Structural Equation Modelling of the Moderation Effect of Health Locus of Control on the Pain-Depression Pathway

Kate Hope, Kate M Dunn, Paul Campbell

Introduction

- Low back pain (LBP) is common, and is a major health concern
- Psychological consequences of LBP, such as depression, are significant barriers to recovery
- Recent research has shown that the mechanisms of how psychological factors exert their influence on LBP is unclear, with evidence of considerable variation in what psychological factors are important, and evidence of conceptual overlap[1]
- This may be suggestive of an underlying latent factor, or mechanisms that underpin and determine psychological expression
- One potential mechanism is an individuals' Health Locus of Control internality (HLOCi)
  - **Individuals with lower levels of HLOCi believe their health is beyond the control of their own actions, and see themselves as passive agents in the management of their health**[2]

Aim

i. to construct a viable pain/disability to depression pathway model
ii. to test the moderation effect of HLOCi on the pain/disability-depression pathway

Method

Setting/procedure - Cross sectional study of participants (n = 637) who had taken part in two longitudinal cohort studies[3,4]. In both studies patients who had consulted their General Practitioner (GP) about back pain were invited to take part. Participants received questionnaires at regular intervals over a period of 12 months and were then followed up years later. This current analysis used data gathered at their long term follow up of 7 years[3] and 5 years[4]

Measures

- ***Outcome*****:** Depression (Hospital Anxiety and Depression Scale, HADS)
- ***Predictors*****:**
  - Pain intensity (0 to 10 scale of average, lowest and current pain combined)
  - Disability (Roland Morris Disability Questionnaire, RMDQ)
  - Pain interference (single item, 0 to 10 scale)
  - Bothersomeness (single Item, 5 point Likert scale)
- ***Moderator*****:** HLOC Internality Scale (5 questions, 6 point Likert scale, upper and lower quartile groups compared)

Analysis

- **Structural Model:** Pain intensity and disability were placed as exogenous predictors, pain interference as a endogenous mediator and bothersomeness as an endogenous predictor with adjustment for age and gender (see Figures 1and 2)
- Premise for the model is that depression will manifest when pain and disability are perceived as interfering and bothersome
- Model fit was assessed using Comparative Fit Index (CFI), Goodness of Fit Index (GFI) and Root Mean Square Error Approximation (RMSEA)
- Moderation analysis was carried out using multi group analysis on AMOS version 21
- Pairwise Comparison Tests were carried out on pathway coefficients between HLOCi Models (i.e. low and high internality) to determine critical ratio differences. Pathway coefficients that differ between models (≥ 1.96 critical ratio difference) are significant (p ≤ 0.05)

Table 1. Participant characteristics

	Mean (SD)	Median	IQR	Percentage
Age	58.8 (8.8)	57	14	
Gender (Female)				61.9%
HADS Depression Scale	4.9 (4.0)	4	5	
Pain intensity	2.8 (2.7)	2	4	
RMDQ	5.7 (6.1)	3	8	
Pain interference	3.1 (2.9)	2	5	
Bothersomeness	2.4 (1.2)	2	2	

SD – Standard Deviation, IQR – Inter Quartile Range

Figure 1. High internality pathway model (standardized beta coefficient values shown)

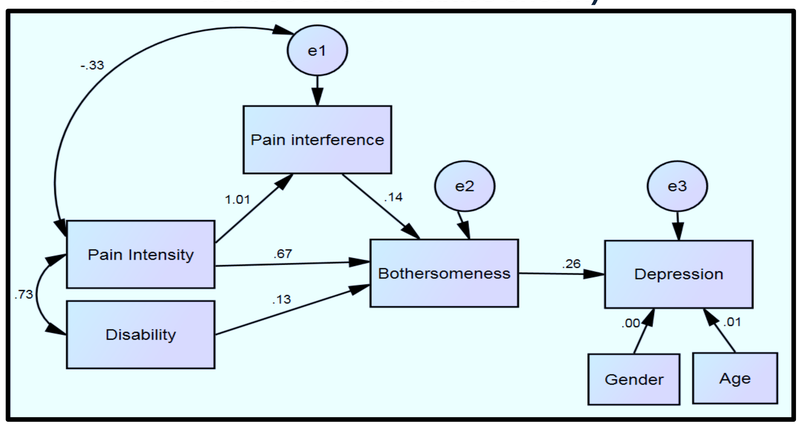
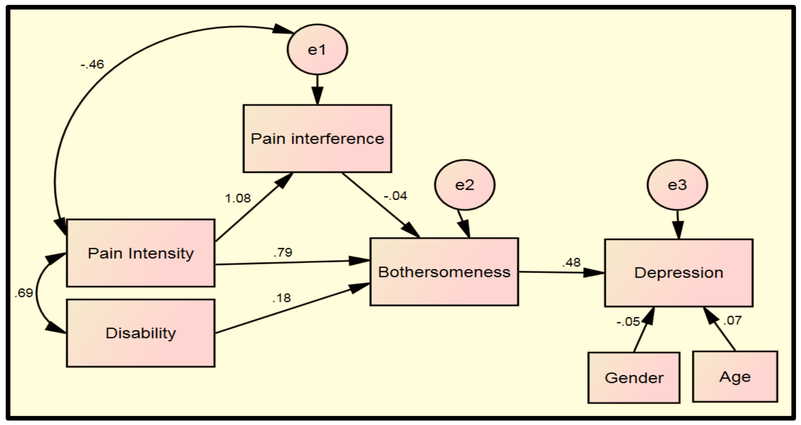


Figure 2. Low internality pathway model (standardized beta coefficient values shown)



Results

Model fit indices indicated an acceptable fit for both independent high internality and low internality models, and for the multi-group model (CFI > 0.95, GFI > 0.94, RMSEA < 0.09)

Table 2. Critical ratio (CR) parameter test

Pathway	CR Value	*p* value (2 tailed)
Pain intensity to pain interference	1.66	*0.10*
Pain interference to Bothersomeness	1.82	*0.07*
Pain Intensity to Bothersomeness	1.30	*0.20*
Disability to Bothersomeness	0.12	*0.90*
Bothersomness to Depression	2.84	*0.005*

Analysis of the critical ratio values (Table 2), and pathway coefficients (Figures 1 and 2) show:

- A significant moderation effect of HLOCi on the bothersomeness to depression pathway, with an almost doubling of strength of association for those with low internality compared to those with high levels of internality
- A non significant trend (*p = 0.07*) on the pathway between pain interference and bothersomeness, suggestive that pain interference plays a lessor role in judgements of bothersomeness for those with low HLOCi

Conclusion

- HLOCi **significantly moderates** the pain/disability to depression pathway in those who report back pain
- People who report having a **low level of control** over their own general health report **greater levels of depressive symptoms** in relation to their pain/disability
- This finding may signify a potential factor that may predict depression among people with pain, and could **potentially be a target for intervention,** for example increasing perceptions of control leading to improved self-management
- Further prospective work is now required to track the influence of HLOC beliefs on the development of depression in those with back pain

References

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Contact

p.campbell@keele.ac.uk

Research Institute for Primary Care & Health Sciences, Keele University, Keele, Staffordshire, ST5 5BG, UK

Funding: This research was supported by the Wellcome Trust [083572]

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