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The role of mindfulness in a contextual cognitive-behavioral analysis of chronic pain-related suffering and disability

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Abstract

An increasing number of studies consider the specific processes by which distressing sensations, thoughts, and emotional experiences exert their influence on the daily functioning of those who suffer with chronic pain. Clinical methods of mindfulness and the processes that underlie them appear to have clear implications in this area, but have not been systematically investigated to this point in time. The purpose of the present study was to examine mindfulness in relation to the pain, emotional, physical, and social functioning of individuals with chronic pain. The present study included 105 consecutive patients attending a clinical assessment for treatment of chronic pain. Each completed a standardized battery of questionnaires, including a measure of mindfulness, the Mindful Attention Awareness Scale [Brown KW, Ryan RM. The benefits of being present: mindfulness and its role in psychological well-being. J Pers Soc Psychol 2003;84:822–48]. Correlation analyses indicated that mindfulness was unrelated to age, gender, education, or chronicity of pain, but was significantly related to multiple measures of patient functioning. In multiple regression analyses, after controlling for patient background variables, pain intensity, and pain-related acceptance, mindfulness accounted for significant variance in measures of depression, pain-related anxiety; physical, psychosocial, and ''other'' disability. In each instance greater mindfulness was associated with better functioning. The combined increments of variance explained from acceptance of pain and mindfulness were at least moderate and, in some cases, appeared potentially meaningful. The behavioral processes of mindfulness and their accessibility to scientific study are considered.

Keywords: Chronic pain; Disability; Mindfulness; Acceptance; Contextual cognitive-behavioral therapy

1. Introduction

One current psychological model of chronic pain suggests that patients with chronic pain suffer and are disabled particularly by process of restricted awareness, overwhelming influences of distressing thoughts and emotions, and from habitual patterns of ineffective avoidance (McCracken, 2005). Some chronic pain sufferers become overly focused on their pain, think in negative terms about their situation, suffer emotionally from both their thoughts and events outside their thoughts, and become fixed in recurrent patterns of unsuccessful struggling with pain in ways that limit their functioning. This general, contextual, cognitive-behavioral model is gaining increasing support, particularly its component processes of acceptance of pain (e.g., McCracken, 1998; McCracken et al., 1999; Viane et al., 2003; McCracken et al., 2004) and values (McCracken and Yang, 2006).

There are specific treatment methods for chronic pain designed to address the processes of suffering and disability outlined above. Mindfulness-based methods are one example. These methods are intended to reduce the contribution of restricted awareness and some of the emotional and behavioral impact of distressing

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psychological experiences (Baer and Krietemeyer, 2006). Mindfulness can be defined as the practice of broad, present-focused, and behaviorally neutral awareness. It is a way to observe experiences, such as physical symptoms, emotions, or thoughts, such that some of the otherwise automatic behavioral influences attached to these experiences are reduced, leading to more balance, non-reactive, and realistic contact with situations, and more effective action. Although mindfulness-based methods appear effective for chronic pain in uncontrolled studies (e.g., Kabat-Zinn, 1982; Kabat-Zinn et al., 1985; Kaplan et al., 1993), and have been the basis for recent quantitative reviews (Baer, 2003; Grossman et al., 2004), there are few studies attempting to directly measure the *processes* of mindfulness, and no empirical studies of this type in relation to chronic pain.

The goal of mindfulness is not to alter the content of what is experienced but to change how it is experienced and the influences it exerts on behavior. In this way, mindfulness is best understood within a functional and contextual framework, as opposed to a framework that advocates the challenging or modifying of thoughts and feelings. This functional aspect of mindfulness appears well suited as a treatment method for intractable chronic pain, where changing what is felt appears dramatically more difficult than changing behavior in relation to what is felt.

The purpose of this investigation was to examine the role of mindfulness in relation to the functioning of persons with chronic pain. In this study, measures of patient functioning included pain, emotional distress, disability, and pain-related medication use. It was predicted that the greater neutral and present-focused awareness implied by mindfulness would be associated with more healthy and less distressed functioning on these measures. An additional purpose of the current study is to examine the relationship between acceptance of pain and mindfulness. It was expected that mindfulness would be positively associated with acceptance of pain but also that mindfulness, as a more general process of awareness and non-reactivity, would predict patient functioning independent of acceptance of pain.

