Level 1 Research Award report, Vasileios Georgopoulos, June 2020

Central sensitisation as a predictor of self-management in individuals with chronic low back pain

Background and aims: Chronic low back pain (CLBP) is one of the most prevalent reasons people seek healthcare assistance worldwide. Guidelines for managing CLBP prioritise the development of self-management strategies. Levels of central sensitisation (CS) vary between individuals with chronic pain, and may contribute to the relatively poor efficacy of treatments aiming to facilitate self-management. It is currently unknown whether CS might be a dominant factor predicting worse self-management in people with CLBP following interventions aiming to improve such outcomes. CS might be associated with increasing psychological distress, pain, fatigue and catastrophisation which might also be predictors of effective self-management. Quantitative sensory testing (QST) may provide reliable and valid indices of CS. In people with knee pain, CS has also been associated with self-report measures of widespread pain distribution (reported by shading a pain manikin) or a self-report Central Mechanisms Trait score, comprising items addressing depression, anxiety, neuropathic-like symptoms, pain distribution, catastrophising, sleep, fatigue and cognitive difficulties. The aims were to determine the reliability of a QST protocol to detect CS, and the ability of CS indices to predict self-management outcomes in a population with CLBP.

Methods: The study was approved by the Nottingham Research Ethics Committee 1 (18/EM/0049). Reliability of Pressure Pain Detection Threshold (PPT), Temporal Summation (TS) and Conditioned Pain Modulation (CPM) conducted at a site distant from the low back were assessed in healthy participants (n=25) and individuals with CLBP (n=25). QST test site was the dominant forearm, conditioning site contralateral arm. Receiver operating characteristics (ROC) analysis established the cut-off point for the optimal number of painful sites needed to classify low PPT (1st quartile). Confirmatory factor analysis (CFA) was used to assess model fit and produce a single Central Mechanisms Trait score. The ability of baseline indices of CS (PPT, TS, CPM, number of painful sites on a manikin, and Central Mechanisms

Trait score) to predict self-management outcomes at 3-months follow-up was assessed in individuals with CLBP (n=97) participating in a cognitive behavioural therapy (CBT)-based group physiotherapy intervention, which aimed to facilitate self-management. Self-management was measured in 8 discrete domains; health-directed behaviour, positive engagement in life, self-monitoring and insight, constructive attitudes and approaches, skill and technique acquisition, social integration and support, health services navigation and emotional distress. Pain (numerical rating scale), depression/anxiety (hospital anxiety-depression scale), fatigue (fatigue severity scale) and catastrophising (pain catastrophising scale) were also measured.

Results: Test-retest and inter-rater reliability were high for PPT and TS in both normal and CLBP populations (ICC=0.76-0.92) but low for CPM (ICC=0.43-0.46). In people with CLBP (n=97), ROC analysis determined that >9/24 painful sites optimally predicted low PPT at the forearm (AUC=0.67, 95%CI: 0.55-0.80). The single-factor Central Mechanisms Trait model showed a good fit to the data (CFI=0.92, TLI=0.88; RMSEA=0.09; SRMR=0.07; x^2(df)=34.19(20)). Follow-up questionnaires were completed by 87 people with CLBP (67% female, mean age 65y). Low PPT and inefficient CPM measures at baseline predicted worse social integration and support (r=0.28, p<0.01) and positive engagement in life (r=0.31, p<0.01) at 3 months respectively. More than 9/24 painful sites shaded on the pain manikin at baseline also predicted worse positive engagement in life (r=-0.32, p<0.01) at 3 months. Baseline Central Mechanisms Trait score also predicted worse positive engagement in life, constructive attitudes and approaches and emotional distress (r=0.51-0.54, p<0.01) at 3-months. In multivariate regression models adjusted for baseline demographics, depression, catastrophisation, pain and fatigue, low PPT, high TS, inefficient CPM and the Central Mechanisms trait at baseline, remained significantly associated (p<0.05) with social integration and support, emotional distress, positive engagement in life and constructive attitudes and approaches at 3 months respectively.

Conclusion: Baseline indices of high CS can predict reduced ability of individuals with CLBP to self-manage their condition 3 months after commencing a CBT-based group physiotherapy intervention. Self-management is a multidimensional concept and its influence by factors other than CS merits further research. Treatments which specifically target CS might help remove barriers to self-management in people with CLBP.