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ORIGINAL RESEARCH

# Jordanian Arabic Version of the Dizziness Handicap Inventory

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**Objective:** This study aimed to establish and validate a Jordanian Arabic version of the Dizziness Handicap Inventory (DHI-JA) equivalent to the original DHI in English (DHI-E).

**Methods:** The THI-E questionnaires were translated into formal Jordanian Arabic by two bilingual volunteer audiologists. The final version, curated by the author, was administered to 20 participants with normal balance and 64 patients experiencing dizziness at the Middle East Hearing and Balance Centre.

**Results:** The results demonstrated excellent internal consistency and reliability of DHI-JA. A highly significant correlation was observed between the total scores and sub-scores of DHI-JA and DHI-E.

**Conclusion:** This study concludes that the DHI-JA is a valid and reliable tool for assessing the severity of dizziness and balance disorders in the Jordanian Arabic-speaking population.

**Keywords:** dizziness handicap inventory, Arabic dizziness handicap inventory, vertigo, balance disorder

## Introduction

Dizziness, vertigo, and imbalance are prevalent concerns among patients, frequently left untreated, which may ultimately lead to disability. Several investigators reported a remarkable correlation between the presence of vertigo or dizziness, impaired quality of life, and psychiatric comorbidities like depression, reduced daily activities, work incapacity, and psychological distress.[1–6] The Dizziness Handicap Inventory in English (DHI-E) is widely acknowledged as the standardized method for assessing the severity of dizziness and its effects on quality of life.[3,7]

The dizziness handicap inventory (DHI-E) was created by Jacobson & Newman[7] to evaluate the quality of life and its impact on daily functioning for patients suffering from vertigo and dizziness. It is composed of 25 items, with three main subgroups including functional, emotional, and physical aspects of dizziness and unsteadiness. DHI is widely used as a self-reported measurement of dizziness and has been translated to more than 20 languages.

The DHI has been translated to Arabic language by Alsanosi[8] and was conducted in formal Arabic considering the Saudi dialect. There are cultural and Linguistic differences when it comes to Arabic language and it is recommended that Linguistic differences between the source culture and the target Arabic culture should be considered.[9]

The objectives of this study were to generate a new version of the dizziness handicap inventory in the Jordanian Arabic language (DHI-JA), validate the cross-cultural adaptation after translating the questionnaire, assess its internal consistency within the final version, and evaluate the reliability of the DHI-JA.

## Materials and Methods

### Safety and Ethics

The Scientific Research Ethics Committee of the Faculty of Allied Medical Sciences at Al-Ahliyya Amman University adheres to the Helsinki Declaration, a fundamental document for research ethics involving humans and animals. The

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committee also follows the regulations and policies of the Jordanian Ministry of Health and the General Food and Drug Administration in Jordan. Additionally, its procedures align with internationally accepted principles of good clinical practice (Good Clinical Practice-GCP). During a quorum meeting on January 2, 2024, the committee reviewed a research paper submitted by the authors and granted approval (IRB: AAU/6/9/2023-2024). Consequently, all participants signed the consent form before participating in the study.