2. Methods

2.1. Participants

Subjects for this study were 105 consecutive patients seeking services on an interdisciplinary pain management unit in the UK between November 2005 and June 2006. The majority were women (60.0%). The overwhelming majority reported their ethnic background as white (including British, Irish, or other) (98.1%). Mean age was 46.9 years (SD = 12.5). Mean years of education completed was 12.3 (SD = 2.3). Most were married (61.9%), followed by single (16.2%), divorced (16.2%), and widowed, separated or co-habitating (5.7%). The median duration of pain was 96.0 months (range 7–540). Low back pain was the most frequent primary pain complaint (54.3%), followed by lower extremity (14.3%) shoulder or upper limb (11.4%), full body (11.4%), and other locations (8.6%). Only 9.6% of patients were working either full or part time away from home.

The data for this study were collected as part of a standard assessment process to consider patients' treatment needs. Patients were mailed questionnaire packets at home and were asked to complete them and bring them with them to their initial visit in the clinic. All patients provided written consent for their data to be used in research. There was a less then 10.0% rate of non-completion due to lack of reading ability, misplaced forms, errors during the process of assembling the forms, or failures to request consent. In addition to a set of standardized instruments, patients also provided information about background characteristics, ratings of pain and pain-related distress (0–10 scales), estimates of daily time spent upright, standing or walking, and medications taken. Medications for pain were classified into one of ten classes (e.g., weak opioids, strong opiods, NSAID, tricyclic antidepressant, muscle relaxant) and a sum of the number of classes prescribed was used for analysis. Approval to conduct this study was given by the Research Committee at the Royal National Hospital for Rheumatic Diseases.

2.2. Measures

The primary measure of interest in this study was the Mindful Attention Awareness Scale (MAAS; Brown and Ryan, 2003), a 15-item measure of mindfulness. The item content was designed to reflect the opposite of the construct of mindfulness, or "mindlessness," and thus endorsing the item content at a lower frequency is taken to represent a higher level of mindfulness (e.g., "I find it difficult to stay focused on what is happening in the present," "I rush through activities without being really attentive to them," "I find myself preoccupied with the future or the past."). Each item is rated on a scale from 1 (almost always) to 6 (almost never). The items are averaged to form the total score. The initial development studies of the instrument demonstrated that scores from the MAAS achieve alpha reliability levels above .80, appropriately correlate with measures of emotional distress and physical symptoms in students and general adult samples, distinguish individuals based on their history of mindfulness training and practice, and correlate with measures of self-awareness (Brown and Ryan, 2003). Additional study supports the factor structure and validity of the MAAS in a clinical population, patients with cancer (Carlson and Brown, 2005). The internal consistency reliability coefficient (alpha) in the current sample was .87.

The British Columbia-Major Depression Inventory (BC-MDI; Iverson and Remick, 2004) was used to measure depression. The BC-MDI is a relatively new 20-item self-report measure of depression modeled after the Diagnostic and Statistical Manual of Mental Disorders (4th edition; DSM-IV; American Psychiatric Association, 1994) criteria for major depression. Items 1–16 are symptoms of depression. Patients are asked to report whether they had each of these symptoms in the past two weeks and then to rate each endorsed symptom on a 1–5 scale of severity, from 1 (very mild problem) to 5

(very severe problem). Items 17–20 asked patients to rate the impact of the endorsed symptoms on their lives, in areas of work or school, family, and social life. The life impact in each area is rated from 0 (no impact) to 4 (very severe impact). The measure yields scores for both symptom severity and symptom-related interference with functioning. Scores from the BC-MDI have demonstrated convergent and discriminant validity (Iverson, 2001), a sensitivity of .92, and a specificity of .99 for detecting cases of depression as identified by a structured clinical interview (Iverson and Remick, 2004). The BC-MDI was used in this study to examine relations between mindfulness and emotional functioning.

