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Enhanced psychological flexibility and improved quality of life in chronic fatigue syndrome/myalgic encephalomyelitis

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Objective: Psychological Flexibility (PF) is a relatively new concept in physical health. It can be defined as an overarching process of being able to accept the presence of wanted/unwanted experiences, choosing whether to change or persist in behaviour in response to those experiences. Associations between processes of PF and quality of life (QoL) have been found in long-term health conditions such as chronic pain, PF has not yet been applied to Chronic Fatigue Syndrome/Myalgic Encephalomyelitis (CFS/ME).

Methods: Changes in PF, fatigue severity and QoL were examined in one hundred and sixty-five patients with CFS/ME engaged in a six-week outpatient interdisciplinary group treatment programme. Participants were assessed using a series of self-report measures at the start of the start (T1) and end of a six-week programme (T2) and at six months follow up (T3).

Results: Significant changes in PF and QoL were observed from pre-treatment (T1) to post treatment follow-up (T2 and T3); changes in fatigue severity were observed from T1 to T3 only. Controlling for fatigue severity, changes in the PF dimension of activity/occupational engagement were associated with improvement in QoL at six month follow up (T3) but not at six weeks post programme (T2).

Conclusion: Findings indicate an interdisciplinary group treatment approach for people with CFS/ME may be associated with improved QoL, processes of PF and fatigue severity, supporting a link between PF and long term health conditions. Results highlight links

between PF and patient QoL in CFS/ME and the value of interdisciplinary treatment approaches in this patient population.

Keywords

Acceptance

Chronic fatigue

Interdisciplinary treatment

Psychological flexibility

Quality of life

Values

Introduction

Chronic Fatigue Syndrome/Myalgic Encephalomyelitis (CFS/ME) is a debilitating illness, characterised by persistent extreme fatigue, unrelated to exertion and not relieved by rest. Other common symptoms are muscle cramps, sleep disturbances and cognitive difficulties [1]. Patients have described experiences of social isolation, emotional turmoil and inability to engage in usual activities due to physical and mental exhaustion [2]. The precise medical pathophysiology of CFS/ME is unknown [3]. Despite accumulating evidence recognising it as affecting 250,000 people in the UK [4], controversy surrounding this diagnosis is reflected in CFS/ME patient experiences of feeling stigmatised and marginalised [5]. Two main diagnostic criteria commonly used to diagnose CFS/ME [6] are those of the CDC (Centers for Disease Control and Prevention, US) [1] and Oxford [7], with the former most commonly used in the UK [8].

Patient experience of the uncertainty of CFS/ME is often reflected in attempts to gain control over and prevent the onset of fatigue [9]. Behaviours to gain control may not always be beneficial to wellbeing if they are not aligned with the long-term values and goals of the patient. When the desire to control fatigue becomes overwhelming, behaviour can become rigid and inflexible, impeding upon patients' ability to achieve a balance between accepting the implications of CFS/ME and living their lives [9].

Psychological flexibility (PF)

The management of CFS/ME has been linked to processes associated with the concept of Psychological Flexibility (PF) [10]. PF is defined as an overarching process of being able to accept the presence of both unwanted and wanted experiences, using this awareness to choose whether to change or persist in behaviour in response to those experiences, depending on what is most adaptive and functional for a meaningful life [11]. Mindfulness, the act of purposefully connecting with present moment experiences, fully and without judgement, is

thought to enable PF processes [12,13]. It can be considered a platform for the development of PF, in which self-awareness and exploration from paying attention is related to cognitive defusion and acceptance, to influence purposeful behavioural choices [14,15].

Attempts to gain complete control over physical sensations can present a paradox: avoiding experiences that have become associated with fatigue can lead to a narrowing of the patient's behavioural repertoire and reduce value based living, resulting in less meaningful adaptive behaviours. Through intervention approaches patients learn over time to manage their energy through effectual behaviour change, reducing fatigue severity [16,17]. The most recent behaviour change model of PF [18] constitutes six related aspects: i) 'Cognitive defusion' (a process through which experiences become less dominated by thoughts, language and verbalised rules); ii) 'Acceptance' (making room for unwanted experiences and creating space to engage with bodily sensations); iii)'Contact with the present moment' (ability to fully engage with current experiences without focus on past or future events); iv) 'Self as context' (experiences of the present moment are defined by 'pure awareness', or the 'observing self'); v)'Values' (desires that can be reflected in our behaviour and relate to goals); vi) 'Committed action' (carrying out effective behaviours that are in line with and guided by our values) [12,13,19]. Mindfulness is a wellbeing strategy used alone or as part of other psychological interventions [20,21] and links to the first four of these six PF core processes [22]. Quality of life is an important outcome to assess since it can indicate overall level of wellbeing in different life domains, which may reflect experience of value based living and acceptance.

