VALIDATION AND CULTURAL ADAPTATION OF THE SWALLOWING DISTURBANCE QUESTIONNAIRE (SDQ) INTO GREEK FOR PEOPLE LIVING WITH PARKINSON'S DISEASE

Angeliki Alivizatou[1], Nefeli K. Dimitriou[2], Georgios Dimakopoulos[3], Grigorios Nasios[2]

[1]Department of Medicine, University of Thessaly, Larisa, Greece
[2]Department of Speech and Language Therapy, University of Ioannina, Ioannina, Greece
[3]BIOSTATS, Science and Technology Park of Epirus, Ioannina, Greece

ABSTRACT

Background: Dysphagia is a frequent and impactful symptom of Parkinson's Disease (PD), associated with malnutrition, dehydration, and increased mortality. Early detection is essential, yet reliable screening tools remain limited. The Swallowing Disturbance Questionnaire (SDQ) is a validated tool for dysphagia screening in PD. However, no culturally adapted and validated Greek version currently exists. **Methods:** Forty individuals diagnosed with PD participated in this study. The original SDQ was translated into Greek and a pilot administration was conducted with healthy controls. To evaluate validity, participants completed two additional self-questionnaires (Speech Pathology-Specific Questionnaire for Persons with Multiple Sclerosis; SMS and Dysphagia in Multiple Sclerosis questionnaire; DYMUS) and performed the 3-ounce Water Swallow Test (3oz WST). Cognitive and language functions were evaluated with the Montreal Cognitive Assessment (MoCA) and the Verbal Fluency Test (VFT). **Results:** The Greek SDQ (g-SDQ) showed excellent internal consistency (Cronbach's $\alpha = 0.841$) and good diagnostic accuracy (AUC = 0.820). Strong positive correlations were found between the g-SDQ and both the DYMUS ($r = 0.86$, $p < .001$) and SMS questionnaires ($r = 0.73$, $p < .001$). A positive but not statistically significant correlation was observed with the 3oz WST ($r = 0.48$, $p = .002$). Cognitive assessments revealed significant negative correlations between the g-SDQ and MoCA, as well as the VFT. **Conclusion:** The g-SDQ is a reliable and valid tool for early screening and monitoring of dysphagia in Greek people with PD, aiding clinicians in identifying swallowing difficulties and supporting personalised care.

Keywords: Parkinson's disease, Dysphagia, Early detection, Self-report Questionnaire, Validation

ΣΤΑΘΜΙΣΗ ΚΑΙ ΠΟΛΙΤΙΣΜΙΚΗ ΠΡΟΣΑΡΜΟΓΗ ΤΟΥ ΕΡΩΤΗΜΑΤΟΛΟΓΙΟΥ SWALLOWING DISTURBANCE QUESTIONNAIRE (SDQ) ΣΤΗΝ ΕΛΛΗΝΙΚΗ ΓΛΩΣΣΑ ΓΙΑ ΑΤΟΜΑ ΠΟΥ ΖΟΥΝ ΜΕ ΝΟΣΟ ΤΟΥ ΠΑΡΚΙΝΣΟΝ

Αγγελική Αλιβιζάτου[1], Νεφέλη Κ. Δημητρίου[2], Γεώργιος Δημακόπουλος[3], Γρηγόριος Νάσιος[2]

[1]Τμήμα Ιατρικής, Πανεπιστήμιο Θεσσαλίας, Λάρισα
[2]Τμήμα Λογοθεραπείας, Πανεπιστήμιο Ιωαννίνων, Ιωάννινα
[3]BIOSTATS, Επιστημονικό και Τεχνολογικό Πάρκο Ηπείρου, Ιωάννινα

ΠΕΡΙΛΗΨΗ

Εισαγωγή: Η δυσφαγία αποτελεί ένα συχνό σύμπτωμα της νόσου του Πάρκινσον (ΝΠ), το οποίο συνδέεται με υποσιτισμό, αφυδάτωση και αυξημένη θνησιμότητα. Η έγκαιρη ανίχνευσή της είναι κρίσιμη, ωστόσο τα αξιόπιστα μέσα διάγνωσης παραμένουν περιορισμένα. Το SwallowingDisturbanceQuestionnaire (SDQ) αποτελεί ένα αξιόπιστο εργαλείο για την ανίχνευση της δυσφαγίας στη ΝΠ, όμως έως σήμερα δεν έχει σταθμιστεί στα Ελληνικά. **Μεθοδολογία:** Στη μελέτη συμμετείχαν 40 άτομα με ΝΠ. Το πρωτότυπο SDQ μεταφράστηκε στα ελληνικά και δοκιμάστηκε πιλοτικά σε υγιή άτομα. Για την αξιολόγηση της εγκυρότητάς του,

