIONS

- Original questionnaires and translated questionnaires are not equivalent instruments. Assessments of validity and reliability of newly translated questionnaires should be completed prior to clinical implementation.
- Results of the psychometric analyses on the construct validity of the NVIe showed that it differed from the original English version, resulting in a 22-item scale with 4 neuropsychological constructs.
- A simple self-report questionnaire like the NVIe has the potential to contribute to the identification of cognitive deficits, especially those that may be affected by vestibular impairments, and help in determining which patients may be in need of a referral for a more extensive testing.
- Future investigations on the psychometrics of the 22 items on the NVIe will be completed including studies on reliability and convergent validity.

REFERENCES

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