Middlesex University Research Repository

An open access repository of

Middlesex University research

Copyright:

ACCEPTED VERSION-Authors' Pre-Proof Copy

Preliminary Investigation of Self-As-Context in People with Fibromyalgia

Lin Yu[1], Sam Norton[1], Sarah Almarzooqi[1], Lance M. McCracken[1, 2]

[1]King's College London, Health Psychology Section, Psychology Department, Institute of Psychiatry, Psychology & Neuroscience and [2]INPUT Pain Management, Guy's and St Thomas' NHS Foundation Trust, London

Correspondence to:

Professor Lance M. McCracken

Health Psychology Section, Psychology Department

King's College London, Guy's Campus

London SE1 9RT UK

Email: Lance.McCracken@kcl.ac.uk

Abstract

Acceptance and Commitment Therapy (ACT), based on the Psychological Flexibility (PF) model, has been recently applied to Fibromyalgia (FM), and appeared effective in improving functioning. However, evidence for some of the processes within the PF model, self-as-context (SAC) in particular, is lacking within this population. The current study validates a measure of SAC, the Self Experiences Questionnaire (SEQ), and preliminarily investigates the role of SAC in relation to functioning in FM. Participants (N = 298, 93.3% women) self-reporting a diagnosis of FM were recruited via the internet and completed an online survey. Measures included pain, pain acceptance, and SAC, as processes, and pain interference, work and social adjustment, depression, and depression-related interference, as outcomes. Confirmatory factor analysis of the SEQ suggested a bi-factor structure, with a general factor underlying all items and two sub-factors, self-as-distinction and self-as-observer ($\chi 2$=46.55, p=.06, CFI=.99, TLI=.99, RMSEA=.04). Component factors showed good reliability, Cronbach's α=.90, and construct validity, supported by significant Pearson's correlations between SEQ scores, acceptance, and outcomes (r= -.14 to -.33). In multiple regression analyses, SEQ scores significantly predicted pain-related interference (β=-.17, p<.05), work and social adjustment (β=-.14, p<.05) and depression (β=-.21, p<.01), but not depression-related interference, after controlling for pain, but only significantly predicted depression after

controlling pain acceptance. These preliminary results show potentially important associations between SAC and functioning in people with FM.

Key words

Fibromyalgia; Psychological Flexibility; Acceptance and Commitment Therapy; Self-as-context; Self Experiences Questionnaire

1. Introduction

Fibromyalgia (FM) is a condition primarily characterised by chronic widespread pain, and tenderness.[1] FM is estimated to affect from 0.5% to 5% of the adults. [2,3,4] Associated symptoms, such as sleep disturbance, fatigue, anxiety, and depression are common among people with FM.[5] It is often observed that people with complex chronic pain struggle with their sense of self, and in holding onto the "real me". [6,7] This appears particularly relevant to people with FM.[8,9,10] In addition to the "loss of self",[10] many people with FM appear to strongly identify themselves as FM sufferers, which is demonstrated by the emergence of numerous support groups, internet websites, and forums amongst other forms of communities for people with FM.[11]

Cognitive Behaviour Therapy (CBT) has been used to treat FM with some success. Recent systematic reviews of CBT for FM, however, report small effects for depression at post-treatment, and mixed evidence for effects on sleep.[12,13] Acceptance and Commitment Therapy (ACT), a form of CBT, has been recently used to treat FM, and appeared beneficial for a range of outcomes, including psychological and physical functioning.[14,15,16]

ACT is based on a model of general functioning and well-being called the

Psychological Flexibility (PF) model.[17] The therapeutic aim of ACT is to improve functioning

through the improvement of PF. PF is the capacity to be directly, consciously, and fully in

contact with the present moment without needless defence, and to carry on or redirect

one's behaviours in the service of one's goals. The PF model includes a set of core

processes: acceptance, cognitive defusion, present-focused awareness, self as context

(SAC), values, and committed action. Evidence supports the effectiveness of ACT in

improving psychological and physical functioning in chronic pain, and the specific role of

these processes in producing the results observed.[18, 19, 20, 21, 22] In FM, ACT also appears to

produce benefits through improvements in PF processes.[14,15,16] However, evidence for the

relationship between processes within the PF model and functioning in FM remains

limited, and specifically does not include the relationship between SAC and functioning,

partly due to the lack of adequate measurement of this process.