Whilst PF processes have largely been investigated in the context of chronic pain [23-25,26,27], no studies have explicitly used PF as a framework to understand processes in CFS/ME. There are comparable features between these two populations, including the occurrence of pain and fatigue, sleep disturbances, limitations in physical activity, muscle

weakness and digestive problems [28]. There are also likely to be differences between the experience of chronic pain and CFS/ME [29,9]. The length of time it takes CFS/ME patients to develop processes of PF and to experience the benefits of PF on their QoL may be influenced by the fluctuating nature of the condition.

The present study examined processes of PF within an adult CFS/ME population. It aimed to increase understanding of PF in this population by investigating changes in PF processes, fatigue severity, and QoL in CFS/ME over six months, assessed before and after treatment. The treatment programme was for clinical purposes to improve condition management and quality of life and not specifically designed with the aim of improving PF. It was hypothesised that there would be changes in fatigue severity, PF and QoL following the six week treatment programme and at six month follow-up (pre to post treatment assessments T1 to T2/T3). Secondly, it was hypothesised that changes in PF would be associated with changes in patient QoL outcomes at six month follow-up when controlling for changes in fatigue severity across respective time points.

Method

Participants

Participants were 165 patients who attended a treatment programme at a tertiary care Adult Fatigue Management Service in South West England between 2006 and 2014. Women formed the larger proportion of participants (78.2%), as is typically the case for CFS/ME [30]. Eligibility criteria required participants to be over 18 years of age and have been diagnosed with CFS/ME (CDC criteria) or Post Viral Fatigue Syndrome (PVFS). PVFS was recorded for patients who at study entry, diagnosis was either unknown or for who symptom duration had been less than four months (Fukuda criteria for CFS [1]). Combined inclusion was justified on the basis that patients with CFS and PVFS were treated alike in the programme and both syndromes have comparable key diagnostic indicators. In this sample,

the prevalence of PVFS was approximately 3-5% of participants. All patients were between the ages of 18 and 70 years (M = 40.54, SD = 12.075), the majority were White British (95.8%), over half were married/living with a partner (57.1%) and almost a third were single (29.2%). Mean duration since CFS/ME symptom onset was 56.15 months (mode: 8 months; range: 3-408 months).

The treatment programme adopted the recommendations of the UK NICE guidelines 2007 [4] for the treatment and management of CFS/ME. It employed the evidence base of cognitive behavioural therapy (CBT principles), an activity management approach (comparable to Graded Exercise Therapy), goal setting, relaxation techniques, communication skills and third wave CBT approaches, such as mindfulness, alongside pharmacological treatment delivered by the patient's GP if appropriate. Aspects of the treatment programme incorporated the facilitation of developing PF. The ethos of the programme was centred on the principles of occupational science [see 31,32], enabling an interdisciplinary and holistic approach to treatment with an emphasis on the importance of action/doing for the individual. The interdisciplinary team comprised Occupational Therapists, Physiotherapists, and Practitioner Psychologists. Following individual tailored assessment the group treatment sessions were two hours long, once a week, for 6 weeks, with one follow up group session held 6 months after the last session. Average group size comprised of eight patients.

Using data collected at initial assessment (pre-treatment/T1), at the end of the six week programme (post treatment/T2) and six months after the programme finished (six month follow up/T3) provided an investigation of PF over time, situating the research within the current evidence base for CFS/ME in adults [4].

Measures and Procedure

Participants completed a self-report questionnaire pack at all assessment points collected as part of routine practice and provided informed consent for their data to be used for research purposes. Ethical approval for the study was received from the relevant local institutional ethics committee and ethical procedures were followed throughout. This CFS database has retrospective and prospective national ethical approval (NHS ref 09/H0101/58). Questionnaire packs included the following assessments:

Psychological Flexibility

In accordance with previous research, PF was measured using items in the Chronic Pain Values Inventory (CPVI) [33], that assessed 'success in value based living'. The CPVI wording was adapted to reflect the presence of fatigue as opposed to pain (recommended in the CPVI appendix). PF was also measured using a previously adapted version of the Chronic Pain Acceptance Questionnaire (CPAQ) [33], the Fatigue Acceptance Questionnaire (FAQ) that replaces the word 'pain' with 'fatigue' [34]. The FAQ is made up of two subscales: 'activity engagement' reflects the pursuit of meaningful activities in the presence of fatigue; and 'fatigue willingness' reflects a relative absence of attempts to avoid or control fatigue. Separate scores from the two subscales were used to measure PF for the analyses in the present study. Cronbach's alpha scores in the present study were .88, .90 and .91 respectively for activity engagement from pre to follow up assessment and .43, .63 and .73 respectively for fatigue willingness from pre to follow up assessment. The concept of PF is difficult to measure [11]. It is frequently seen as a single construct and focus on components of the model can make it difficult to investigate the full meaning of the construct yet considering specific PF components enables a more detailed examination and may lead to development of more targeted interventions. It is acknowledged that there are other processes incorporated in the PF contruct that are not being assessed in the current study.