**Table 1** The Dizziness Handicap Inventory of Jordanian Arabic Language (DHI-JA)

| النسخة الاردنية العربية من تقيم الإعاقة الناتجة عن الدوخة او عدم التوازن | | | | |
|---|---|---|---|---|
| | السؤال | نعم | في بعض الاحيان | لا |
| 1 | هل يزيد شعورك في الدوخة او عدم التوازن عندما تنظر الى اعلى؟ | | | |
| 2 | هل شعورك في الدوخة او عدم التوازن يسبب لك نوع من الإحباط؟ | | | |
| 3 | هل الدوخة او عدم التوازن تعيق ذهابك الى العمل او الترفيه او التنزه؟ | | | |
| 4 | هل المشي في الممرات الضيقة في السوبرماركت او اماكن التسوق يزيد من شعورك في الدوخة او عدم التوازن؟ | | | |
| 5 | نتيجة شعورك في الدوخة او عدم التوازن, هل تجد صعوبة في النوم على السرير او النهوض من السرير؟ | | | |
| 6 | هل تجد نتيجة شعورك في الدوخة او عدم التوازن, صعوبة ومحدودية في المشاركة او القيام بالنشاطات الاجتماعية المختلفة مثل الحفلات والاعراس او الذهاب الى المطاعم او دور السينما؟ | | | |
| 7 | هل تعاني من صعوبة بالقراءة, نتيجة الدوخة او عدم التوازن؟ | | | |
| 8 | هل قيامك بالمجهود الجسدي مثل ممارسة بعض الالعاب الرياضية او الرقص او الاعمال المنزلية مثل تنظيف المنزل يزيد من شعورك في الدوخة او عدم التوازن؟ | | | |
| 9 | هل الدوخة او عدم التوازن تسبب لك الخوف من الخروج من المنزل بدون مرافق؟ | | | |
| 10 | هل اصيبت في الحرج امام الاخرين نتيجة الدوخة او عدم التوازن؟ | | | |
| 11 | هل تحريك راسك بسرعة يسبب زيادة في الدوخة او عدم التوازن؟ | | | |
| 12 | يسبب بالدوخة او عدم التوازن هل تتجنب المرتفعات؟ | | | |
| 13 | هل التقلب في السرير يسبب الزيادة في الشعور بالدوخة او عدم التوازن؟ | | | |
| 14 | بسبب الدوخة او عدم التوازن, هل تتجنب القيام بمجهود شاق في المنزل او الحديقة؟ | | | |
| 15 | هل تخشى أن يظن الناس بأنك تبدو مثل السكران نتيجة الدوخة وعدم التوازن؟ | | | |
| 16 | يسبب الدوخة او عدم التوازن, هل تجد صعوبة في المشي منفردا؟ | | | |
| 17 | هل السير على الرصيف يزيد الدوخة او عدم التوازن؟ | | | |
| 18 | هل تجد صعوبة في التركيز بسبب الدوخة او عدم التوازن؟ | | | |
| 19 | بسبب الدوخة اوعدم التوازن هل تجد صعوبة في السير حول المنزل في الظلام؟ | | | |
| 20 | بسبب الدوخة او عدم التوازن, هل تشعر في الخوف من البقاء في البيت بمفردك؟ | | | |
| 21 | هل تشعر ان الدوخة او عدم التوازن تسبب لك نوع من الإعاقة؟ | | | |
| 22 | هل تسبب لك الدوخة او عدم التوازن توتر علاقتك مع افراد اسرتك او اصدقائك؟ | | | |
| 23 | هل تعاني من اكتئاب بسبب الدوخة او عدم التوازن؟ | | | |
| 24 | هل مشكلة الدوخة او عدم التوازن تتعارض مع وظيفتك أو مسؤولياتك المنزلية؟ | | | |
| 25 | هل الانحناء الى الامام يزيد مشكلة الدوخة او عدم التوازن؟ | | | |

## Participants

The research involved 84 bilingual volunteers (44 males and 40 females) proficient in Arabic and English, recruited from the Middle East Hearing and Balance Centre in Amman, Jordan. It was conducted in two phases, one at the Middle East Hearing and Balance Centre and the other at Al-Ahliyya Amman University, both in Amman, Jordan. The initial phase, comprising translation and validation of questionnaires, occurred from March 2021 to May 2023. The subsequent phase involved human subjects from January 2nd, 2024, to March 1st, 2024. Participants' ages ranged from 18 to 66 years, with an average age of 43.3 years. They were divided into two groups: a control group comprising 20 individuals with normal otological status,[10] including normal hearing thresholds, and no reported history of vertigo, dizziness, or balance issues.