SAC entails an experience of a distinction from one's psychological experiences and

a sense of containing these, or a sense of taking a perspective on one's psychological

experiences. A measure of SAC, the Self Experiences Questionnaire (SEQ) has been

recently developed in a mixed chronic pain sample, and appeared to be a reliable and

valid measure of the self as defined within the PF model.[23] However, the SEQ has not been validated specifically in people with FM.

The current study investigates SAC in people with FM. The specific objectives of the current study were to: (1) conduct confirmatory factor analysis for the SEQ to examine if the previously demonstrated factor structure of the SEQ is supported, (2) examine the reliability and validity, and (3) explore the role of SAC in functioning in people with FM independent from pain, and other PF processes. It is hypothesised that scores from the SEQ will show significant associations with all measures of functioning, and that scores from the SEQ will demonstrate unique associations with measures of functioning, independent from pain and other PF processes.

2. Methods

2.1 Participants

Participants were recruited through online media including online fibromyalgia forums, online fibromyalgia (or pain) support groups, Facebook and Twitter, and provided an Internet link to the online survey simultaneously. Participants clicked on the link to access study information and to participate if they wished to do so. Initially, 347 people

responded to invitations. Among these three people did not meet the inclusion criteria, and 14 people did not agree to participate or give consent after reading detailed information about the study. Another 5 people did not provide data on assessment measures. Amos 20 requires complete data to produce model fit modification indices - only participants providing complete data on the SEQ were included in the analyses. Hence, 298 (91.7%) participants were included in the analyses. 278 participants were (93.3%) women. 281 participants (94.3%) reported a physician diagnosis of fibromyalgia, and 17 (5.7%) reported a diagnosis without physician verification. Mean age was 44.73 (SD=11.04) years old. Endorsed pain sites included back (n=275, 92.3%), neck (n=258, 86.6%), hips (n=237, 79.5%), shoulders (n=231,77.5%), arms (n=181, 60.7%), lower leg (n=188, 63.1%), upper leg (n=179, 60.1%), abdomen (n=178, 59.7%), chest (n=159, 53.4%), and jaw (n=97, 32.6%), clearly showing a predominant pattern of generalized pain. All participants included in the analyses gave consent for their data to be used for research. The project was granted ethics approval.

2.2 Measures

2.2.1 Pain intensity

Participants rated their pain intensity on average over the past week on a standard scale from 0 (no pain) to 10 (extremely intense pain).

2.2.2 Self Experiences Questionnaire (SEQ)

The Self Experiences Questionnaire is a 15-item self-report measure of "contextual self" within the PF model.[23] Contextual self refers to a sense of self that is not based on the content of one's psychological experiences such as thoughts, feelings, and judgements but rather on a sense of taking a perspective on these. Examples of the items from this new measure include "Although I can get caught up in my thoughts, emotions and sensations, I can also separate from them"; "I can experience a distinction between my experiences and the 'I' who notices these experiences." All items are rated on a scale from 0, "never true", to 6 "always true". This measure was developed in our previous study in which adequate internal consistency and validity for the SEQ were reported. The reliability of the SEQ in the current study was good, α= .94.

2.2.3 Chronic Pain Acceptance Questionnaire (CPAQ-8)

The Chronic Pain Acceptance Questionnaire is a 20-item measure of the activity engagement and the willingness or openness components of pain acceptance.[24] Items are rated on a 0-6 scale from "never true" to "always true". Higher total scores indicate

greater acceptance of pain. An 8-item form with the same factor structure was further validated and was used here.[25] The reliability of the CPAQ-8 in the current study was acceptable, α= .77.

2.2.4 Brief Pain Inventory (BPI)

The BPI interference scale is a self-report measure of the impact of pain on daily functioning. In this measure interference related to pain is rated for seven domains of functioning, including general activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life, with one item for each domain. All items of the interference scale are rated on a 0-10 scale from "does not interfere" to "completely interferes". The total score forms a unidimensional scale. It has demonstrated reliability and validity.[26] The reliability of the BPI in the current study was good, α= .88.

2.2.5 Work and Social Adjustment Scale (WSAS)

The WSAS is a five-item self-report measure of impairment of functioning in terms of work, home management, social leisure, private leisure, and personal or family relationships. All items are rated on a 0-8 scale from "no impairment" to "very severe impairment". The total score forms a unidimensional scale. It is regarded as a reliable and

valid measure of impaired functioning.[27] The reliability of the WSAS in the current study was good, α= .88.