Quality of Life

Perceived QoL was assessed using the Sickness Impact Profile (SIP) [35], a well established behaviourally based measure. It reflects perceived QoL in 12 areas of activity including home management, social interaction and emotional behaviour, comprising 136 statements in total. Items on the SIP are weighted to enable an overall score to be calculated that reflects physical and psychosocial dimensions accumulatively. Higher scores mean more functional disability, reflecting lower QoL. The SIP is frequently used in healthcare settings as a measure of QoL and has demonstrated good construct validity and internal consistency reliability (Cronbach's alpha = 0.92) [36].

Fatigue Severity

Average fatigue severity over the past week was assessed using a Visual Analogue Scale (VAS) employing a 0 (no fatigue) to 10 (worst possible fatigue) numerical rating scale. Sample items included "how fatigued are you right now?" and "how fatigued have you usually been this week?" The use of this measure was based on the clinical practice used by the service delivery team.

Statistical analyses

Paired sample t-tests were used to assess changes across time (pre to post) in fatigue severity, QoL and PF processes. For the analysis of the associations between acceptance, success in value based living, fatigue severity and QoL outcomes, both the period of treatment (T1 to T2) and the overall period of the study (T1 to T3) were examined. The present study followed a similar approach adopted by another research study investigating PF in Chronic Pain [30]. The current analyses focused on changes in fatigue severity and PF processes during the treatment period (T1 to T2) in relation to changes in QoL outcomes from T1 to T3. The analyses also investigated changes in fatigue severity and PF processes for the overall period of the study (T1 to T3) in relation to QoL outcomes at T1 to T3. In line

with previous research [38] to enable this exploration of change between the time points of assessment, change scores were calculated for each of the variables.

Hierarchical multiple regression was applied to assess whether changes in aspects of PF were associated with changes in patient QoL outcomes from the beginning of the treatment period through to 6 month follow up, when controlling for fatigue severity. Hierarchical multiple regression was used to assess whether changes in PF processes occurring during the treatment period (T1 to T2) were associated with changes in QoL outcomes between T1 to T3 when controlling for changes in fatigue severity during the treatment period (T1 to T2). A second hierarchical multiple regression assessed whether changes in PF processes occurring over a longer period of time (T1 to T3) were associated with changes in QoL outcomes between T1 to T3, when controlling for changes in fatigue severity between T1 to T3. As symptom duration was not significantly associated with the outcome variable of quality of life, this was not included as a control variable in the initial regression analyses. Post hoc analyses included symptom duration as a validation of this strategy.

Results

Pre to post-treatment comparisons of changes in fatigue severity, psychological flexibility and quality of life

Pairwise pre-post comparisons found significant patient improvement in QoL, and the PF subscales of activity engagement, fatigue willingness, and success in value based living for T1to T2 scores, $t\ (168) \geq 2.905$, ps $< .01$ and T1 to T3 scores, $t\ (168) \geq 5.074$, ps $< .01$. A significant difference in fatigue severity was found between T1 and T3, $t\ (168) = 2.699$, $p = .008$, where scores significantly decreased between these two time points. No significant difference in fatigue severity was observed between T1 to T2. Table 1 displays means and

standard deviations for the total scores at T1, T2 and T3, indicates significance values of pairwise comparisons, and descriptive statistics for all primary outcome measures.

Insert table 1 about here

Table 2 shows the inter-correlations between change scores on the variables of activity engagement and quality of life across measurement points. Changes between quality of life and the PF subscale of activity engagement scores are not highly correlated (r's =/< .283) with the exception of these scores from T1 to T3. All scores are in the direction of greater activity being associated with greater quality of life and imply that these two variables may be measuring a common construct albeit with varying degrees of association.

Insert table 2 about here

Changes in psychological flexibility pre to post treatment on quality of life at follow-up

Controlling for T1 to T2 changes in fatigue severity, changes in activity engagement, fatigue willingness and success in value based living (T1 to T2) were not individually associated with changes in QoL outcomes from T1 to T3. Regression values are shown in table 3.