**Table 2** The Dizziness Handicap Inventory of English Language questionnaires[7]

| No | Question | Yes | Occasional | No |
|---|---|---|---|---|
| 1 | Does looking up increase your problem? | | | |
| 2 | Because of your problem, do you feel frustrated? | | | |
| 3 | Because of your problem, do you restrict your travel for business or recreation? | | | |
| 4 | Does walking down the aisle of a supermarket increase your problems? | | | |
| 5 | Because of your problem, do you have difficulty getting into or out of bed? | | | |
| 6 | Does your problem significantly restrict your participation in social activities, such as going out to dinner, going to the movies, dancing, or going to parties? | | | |
| 7 | Because of your problem, do you have difficulty reading? | | | |
| 8 | Does performing more ambitious activities such as sports, dancing, household chores (sweeping or putting dishes away) increase your problems? | | | |
| 9 | Because of your problem, are you afraid to leave your home without having without having someone accompany you? | | | |
| 10 | Because of your problem have you been embarrassed in front of others? | | | |
| 11 | Do quick movements of your head increase your problem? | | | |
| 12 | Because of your problem, do you avoid heights? | | | |
| 13 | Does turning over in bed increase your problem? | | | |
| 14 | Because of your problem, is it difficult for you to do strenuous homework or yard work? | | | |
| 15 | Because of your problem, are you afraid people may think you are intoxicated? | | | |
| 16 | Because of your problem, is it difficult for you to go for a walk by yourself? | | | |
| 17 | Does walking down a sidewalk increase your problem? | | | |
| 18 | Because of your problem, is it difficult for you to concentrate | | | |
| 19 | Because of your problem, is it difficult for you to walk around your house in the dark? | | | |
| 20 | Because of your problem, are you afraid to stay home alone? | | | |
| 21 | Because of your problem, do you feel handicapped? | | | |
| 22 | Has the problem placed stress on your relationships with members of your family or friends? | | | |
| 23 | Because of your problem, are you depressed? | | | |
| 24 | Does your problem interfere with your job or household responsibilities? | | | |
| 25 | Does bending over increase your problem? | | | |

A patient group of 64 individuals (77%) experiencing dizziness or balance disorders for over 6 months (average duration 14.3 years, ranging from 0.7 to 36.2 years). The patient group was further classified based on their diagnoses, including benign paroxysmal positional vertigo (BPPV) (posterior canals: R = 6 and L = 5; Lateral canals: R = 4 and L = 5; superior canals: R = 2 and Lt = 0), unilateral or bilateral vestibular hypofunctions, Ménière's disease, vestibular neuritis, and central vestibular disorders. Thirteen participants were excluded due to middle ear infections.

