

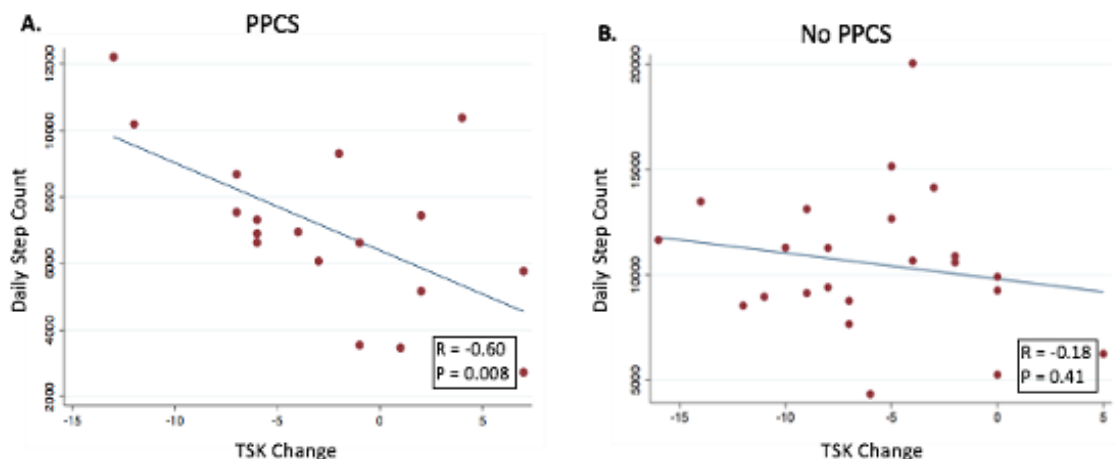
**Physical Activity Predicts Kinesiophobia at Return to Play for Athletes with Persistent Post-Concussion Symptoms.** KL Smulligan (PhD, GS), MJ Wingerson, CN Seehusen, JC Wilson, DR Howell, Department of Orthopedics, University of Colorado School of Medicine, Aurora, CO.

**Purpose:** Physical activity (PA) is recommended to improve concussion recovery time, however, fear of pain with movement (kinesiophobia) may limit PA. Our purpose was to examine the correlation between PA level and kinesiophobia between initial evaluation and return to play (RTP) clearance among adolescents who did and did not experience persistent post-concussion symptoms (PPCS).

**Methods:** Athletes rated kinesiophobia using the Tampa Scale of Kinesiophobia (TSK) at initial ( $\leq 14$  days post-concussion) and RTP clearance visits. They wore activity monitors to quantify daily step count and exercise frequency/duration between initial and RTP visits. Our primary outcome was TSK score change from initial to RTP visits. We grouped athletes based on symptom duration  $\geq 28$  days (PPCS) or  $< 28$  days (no PPCS), and calculated correlation coefficients between activity variables (Pearson  $r$  for normal distribution, Spearman  $\rho$  for non-normal distribution) and TSK change scores.

**Results:** We enrolled 41 athletes ages 10-18 years evaluated within 14 days of concussion. Among our sample, 44% developed PPCS ( $n=18$ ; age= $14.5 \pm 2.0$  years; 50% female; RTP= $66.8 \pm 6.4$  days) and 56% did not ( $n=23$ ; age= $14.9 \pm 1.8$  years; 48% female; RTP= $21.7 \pm 1.9$  days). For the PPCS group, lower TSK change scores were significantly and moderately correlated with higher daily step count ( $r=-0.60$ ,  $p=0.008$ ) and exercise frequency ( $r=-0.63$ ,  $p=0.005$ ), but non-significantly correlated with exercise duration ( $\rho=-0.12$ ,  $p=0.65$ ). Among the no PPCS group, activity variables were weakly and non-significantly correlated with TSK change (step count:  $r=-0.18$ ,  $p=0.41$ ; frequency:  $r=-0.34$ ,  $p=0.12$ ; duration:  $\rho=0.10$ ,  $p=0.67$ ).

**Conclusions:** Higher daily step count and exercise frequency during concussion recovery, regardless of duration or intensity, may help reduce kinesiophobia for those with persistent symptoms.



**Figure 1.** Scatterplot showing the correlation between daily step count and the TSK change between initial and RTP visits for the (A) PPCS and (B) no PPCS groups.