Insert table 3 about here

Changes in psychological flexibility pre treatment to follow-up on quality of life at follow-up

After controlling for fatigue severity (T1 to T3), the addition of activity engagement, fatigue willingness, and success in value based living to the model significantly increased the variance explained. Changes in activity engagement from T1 to T3 accounted for significant variance in T1 to T3 changes in QoL, contributing significantly to the change in R squared. T1 to T3 changes in fatigue willingness and success in value based living were not significantly associated with changes in QoL outcomes over this time period. Regression values are shown in table 4.

Insert table 4 about here

In post hoc regression analyses using hierarchical regression to assess any unaccounted for effects of symptom duration as a control variable findings remained significant at $p<.001$ for T1-T3 analyses (fatigue severity or activity engagement change scores) being associated with quality of life; for T1 – T2 analyses where change in fatigue severity was previously a significant predictor at $p<.05$ level, controlling for symptom duration on the first step of the regression there was a slight decrease in significance with a reduction to $p=.063$ making the effect marginal.

Discussion

The current study investigated changes in fatigue severity, PF and QoL in the context of an interdisciplinary programme for adults with CFS/ME. Consistent with NICE Guidelines 2007 [4] and the Framework of Occupational Science [31,32], results indicate that such an approach to the treatment of CFS/ME may facilitate PF and improve QoL.

This study extends previous research exploring aspects of PF in a CFS/ME population and provides evidence for the relevance of PF in long term health conditions [10,34,39,40].

Findings support our hypothesis that in a CFS/ME population, PF processes, QoL and fatigue severity may significantly improve after an interdisciplinary treatment programme. It suggests a potential role for PF in programmes designed to improve quality of life for people living with CFS/ME. It cannot be inferred from the current study that the treatment programme directly acted to increase PF, which in turn improved quality of life; indeed PF is not a simple mediator of outcomes. A more cautious interpretation acknowledges both PF and quality of life as simultaneous improvements. As indicated by low to moderate intercorrelations between changes in activity engagement and quality of life scores, these two variables may be measuring simultaneous changes in PF and QoL that might imply a degree of overlap between contructs. Further work is needed to determine the degree to which these constructs are distinct and whether these current findings relate to a unified construct or to separate constructs.

The current study supports previous findings [10,9,39,40] that increasing PF processes is associated with recovery from functional disability associated with CFS/ME. Changes in activity engagement were associated with improvements in patient QoL across the 6-month follow up. This was not based on early changes in PF during the first 6-weeks but emerged at the 6-month assessment. Changes observed in PF processes are indicative of patients learning to shift focus between controlling CFS/ME symptoms and accepting limitations, whilst engaging in meaningful behaviours. This complements qualitative findings that suggest an ability to respond to CFS/ME symptoms in an adaptive way by choosing to engage in activities providing benefit for patient wellbeing [17].

Differences between CFS/ME and chronic pain

The hypothesis that changes in PF would be significantly associated with changes in patient QoL at six-month follow up when controlling for changes in fatigue severity, was partially supported. Similar to findings in the chronic pain literature, there were significant

improvements in PF during the six-week treatment period for this CFS/ME population. However, changes in PF were not significantly associated with improvements in QoL during this time. The nature of CFS/ME means that setbacks are likely to be experienced within this initial 6-week time frame and may impede upon the newly established PF processes that are integrated post treatment. The notion that CFS/ME is protracted and nonlinear is emphasised in previous work [9]. In comparison to other chronic illness populations the lengthy, pendular nature of the illness trajectory [2] is likely to influence development of PF processes and impact upon the experience of beneficial effects. In studies of PF in chronic pain, changes from pre to post treatment have predicted changes in QoL at follow-up [23], highlighting a difference between the current findings and those from the chronic pain literature. This is not surprising given that chronic pain programmes have employed more intensive treatment programmes with PF explicitly targeted [23,24]. In the current study PF was not an intended programme outcome as originally designed. Consistent with findings from the chronic pain literature [23,25], the results of this study suggest a treatment approach for CFS/ME that is aimed at living with rather than fighting against fatigue as beneficial to improving quality of life.