2.2.6 Patient Health Questionnaire (PHQ-9)

The PHQ-9 is a ten-item self-report measure of depressive symptoms. The first nine items represent symptoms and are rated on a 0-3 scale from "not at all" to "nearly every day". The total score of these nine items reflects the severity of depression, with higher scores reflecting higher severity of depression. The final item assessing the extent to which depressive symptoms have affected levels of functioning does not form a part of the severity scale, and is rated on a scale of difficulty from "not difficult at all" to "extremely difficult". The PHQ-9 is regarded as a reliable and valid measure of depression severity, and a total score of greater than nine has good diagnostic accuracy as an indicator of depression.[28] The reliability of the PHQ-9 in the current study was good, α=.85.

2.3 Analysis

Skewness, kurtosis, histograms and Q-Q plots for each variable were examined for normality. Scatter plots for all variables involved in correlation analyses were examined

for linearity. The total scores of all measures were considered normally distributed. No obvious non-linear relation was found. Participants who provided data on included measures and those who did not were compared on gender using Chi-square test, and on age using independent-sample t-test and no difference was observed.

After these preliminary analyses, confirmatory analysis was conducted to examine factor structure of the SEQ using AMOS version 20. The factor structure of the SEQ has only been validated in one study.[23] In that study, two moderately correlated factors including one factor reflecting self as distinction (SAD; items 1, 2, 3, 4, 5, 6, and 7), and one factor reflecting self as observer (SAO; items 8, 9, 10, 11, 12, 13, 14, and 15) were identified, together reflecting a contextual sense of self. This two-factor model was evaluated here. Chi-square and several goodness of model fit indices including comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square residual (RMSEA) were reported. Assessment of goodness of fit of these models was based on the following standard structural equation modelling cut-off criteria: CFI>0.92, TLI>0.92,[29] and RMSEA <0.08.[30]

Following the confirmatory factor analysis, the reliabilities of the component factors of the SEQ were examined using Cronbach's α. Construct validity of the component

factors was examined using Pearson's correlations with other process variables and outcome variables. Additionally, hierarchical regressions were conducted to examine the associations between SEQ-based variables and functioning, including pain-related interference, work and social adjustment, depression, and depression-related interference. A recent comprehensive examination of the structure of the PF model using confirmatory factor analyses in a large chronic pain sample suggested that a general factor reflecting openness explained variance across all measures of PF.[31] Therefore, we included pain acceptance, a process that explicitly reflects openness in the PF model, as a covariate, alongside background variables, to investigate the relative independent role of the SAC in predicting functioning. Hierarchical regression equations included measures of functioning as dependent variables, and background variables (gender, age) and process variables (pain, pain acceptance, SEQ-based variables) as independent variables. Two hierarchical regression equations were produced for each outcome variable. In one equation (A), demographic variables were entered into the first block, pain in the second block, and SEQ-based variables were entered last. In the other equation (B), demographic variables were entered into the first block, pain in the second block, pain acceptance and SEQ-based variables were simultaneously entered into the last block.

3. Results

The two-factor model of the SEQ items including SAD and SAO was found to have poor fit (Table 1, model A). The correlation between the two factors was significant and large, r=.82, p<.001. Each item showed sufficient loading onto their respective factors (standardised loading = .71 to .86 for SAD, .57 to .78 for SAO).

Due to the poor model fit of the two-factor model, despite sufficiently differentiated factor loadings on separate factors, and given the high correlation between the two factors, a higher-order model was tested, in which a general factor predicted these two sub-factors (SAD and SAO). The higher-order model was also found to have poor fit (Table 1, Model B). Each item again showed sufficiently differentiated loadings on respective factors (standardised loading =.71 to .86 for SAD, .57 to .78 for SAO).

A bi-factor model was then tested, in which a general factor predicted each item, and each item loaded onto respective sub-factors (item 1, 2, 3, 4, 5, 6, 7 loaded onto SAD and item 8, 9, 10, 11, 12, 13, 14 loaded onto SAO). This model examined if there was a general factor that could account for the variance amongst these items and if each factor accounted for unique variance over and above the general factor. The bi-factor model

showed marginally good fit (Table 1, Model C). All items showed relatively high loading onto the general factor (standardised loading = .56 to .85), except for item 12 (standardised loading= .34). This indicated that a general factor could account for the variance amongst all items. However, Items 4, 5, 6, and 7 loaded poorly onto SAD, suggesting that SAD did not account for unique variance over and above the general factor amongst these items. In addition, modification indices suggested that regressing item 4 and item 5 onto SAO could lead to improvement in model fit. Theoretically, item 4 and 5 do reflect elements of SAO, a sense of self above one's thoughts and feelings. Therefore, item 6 and 7 were removed from the analysis, and item 4 and 5 were regressed onto SAO (Model D). Model D showed better model fit compared to the original bi-factor model (Model C). However, the model fit remained unsatisfactory. When Model D was fitted, all items showed significant and high loading onto to the general factor (standardised loading=.48 to .83), with item 12 showing significant but relatively lower loading (standardised loading=.30) (Factor loadings for Model C and Model D were included in Appendix A). Modification indices suggested that correlating the measurement errors between item 9 and item 10 would lead to improved model fit, suggesting that they correlated above what could be accounted for by the latent factor. Theoretically speaking, these two items both reflect a kind of emotional attachment

