Kinesiophobia Does Not Influence the Rate of Torque Development and Hop Distance in Individuals with Anterior Cruciate Ligament Reconstruction in Controlled Environments

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Background

- **Kinesiophobia is fear of physical movement that often follows anterior cruciate ligament reconstruction (ACLR)**
  - Kinesiophobia associated with greater reaction time to perform voluntary tasks
  - The Tampa Kinesiophobia Scale (TSK-11) is a reliable subjective questionnaire used to assess kinesiophobia
  - Correlations between TSK-11 scores and outcomes indicative of strength and power in the surgical limb (i.e. Quadriceps muscle rate of torque development (RTD) and hop distance) would determine whether TSK-11 is capable of identifying if an individual is prepared to return to sport after ACLR

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Purpose

To determine if quadriceps RTD and hop distance values are associated with TSK-11 scores 9 months post-ACLR.

Subjects & Study Design

Participants

- 17 individuals who underwent unilateral ACLR (20.9±4.2 years old; 9.7±1.0 months since surgery)
  - Participants that had undergone ACLR utilizing a hamstring, patellar, or quadriceps tendon graft

Study Design

- The TSK-11, quadriceps RTD, and a single-leg unplanned crossover drop jump (UXDJ) in which their hop distance was measured for both legs were assessed in a single testing session

Frequencies of Graft Source

Graft Source	Counts	% of Total	Cumulative %
Hamstring	6	35.3%	35.3%
Patellar	7	41.2%	76.5%
Quad	4	23.5%	100.0%

Frequencies of ACLR Limb

ACLR Limb	Counts	% of Total	Cumulative %
Left	6	35.3%	35.3%
Right	11	64.7%	100.0%

Frequencies of Sex

Sex	Counts	% of Total	Cumulative %
female	9	52.9%	52.9%
male	8	47.1%	100.0%

Tables 1-3. Frequency counts of subject demographics although data were not split by these variables.

Methods

TSK-11 Evaluation

- Prior to beginning the RTD and hop test assessments, subjects completed the TSK-11 questionnaire to determine their levels of comfortability or fear related to movements such as those related to their mechanism of injury

Rate of Torque Development (RTD)

- Quadriceps RTD was measured by a dynamometer
- The participant was instructed to extend the knee (i.e. kick out) at 100% maximal effort while torque data were recorded
- Torque data were sampled at 600 Hz and exported from the dynamometer using a remote access port and imported to computer through an analog-to-digital converter (USB-6211; National Instruments)
- RTD was determined by calculating the slope of the torque-time curve between 20-80% of the peak torque

Figure 1. Multimode Dynamometer *Humac Norm, CSMi, Stoughton, MA*

Unplanned Crossover Drop Jump (UDXJ) or Hop Distance

- Participants began each trial standing on a single leg on top of a 30-cm box that was positioned 40-cm away from the landing surface
- When instructed, participants jumped from the box to the landing surface and then hopped at a 45º angle for maximal distance, either in the direction of or away from an illuminated target
- Prior to each trial, the participant would be instructed which leg to stand on and whether to jump toward or away from the illuminated target
- The target illuminated once the individual had begun the trial by hopping onto the landing surface
- Hop distance was measured as the distance from the center of the landing surface to the back of the participant's heel of the hopping leg

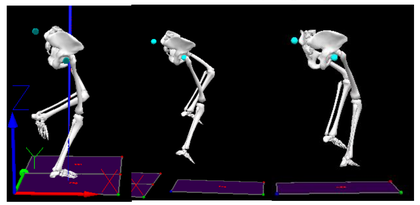

Figure 2. Vicon Nexus trial processed with Visual 3D

Statistical Analysis

- Pearson correlations between the TSK-11 score, RTD, and hop distance were evaluated using Jamovi software

Results

- No significant correlation between TSK-11 scores and RTD or hop distance

Table 4. Correlation Matrix of the data showing no significant correlation

Correlation Matrix

		RTD_20_80	UXDJ_hop_distance
TSK-11	Pearson's r	0.230	0.089
	p-value	0.391	0.753
	95% CI Upper	0.651	0.575
	95% CI Lower	–0.300	–0.444

Discussion

- **No correlation between kinesiophobia and RTD or hop distance**
  - Implies that kinesiophobia could be a contextual situation
    - We can hypothesize that results would be different had we performed the trials in an environment similar to that in which the subject was injured.
- Future studies should examine the relationship between environmental stressors and kinesiophobia as this study was performed in a controlled environment

References

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