Limitations

Despite the potential practical and conceptual findings, there are important limitations to the data and analysis presented. Firstly, we acknowledge the lack of a control group of CFS/ME patients; this was not feasible within the current structure of the services provided. We recognise that as such we cannot fully determine whether changes experienced by patients resulted from the interdisciplinary group treatment programme or were a result of natural progression over time. Further work is needed that more rigorously evaluates intervention against control using the conceptual framework suggested here. Secondly, we recognise the inherent challenges of diagnostic criteria for CFS/ME. The criteria is deemed unsatisfactory

by some as it is achieved through exclusion of medical causes of fatigue and the lack of discrimination of other similar conditions including mental health disorders [41]. Variability in duration of symptoms in our sample adds further complexity, suggesting the need for greater homogeneity of sample characteristics and further exploration of symptom duration in understanding the development of PF processes. Whilst only a small proposrtion of the sample were diagnosed with PVFS, missing data on diagnosis and symptom duration may have accounted for more cases of PVFS than the three identified. Yet data analysis was not found to alter significantly when these participants were exclude, providing confidnece in the generalisability of the results within a CFS population. However, the sample offers a clinically representative CFS/ME population accessing specialist care which has been previously advocated as a priority for health research [42]. Thirdly, there are issues with respect to our design and measurement of PF. As the programme was not specifically designed to enhance PF we are in essence imposing an artificial assessment upon the outcomes of the programme and future research is needed in which improvements in PF are targeted as primary outcome goals. Whilst the PF subscale of activity engagement met acceptable reliability criteria at all time points, reliability for fatigue willingness was poor at both pre and post assessments, indicating caution in interpretation of these effects. Fourthly, quality of life was assessed using the SIP, a tool appropriate to the current study but which is not without criticism of its scoring system [43]. Consideration of the scoring structure and alternative scoring may benefit future research, as would the development of a SIP designed specifically for the CFS/ME population. Finally, assessment of change is complex due to difficulties in controlling for external factors and raises issues of clinical relevance [44]. We acknowledge that future research could employ more robust methods of assessing change over time, as that recommended by Vowles et al [25].

Importantly, this study addresses a limitation of previous research; it explicitly comments on specific psychosocial processes situated within a particular model and furthers understanding of how PF can be investigated through quantitative measures. In accordance with chronic pain research [23], we found that changes in the pursuit of meaningful activities played an important role in association with QoL outcomes. Yet changes in value based living were not associated with QoL outcomes. This contributes to existing contradictory findings regarding the relationship between PF measured using the CPVI and associations with QoL outcomes [33]. It questions the ability of the CPVI to accurately capture complex PF processes and suggests the need for future research to attend more closely to the development of PF measurement tools. Based on findings from a recent study into the reliability and validity of the FAQ [34] the contributions of fatigue willingness and activity engagement are in need of further investigation. In this study, reliability of the fatigue willingness subscales ranged from poor to acceptable depending on assessment point. Similarly, value based living was assessed using the CPVI with wording adapted to reflect the presence of fatigue as opposed to pain. To our knowledge, there are no current alternative measures in CFS research measure of acceptance based processes.

In accordance with previous findings [26,27], the pursuit of meaningful activities in the presence of fatigue and the relative absence of attempts to avoid or control fatigue contributed separately to PF. The model of PF has previously been considered a behaviour change model [11] and analysis of such models have highlighted a gap between attitude and behaviour. This is reflected in the current study by the assessment of fatigue willingness and activity engagement respectively in relation to QoL. It is plausible that PF may be an active process embedded within some current approaches to CFS/ME management and this study fits with a current trend away from the ‘best model for treatment’ towards achieving a tailored treatment approach for individuals.

In summary, findings indicate that an interdisciplinary group treatment approach for people with CFS/ME may be associated with improved PF and QoL, despite fatigue severity. The application of a PF model within a CFS/ME population is novel and results indicate the possible scope for such a model in the context of interdisciplinary approaches to treatment and management. This study highlights the benefits of change processes involved in PF in association with improved QoL and calls for future research to investigate PF processes in more depth to benefit patient outcome in long term conditions such as CFS/ME.

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Competing Interest Statement

The authors have no competing interests to report.

References

[1] Fukuda, K., Straus, S., Hickie, I., Sharpe, M., Dobbins, J., & Komaroff, A. (1994). The Chronic Fatigue Syndrome: A Comprehensive Approach to Its Definition and Study. *Annals of Internal Medicine*, 15, 953-959. doi:10.7326/0003-4819-121-12-199412150-00009

[2] Whitehead, L. (2006). Quest, chaos and restitution: Living with chronic fatigue syndrome/myalgic encephalomyelitis. *Social Science & Medicine,* 62, 2236 - 2245. doi:10.1016/j.socscimed.2005.09.008

[3] Speight, N. (2013). Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: Review of History, Clinical Features, and Controversies. *Saudi Journal of Medicine & Medical Sciences*, 1, 11-13. doi:10.4103/1658-631X.112905

[4] NICE (2007). *Chronic fatigue syndrome/myalgic encephalomyelitis (or encephalopathy) Diagnosis and management of CFS/ME in adults and children* Retrieved from http://www.nice.org.uk/guidance/CG53.