to one's thoughts and feelings, besides one's perspective on one's thoughts and feelings, which is separation from one's thoughts and feelings (a relationship of distinction), or being above and containing one's thoughts and feelings (a relationship of hierarchy). Therefore, item 9 and item 10 were removed from the analysis (Model E). This led to significantly improved model fit. All model fit indices suggested good fit for Model E. Item 1, 2, and 3 regressed significantly onto SAD, suggesting that SAD accounted for unique variance over and above the general factor amongst these items. Item 4, 5, 8, 11, 12, 13, 14, and 15 regressed significantly onto SAO, suggesting that SAO accounted for unique variance over and above the general factor amongst these items. Table 2 shows loadings of each item onto each factor in model E. Taken together, there appeared to be a general factor underlying all SEQ items, and these two sub-factors (SAD and SAO) each accounted for unique variance amongst respective sub-sets of items. Omega hierarchical (ωh)[32] was calculated for model E, using the package Omega.[33] ωh compares the variance of general factor to the total score variance. ωh values of .75 or higher were suggested as preferred and values of .50 as useful in determining whether a composite score provides unique, reliable variance.[34] The ωh of model E was .74, with 65.4% variance explained by the general factor, 25.6% variance explained by SAD, and 9% variance explained by SAO, supporting the

general factor explaining variance amongst all items, while the components of SAO were less well captured by the general factor.

[Table 1 about here]

[Table 2 about here]

The SAD and SAO factors both showed good internal consistency when treated as separate subscales, Cronbach's α=.90 for both sub-scales. Table 3 shows the results from Pearson correlation analyses between SEQ scores (SAD, SAO & total score) and background variables, pain, pain acceptance, and all outcome variables. SEQ scores did not show particularly significant correlations with any background variables, and the correlation between SAD and age was small (r=.13). SEQ scores showed significant correlations with all process variables and outcome variables in the hypothesised directions, with small to medium effect sizes (|r|=.13 to .33), except for pain which did not correlate with SAO to a statistically significant level. Overall the validity of each component factors of the SEQ was supported. In general, higher levels of SEQ scores correlated with better functioning.

[Table 3 about here]

Table 4 shows the results of regression analyses. None of the background variables explained significant variance in any of the equations except for age which explained

significant variance in the equations for work and social adjustment, β=. 15, p<.001 (Equation A) and β=.14, p< .01 (Equation B), and gender which explained significant variance in the equation (Equation A) for depression-related interference, β=.-14, p< .01. Pain explained significant incremental variance in all equations, β =. 26 to .41, all p< .001. Pain acceptance also explained significant incremental variance in all equations, β = -.29 to -.50, all p< .001. SEQ scores explained significant incremental variances, independently from pain (Equation A), in the equation for pain interference, β= -.17 p< .05, the equation for work and social adjustment, β= -.14, p< .05, and the equation for depression, β= -.21, p< .01, but not in the equation for depression-related interference. When pain acceptance was entered into the equations (Equation B), SEQ scores no longer explained significant incremental variance in any of the equations, except for the equation for depression, β= -.16, p< .05. Pain acceptance was the strongest predictor of all outcomes among pain, pain acceptance, and SEQ scores. SAC, as reflected is scores from the SEQ, better predicted depression as compared to other outcomes.

[Table 4 about here]

4 Discussion

The current study provides support for the validity of the SEQ, a measure of self conceptualised within the PF model, and investigates SAC in people with FM. A bi-factor model, in which a general factor underlying all SEQ items and two sub-factors (SAD and SAO) accounted for unique variance over and above the general factor, produced good model fit for data from the SEQ. Both component factors showed good reliability and construct validity. As expected, SEQ scores predicted pain interference, work and social adjustment, and depression, but not depression-related interference, when considered independently from pain. However, these scores did not predict any outcome variables independently from pain acceptance, except for depression.

