CENTRAL ASPECTS OF PAIN IN THE KNEE (CAP-KNEE) QUESTIONNAIRE FOR ASSESSING CENTRAL MECHANISMS IN PEOPLE WITH KNEE PAIN

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Introduction

- Knee pain is the prevailing symptom of knee osteoarthritis.
- Central sensitisation creates discordance between pain and knee joint pathology.
- We previously reported associations between a QST index of central sensitization and a self-report central mechanisms trait derived from 8 discrete characteristics; neuropathic-like pain, fatigue, cognitive impact, catastrophising, anxiety, sleep disturbance, depression, and pain distribution.

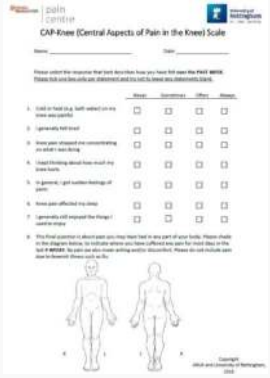
Study Aim

- This study sought to validate an 8-item questionnaire - Central Aspects of Pain in the Knee (CAP-Knee, *figure 1*) - which addresses these 8 characteristics that contribute to the Central Mechanisms trait.

OBJECTIVES

1. Explore the range of interpretations specific to each item within the CAP-Knee questionnaire in order to inform decisions on item revision
2. Demonstrate the psychometric properties of CAP-Knee questionnaire.

Figure 1. CAP-Knee Questionnaire



Methods

- Participants with knee pain were from the community-based Investigating Musculoskeletal Health and Wellbeing study in the East Midlands, UK.
- Items were refined following cognitive interviews (n=22). Psychometric properties were assessed in 250 people using Rasch analysis, Cronbach's alpha and factor analysis.
- Intra-class correlation coefficients tested repeatability in 76 participants.
- Associations between CAP-Knee scores and knee pain severity were examined using linear regression and McGill Pain Questionnaire.

Results

COGNITIVE INTERVIEWS

- Participants interpreted final versions of the CAP-Knee items in diverse ways which were aligned to their intended meanings – Table 1.

Table 1. Themes identified for each item included within the CAP-Knee questionnaire

Item	Main Themes
1. Neuropathic-like pain ('Cold or heat touching my knee was painful')*	Thermal allodynia; Weather induced pain and Thermotherapy
Revised Neuropathic-like pain item: (' Cold or heat (e.g. bath water) on my knee was painful ')#	*Thermal allodynia*
2. Fatigue ('I generally felt tired')	Source of fatigue
3. Cognitive impact ('Knee pain stopped me concentrating on what I was doing')	Task Distraction
4. Catastrophizing ('I kept thinking about how much my knee hurts')	Causes and Consequences; Avoidance behaviours
5. Anxiety ('In general, I got sudden feelings of panic')	Fear
6. Sleep ('Knee pain affected my sleep')	Sleep disturbance
7. Depression ('I generally still enjoyed the things I used to enjoy)	Social function; Physical limitation
8. Pain Distribution (Body Pain Manikin)	Painful sites

*Original version of Neuropathic-like pain item was misinterpreted by participants.
#The revised Neuropathic-like pain item was found to work well across all participants.

PYCHOMETRIC PROPERTIES

- Fit to the Rasch model was optimised by rescoring from 4 to 3 responses per item, producing a summated score ranging from 0-16 (Table 2).
- Consistent with findings from the rasch analysis, Confirmatory Factor Analysis (CFI = 0.99; TLI= 0.98; X2(df)=37(20); RMSEA= 0.06) showed that the CAP-Knee questionnaire constituted a unidimensional scale. All CAP-Knee items contributed significantly (item loading range = 0.21-0.92; p<0.01) to one distinct factor.
- Internal consistency was acceptable (α = 0.75).
- Test–retest reproducibility was excellent (ICC=0.91, 95% CI, 0.86-0.94).
- High CAP-Knee scores were associated with worse overall knee pain intensity (B=0.33 (95% CI 0.25 – 0.41), p<0.001, n=137) after adjusting for age, sex and BMI in the model.

Conclusion

- CAP-Knee is a simple and valid 8-item self-report questionnaire which measures a single construct.
- Measuring central aspects of knee pain may help identify and target treatments that aim to reduce central sensitisation.

Table 2. Summary item-person interaction statistics for CAP-Knee using the partial credit Rasch model

Model	X^2 (df)	P value	Item fit residual (mean)	Item fit residual (SD)	Person fit residual (mean)	Person fit residual (SD)	PSI	Percentage of significant *t*-tests (95% CI)
Scores not Rasch transformed	63 (28)	<0.05	0.79	1.35	0.01	1.09	0.8	4.43% (2.23% to 7.79%)
Scores Rasch transformed	52 (28)	<0.05	0.19	1.34	0.02	1.28	0.73	4.43% (2.23% to 7.79%)
Ideal value	-	*>0.05*	*0*	*1*	*0*	*1*	*≥0.70*	*<5%*

Rasch transformation comprised collapsing responses `Often' and `Always' each scored 2, whereas non-transformed scores were `Often'=2, `Always'=3. PSI; Person Separation Index. N=250.

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