[5] Dickson, A., Knussen, C., & Flowers, P. (2007). Stigma and the delegitimation experience: An interpretative phenomenological analysis of people living with chronic fatigue syndrome. *Psychology and Health*, 22, 851-867. doi: 10.1080/14768320600976224

[6] Flo, E. & Chalder, T. (2014). Prevalence and predictors of recovery from chronic fatigue syndrome in a routine clinical practice. *Behaviour Research and Therapy,* 63**,** 1-8.

[7] Sharpe, M. C., et al. (1991). A report--chronic fatigue syndrome: guidelines for research. *Journal of the Royal Society of Medicine***,** 84, 118-121.

[8] McDermott, C., et al. (2014). What is the current NHS service provision for patients severely affected by chronic fatigue syndrome/myalgic encephalomyelitis? A national scoping exercise. *BMJ Open* **4**(6): e005083.

[9] Whitehead, L. (2014). Toward a trajectory of identity reconstruction in chronic fatigue syndrome/myalgic encephalomyelitis: A longitudinal qualitative study. *International Journal of Nursing Studies,* 1-9. doi:10.1016/j.ijnurstu.2006.01.003

[10] Van Damme, S., Crombez, G., Van Houdenhove, B., Mariman, A., & Michielsen, W. (2006). Well-being in patients with chronic fatigue syndrome: The role of acceptance. *Journal of Psychosomatic Research,* 61, 595-599. doi:10.1016/j.jpsychores.2006.04.015

[11] Hayes, S., Pistorello, J., & Levin, M. (2012). Acceptance and commitment therapy as a unified model of behavior change. *The Counselling Psychologist*, 40, 976-1002. doi:10.1177/0011000012460836

[12] Harris, R. (2009). *ACT made simple. An easy-to-read primer on acceptance and commitment therapy.* New Harbinger publications: Oakland, California.

[13] Hayes, S., Luoma, J., Bond, F., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behavior Research and Therapy*, 44, 1-25. doi:10.1016/j.brat.2005.06.006

[14] Flaxman, P.E., Blackledge, J.T. and Bond, F.W. (2011) *Acceptance and Commitment Therapy.* London: Routledge

[15] Hayes, S.C., Strosahl, K.D. and Wilson, K.G. (1999) *Acceptance and Commitment Therapy: An Experiential Approach to Behavior Change.* New York: Guilford Press

[16] Van Ravesteijn, H., Suijkerbuijk, Y., Langbroek, J., Muskens, E., Lucassen, P., Van Weel, C., & Speckens, A. (2014). Mindfulness-based cognitive therapy (MBCT) for patients with medically unexplained symptoms: Process of change. *Journal of Psychosomatic Research*, 77, 27-33. doi:10.1016/j.jpsychores.2014.04.010

[17] Pemberton, S., & Cox, D. (2013). Experiences of daily activity in chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME) and their implications for

rehabilitation programmes. *Disability and Rehabilitation*, 36, 1-8. doi:10.3109/09638288.2013.874503

[18] McCracken, L., & Morley, S. (2014). The psychological flexibility model:A basis for integration and progress in psychological approaches to chronic pain management. *The Journal of Pain*, 15, 221-234. doi:10.1016/j.jpain.2013.10.014

[19] Hayes, S., Villatte, M., Leven, M., Hildebrandt, M. (2011). Open, aware, and active: Contextual approaches as an emerging trend in the behavioral and cognitive therapies. *Annual Review of Clinical Psychology*, 7, 141-168. doi:10.1146/annurev-clinpsy-032210-104449

[20] Kabat-Zinn (1990). *Full catastrophe living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness.* New York: Dell Publishing.

[21] Segal, Z.V., Williams, J.M.G., and Teasdale, J.D. (2002). *Mindfulness-based Cognitive Therapy for Depression: a New Approach to Preventing Relapse.* New York: The Guildford Press.

[22] Flaxman, P.E., Blackledge, J.T and Bond, F.W. (2011). *Acceptance and Commitment Therapy*. Dryden, W. (series editor). London: Routledge.