οι συμμετέχοντες συμπλήρωσαν δύο επιπλέον ερωτηματολόγια αυτό-αναφοράς (Speech Pathology-Specific Questionnaire for Persons with Multiple Sclerosis; SMS και Dysphagia in Multiple Sclerosis questionnaire; DYMUS) και υποβλήθηκαν σε δοκιμασία κατάποσης νερού (3-ounce Water Swallow Test; 3oz WST). Οι γνωστικές και γλωσσικές λειτουργίες αξιολογήθηκαν με το Montreal Cognitive Assessment (MoCA) και το Verbal Fluency Test (VFT). **Αποτελέσματα:** Η ελληνική εκδοχή του SDQ (g-SDQ) παρουσίασε άριστη εσωτερική συνοχή (Cronbach's α = 0,841) και καλή διαγνωστική ακρίβεια (AUC = 0,820). Βρέθηκαν ισχυρές θετικές συσχετίσεις μεταξύ του g-SDQ και των ερωτηματολογίων DYMUS (r = 0,86, p< .001) και SMS (r = 0,73, p< .001). Παρατηρήθηκε, επίσης, θετική, αλλά όχι στατιστικά σημαντική, συσχέτιση με τη δοκιμασία 3ozWST (r = 0,48, p = .002). Οι γνωστικές αξιολογήσεις έδειξαν σημαντικές αρνητικές συσχετίσεις μεταξύ του g-SDQ και των δοκιμασιών MoCA και VFT. **Συμπεράσματα:** Το g-SDQ αποτελεί ένα αξιόπιστο εργαλείο για την έγκαιρη ανίχνευση και παρακολούθηση της δυσφαγίας σε άτομα με ΝΠ, συνεισφέροντας στην κλινική πρακτικήμέσωτης αναγνώρισης προβλημάτων κατάποσης και της παροχής εξατομικευμένης φροντίδας.

Λέξεις-κλειδιά: Νόσος Πάρκινσον, Δυσφαγία, Έγκαιρη ανίχνευση, Ερωτηματολόγιο Αυτοαναφοράς, Στάθμιση

INTRODUCTION

Parkinson's Disease (PD) has been defined as "***a core clinical motor syndrome (parkinsonism) accompanied by substantia nigra pars compacta neurodegeneration and synuclein deposition***" by the International Parkinson and Movement Disorders Society (IPMDS) Task Force.[1] Epidemiological data show an increasing global prevalence that goes beyond the effects of aging alone; higher rates are observed among older individuals, while healthcare accessibility may have an impact on geographic and ethnic disparities. However, there are unclear trends in incidence, particularly among women and low-/middle-income countries, because there is a lack of high-quality data. As the second most common neurodegenerative disease, PD seems to be a global priority and a significant social concern.[2]

PD is diagnosed using clinical criteria, as there is no definitive test available. The primary symptoms include rest tremor, bradykinesia, rigidity, and loss of postural reflexes, accompanied by secondary motor symptoms such as dysphagia and non-motor symptoms that encompass autonomic and cognitive challenges.[3] Dysphagia may occur at any stage of the disease, including early onset, significantly diminishing the quality of life for affected individuals.[4] Specifically, weight loss, dehydration, and malnutrition might arise from difficulties in swallowing food, liquids, or medications, while individuals with dysphagia frequently withdraw from social interactions. Aspiration pneumonia is among the most serious complications and a common cause of hospitalisation and mortality.[5],[6],[7]