The Chronic Pain Acceptance Questionnaire (CPAQ; McCracken et al., 2004) is a 20-item inventory designed to measure acceptance of pain. It was derived from a measure first presented by Geiser (1992). The CPAQ includes two subscales, activity engagement and pain willingness, assessing the tendency to perform activities with pain present and the relative absence of attempts to control or avoid pain, respectively. Patients rate each item on a scale of 0 (never true) to 6 (always true). The CPAQ scales have demonstrated internal consistency values of .78–.82 supporting reliability, and significant correlations with measures of avoidance, distress, and daily functioning, supporting their validity as measures of acceptance of pain (McCracken et al., 2004). The CPAQ was used in this study to examine the degree of correlation between acceptance and mindfulness, as these are presumed to be related processes, and the degree to which a measure of mindfulness can account for variance in patient functioning over and above variance accounted for by acceptance of pain.

The Pain Anxiety Symptoms Scale (PASS-20; McCracken and Dhingra, 2002) is a 20-item measure of fear, avoidance, cognitive, and physiological anxiety responses related to chronic pain. Patients rate each item on a scale from 0 (never) to 5 (always) indicating how often they do or experience each of the responses described. Study of the PASS-20 has demonstrated good internal consistency reliability, strong correlations with the original subscales and with measures of patient functioning, and an appropriate factor structure, supporting the validity of the derived scores as indices of pain-related anxiety responses (McCracken and Dhingra, 2002; Roelofs et al., 2004). The PASS-20 was used to examine relations between mindfulness and pain-related anxiety and avoidance.

The Sickness Impact Profile (SIP; Bergner et al., 1981) is a 136-item measure of the effects of a health problem on daily functioning. It includes 12 categories of functioning that can be combined to form three composite scores for physical, psychosocial and "other" aspects of disability. During completion of the SIP patients endorse statements that describe problems with functioning in relation to their health. In scoring the SIP each item is given a different weight to reflect the degree of disability implied by the item content. Each scale sum is converted to a proportion and, thus, all scores from the SIP range from 0 to 1. The temporal consistency reliability of the SIP total score is very good at $r = .92$, and the composite scores have demonstrated good convergent and discriminant validity (Bergner et al., 1981). The SIP composite scores were used to examine relations between mindfulness and disability. The 10-item SIP "Alertness" scale was also used to explore relations between mindfulness and difficulties with cognitive functioning.

3. Results

3.1. Preliminary analyses

Means and standard deviations for all of the primary study variables are included in Table 1. The mean score on the MAAS for the current sample was 4.03 (SD = .92), which corresponds to "somewhat infrequently" on the instrument's rating scale. Based on correlation analyses, the mindfulness score was not significantly related to age, gender, years of education, or chronicity of pain (all $p > .08$). Further exploratory analyses examining patient characteristics demonstrated particular correlations with medication use. Mindfulness was negatively correlated with use of tranquilizers or sedating medication, $r = -.28$, $p < .01$, and selective serotonin reuptake inhibitor (SSRI) type antidepressants, $r = -.28$, $p < .01$.

3.2. Correlation analyses

To examine relations between mindfulness and patient functioning, a series of correlations were calculated between the mean score from the MAAS and the measures of pain, pain-related distress, acceptance of pain, depression, depression-related interference with functioning, pain-related anxiety, the composite scores for disability, the measure of cognitive functioning, and a tally of number of pain-related medications being taken. The correlation results for the MAAS as well as intercorrelations among the other primary study variables are demonstrated in Table 1.

All eleven correlations involving the MAAS met criteria for significance at $p < .01$. If a more conservative Bonferroni-type correction for alpha were applied (i.e., $.05 \div 11 = .0045$), only one of the correlations would fail to meet criteria for significance, the correlation with number of medications. Mindfulness was positively correlated with the acceptance total score and negatively correlated with the measures of pain, emotional distress and disability. Quite moderate-sized correlations were achieved with the measures of depression, psychosocial disability, "other" disability, and "alertness," $r = -.48$ to $-.51$, suggesting overlapping variance in the vicinity of 25%. In terms of daily functioning, those patients who reported more mindfulness also reported less pain and pain-related distress, less depression and less interference with functioning due to depression, less pain-related anxiety, less disability, fewer problems with cognitive functioning, and fewer medications related to pain.