## Procedure

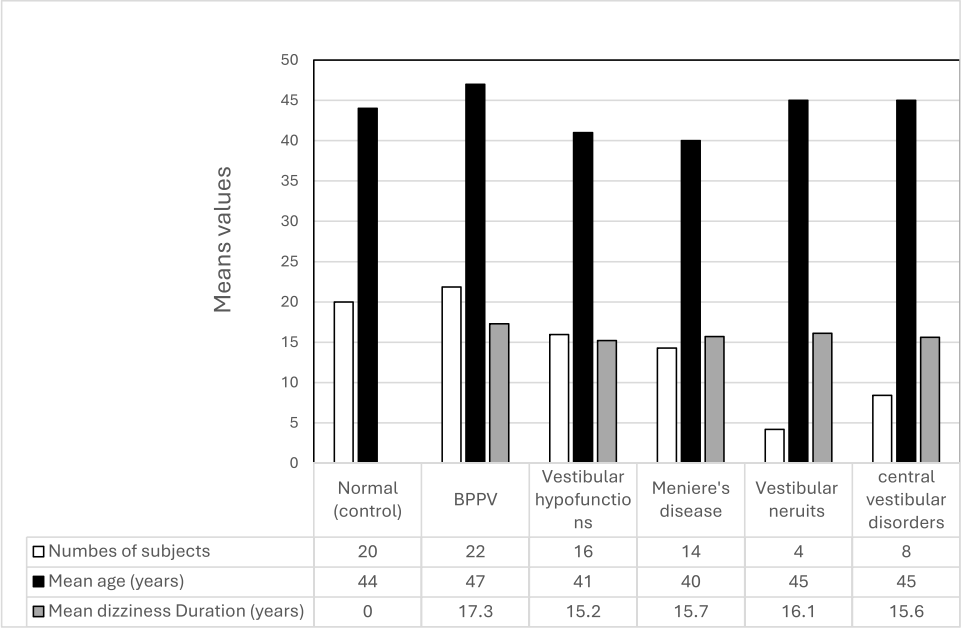
The author utilized Wild et al,[11] the good practice guideline to translate the DHI-E to Jordanian Arabic DHI. The translation took place by two bilingual native speakers of Jordanian Arabic and British English Languages. Both volunteers were clinical audiologists with experience of working with dizzy patients. The text of the two translated versions by the two volunteers from English language to Jordanian Arabic language were given to professional translator to do backward translation to English language. The two documents were evaluated by other bilingual Jordanian Arabic and English languages speakers. The results illustrate no significant difference between the two translated texts. Then, the authors curated the final DHI-JA version. The questionnaires answers were as follows: No = 0 point, Occasional = 2 points, and Yes = 4 points. The questionnaire's reliability was assessed using the Cronbach's alpha test, and the same test was used to assess total and subscales of the DHI-JA, which were classified in three subscales: functional, emotional, and physical.

The subjects filled the questionnaires twice, half of them started with the DHI-JA then the DHI-E, and the second half started with the DHI-E then the DHI-JA Table 1 and 2.

Statistical analysis was conducted using The IBM® SPSS® software version 22. The data were analysed using ANOVA, Spearman and Pearson tests, and Cronbach's Alpha coefficient test to measure the repeatability and correlation between the DHI-JA scores and the DHI-E scores.

# Results

Figure 1 displays the distribution of participants according to their diagnoses. The control group comprised 20 individuals, roughly 23% of the total, who reported no history of hearing loss, vertigo, dizziness, balance issues, or ear problems. Conversely, 64 subjects, approximately 77%, reported experiencing persistent vertigo, dizziness, or balance disorders lasting more than 6 months. Within the group experiencing vertigo, dizziness, and balance disorders, the




| | Normal (control) | BPPV | Vestibular hypofunctions | Meniere's disease | Vestibular neruits | central vestibular disorders |
|---|---|---|---|---|---|---|
| Numbes of subjects | 20 | 22 | 16 | 14 | 4 | 8 |
| Mean age (years) | 44 | 47 | 41 | 40 | 45 | 45 |
| Mean dizziness Duration (years) | 0 | 17.3 | 15.2 | 15.7 | 16.1 | 15.6 |

**Figure 1** The presented data includes the number of subjects, their average age, and the diagnosed conditions of dizziness and balance disorders.

breakdown based on diagnosis was as follows: BPPV accounted for roughly 26% (posterior canals = 13%, horizontal canals = 11%, anterior canals 2%) unilateral or bilateral vestibular hypofunctions for about 19%, Meniere's disease for approximately 17%, vestibular neuritis for around 5%, and central vestibular disorders for about 10%. Importantly, the findings suggest that there is no significant difference between the average duration of disorders and the age of participants in each group ($p > 0.05$).

Figure 2 displays the data distribution and the average scores of total DHI-JA and DHI-E for both the control group and the balance disorder groups. The Figure shows that the average total score for DHI-JA in the control group is 8 (ranging from 0 to 14), and for DHI-E, it is 8.2 (ranging from 0 to 14). In contrast, the average total scores for DHI-JA and DHI-E in the vestibular disorder groups are substantially higher ($p < 0.05$), measuring 58.3 (ranging from 38 to 88) and 59.0 (ranging from 38 to 88) respectively. Furthermore, no significant difference is observed between the total scores of DHI-JA and DHI-E ($P > 0.05$) for the vestibular disorder groups.

