Pain-related fear is associated with suboptimal performance on a variety of physical challenges in individuals with chronic low back pain. The fear–avoidance model of low back pain and disability suggests that individuals with elevated levels of pain-related fear tend to perceive pain in a threatening, catastrophic manner (i.e., as a sign of tissue damage) and thus are more likely to engage in escape or avoidance behaviors. According to the model, individuals who tend to avoid threatening situations and behaviors are more likely to recover from an initial back injury and more likely to suffer from depression, disease syndrome, and chronic pain and disability.

Although avoidance is typically conceived as a reluctance to engage in specific behavior or to execute maximal effort, it is also possible that avoidance may take the form of altered motor control (i.e., performing the behavior, but in a different manner). Results from a recent study provide preliminary support for this notion in individuals with subacute back pain, demonstrating that those with high versus low pain-related fear used significantly less flexion of the lumbar spine when performing standardized full body reaching tasks. While it is currently unknown if people with high pain-related fear continue to display differences in motor behavior after resolution of symptoms, fame and colleagues, using a movement paradigm that requires participants to perform rapid trunk flexion and extension tasks while maintaining the trunk at various flexed angles (i.e., ±15, 30, 60 degrees), have reported that back pain sufferers show decreased peak velocity and acceleration of the trunk and that these limitations can persist after participants no longer experience pain. It remains to be determined if these findings generalize to less constrained movement tasks and whether they are particularly evident in high versus low pain-related fear.

As presented, the current study was designed to examine the relationship between pain-related fear and motor behavior during performance of a standardized reaching task in individuals who had recently recovered from an episode of low back pain.

Methods

Participants

Eighty-eight participants (46 females, 42 males) who had recovered from an episode of low back pain and were pain free for 4 weeks (± 2 weeks) performed a series of reaching movements to three targets located in a sagittal plane. Prior to the start of the reaching trials subjects completed the Tempor Scale for Kinesiophobia (TSK).

Physical Performance Measures

Starting from an upright standing posture, the participant performed three movement trials (at a comfortable pace) of both their right hand, then three trials with their left hand. The movement trials were then repeated at a fast-pace movement speed. See Figure 1. Data Collection & Analyses

The 3D motions of the trunk, pelvis, and limb segments were recorded using the Motion Monitor System. An Euler angle sequence was used to derive the three-dimensional joint motions of the hip (i.e., motion of the pelvis relative to the hip) and lumbar spine (i.e., motion of the vertebrae relative to the pelvis). Sagittal-plane joint excursions, peak angular velocities, and peak-to-peak angular accelerations of the hip and lumbar spine were then extracted. To examine joint group differences in reaching movements, 3-way MANOVA’s were repeated measures design were performed with a between subject factor of group (high pain-related fear, low pain-related fear) and within subject factors of movement speed (comfortable, fast pace) and target height (mid, low, high).

Figure 1. A diagrammatic representation of how target locations were normalized to each subject’s anthropomorphic characteristics. Target locations were determined for each subject based on their hip height, trunk length, and arm length. The high target was located such that the subject could, in theory, reach the target by flexing the hips 15° with shoulder flexed to 90° and the elbow extended. The low target could be reached by flexing the hips 60°. This research was supported by the National Institutes of Health Grant R01-ES004512.