3.3. Regression analyses

Regression analyses were calculated to examine whether mindfulness retains an ability to predict aspects of daily functioning for pain sufferers, after variance due

Table 1
Means, standard deviations, and correlations for primary study measures ($n = 105$)

	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Mindfulness (MAAS)	4.04	.93													
2. Pain intensity (0–10)	6.65	1.99	−.30**												
3. Pain-related distress (0–10)	7.34	2.31	−.36***	.61***											
4. Acceptance of pain (CPAQ)	44.91	20.16	.28**	−.32***	−.46***										
5. Activity engagement (CPAQ)	26.87	12.34	.26**	−.31**	−.44***	.88***									
6. Pain willingness (CPAQ)	18.05	10.86	.22*	−.25**	−.36***	.85***	.51***								
7. Depression (BC-MDI)	27.88	14.42	−.51***	.37***	.49***	−.66***	−.66***	−.47***							
8. Depress. interfer. (BC-MDI)	3.01	.93	−.27**	.38***	.32***	−.59***	−.60***	−.41***	.66***						
9. Pain anxiety (PASS-20)	49.98	20.04	−.39***	.34***	.41***	−.72***	−.60***	−.66***	.67***	.54***					
10. Physical disability (SIP)	.23	.15	−.40***	.33***	.51***	−.47***	−.41***	−.41***	.64***	.60***	.60***				
11. Psychosoc. disability (SIP)	.28	.18	−.50***	.31**	.44***	−.63***	−.61***	−.47***	.82***	.61***	.61***	.61***			
12. "Other" disability (SIP)	.31	.11	−.50***	.29**	.46***	−.62***	−.56***	−.52***	.65***	.54***	.55***	.75***	.72***		
13. Alertness (SIP)	.36	.29	−.48***	.27**	.32***	−.50***	−.52***	−.34***	.69***	.46***	.47***	.53***	.88***	.60***	
14. Number of pain medications	2.90	1.68	−.26**	.26**	.32***	−.29**	−.22*	−.28**	.38***	.26**	.29***	.34***	.34***	.29**	.26**

* $p < .05$.
** $p < .01$.
*** $p < .001$.

to patient background characteristics, pain, and acceptance of pain is taken into account, and also to examine the total variance predictable by these combined processes. For these purposes a series of eight hierarchical multiple regression analyses were calculated, including the eight primary measures of pain-related distress, emotional functioning, disability, and medication use. In each equation, patient age, gender, education, and duration of pain were entered first, the numerical rating of pain intensity was entered next followed by the two scores from the CPAQ, activity engagement and pain willingness, and the mindfulness score from the MAAS was entered in a final step. The regression results are demonstrated in Table 2.

In general, the four patient background variables contributed little variance in the regression analyses, range $\Delta R^2 =$ .004–.14, and the block of variables contributed a significant increment just once, in the equation for depression-related interference with functioning. The background variables with significant regression coefficients included education, which had a positive relationship with depression; duration of pain, which had a negative relationship with depression-related interference with functioning; and gender, indicating that female gender was associated with higher levels of physical disability. The pain intensity score, on the other hand, added a significant contribution to explained variance in each of the eight equations, the smallest, $\Delta R^2 = .065$, for number of pain medications and the largest, $\Delta R^2 = .37$, for the rating of pain-related distress. The pair of acceptance variables significantly contributed to seven of the equations, range $\Delta R^2 = .091$–.38.

In five of eight equations, mindfulness added a significant increment of variance in the prediction of the criterion variables, independent of patient background characteristics, pain, and the acceptance scores. The exceptions were the equations for pain-related distress, interference with functioning due to depression, and number of pain-related medications being used. The significant variance increments attributable to mindfulness ranged from $\Delta R^2 = .033$, for pain-related anxiety, to $\Delta R^2 = .11$, for both depression, and "other" disability. The average variance increment for mindfulness across all eight equations was $\Delta R^2 = .060$, and for acceptance and mindfulness combined was $\Delta R^2 = .28$. Accordingly, total explained variance from the full models was good, ranging from $R^2 = .15$ to $R^2 = .61$, average $R^2 = .47$. The direction of the relationship between mindfulness and the measures of functioning was in each case as predicted, to report more mindfulness was to report less distress and disability.