According to a recent meta-analysis research, more than one-third of persons with PD experience subjective oropharyngeal dysphagia (OD), with prevalence increasing in advanced stages, and up to 80% when subclinical cases are included.[8] However, estimates of OD prevalence range greatly, from 11% to 81%, depending on the assessment method employed. This current knowledge is constrained by the variety of detection methods, emphasising the urgent need for a reliable, standardised, and validated approach to accurately identify dysphagia in PD.[9] To this purpose, a multinational expert group reviewed literature on neurogenic dysphagia and PD (Jan 1990–Feb 2021) following PRISMA guidelines. The expert group addressed the screening, diagnosis, impact on quality of life, and prognostic significance of dysphagia in PD, providing guidelines for an efficient detection and treatment. Among the guidelines, several questionnaire-based tools are recommended for screening dysphagia in PD, including the Swallowing Disturbance Questionnaire (SDQ).[10]

The SDQ is a self-report instrument validated for the early detection of dysphagia occurring during all the stages of swallowing. The original version, specifically developed for individuals with PD, demonstrated a sensitivity of 80.5% and a specificity of 81.3%.[11] The instrument, originally available in English, has also been translated and validated in Persian, Japanese, Portuguese, and Brazilian Portuguese.[12],[13],[14],[15]

In this context, the current study aims to translate, culturally adapt, and validate the initial psychometric properties of the SDQ questionnaire in the Greek language, with the purpose of facilitating the early detection of dysphagia in people living with PD.

MATERIALS AND METHODS

Participants

The sample consisted of 40 individuals diagnosed with PD. Demographic (age, sex, and years of education) and clinical (year of diagnosis) data were collected for each one of them. Participants were eligible for inclusion in this study if they met the following criteria: (1) have a diagnosis of PD; (2) be ≥ 18 years of age; (3) be native speakers of the Greek

language; (4) be able to fill out the questionnaire by him/herself; and (5) have a Montreal Cognitive Assessment (MoCA) score above 15. Exclusion criteria included any conditions that could interfere with participants' performance: (1) the presence of psychiatric disorders (e.g., untreated depression, psychotic symptoms, alcohol or drug abuse); (2) concomitant neurological disorders (e.g., epilepsy, stroke, or traumatic brain injury); (3) malignancies of the larynx or other relevant regions; and (4) severe visual and/or hearing impairments.

Greek version of the Swallowing Disturbance Questionnaire (g-SDQ)

The original SDQ[11] is a self-report questionnaire consisting of 15 items that assess symptoms of dysphagia arising at any stage of swallowing. Questions 1 to 5 pertain to the oral-stage symptoms, while questions 6 to 15 concern pharyngeal-stage dysphagia. Items 1 through 14 are graded on a 4-point Likert scale to determine the symptom frequency: 0 – 'never'; 1 – 'rarely' (≥ once per month); 2– 'often' (1–7 times per week); and 3 – 'very often' (> 7 times per week). Item 15 requires a "yes" or "no" response, which is scored as 2.5 or 0.5, respectively. A total SDQ score of ≥11 indicates a potential diagnosis of dysphagia, based on findings from individuals with diverse underlying conditions. The original English version was translated and converted into Greek by three Greek native speakers, including two speech language pathologists and a neurologist. No items from the original edition were omitted, modified or replaced. The final Greek version of the SDQ questionnaire (g-SDQ) was tested on ten healthy control subjects to determine its perceptiveness and was authorised by the research team.

Swallowing Assessment

For assessing convergent validity, the participants completed two other patient-reported outcome measures (PROMs), which have already been validated in Greek:

The Speech Pathology-Specific Questionnaire for Persons with Multiple Sclerosis (SMS[16]) is a 16-item questionnaire that examines speech/language, voice, and swallowing abilities, with each item rated on a 5-point scale for a maximum total score of 64 points.

The Dysphagia in Multiple Sclerosis (DYMUS[17]) questionnaire consists of ten yes/no questions with a 10-point score. The questionnaire was created especially for people with multiple sclerosis. It evaluates both liquid and solid dysphagia; a single affirmative response denotes dysphagia, whereas three or more indicate severe difficulties.

For assessing criterion validity, the participants performed the non-invasive physical assessment 3-ounce Water Swallow Test (3oz WST[18]). Specifically, a speech-language pathologist (SLP) specialising in dysphagia observed the individuals as they consumed 90 mL of water either through a straw or by sipping from a cup in their usual manner. The SLP monitored symptoms of aspiration, including coughing, choking, changes in the voice quality, nasal regurgitation of fluids or food, and post-swallowing respiratory distress. The examination was scored as either impaired (1) or normal (0).