Further examination of the subgroups within the balance disorder group, given the absence of data collected during the acute phase of vertigo/vertigo attacks, reveals that the highest DHI score is linked with BPPV, while the lowest score corresponds to vestibular neuritis. This study underscores the lack of a significant difference between the DHI-JA and DHI-E scores among the various subgroups of balance disorders ($P > 0.05$), highlighting the consistency of the results across different conditions. Additionally, there is a strong correlation between DHI-JA and DHI-E ($r = 0.89$, $p < 0.001$).

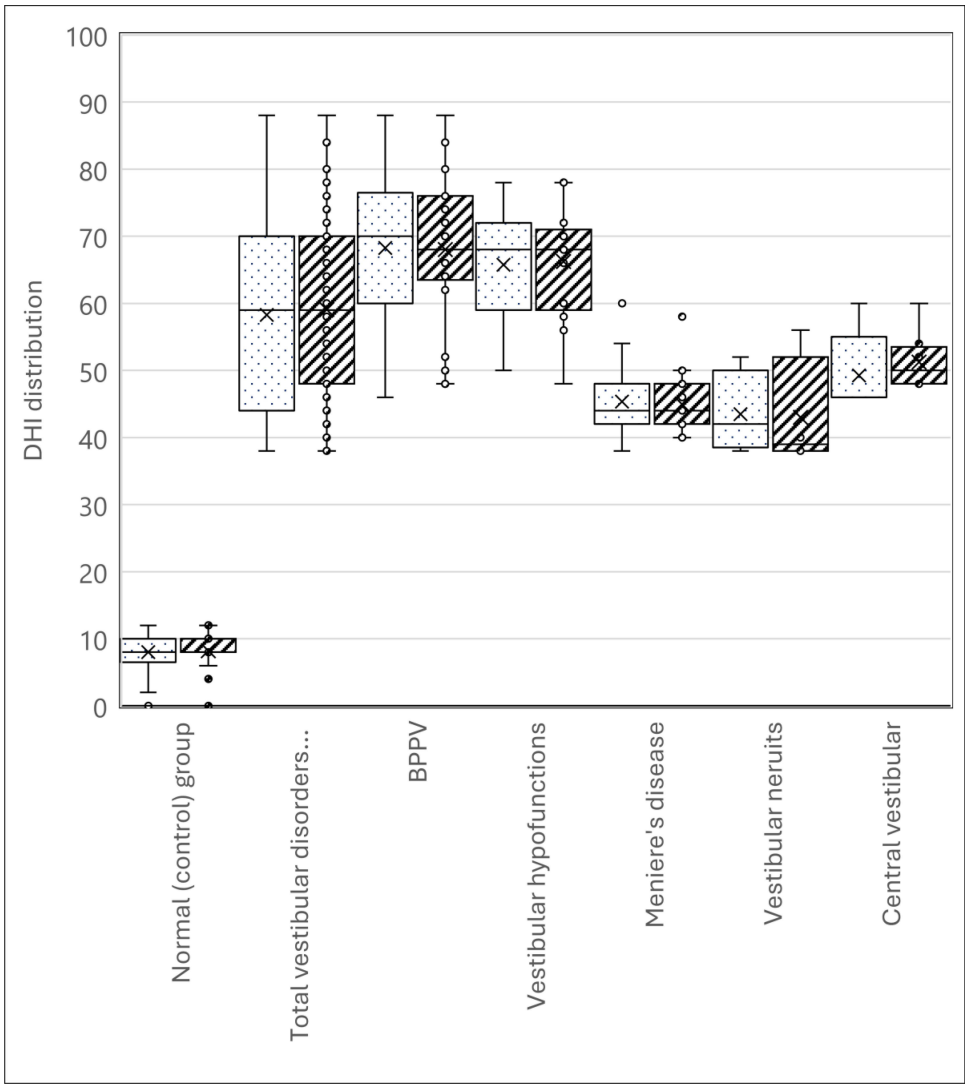



**Figure 2** The total distribution scores of DHI-JA and DHI-E for both the control group and the balance disorder group, as well as their respective subgroups.