4. Discussion

Results from the present investigation demonstrate that behavior patterns characterized as "mindful"

Table 2
Hierarchical multiple regression analyses examining unique contributions of acceptance of pain (activity engagement and pain willingness) and mindfulness to emotional, physical, social functioning, and medication use in chronic pain, after controlling for relevant patient characteristics and pain intensity

Predictors	Beta (final)	ΔR^2	R^2
Pain-related distress (0–10)			
1. Age	.024		
Gender	.12		
Education	.11		
Duration of pain	−.029	.017	
2. Pain intensity	.49***	.37***	
3. Activity engagement	−.20*		
Pain willingness	−.16	.091***	
4. Mindfulness	−.16	.020	.50***
Depression			
1. Age	.081		
Gender	.008		
Education	.15*		
Duration of pain	−.098	.058	
2. Pain intensity	.13	.15***	
3. Activity engagement	−.42***		
Pain willingness	−.16	.29***	
4. Mindfulness	−.37***	.11***	.61***
Depression-related interference with functioning			
1. Age	.090		
Gender	−.13		
Education	.11		
Duration of pain	−.22**	.14**	
2. Pain intensity	.24**	.16***	
3. Activity engagement	−.38***		
Pain willingness	−.11	.17***	
4. Mindfulness	−.10	.009	.48***
Pain-related anxiety			
1. Age	−.033		
Gender	.008		
Education	.075		
Duration of pain	.001	.048	
2. Pain intensity	.10	.12***	
3. Activity engagement	−.27**		
Pain willingness	−.48***	.38***	
4. Mindfulness	−.20**	.033**	.58***
Physical disability			
1. Age	.11		
Gender	.25**		
Education	.12		
Duration of pain	−.084	.029	
2. Pain intensity	.13	.11***	
3. Activity engagement	−.20*		
Pain willingness	−.28**	.18***	
4. Mindfulness	−.30***	.073***	.40***
Psychosocial disability			
1. Age	−.022		
Gender	.004		
Education	.072		
Duration of pain	−.079	.063	
2. Pain intensity	.053	.095***	
3. Activity engagement	−.37***		
Pain willingness	−.21*	.27***	
4. Mindfulness	−.35***	.10***	.53***
"Other" disability			
1. Age	−.001		
Gender	.073		
Education	.075		
Duration of pain	−.11	.047	
2. Pain intensity	.027	.082**	
3. Activity engagement	−.28**		
Pain willingness	−.32***	.29***	
4. Mindfulness	−.37***	.11***	.53***
Number of pain-related medications			
1. Age	−.014		
Gender	.031		
Education	.078		
Duration of pain	.018	.004	
2. Pain intensity	.16	.065**	
3. Activity engagement	−.020		
Pain willingness	−.21	.053	
4. Mindfulness	−.18	.026	.15*

Note: In these analyses age, gender (1 = men, 2 = women), education (years completed), and duration of pain (months) were entered as a block in the first step. Present pain intensity (rated 0–10) was entered and then the two components of acceptance were entered simultaneously, and the contribution mindfulness was tested in a final step.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

significantly predict physical, social, cognitive, and emotional functioning, as well as medication use, in patients seeking treatment for chronic pain. The magnitude of the relations between mindfulness and these aspects of patient functioning was generally small to medium, but in some cases suggested 25% overlapping variance. In the prediction of depression, pain-related anxiety, physical, psychosocial, and "other" types of disability, the role of mindfulness remained significant even after variance due to patient background characteristics, pain, and acceptance of pain was statistically controlled.

The primary findings of this study are consistent with findings of other studies demonstrating that mindfulness is positively associated with emotional functioning and well-being, and negatively associated with physical symptom complaints (Brown and Ryan, 2003; Baer et al., 2004; Carlson and Brown, 2005), and with studies demonstrating that mindfulness-based treatments appear broadly effective for patients with chronic pain (Kabat-Zinn et al., 1985), for mood disturbance and stress in cancer (Speca et al., 2000; Brown and Ryan, 2003), and for relapse after treatment for depression (Ma and Teasdale, 2004).

While not a primary focus of the present study, the results also provide support for the validity of the mindfulness data from the MAAS. The negative association between the MAAS and the alertness subscale of the SIP was predicted, consistent with the definition of mindfulness as a skill of focused attention and

non-reactivity to private experiences. Emotional reactions are known to predict cognitive interference in patients with chronic pain (e.g., Crombez et al., 1999; McCracken and Iverson, 2001); therefore, to be "non-reactive" to these would be expected to minimize this effect. Similarly, the positive correlation with acceptance of pain was predicted. Both mindfulness and acceptance of pain include open, "non-defensive," neutral, and non-reactive responses to private experiences. The important point about acceptance of pain and mindfulness is that, although both include acceptance, the former is pain-focused and the latter is broader than that. Acceptance of pain includes noticing and not reacting to pain. Mindfulness includes noticing and not reacting to pain, emotions, urges, thoughts, and other feelings in the body.