Cognitive and Language Assessment

Cognitive function was evaluated using the Montreal Cognitive Assessment (MoCA),[19] and linguistic performance was assessed with the Verbal Fluency Test (VFT).[20]

MoCA is a brief test that evaluates the following cognitive and language domains: visuospatial and executive functioning, naming, attention, language, abstraction, delayed recall (short-term memory), and orientation. Scores range from 0 to 30, with a score of 26 and higher generally considered normal. Notably, participants with 12 years or less of formal education receive an additional point on their score.[19]

VFTs assess the ability to produce words within a limited timeframe. There are two main types: **phonemic (PhVFT),** where words begin with a specific letter, and **categorial (CVFT),** where words belong to a target category. VFTs measure cognitive functions like semantic memory, language ability, attention, processing speed, and executive functions such as inhibition, self-monitoring, and information differentiation.[20]

Procedure

The study was conducted in accordance with the Declaration of Helsinki ethical principles.[21] Data processing and analysis were approved by the ethics committee of the University of Ioannina (reference number 48936/17-12-2024). All participants were informed about the study's objectives and procedures and provided written informed consent prior to participation. They were notified they could opt out of the study at any time as they wished, without any impact on their medical treatment.

All tasks were carried out in a quiet room to minimise external distractions, and no other individuals were present during the procedure. Furthermore, the administration of all questionnaires followed a consistent, pre-determined order.

Statistical Analysis

Descriptive statistics were applied to the collected data. The internal consistency of the g-SDQ scale was evaluated using the Cronbach's alpha coefficient. The global g-SDQ scor***e*** was assessed for its diagnostic accuracy via Receiver Operating Characteristic (ROC) curve analysis, while its external reliability was examined using results from the

DYMUS questionnaire. All correlations to the g-SDQ were determined through the Pearson correlation coefficient (PCC). The significance level was set at $p < 0.05$, and the statistical analysis was conducted using the SPSS v26.0.

RESULTS

Study population

The study sample consisted of 40 patients (10 women corresponding to 25%) with a mean age of 74.1 years (SD = ±8.1). Educational level was recorded in years (mean = 11.1, SD = ±3.8) and ranged from 6, indicating only mandatory education, to 16 years, indicating university graduates.

Internal Consistency and Diagnostic Accuracy of the g-SDQ

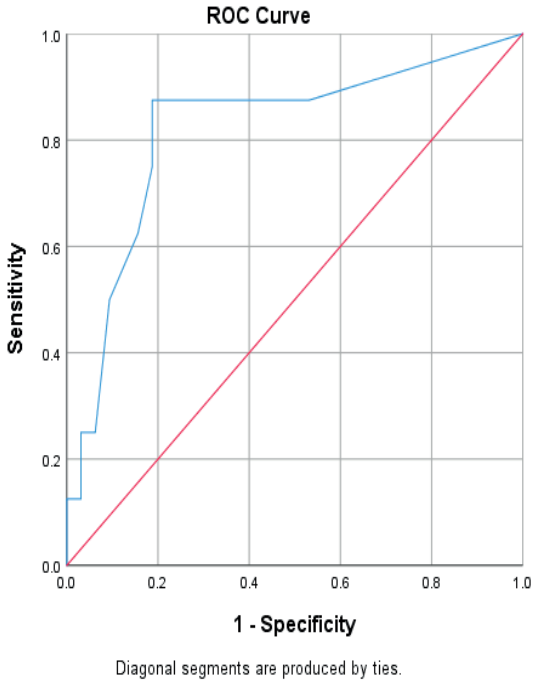
The internal consistency of the g-SDQ was assessed using Cronbach's alpha coefficient, and it was found to be 0.841, demonstrating excellent internal consistency of the questionnaire. "Corrected item–total correlations" and "Cronbach's alpha if item deleted" are presented in Table 1. The initial Cronbach's alpha for the 15 items could be improved, changing up to 0.846 after deleting specific items, but their importance regarding content validity, as well as the practically negligible increase, led to the decision to maintain the scale in its original form, following similar studies.[12],[13],[14] Receiver Operating Characteristic (ROC) curve analysis was performed to evaluate the diagnostic accuracy of the 15-items g-SDQ. The ROC analysis demonstrated a good accuracy of the instrument, with an area under the curve (AUC) of 0.820, as shown in Figure 1.