In the current study, both SAC and pain acceptance correlated with functioning, the latter more strongly so. The results here are in line with findings from previous studies. In previous research in FM, only one similarly designed observational study investigated a PF process, pain acceptance, and significant correlations were observed between pain acceptance and a range of measures of psychological and physical functioning with small to medium effect sizes (r=.25 to .42).[35] These results also resonate with evidence from heterogeneous chronic pain samples, where positive associations and a mediating role of pain acceptance have been observed in functioning.[36,37,38] Hence, as with other chronic pain

conditions, active engagement in meaningful activities without struggling with pain-related sensations, thoughts, and feelings appears potentially beneficial for the wellbeing of people with FM. Measures of PF have also appeared in randomised controlled trials (RCTs) of ACT for FM. Luciano and colleagues showed a role of pain acceptance in a trial of ACT.[14] In two others, a measure of psychological inflexibility was used. [15,16] Each of these showed an effect of ACT-related treatments on the key processes assessed. In one of these, significant associations were observed between changes in psychological inflexibility and changes in pain, pain disability, and depression.[16] This evidence along with findings from the current study suggest a beneficial role of PF, and specific PF-related processes, in functioning and wellbeing of people with FM.

It is notable that SAC showed moderate correlation with depression, and explained significant and incremental variance in depression, independently from pain acceptance. This relation between SAC and depression indicated a potentially beneficial role of SAC in emotional functioning, and perhaps a potential indirect impact on other aspects of daily functioning via depression. The finding here is in line with results from the investigation of related processes. Evidence suggests positive associations between rumination ("entangled with one's thoughts and feelings") and depression,[39,40,41,42] including studies in chronic pain

samples,[40] which also indicate the beneficial role of "distancing" from one's psychological experiences in depression.

The confirmatory factor analysis did not verify the original factor structure of the SEQ, and components of self as observer were not well captured by the general factor. On the other hand, the bi-factor model including a general factor underlying all items, and two separate dimensions (SAD and SAO) above the general factor, produced good model fit. This factor structure is consistent with the theoretical model underlying the SEQ. As the model suggested, the contextual self generally involves "distancing" from one's thoughts and feelings, with SAD reflecting a distinction from one's thoughts and feelings, and SAO reflecting a kind of hierarchical relations to these (i.e. "bigger than" or "containing" one's thoughts and feelings).[43,44] In addition, to act with a quality of SAD and SAO requires one's ability to be aware of ongoing events, namely self as process, which is another component of self defined within the functional contextual approach connected with PF and ACT. In fact, in the study where the SEQ was developed,[23] the two sub-factors SAD and SAO showed significant moderate correlation, which could suggest overlap or common underlying processes between the two sub-factors, processes like awareness and a general sense of perspective. Again, the inter-related nature of these elements of the self, and perhaps the

challenge of reporting them, may underlie the difficulty in delineating and producing definitive facets of the model of self in the data. Further testing, refinement, or even expansion of items may lead to improvements in data in the future. Nevertheless, although the original factor structure was not verified, the bi-factor model suggested here appears theoretically consistent.

This study did not show a unique role of SAC in predicting functioning independently from pain acceptance, except for depression. Indeed the PF model is conceptualized around a set of inter-related core processes of PF that are highly inter-related.[45,31] In addition, a comprehensive examination of the structure of the PF model, suggested a general factor reflecting openness explaining variance across all measures of PF.[31] Therefore the inclusion of pain acceptance, a process explicitly addressing openness, and perhaps the most general aspec t of PF, may partial out the variance explained by SAC, thus limit the power of SEQ scores in predicting functioning. Alternatively, the lack of power for predicting functioning may be due to some limit in precision or reliability in the measurement of SAC by self-report. As suggested in the validation study of the SEQ,[23] SAC is a counter-intuitive process that people do not easily or naturally report with respect to their own behaviour and experiences. Perhaps training is needed for a more accurate report of SAC. Further

investigations of self as conceptualized in the PF model may also include behavioural measurement alongside the SEQ to better capture SAC and to further validate or develop the self-report measure. We believe an important small step is made here and that more steps are needed.

As a preliminary internet-delivered investigation, the study naturally has its limitations. First, participants were recruited online through social media. This allows little control over the process of recruitment and little to no ability to verify either diagnosis or other participant responses. This type of recruitment required that the survey remains very brief to retain participation. This is also a selective recruitment process, and generality of these results to a wider population remains to be demonstrated. As a preliminary investigation, we did not comprehensively measure PF processes, but focused on two processes, which means our examination of the PF model is incomplete. As the data gathered were very focused, our ability to conduct analyses of different sub-groups was also limited. Of course, previous studies do show a limited role of background differences in similar analyses and the role of PF facets appears rather generally applicable,[46,23] which argues against the need to assess and extensively analyse individual background

differences. An additional caveat is that the variance that SAC explained in the equations was small.

