

## DEVELOPMENT OF A TOOL FOR VISUAL INSPECTION OF PELVIC FLOOR MUSCLE COORDINATION

### Hypothesis / aims of study

Observation of muscle coordination is a common part of a pelvic floor muscle examination; however, no observational tool is currently available to facilitate a clinician's objective documentation of pelvic floor muscle coordination. The Pelvic Floor Clinical Assessment Group of the International Continence Society states, "Quantification of the function of the pelvic floor muscles is not easy, due to the lack of simple to use and reliable measurement techniques" and has stressed the need for inter-rater variability for testing of pelvic floor muscle signs[1.] The purpose of this study was to develop a scale, the Pelvic Floor Musculature Coordination Scale (PFMCS), to visually quantify pelvic floor muscle coordination during a physical therapy examination and to establish its inter-rater reliability and criterion-related validity.

### Study design, materials and methods

20 women with varying levels of perceived pelvic floor dysfunction volunteered for the study. These participants responded to an advertisement seeking women between the ages of 30-70 to learn about the function of pelvic floor muscles. Subjects were excluded from participation if they were non-ambulatory, unable to follow three-step commands, or if they had a history of the following: radiation to the pelvis, pelvic reconstruction surgery, complete uterine eversion (stage 4 prolapse), a history of sexual abuse for which they have not sought counseling, or neuromuscular conditions (e.g. multiple sclerosis, stroke, Parkinson's disease, spinal cord injury) that would impair their ability to contract the muscles properly. Subjects completed the 20-item Pelvic Floor Distress Inventory short form (PFDI-20), which served as our criterion standard. Five investigators administered the PFMCS with standardized verbal cueing preceding performance of five activities. Five items were assessed: Respiration, Pelvic Floor Muscle Contraction, Extra-Pelvic Muscle Activity, Pelvic Floor Muscle Expansion, and Cough. Performance on each item was quantified using an ordinal scale ranging from 0-2 with a rating of 0 indicating optimal performance, a rating of 1 indicating dysfunctional performance, and a rating of 2 indicating absence of performance. Intraclass correlation coefficients (ICCs) were used to examine interrater reliability. Quadratic regression analyses were used to assess validity.

### Results

The PFMCS total score ICC was 0.792 and the pelvic floor muscle contraction and expansion subscales demonstrated good reliability, with ICCs of 0.812 and 0.798, respectively. Moderate reliability was found for quantifying the extra-pelvic muscle activity (ICC = 0.564), respiration (ICC = 0.603), and cough items (ICC = 0.642). (Table 1.) Results of the total score of the PFMCS were compared to the total score of the PFDI-20, as well as the subscales that quantify a woman's symptomatic pelvic organ prolapse distress, colorectal-anal distress, and urinary distress. Scores on the PFMCS were correlated with the pelvic organ prolapse distress inventory (POPDI-6) ( $R^2 = 0.355$ ,  $p = 0.024$ ) and the urinary distress inventory (UDI-6) ( $R^2 = 0.304$ ,  $p = 0.046$ ) subscales of the PFDI-20. (Figure 1 and Figure 2, respectively.)

### Interpretation of results

The PFMCS holds promise as an instrument that may facilitate a clinician's ability to objectively document observable patterns of pelvic floor muscle coordination. Total score inter-rater reliability of the scale was strong, as were the pelvic floor muscle contraction and pelvic floor muscle expansion subscales. Additionally, scores on the PFMCS were associated with the POPDI-6 and UDI-6 subscales of the PFDI-20 questionnaire as a criterion standard, indicating the observational scale has some level of criterion-related validity.

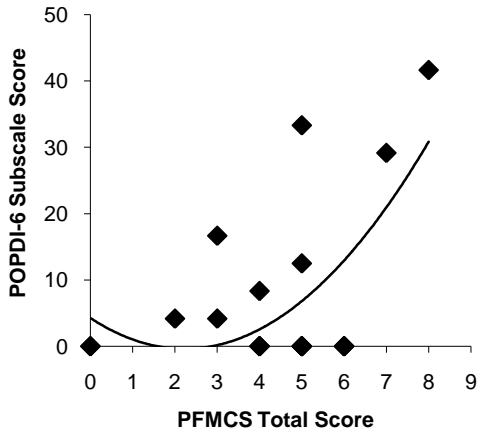
### Concluding message

The PFMCS is a promising observational scale for pelvic floor coordination assessment. The scale demonstrated good reliability and scores were correlated with the POPDI-6 and the UDI-6 subscales of the PFDI-20 questionnaire. The scale was developed and administered by a women's health physical therapist and doctor of physical therapy students, and it has the potential to be utilized for clinical intake/outcomes, goal-setting, and future research opportunities.

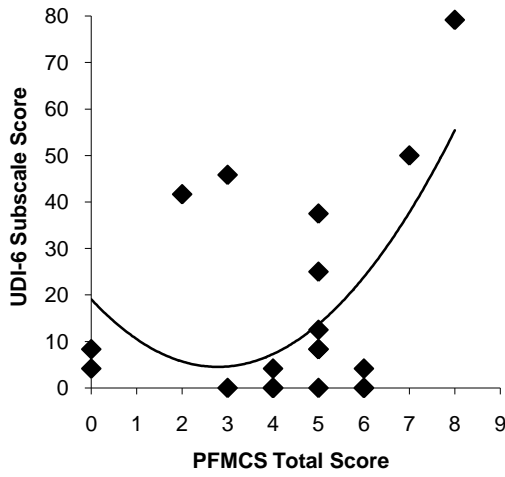
**Table 1.** Intraclass correlation coefficients (ICC) for the Pelvic Floor Muscle Coordination Scale (PFMCS) total score and item scores.

	ICC	95% CI
PFMCS Total Score	0.792	0.656 – 0.898
Pelvic Floor Muscle Contraction item score	0.812	0.684 – 0.908
Extra-Pelvic Muscle Activity item score	0.564	0.370 – 0.758
Pelvic Floor Muscle Expansion item score	0.798	0.665 – 0.901
Respiration item score	0.603	0.413 – 0.785
Cough item score	0.642	0.459 – 0.810

**Figure 1.** Curvilinear correlation between the PFMCS total score and the POPDI-6 subscale of the PFDI-20 ( $R^2 = 0.355$ ,  $p = 0.024$ ).



**Figure 2.** Curvilinear correlation between the PFMCS total score and theUDI-6 subscale of the PFDI-20 ( $R^2 = 0.304$ ,  $p = 0.046$ ).



**References**

1. Messelink B, Benson T, Berghmans B, et al. Standardization of Terminology of Pelvic Floor Muscle Function and Dysfunction: Report From the Pelvic Floor Clinical Assessment Group of the International Continence Society. *Neurourology & Urodynamics*. 2005;24(4):374-380

<b><i>Specify source of funding or grant</i></b>	<b>NONE</b>
<b><i>Is this a clinical trial?</i></b>	<b>No</b>
<b><i>What were the subjects in the study?</i></b>	<b>HUMAN</b>
<b><i>Was this study approved by an ethics committee?</i></b>	<b>Yes</b>
<b><i>Specify Name of Ethics Committee</i></b>	<b>Mayo Clinic Institutional Review Board</b>
<b><i>Was the Declaration of Helsinki followed?</i></b>	<b>Yes</b>
<b><i>Was informed consent obtained from the patients?</i></b>	<b>Yes</b>