[23] McCracken, L., & Gutierrez-Martinez, O. (2011). Processes of change in psychological flexibility in an interdisciplinary group-based treatment for chronic pain based on Acceptance and Commitment Therapy. *Behaviour Research and Therapy*, 49, 267-274. doi:10.1016/j.brat.2011.02.004

[24] Vowles, K., & McCracken, L. (2008). Acceptance and values-based action in chronic pain: a study of treatment effectiveness and process. *Journal of Consulting and Clinical Psychology*, 76, 397-407. doi:10.1037/0022-006X.76.3.397

[25] Vowles, K., Witkiewitz, K., Sowden, G., & Ashworth, J. (2014). Acceptance and commitment therapy for chronic pain: Evidence of mediation and clinically

significant change following an abbreviated interdisciplinary program of rehabilitation. *Journal of Pain,* 15, 221-234. doi:10.1016/j.jpain.2013.10.002

[26] Bendayan, R., Esteve, R., & Blanca, M. (2012). New empirical evidence of the validity of the Chronic Pain Acceptance Questionnaire: The differential influence of activity engagement and pain willingness on adjustment ot chronic pain. *British Journal of Health Psychology*, 17, 314-326. doi:10.1111/j.2044-8287.2011.02039.x

[27] Fish, R., Hogan, M., Morrison, T., Stewart, I., & McGuire, B. (2013). Willing and Able: A closer look at pain willingness and activity engagement on the chronic pain acceptance questionnaire (CPAQ-8). *The Journal of Pain*, 14, 233-245. doi:10.1016/j.jpain.2012.11.004

[28] Meeus, M., & Nijs, J. (2007). Central sensitization: a biopsychosocial explanation for chronic widespread pain in patients with fibromyalgia and chronic fatigue syndrome. *Clinical Rheumatology*, 26, 465-473. doi:10.1007/s10067-006-0433-9

[29] Vroman, K., Warner, R., & Chamberlain, K. (2009). Now let me tell you in my own words: Narratives of acute and chronic low back pain. *Disability & Rehabilitation*, 31, 976-987. doi:10.1080/09638280802378017

[30] Tuck, I. (2000). Chronic fatigue syndrome: A woman's dilemma. *Health Care for Women International*, 21, 457-466. doi:10.1080/07399330050082263

[31] Christiansen, C.H. and Townsend, E.A. (2011). Introduction to The Art and Science of Living (2nd ed.) London: Pearson.

[32] Pierce, D. (2014) (ed.) Occupational Science for Occupational Therapy. Thorofare, NJ USA: Slack Incorporated.

[33] McCracken, L., & Yang, S. (2006). The role of values in a contextual cognitive-behavioral approach to chronic pain. *Pain*, 123, 137-145. doi:10.1016/j.pain.2006.02.021

[34] Brooks, S., Rimes, K., & Chalder, T. (2011). The role of acceptance in chronic fatigue syndrome. *Journal of Psychosomatic Research*, 71, 411-415. doi:10.1016/j.jpsychores.2011.08.001

[35] Bergner, M., Bobbitt, R., Carter, W., & Gilson, B. (1981). The sickness impact profile: development and final revision of a health status measure. *Medical Care*, 19, 787-805. doi:10.1097/00005650-198108000-00001

[36] McCracken, L., & Keogh, E. (2009). Acceptance, mindfulness and values-based action may counteract fear and avoidance of emotions in chronic pain: an analysis of anxiety sensitivity. *The Journal of Pain*, 10, 408-415. doi:10.1016/j.jpain.2008.09.015

[37] Gauntlett-Gilbert, J., Connell, H., Clinch, J., & McCracken, L. (2012). Acceptance and values-based treatment of adolescents with chronic pain: Outcomes and their relationship to acceptance. *Journal of Pediatric Psychology*, 38, 1-10. doi:10.1093/jpepsy/jss098

[38] Vowles, K., McCracken, L., & O'Brien, J. (2011). Acceptance and values-based action in chronic pain: A three-year follow-up analysis of treatment effectiveness and process. *Behaviour Research and Therapy*, 49, 748-755. doi:10.1016/j.brat.2011.08.002

[39] Poppe, C., Petrovic, M., Vogelaers, D., & Crombez, G. (2013). Cognitive behavior therapy in patients with chronic fatigue syndrome: The role of illness acceptance and neuroticism. *Journal of Psychosomatic Research*, 74, 367-372. doi:10.1016/j.jpsychores.2013.02.011

[40] Chalder, T., Goldsmith, K. A., White, P. D., Sharpe, M., & Pickles, A. R. (2015). Rehabilitative therapies for chronic fatigue syndrome: a secondary mediation analysis of the PACE trial. Lancet Psychiatry, 2(2), 141-152. doi:10.1016/S2215-0366(14)00069-8