Obviously, the cross-sectional design of the study limits the causal inferences that can be made here. The relationships we observed between process variables and outcomes are only correlational and do not provide the basis to identify the source or direction of influence. Studies with longitudinal and experimental designs are needed to understand the impact of these processes on functioning and wellbeing over time among people with FM.

In summary, this preliminary investigation supports the validity of a measure of SAC, the SEQ, with a factor structure that is theoretically consistent. It also showed associations between SAC and daily functioning in people with FM. This is the first study to address SAC in a sample of people with FM. In particular, the demonstrated role of this process in depression is potentially important. More comprehensive investigation of the PF model in FM is suggested. The PF model, with its unique inclusion of a process related to the sense of self, may help direct these further investigations into some of the particularly thorny psychosocial problems that impact on the daily life of people with FM.

References

1. Wolfe F. The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. *Arthritis Rheum* 1990; 33(2): 160-172.

2. Branco JC, Bannwarth B, Failde I, et al. Prevalence of fibromyalgia: A survey in five European countries. *Semin Arthritis Rheum* 2010; 39(6): 448-453.

3. Lawrence RC, Helmick CG, Arnett FC, et al. Estimates of the prevalence of arthritis and selected musculoskeletal disorders in the United States. *Arthritis Rheum* 1998; 41(5): 778-799.

4. White KP and Harth M. Classification, epidemiology, and natural history of fibromyalgia. *Curr Pain Headache Rep* 2001; 5(4): 320-329.

5. Bernatsky S, Dobkin PL, Civita MD, et al. Comorbidity and physician use in fibromyalgia. *Swiss Med Wkly 2005*; 135(5-6): 76-81.

6. Toye F, Seers K, Allcock N, et al. A meta-ethnography of patients' experience of chronic non-malignant musculoskeletal pain. *HS & DR* 2013; 1(12).

7. Yu L, Norton S, Harrison A, et al. In search of the person in pain: A systematic review of conceptualization, assessment methods, and evidence for self and identity in chronic pain. *J Contextual Behav Sci 2015*; 4(4): 246-262.

8. Compañ V, Feixas G, Varlotta-Domínguez N, et al. Cognitive factors in fibromyalgia: The role of self-concept and identity related conflicts. *J Constr Psychol* 2011; 24(1): 56-77.

9. Morea JM, Friend R and Bennett RM. Conceptualizing and measuring illness self-concept: a comparison with self-esteem and optimism in predicting fibromyalgia adjustment. *Res Nurs Health* 2008; 31:563-575.

10. Rodham K, Rance N and Blake D. A qualitative exploration of carers' and 'patients' experiences of fibromyalgia: one illness, different perspectives. *Musculoskeletal Care* 2010; 8*(*2): 68-77.

11. Barker K. Self-help literature and the making of an illness identity: the case of fibromyalgia syndrome (FMS). *Social Problems* 2002; 49(3): 279-300.

12. Bernardy K, Fuber N, Kollner V, et al. Efficacy of cognitive behavioural therapies in fibromyalgia syndrome – A systematic review and meta-analysis of randomized controlled trials. *J Rheumatol* 2010; 37: 1991-2005.

13. Glombiewski JA, Sawyer AT, Gutermann J, et al. Psychological treatments for fibromyalgia: a meta-analysis. *Pain* 2010; 151: 280-295.

14. Luciano JV, Guallar JA, Aguado J, et al. Effectiveness of group acceptance and commitment therapy for fibromyalgia: A 6-month randomised controlled trial (EFFIGACT study). *Pain* 2014; 155(4): 693-702.

15. Ljótsson B, Atterlöf E, Lagerlöf M, et al. (2014). Internet-delivered acceptance and values-based exposure treatment for fibromyalgia: A pilot study. *Cogn Behav Ther* 2014; 43(2): 93-104.

16. Wicksell RK, Kemani M, Jensen K, et al. Acceptance and commitment therapy for fibromyalgia: A randomized controlled trial. *Eur J Pain* 2013; 17(4): 599-611.

17. Hayes SC, Pistorello J and Levin ME. Acceptance and Commitment Therapy as a unified model of behavior change. *Couns. Psychol* 2012; 40(7): 976-1002.

