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PREVENTION & REHABILITATION: RELIABILITY RESEARCH

Interrater reliability of a Pilates movement-based classification system☆

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Summary *Objective:* To determine the interrater reliability for identification of a specific movement pattern using a Pilates Classification system.
Method: Videos of 5 subjects performing specific movement tasks were sent to raters trained in the DMA-CP classification system.
Results: Ninety-six raters completed the survey. Interrater reliability for the detection of a directional bias was excellent ($_{Pi}$ = 0.92, and K_{free} = 0.89). Interrater reliability for classifying an individual into a specific subgroup was moderate ($_{Pi}$ = 0.64, K_{free} = 0.55) however raters who had completed levels 1–4 of the DMA-CP training and reported using the assessment daily demonstrated excellent reliability ($_{Pi}$ = 0.89 and K_{free} = 0.87).
Conclusion: The reliability of the classification system demonstrated almost perfect agreement in determining the existence of a specific movement pattern and classifying into a subgroup for experienced raters. There was a trend for greater reliability associated with increased levels of training and experience of the raters.

Introduction

Pilates is a discrete exercise approach which aims to target specific motor control patterns and re-educate mal-adaptive movement (Gladwell et al., 2006; La Touche et al., 2008; Rydeard et al., 2006). Traditional Pilates has been modified by physiotherapists for exercise interventions and

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List of abbreviations

CS	Classification System
DMA-CP	Dance Medical Australia Clinical Pilates
Email	Electronic Mail
HOP	Rebound Hop
K_{free}	Free-Marginal Kappa
LBP	Low Back Pain
MB	Movement-Based
$_{Pi}$	Percentage of Agreement
SHR	Single Heel Raise
4 PK	Four-Point Kneel

termed Pilates-based exercise (Lim et al., 2011; Rydeard et al., 2006; Tulloch et al., 2012). Dance Medicine Australia Clinical Pilates (DMA-CP), developed as a new Pilates-based approach, modified from traditional Pilates and provides specific rehabilitation exercises for patients with musculoskeletal disorders. The key feature of the DMA-CP concept is categorization of patients into specific subgroups by assessing individual's specific movement patterns (directional biases). The results from this assessment then inform decisions on management (Tulloch et al., 2012).

Subgrouping of patients who share similar clinical characteristics has been recommended to achieve improved patient outcomes (Long et al., 2004; McKenzie and May, 2003; Stolze et al., 2012). A number of movement-based classification systems have been proposed within the past two decades for subgrouping patients (Dettori et al., 1995; Karayannis et al., 2012). While some other movement-based classifications have undergone extensive research into their clinometric properties, (Dankaerts et al., 2006; Harris-Hayes and Van Dillen, 2009; Trudelle-Jackson et al., 2008) evaluation on the reliability of the DMA-CP system is limited despite its widespread use by physical therapists. A recent study of the DMA-CP found the reliability between two experienced raters was high (Tulloch et al., 2012). However, this research suggested that further study into the reliability and validity of the testing procedure was required within a larger sample size. Thus, results would have the potential to be more representative and therefore be generalized with a greater degree of confidence for clinical practice (Tulloch et al., 2012). Therefore the aims of this study were to investigate the levels of agreement within a large sample of raters working in clinical practice in using DMA-CP classification system to (1) detect the presence of a specific movement pattern(s) (directional bias); (2) categorize subjects into movement-based subgroups within a cohort of subjects with previous musculoskeletal injuries. The secondary aims were to investigate the effects of training and experience of raters on levels of agreement.

Method

Observational survey design: two groups of subjects participated in this study: video subjects and raters.

Video subjects

Five university staff and students (aged between 18 and 65 years) who had a present or history of back or lower limb musculoskeletal injury within 5 years prior to video recording were recruited.

Raters

The raters were recruited through the database of DMA-CP. All raters were required to hold a current physical therapy licensure and to have undertaken DMA-CP training within the previous 3 years. A total of 1320 eligible raters were invited into the study. Raters who agreed to participate but did not complete the survey were excluded from the study. All participants consented to participate in this study. This study was approved by the University of Otago Human Ethics Committee.

Procedure

The study involved 2 stages. The first stage involved developing a video recording of participants and survey preparation and the second stage involved administration of the online survey to the raters and data collection.

Video preparation

All videos were recorded by a musculoskeletal physical therapist (ET), who was highly experienced in DMA-CP directional bias assessment, and assisted by a post-graduate physical therapy student (KY). All recordings were undertaken in the same laboratory room using a standardized setting of mat position, camera and lighting set-up. The same digital video camera (Brand: JVC name of camera, Model: GZma30AA Hard Disk Camcorder) was used for each video recording.

Following informed consent, the video subjects were given standardized verbal instructions, to ensure the standardization of the movement tasks, including number of sets and order they were to be performed. KY demonstrated the following tasks before subjects performed them barefooted on a mat: (1) Single Heel Raise (SHR); (2) Rebound Hop (HOP); (3) Single Leg Kick (SLK); (4) Four Point Kneel (4 PK); (5) Roll ups. Figs. 1 to 5 illustrate the 5 tasks. These tasks followed the standardized protocol described by Tulloch et al. (2012) and are detailed in Appendix A. The standardized procedure for each movement task and recording are described in Appendix B.

Survey preparation

Completed videos were edited by the physiotherapist (KY) for the online survey. Each video was then edited to 5 min in length (KY). The 5 videos were then uploaded onto a password protected website which provided a media digital storage facility with a generated secure link for the video recordings. These links were then stored and embedded into an online survey detailed in Appendix C. Access to the online survey was provided by the principle investigator (KY) to participant raters. Raters were able to display a full screen image with video quality 640x480 pixels and 25 frames per second.