Table 1. Internal Consistency Indices for the 15 items of the g-SDQ.

	Corrected Item - Total Correlation	Cronbach's Alpha if Item Deleted
SDQ1	.742	.813
SDQ2	.695	.815
SDQ3	.000	.845
SDQ4	.269	.841
SDQ5	.523	.829
SDQ6	.544	.827
SDQ7	.735	.812
SDQ8	.000	.845
SDQ9	.146	.844
SDQ10	.733	.811
SDQ11	.765	.811
SDQ12	.475	.831
SDQ13	.306	.839
SDQ14	.239	.842
SDQ15	.188	.846

"Corrected Item–Total Correlation" and "Cronbach's Alpha if Item Deleted" estimations, demonstrating excellent reliability of the scale.

Figure 1. Diagnostic Accuracy of the g-SDQ. ROC curve with an AUC of 0.820, indicating good discriminative ability of the questionnaire.



ROC curve = Receiver Operating Characteristic curve

Swallowing Assessment: Correlation of the g-SDQ with the SMS, DYMUS, and 3oz WST

The correlation between the total g-SDQ score and the DYMUS score was statistically significant and positive ($r=0.860$; $p<.001$), indicating a very strong positive linear correlation between the two assessment tools. With respect to the SMS, the correlation was positive to g-SDQ ($r=0.734$; $p<.001$). In addition, a statistically significant positive correlation was found between the g-SDQ and the 3oz WST score ($r=0.482$; $p=.002$). All correlations are presented in **Table 2**.

Table 2. *Correlation Between g-SDQ Scores and Related Clinical Measures.*

		3oz WST	SDQ	DYMUS	SMS	PhVFT	CVFT
MoCA	*Pearson r*	-.201	-.376	-.268	-.368	.808	.818
	P	.213	.017	.095	.019	.000	.000
	N	40	40	40	40	40	40
3oz WST	*Pearson r*		.482	.445	.254	-.094	-.080
	P		.002	.004	.114	.565	.624
	N		40	40	40	40	40
SDQ	*Pearson r*			.860	.734	-.390	-.292
	P			.000	.000	.013	.068
	N			40	40	40	40
DYMUS	*Pearson r*				.527	-.301	-.157
	P				.000	.059	.333
	N				40	40	40
SMS	*Pearson r*					-.386	-.340
	P					.014	.032
	N					40	40
PhVFT	*Pearson r*						.825
	P						.000
	N						40

DYMUS, SMS, and 3oz WST for swallowing assessment; MoCA and VFTs (PhVFT and CVFT) for cognitive evaluation.
Pearson r: Correlation strength; p: Statistical significance; N: Sample size; 3oz WST: 3-ounce Water Swallow Test; CVFT: Categorial Verbal Fluency Test; DYMUS: Dysphagia in Multiple Sclerosis questionnaire; MoCA: Montreal Cognitive Assessment; PhVFT: Phonemic Verbal Fluency Test; SDQ: Swallowing Disturbance Questionnaire; SMS Speech Pathology-Specific Questionnaire for Persons with Multiple Sclerosis

Cognitive and Language Assessment: Correlation of the g-SDQ with the MoCA and the VFT

Statistically significant correlations between the g-SDQ and MoCA as well as VFT were observed. Specifically, a negative correlation was found for MoCA (r=-0.376; p=.017). Regarding the VFT, both its dimensions were negatively correlated to g-SDQ, with r=-0.390 (p=.013) for PhVFT and r=-0.292 (p=.068) r=0.818 for CVFT, respectively. All correlations are presented in **Table 2**.

DISCUSSION

The current study presents the adaptation and validation of the SDQ into Greek language (g-SDQ). The SDQ is a brief assessment tool designed to facilitate the early detection of dysphagia in individuals with PD, by addressing impairments associated with the oral and pharyngeal phases of the swallowing process. The g-SDQ demonstrated excellent internal consistency (α=0.846), comparable to the original version of the questionnaire (α=0.890).[11] Our results demonstrated a strong positive correlation between the g-SDQ and the other PROMs (SMS and DYMUS), indicating its convergent validity and its reliability in reflecting swallowing difficulties in a manner consistent with established, validated PROMs. Specifically, the DYMUS questionnaire had also shown a strong positive correlation with the SDQ in the study conducted by Sparaco et al.[22] A statistically significant correlation was observed between the g-SDQ and the 3oz WST, supporting the criterion validity of the tool. This finding is consistent with the literature, which suggests that the test's high sensitivity makes it a quick, non-invasive, and useful screening tool for the detection of dysphagia in individuals with PD.[18],[23]

