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## ► To cite this version:

Yannick Delpierre, Laurène Norberciak, Sola Sader, Héloïse Pidoux, Arnaud Brayer. The Fear Avoidance Beliefs Questionnaire threshold for women with chronic Low Back Pain. Can it be defined by avoidance behavior? A pilot study. 2024. hal-04737992

**HAL Id: hal-04737992**

**<https://hal.science/hal-04737992v1>**

Preprint submitted on 15 Oct 2024

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# **The Fear Avoidance Beliefs Questionnaire threshold for women with chronic Low Back Pain. Can it be defined by avoidance behavior? A pilot study**

Yannick Delpierre \*

*Centre de l'Arche, Saint-Saturnin, France*

Laurène Norberciak

*Groupement des Hôpitaux de l'Institut Catholique de Lille, Lomme, France*

Dr Sola Sader

*Centre de l'Arche, Saint-Saturnin, France*

Dr Héloïse Pidoux

*Centre de Médecine Physique et de Réadaptation Côte d'Amour, Saint-Nazaire, France*

Dr Arnaud Brayer

*Centre de l'Arche, Saint-Saturnin, France*

\*Corresponding author. Email: [uam@asso-prh.fr](mailto:uam@asso-prh.fr)

**Keywords:** chronic Low Back Pain, Fear Avoidance Belief, gait, ROC analysis, spatiotemporal parameters

## **1. Introduction**

In the case of patients with chronic Low Back Pain (cLBP), fear-avoidance beliefs are depicted as a guarding strategy (Olugbade et al., 2019), essentially described for women. cLBP tends to perturb walking (Desai et Amonkar, 2021). The Fear-Avoidance Beliefs Questionnaire (FABQ) is currently used with: FABQw the work subscale; FABQpa the physical activity subscale. Only threshold values obtained from psychometric analysis have been defined as yet (Fritz & Georges, 2002).

Patients with cLBP walk with lower cadence and lower self-selected speed than healthy subjects (Desai et Amonkar, 2021). These dynamic parameters describe a high correlation with the FABQ score in the case of patients with other pathologies (Haddas et al., 2021). Therefore, considering women with cLBP, we associated significant low cadence and speed with the effect of fear-avoidance beliefs on walking. The aim of this study was to determine threshold values of each FABQ sub-scale based on cadence and speed.

## **2. Methods**

### **2.1 Population**

This study includes women with cLBP. An Ethical Committee (Angers) approved the study. We recruited 75 patients. Nine had only partial data and were excluded. The remaining 66 patients had a mean age of  $38.2 \pm 8.1$  years, moderate pain (VAS= $4.93 \pm 2.24$ ) and moderate FABQ score (FABQ= $31.09 \pm 13.76$ ; FABQw= $21.09 \pm 10.84$ ; FABQpa= $10.00 \pm 7.11$ ). All the participants were informed about the purpose of the study and the possibility of withdrawing their participation at any stage without giving a reason, and that it complied with accepted ethical standards.

Pain intensity, evaluated with the Visual Analysis Scale (VAS), was located between the lumbar area and the lumbosacral region. The inclusion criteria were: women with cLBP, without neurological or orthopedic disorders, no surgery liable to interfere with locomotion and with complete data. Patients were excluded if they reported intellectual disability, musculoskeletal/neurological diseases, inequalities in leg length, locomotion injuries with surgery of the spine, with leg pain or if they presented incomplete data.

### **2.2 Protocol**

A 3D motion capture system (Nexus, ViconT10, Oxford, UK, 100 Hz) recorded data for passive markers (14 mm) according to the Plug in Gait model. Markers on heels, lateral malleoli and second metatarsal head were used to define strides and compute cadence and speed. Each patient walked at preferred speed in a walking corridor (10 m). were averaged with five strides per patient.

The analyses were carried out with Statistica (V13, Dell, USA) and Excel (Microsoft, USA). A Shapiro-Wilk test ensured normality for each of the distributions. Data are presented as means  $\pm$  standard deviations. Links between the FABQ scores and cadence/speed were studied with the Pearson correlation coefficients. For significant correlations, each possible threshold value was studied using Receiver Operating Characteristic (ROC) analysis: from 0 to maximum of each sub-scale. Low cadence and speed in reference with healthy subjects (Hollman et al. 2016) were considered as quantitative fear-avoidance beliefs. True/false positive/negative cases were distinguished as a function of these quantitative fear-avoidance beliefs. Then, the predictive power of the FABQ score and sub-scores to detect fear-avoidance beliefs (low cadence and speed) were studied. The Area Under the Curve (AUC) was used to determine the diagnostic accuracy of each scale or sub-scale. The AUC is interpreted as the probability of correctly identifying patients who present significant fear-belief avoidance as follows: high probability if  $AUC \geq 0.8$ , fair probability if  $0.7 \leq AUC < 0.8$ , poor

probability of  $0.6 \leq \text{AUC} < 0.7$ . The optimal threshold values were defined from the highest Youden's J statistic (Delacour et al. 2005). A 95% confidence interval around the difference between the AUC and 0.5 was defined. Alpha was set at .05.

### 3. Results and discussion

The patients walked at a speed of  $1.09 \pm 0.14$  m/s and a cadence of  $109.10 \pm 8.52$  steps/min. Correlations with the FABQ sub-scale are detailed in Table 1.

**Table 1.** Correlations between dynamic parameters and FABQ sub-scales. Credit: Y. Delpierre

	FABQ	FABQ <sub>w</sub>	FABQ <sub>pa</sub>
Cadence	-0.25† (p=.04)	-0.31† (p=.01)	0.03 (p=.82)
Speed	-0.16 (p=.19)	-0.22† (p=.05)	0.02 (p=.90)

† significant correlation

Only FABQ and FABQ<sub>w</sub> presented significant but low correlation with cadence and speed. The threshold value of FABQ<sub>pa</sub> could not be defined from ROC analysis. We obtained the optimal cut-off values: 39 for the FABQ scale and 26 for FABQ<sub>w</sub>. The Figure 1 presents ROC analysis in case of FABQ scale. The AUC were 0.77 and 0.69 respectively for the FABQ scale and the FABQ<sub>w</sub> subscale. The threshold value for FABQ<sub>pa</sub> was computed to 13.

**Figure 1.** ROC curves for FABQ<sub>w</sub> scale. Credit: Y. Delpierre

Therefore, FABQ<sub>w</sub>>26 identified patients with cLBP at risk of not returning to work. This value is lower than Fritz and George's value (Fritz & George, 2002) but is close to that described by Cleland et al. (2008). Correlations with other biomechanical or motor control variables should be analyzed to refine this study. Our FABQ<sub>pa</sub> cut-off value corresponds to the value described by Cleland et al.

*Limitations.* Firstly, only women were considered in the study. Secondly, we used significant but low correlations. Finally, we considered reference data in the case of healthy subjects presented in the literature.

### 4. Conclusions

This first study defines FABQ thresholds based on biomechanical parameters.

### Conflict of Interest Statement

None.

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**Received date:04/04/2024**

**Accepted date: 28/06/2024**

**Published date: XX/XX/2024**

Volume: 1

**Publication year: 2024**