18. Hann KE and McCracken LM. A systematic review of randomized controlled trials of Acceptance and Commitment Therapy for adults with chronic pain: Outcome domains, design quality, and efficacy. *J Contextual Behav Sci* 2014; *3*(4): 217-227.

19. McCracken LM, Sato A and Taylor GJ. A trial of a brief group-based form of acceptance and commitment therapy (ACT) for chronic pain in general practice: Pilot outcome and process results. *J Pain 2013; 14*(11): 1398-1406.

20. Scott W, Hann KE and McCracken LM. A comprehensive examination of changes in psychological flexibility following acceptance and commitment therapy for chronic pain. *J Contemp Psychother* 2016; 46(3): 139-148.

21. Trompetter HR, Bohlmeijer ET, Fox J, et al. Psychological flexibility and catastrophizing as associated change mechanisms during online Acceptance and Commitment Therapy for chronic pain. *Behav Res Ther* 2015; 74: 50-59.

22. Vowles KE, Witkiewitz K, Sowden G, et al. Acceptance and commitment therapy for chronic pain: Evidence of mediation and clinically significant change following an abbreviated interdisciplinary program of rehabilitation. *J Pain* 2014; 15(1): 101-113.

23. Yu L, Norton S and McCracken LM. The Self Experiences Questionnaire (SEQ): Preliminary analyses for a measure of self in people with chronic pain. *J Contextual Behav Sci* 2016; 5(3): 127-133.

24. McCracken LM, Carson JW, Eccleston C, et al. (2004). Acceptance and change in the context of chronic pain. *Pain* 2004*;* 109(1-2): 4-7.

25. Fish RA, McGuire B, Hogan M, et al. Validation of the Chronic Pain Acceptance Questionnaire (CPAQ) in an Internet sample and development and preliminary validation of the CPAQ-8. *Pain* 2010; 149(3): 435-443.

26. Cleeland CS and Ryan KM. Pain assessment: Global use of the Brief Pain Inventory. *Ann Acad Med* 1994; 23(2): 129-138.

27. Mundt JC, Marks IM, Shear MK, et al. The Work and Social Adjustment Scale: a simple measure of impairment in functioning. *Br J Psychiatry* 2002; 180(5): 461-464.

28. Kroenke K, Spitzer RL and Williams JB. The PHQ-9. *J Gen Intern Med* 2001; 16(9): 606-613.

29. Hu LT and Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equ Modeling* 1999; 6(1): 1-55.

30. Browne MW and Cudeck R. Alternative Ways of Assessing Model Fit. *Sociol Methods Res* 1993; 21(2): 230-258.

31. Scott W, McCracken LM and Norton S. A confirmatory factor analysis of facets of psychological flexibility in a sample of people seeking treatment for chronic pain. *Ann Behav Med* 2016; 50(2): 285-296.

32. Zinbarg RE, Yovel I, Revelle W, et al. Estimating generalizability to a latent variable common to all of a scale's indicators: A comparison of estimators for ωh. *Appl Psychol Meas* 2006; 30: 121-144.

33. Watkins MW. Omega [Computer software]. Phoenix: Ed & Psych Associates, 2013.

34. Reise SP, Bonifay WE and Haviland MG. Scoring and modelling psychological measures in the presence of multidimensionality. *J Pers Assess* 2013; 9*5*: 129-140.

35. Rodero B, Casanueva B, Luciano JV, et al. Relationship between behavioural coping strategies and acceptance in patients with fibromyalgia syndrome: Elucidating targets of intervention. *BMC Musculoskelet Disord* 2011*;* 12: 143.

36. Åkerblom S, Perrin S, Fischer, MR, et al. The mediating role of acceptance in multidisciplinary Cognitive-Behavioral Therapy for chronic pain. *J Pain* 2015; 16(7): 606-615.

37. Reneman MF, Dijkstra A, Geertzen JHB et al. Psychometric properties of chronic pain acceptance questionnaires: A systematic review. *Eur J Pain* 2010; 14: 457-465.

38. Thompson M and McCracken LM. Acceptance and related processes in adjustment to chronic pain. *Curr Pain Headache Rep* 2011; 15: 144-151.

39. Just N and Alloy LB. The response styles theory of depression: tests and an extension of the theory. *J Abnorm Psychol* 1997; 106(2): 221.

40. McCracken LM, Barker E and Chilcot J. Decentering, rumination, cognitive defusion, and psychological flexibility in people with chronic pain. *J Behav Med 2014;* 37(6): 1215-1225.

41. Nolen-Hoeksema S and Morrow J. Effects of rumination and distraction on naturally occurring depressed mood. *Cogn Emot* 1993; *7*(6): 561-570.