Both acceptance of pain and mindfulness uniquely predict patient functioning when considered together in multiple regression analyses. This suggests that a process of allowing the experience of pain, without struggling or avoiding it, *and* a general process of full, present-focused, and non-reactive awareness, both play their roles in the suffering and disability of chronic pain. This seems to occur because the experiences of chronic pain that occasion struggling, avoidance, amplified distress, and failures to achieve important goals are not all directly pain-related. Chronic pain sufferers may experience restriction in their functioning from a range of thoughts, memories, emotions, and physical sensations. These may occur from losses, threats, or failures they experience in a range of situations, such as in relationships, family, work, finances, or in relation to other health problems. Results showing significant amounts of variance in patient functioning predicted by measures of acceptance of pain and mindfulness provide support for a contextual cognitive-behavioral model of chronic pain (McCracken, 2005).

The word "mindfulness" may carry some unhelpful baggage, evoke unfortunate associations, or cause confusion in its many non-technical definitions. Some researchers and clinicians may question its validity due to its roots in religious and non-scientific practices (Kabat-Zinn, 1990). However, as noted above, mindfulness incorporates notions of attentional control, present focus, accurate self-monitoring, and inhibition of automatic responses, processes with implicit legitimacy in other areas of work. Examples include studies of attentional bias in psychological disorders (Harvey et al., 2004), temporal location of cognition (e.g., future-focused worry, past-focused rumination; Watkins et al., 2005), attention-based treatment methods (e.g., Silverstein et al., 2005), accuracy training for self-monitoring (Bornstein et al., 1978), and physiological response changes measurable by neuroelectric and other neuroimaging methods (Cahn and Polich, 2006). Thus, although mindfulness has entered the literature as a set of methods with non-scientific roots, the processes of mindfulness appear potentially coherent, important, and testable, provided that we discriminate these processes from the methods of mindfulness and then technically define them.

The current study has limitations. First, the methods were retrospective and correlational. Further experimental and treatment-based studies will be needed to determine the direction and strength of causal relations. Second, assessment of mindfulness is a technically challenging task, as a degree of awareness is required to report on one's level of awareness. Although the MAAS appeared to work well in the current study, further developments in the assessment of mindfulness will be welcomed. Finally, the sample studied here is a highly selected one, including complex patients seeking tertiary care. Generality of these results to other groups of pain sufferers, such as in the community or in primary care settings, will be needed to further substantiate the role of mindfulness in chronic pain more broadly.

As people learn to be more mindful they may become more accurately aware of how "mindless" they were in the past compared to what they may have reported. It is possible that failures in present-focused awareness and non-reactivity, negatively keyed or so-called "indirect" reflections of mindfulness are more easily reported than positively keyed or direct mindful responses. In fact, the developers of the MAAS showed that indirect and direct assessments of mindfulness are significantly correlated ($r = .70$), show similar patterns of correlations with related variables, and appear to tap the same construct (Brown and Ryan, 2003). They also found, however, that compared to an alternate direct version of the same item content, the indirect assessment of mindfulness employed in the MAAS was more strongly related to multiple measures of well-being. Of course, the MAAS is only one of several available methods for assessing mindfulness. A recent investigation of a broad range of mindfulness questionnaires demonstrated that mindfulness appears best conceptualized as a multifaceted construct, which includes both negatively keyed and positively keyed components (Baer et al., 2006).

In summary, a short measure of mindfulness has achieved significant correlations with measures of pain, emotional distress, disability, and medication use in a sample of patients seeking treatment for chronic pain. This suggests that when patients are more realistically in contact with their experiences, and aware of these experiences in a way that minimizes some of their otherwise automatic reactions, they may function better and suffer less. We propose that mindfulness leads to behavior patterns that are more effective and less caught up in distressing thought content or emotions. There is some evidence for the utility of mindfulness in treatment for chronic pain (Kabat-Zinn et al., 1985; McCracken

et al., 2005). We suggest that additional study of processes of mindfulness and further treatment developments may be justified.

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