**Table 3** Cronbach's Alpha Coefficient Score of 84 Subjects for Overall and Each Domain of DHI-JA and DHI-E Questioners

| | DHI-JA: Cronbach's Alpha coefficient for 84 subjects | CI 95% | DHI-E: Cronbach's Alpha coefficient for 84 Subjects | CI 95%2 |
|---|---|---|---|---|
| Functional | 0.87 | 0.82–0.92 | 0.89 | 0.86–0.92 |
| Physical | 0.83 | 0.75–0.91 | 0.84 | 0.0.77–0. 89 |
| Emotional | 0.88 | 0.80–0.96 | 0.87 | 0.78–0. 96 |
| Overall | 0.91 | 0.87–95 | 0.92 | 0.86–0.96 |

The reliability of the DHI-JA and DHI-E questionnaires was assessed using Cronbach's Alpha coefficient and Spearman rank correlation coefficient tests, as outlined Table 3. The results in this Table demonstrate excellent overall reliability for both DHI-JA (α=0.912) and DHI-E (α=0.92). Moreover, very good reliability is observed across all domains ($P > 0.05$). Notably, there is no significant difference in reliability between DHI-JA and DHI-E ($P > 0.05$).

In line with Jacobson and Newman's[3] classification in 1990, the DHI questionnaires were divided into three domains: functional, physical, and emotional. Figure 3 presents the distribution scores of both DHI-JA and DHI-E, along with the total average scores, for both the control group and the balance disorders group. The results indicate that the control group's average scores for DHI-JA and DHI-E are 8.4 and 8.2, respectively, while the balance disorders group's scores are significantly higher at 58.3 for DHI-JA and 59.00 for DHI-E. Furthermore, no significant difference is observed between the total scores of DHI-JA and DHI-E ($P > 0.05$) for the vestibular disorder groups. Notably, Figure 3 highlights that emotional domain scores are the highest, whereas physical domain scores are the lowest.