42. Papageorgiou C and Wells A. An empirical test of a clinical metacognitive model of rumination and depression. *Cognit Ther Res* 2003; 27(3): 261-273.

43. Foody M, Barnes-Holmes D. and Barnes-Holmes Y. The role of self in Acceptance and Commitment Therapy. In: McHugh L and Stewart I (eds.) *The Self and Perspective Taking.* Oakland: New Harbinger Publications, 2012, pp. 125–142.

44. McHugh L. A Contextual Behavioural Science approach to the self and perspective taking. *Curr Opin Behav Sci 2015;* 2: 6-10.

45. Vowles KE, Sowden G. and Ashworth J. A comprehensive examination of the model underlying acceptance and commitment therapy for chronic pain. *Behav Ther* 2014; *45*(3): 390-401.

46. Vowles KE, McCracken LM and O'Brien JZ. Acceptance and values-based action in chronic pain: a three-year follow-up analysis of treatment effectiveness and process. *Behav Res Ther* 2011; 49(11): 748-755.

Table 1 Goodness of model fit for each model used in confirmatory analyses.

	Model	Chi-square	df	p value	CFI	TLI	RMSEA
A	Two factor	596.26	89	<.001	.84	.81	.14
B	Higher-order	596.26	89	<.001	.84	.81	.14
C	Bi-factor (original)	309.92	75	<.001	.93	.90	.10
D	Bi-factor (item4,5 loading onto SAO, item 6,7 removed from analysis)	199.09	52	<.001	.94	.92	.10
E	Bi-factor (item9, 10 further removed from analysis)	46.55	33	.06	.99	.99	.04

Table 2 Loadings of each item onto each factor in model E (final bi-factor model)

Items	Estimates		
	General	Self as distinction	Self as observer
SEQ5	0.83		0.19
SEQ2	0.80	0.43	
SEQ3	0.78	0.50	
SEQ4	0.76		0.14
SEQ11	0.71		0.30
SEQ1	0.61	0.46	
SEQ8	0.59		0.30
SEQ15	0.58		0.53
SEQ13	0.53		0.68
SEQ14	0.50		0.69
SEQ12	0.30		0.62

Table 3 Correlations between SEQ scores and background variables, process variables, and outcome variables.

	Age	Gender	Pain	Pain acceptance	Pain-related interference	Work and social adjustment	Depression	Depression-related interference
SAD	0.13*	0.06	-0.15**	0.30***	-0.27***	-0.22***	-0.33***	-.19**
SAO	0.09	0.02	-0.11	0.27***	-0.22***	-0.22***	-0.27***	-.14*
SEQ Total	.11	.03	-.13*	.30***	-.26***	-.24***	-.31***	-.17**

Note. SAD = Self as distinction, SAO = Self as observer, SEQ = Self Experiences Questionnaire.

*p< .05; **p<.01; ***p<.001

Table 4 Hierarchical regressions with measures of functioning as dependent variables.

Block	Predictor	Adjusted R^2	Δ R^2	β
Pain interference (BPI)				
1	Pain	.19	.19***	.41***
2	SAD	.23	.05***	-.17*
	SAO			-.08
1	Pain	.19	.19***	.31***
2	Pain acceptance	.40	.21***	-.44***
	SAD			-.08
	SAO			-.02
Work and social adjustment (WSAS)				
1	Age	.02	.03**	.15***
2	Pain	.19	.17***	.38***
3	SAD	.23	.04***	-.09
	SAO			-.14*
1	Age	.02	.03**	.14**
2	Pain	.19	.17***	.27***
3	Pain acceptance	.44	.26***	-.50***
	SAD			.01
	SAO			-.08
Depression (PHQ-9)				
1	Pain	.16	.15***	.34***
2	SAD	.23	.08***	-.21**

	SAO			-.10
1	Pain	.16	.15***	.28***
2	Pain acceptance	.30	.14***	-.29***
	SAD			-.16*
	SAO			-.06

Depression-related interference (Final item from PHQ)

1	Gender	.03	.03*	-.14**
2	Pain	.15	.13***	.34***
3	SAD	.16	.02	-.11
	SAO			-.04
1	Pain	.15	.13***	.26***
2	Pain acceptance	.27	.12***	-.36***
	SAD			-.04
	SAO			.01

Note. SAD = Self as distinction, SAO = Self as observer. Demographic variables that did not contribute significantly to the variance explained in the models are not included here.

*p<.05, **p<.01, ***p<.001.