To ensure the reliability of self-reported data,

participants with significant cognitive impairment, defined as a MoCA score below 15,[19] were excluded from the study. Severe cognitive decline can compromise a person's ability to understand and accurately respond to self-assessment tools, making their responses less valid.[24] This highlights the critical importance of pairing self-report instruments with objective cognitive measures such as the MoCA. By doing so, clinicians and researchers can determine whether individuals have the cognitive capacity to provide meaningful responses. Moreover, the use of standardised severity levels further enhances the interpretability of PROMs. When combined with robust tools like the MoCA, this approach not only improves the accuracy of symptom assessment but also supports more informed clinical decision-making by identifying when interventions are needed and when symptoms have normalised.[25]

The statistical analysis revealed a strong negative correlation between the g-SDQ and the MoCA, indicating that higher cognitive function is associated with fewer symptoms of dysphagia. This finding aligns with the literature, as cognitive decline significantly affects the swallowing mechanism across all phases of swallowing.[26],[27],[28] Similarly, the VFTs were negatively correlated with the g-SDQ, demonstrating that reduced verbal fluency may be associated with increased self-reported swallowing disturbances. In addition, both dimensions of the VFT (phonemic and categorical) were positively correlated with MoCA scores. Although a direct association between verbal fluency deficits and dysphagia has not been firmly established, the present findings suggest that the observed relationship between verbal fluency and swallowing difficulties may represent an indirect link between cognitive decline and dysphagia. Supporting this interpretation, verbal fluency has consistently been shown to be closely associated with overall cognitive performance.[29],[30]

A potential limitation of our study is the absence of an objective clinical assessment of the swallowing mechanism, such as the Video-Fluoroscopic Swallowing Study (VFSS) or the Fiberoptic Endoscopic Evaluation of Swallowing (FEES). However, the SDQ has been previously compared with both VFSS and FEES. Notably, its performance has been consistent across both the original and translated version of the SDQ,[11],[13] demonstrating good sensitivity and specificity in identifying dysphagia. Similarly, given its excellent internal consistency, reliability, and diagnostic accuracy, the g-SDQ may serve as a valuable tool for screening dysphagia in Greek-speaking PD population. Further research could strengthen these findings by combining the use of the g-SDQ with objective clinical methods, such as VFSS or FEES, to further investigate its diagnostic accuracy.

Epidemiological data from PD in Greece highlight a crude incidence of 48 cases and a mortality rate of 71 deaths per 100,000 person-years, along with a prevalence of 400 per 100,000 persons. Regional disparities were evident, with the lowest incidence in Crete (35/100,000) and the highest in Thessaly (69/100,000). The fact that mortality exceeds incidence during the study period may suggest underdiagnosis, late-stage detection, or external factors such as the COVID-19 pandemic.[31] These findings underscore the urgent need not only for improved disease surveillance and early diagnosis, but also for the development and wider implementation of effective, patient-centred therapeutic strategies to reduce disease burden and enhance quality of life for individuals living with PD. Considering the high prevalence of dysphagia in PD,[9] and its serious, potentially fatal complications,[6],[7] along with the importance of culturally and linguistically appropriate PROMs to support effective healthcare communication,[32] the translation and validation of the SDQ self-report questionnaire into Greek represents a valuable contribution to clinical practice.

CONCLUSION

Overall, this study indicates that the 15-item g-SDQ processes good psychometric properties, as well as adequate validity and reliability measurement capacities. Our results support its suitability for the preliminary screening of dysphagia in adults with PD, as well as for assessing the frequency of dysphagia-related symptoms. Analysis of g-SDQ responses may help clinicians detect subtle or intermittent swallowing disturbances that are often overlooked during routine clinical evaluations, thereby supporting more personalised and safer dietary management. Consequently, the g-SDQ stands out as a brief yet sensitive instrument for the detection and monitoring of swallowing difficulties in clinical settings within the Greek-speaking PD population.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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