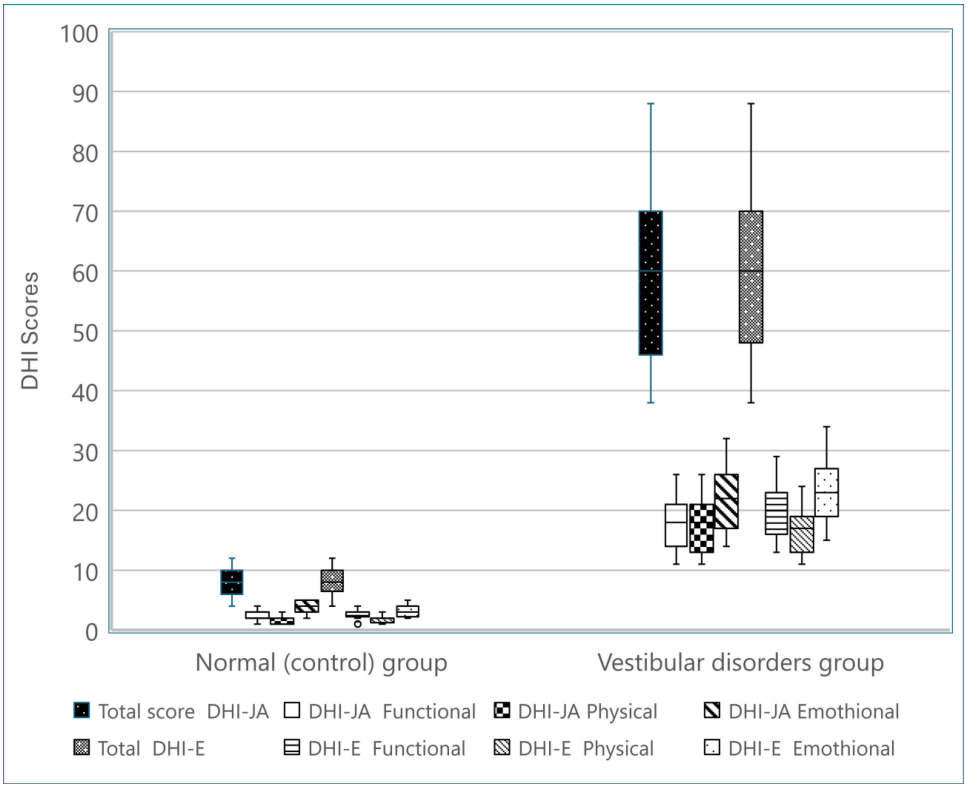



**Figure 3** Presents the total distribution scores of the DHI-JA and DHI-E for both the control group and the vestibular disorder group, as well as their respective subgroups.

**Table 4** Presents a Comparison Between the Cronbach's Alpha Coefficient Scores of This Study and Those Obtained from Other Studies

| Study | Functional | Physical | Emotional | Overall |
|---|---|---|---|---|
| Current study: DHI-JA | 0.87 | 0.83 | 0.88 | 0.91 |
| Current study DHI-E | 0.89 | 0.84 | 0.87 | 0.92 |
| Jacobson and Newman (1990).[7] | 0.85 | 0.78 | 0.72 | 0.89 |
| Poon, et al, (2004).[13] | 0.87 | 0.79 | 0.84 | 0.75 |
| Nola, et al, (2010).[14] | 0.82 | 0.75 | 0.82 | 0.92 |
| Alsanosi (2012).[8] | 0.87 | 0.81 | 0.79 | 0.92 |
| Jafarzadeh, et al, (2014).[15] | 0.90 | 0.83 | 0.82 | 0.79 |
| Christos, et al, (2017).[16] | 0.83 | 0.72 | 0.76 | 0.89 |

## Discussions

The study's objective was to undertake the cross-cultural translation and adaptation of the original Dizziness Handicap Inventory (DHI) questionnaire for a native Jordanian-speaking population. Additionally, the study aimed to analyse the internal consistency and certain aspects of the validity of the translated version.

The emphasized results in Figure 3 for the physical, emotional, and functional domains align with those reported in previous studies ($P > 0.05$).[2,3,6,8,9,12]

Table 4 illustrates a notable internal consistency in the DHI-JA and DHI-E versions, the original DHI text, and various translated versions of other languages.[7,8,13–16.] Much like other iterations of the Dizziness Handicap Inventory, the functional domain exhibits commendable reliability and a high Intraclass Correlation Coefficient. The effectiveness of the DHI-JA in distinguishing between participants experiencing dizziness and balance disorders and those without is evident in this study. The Jordanian Arabic version of DHI demonstrated user-friendly characteristics and reliability. Strong internal consistency, as indicated by high and acceptable Cronbach's α values, was observed across the Physical, Functional, and Emotional domains of the questionnaire. Furthermore, the study's outcomes closely align with those of the original study by Jacobson and Newman,[7] as well as with more recent research as outlined in Table 4.

## Conclusions

Undoubtedly, this study provides strong evidence supporting the effective utilization of the Jordanian Arabic version of the Dizziness Handicap Inventory (DHI-JA) within the native Jordanian Arabic-speaking population. It serves as a valuable tool for assessing the level of disability experienced by individuals dealing with dizziness and balance disorders. Furthermore, healthcare professionals and researchers can depend on the DHI-JA as a standardized assessment tool to evaluate the effectiveness of various treatments for dizziness.

## Disclosure

The authors report no conflicts of interest in this work.

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