[41]Carruthers, B.M., Jain, A.K., De Meirleir, K.L., Peterson, D.L., Klimas, N.G., Lerner, A.M., Bested, A.C., Flor-Henry P., Joshi, P., Powles, A.C.P., Sherkey, J.A. and van de Sande, M.I. (2003) Myalgic encephalomyelitis/ chronic fatigue syndrome: Clinical working case definition, diagnostic and treatment protocols. *Journal of Chronic Fatigue Syndrome, 11(1), 7-115.* doi: 10.1300/J092v11n01_02

[42] Stiles, W.B., Barkham, M., Twigg, E., Mellor-Clark, J. and Cooper, M. (2006) Effectiveness of cognitive-behavioural, person-centred and psychodynamic therapies as practised in UK National Health Service settings *Psychological Medicine, 36, 555-566. DOI:10.1017/S0033291706007136*

[43] Pollard, B., & Johnston, M. (2001). Problems with the sickness impact profile: a theoretically based analysis and a proposal for a new method of implementation and scoring. *Soc Sci Med, 52*(6), 921-934. doi: 10.1016/S0277-9536(00)00194-5

[44] Gottman, J. (2013). *The Analysis of Change.* Psychology Press: Hove, East Sussex.

Table 1. Means (SD) for psychological flexibility, quality of life and fatigue severity pre-post assessment (N = 165)

Psychosocial variables	Pre Intervention (T1)	Post Intervention (6 weeks) (T2)	Post intervention 6 months (T3)	95% CI (pre-6 week post intervention follow-up (T1 – T2)	95% CI pre-6 month post intervention follow-up (T1 - T3)
Activity engagement	27.19 (10.41)	30.58** (10.35)	31.98** (11.12)	2.21 – 4.14	3.63 – 5.97
Fatigue Willingness	21.57 (6.04)	22.86* (5.96)	24.21** (6.85)	.29 – 1.90	1.66 – 3.46
Quality of Life	0.21 (0.09)	0.19* (0.11)	0.17** (0.1)	-0.02 – -.0027	-0.05 – -0.02
Fatigue severity	6.02 (1.5)	5.99 (1.6)	5.65* (1.86)	-0.19 – 0.21	-0.60 – -0.07
Value based living success	1.62(0.74)	1.88** (0.81)	1.96** (0.86)	0.15 – 0.32	0.23 – 0.45

Significance values relevant follow-up with pre-treatment; *p<.01, **p<.001

Table 2. Inter-correlations between change scores for quality of life and activity engagement across time points of assessment (n= 165)

Change score	*1*	*2*	*3*	*4*
1. SIP pre to post program (T1 – T2)	_			
2. SIP pre to follow up (T1 – T3)	.45***	_		
3. FAQ Activity Engagement pre to post program (T1 – T2)	-.28***	-.176*	_	
4. FAQ Activity Engagement pre to follow-up (T1 – T3)	-.181*	-.54***	.46***	_

Note: SIP = Sickness Impact Profile (higher scores indicate poorer quality of life); FAQ = Fatigue Acceptance Questionnaire.

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

Table 3. Hierarchical multiple regression analysis predicting T1 to T3 change scores in quality of life from T1 to T2 change scores in psychological flexibility (PF) and fatigue severity measures

Predictor	*B*	*SE b*	*B*	*t*	*p*
Step 1					
Constant	-0.034	0.006		-5.470	< 0.001
Fatigue severity	0.012	0.005	0.200	2.600	0.010
Step 2					
Constant	-0.03	0.007		-4.160	< 0.001
Fatigue severity	0.011	0.005	0.177	2.109	0.037
Activity engagement	-0.002	0.001	-0.149	-1.611	0.109
Willingness	0.000003	0.001	0.002	0.024	0.981
Success in value based living	0.011	0.013	0.070	0.794	0.429

Note. R^2 = .040 for step 1 (p =.01), R^2 = .057 for step 2 (p =.05)

Table 4. Hierarchical multiple regression analysis predicting T1 to T3 change scores in quality of life from T1 to T3 change scores in psychological flexibility (PF) and fatigue severity measures

Predictor	*B*	*SE b*	*B*	*t*	*p*
Step 1					
Constant	-0.026	0.006		-4.658	< 0.001
Fatigue severity	0.021	0.003	0.457	6.552	0.001
Step 2					
Constant	-0.007	0.006		-1.121	0.264
Fatigue severity	0.013	0.003	0.281	3.905	< 0.001
Activity engagement	-0.004	0.001	-0.416	-5.226	< 0.001
Willingness	-0.000291	0.001	-0.021	-0.318	0.751
Success in value based living	-0.001	0.009	-0.01	-0.131	0.896

Note. R^2 = .208 for step 1 (p <.001), R^2 = .362 for step 2 (p <.001)