The relationship between greater mindfulness and less subjective experience of chronic pain: Mediating functions of pain management self-efficacy and emotional intelligence

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Abstract

Previous research shows a connection between greater mindfulness and less subjective experience of pain. The present study examined whether pain management self-efficacy and emotional intelligence mediate this relationship in individuals experiencing chronic pain. Two hundred participants experiencing chronic pain completed measures of mindfulness, experience of pain, pain management self-efficacy, and emotional intelligence. Greater mindfulness was associated with less subjective experience of pain, greater pain management self-efficacy, and more emotional intelligence. More pain management self-efficacy and higher emotional intelligence were associated with less subjective experience of pain. Emotional intelligence and pain management self-efficacy significantly mediated the relationship between mindfulness and pain. The connection between greater mindfulness and less subjective experience of pain may be due to mindfulness providing a foundation for emotional functioning and behavioural regulation that result in reductions in the experience of pain.

Key words: chronic pain, emotional intelligence, mindfulness, self-efficacy

This project focused on identifying psychological processes associated with the experience of chronic pain. Evidence from intervention studies suggests that increasing mindfulness may reduce subjective experience of pain (Chiesa & Serretti, 2009; Kabat-Zinn, Lipworth, & Burney, 1985; Rosenzweig, Greeson, Reibel, et al., 2010). Interventions described by Kabat-Zinn et al. (1985) and Rosenzweig, Greeson, Reibel, et al. (2010) focused specifically on reduction of perception of chronic pain. The processes linking mindfulness and perception of pain remain to be explored. A review of the literature of interventions aimed at increasing mindfulness found that as well as increasing mindfulness such interventions lead to better emotional functioning and better behavioural regulation (Keng, Smoski, & Robins, 2011). For example, such interventions lead to increases in general subjective psychological well-being, empathy, and hope, and decreases in depression. Such interventions also lead to better regulation of processes ranging from attention to smoking behaviour. The present study investigated whether processes described by emotional intelligence, a characteristic exemplifying positive emotional functioning, and pain management self-efficacy, a characteristic exemplifying behavioural regulation, might help clarify the paths connecting greater mindfulness with less experience of chronic pain.

Pain is a subjective experience characterized by unpleasant emotional and sensory features (Merskey, 2000). A distressing and disabling type of pain, chronic pain, is defined as discomfort or pain that has persisted consistently or intermittently for over a 3-month period (Elliott, Smith, Brnabic, et al., 2001), 30% of adults in the United States (Johannes, Le, Zhou, et al., 2010), and 19% of adult Europeans (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006). Chronic pain negatively impacts realms such as occupational functioning, sleep, and cognitive processing (Fine, 2011).

MINDFULNESS AND PAIN

Mindfulness consists of focus on the present moment in a state of non-judgmental awareness (Kohls, Sauer, & Walach, 2009), with enhanced ability to widen or narrow attention and reduced interference of evaluation with sensory experiences (Brown, Ryan, & Creswell, 2007). Mindfulness has
been conceptualized as a trait as well as a state (Brown et al., 2007). Trait mindfulness is a lasting individual difference characteristic, while state mindfulness is a transitory condition. Trait mindfulness has the advantage of consisting of responses that individuals carry with them to different situations and circumstances, while state mindfulness is more dependent in situational contexts.

Prior research indicates that trait and state mindfulness are associated with more effective management of the sensation of pain and less subjective experience of pain (Brown et al., 2007; Grant & Rainville, 2009; Grant, Courtemanche, Duerden, et al., 2010; Zeidan, Martucci, Kraft, et al., 2011). Some interventions have focused on increasing mindfulness to successfully help individuals manage pain (Chiesa & Serretti, 2009; Kabat-Zinn et al., 1985; Rozensweig et al., 2010). Specific mechanisms through which mindfulness may influence perception of pain have been only partially explored. Some possibilities include that mindfulness may be associated with less perception of pain through neural processes altered by mindfulness (Gard, Hölzel, Sack, et al., 2011) as well as cognitive states that may be associated with mindfulness such as focused attention and non-reactive awareness of the present moment (Perlman, Salomons, Davidson, et al., 2010).

A comprehensive review of empirical literature concluded that mindfulness promotes adaptive psychological functioning and especially positive emotional functioning and effective behavioural regulation (Keng et al., 2011). In relation to this, a purpose of the present study was to examine whether a characteristic that exemplifies positive emotional functioning, emotional intelligence, and a characteristic that may underlie behavioural regulation of pain, pain management self-efficacy, connect greater mindfulness with the experience of chronic pain.

EMOTIONAL INTELLIGENCE AND PAIN

Emotional intelligence consists of adaptive emotional competencies, including perception, understanding, managing, and harnessing emotions (Mayer, Salovey, & Caruso, 2008; Schutte & Malouff, 2013b). Emotional intelligence has been described and assessed both as an ability, similar in nature to cognitive intelligence (Mayer et al., 2008), and a trait, described and assessed as typical functioning (Neubauer & Freudenthaler, 2005). Ability emotional intelligence is typically assessed by maximal performance tests, while trait emotional intelligence, which can be viewed as a personality characteristic comprised of self-perception and dispositions, is generally assessed by self or other report (Petrides, Pita, & Kokkinaki, 2007). For example, assessment of ability emotional intelligence may involve asking respondents to look at photographs of faces and interpret which emotion is being displayed, while assessment of trait emotional intelligence may involve asking participants to rate themselves on how well they are generally able to understand the emotions of others by looking at their facial expression. Trait emotional intelligence is associated with various indices of health and well-being (Dacre Pool & Qualter, 2013; Downey, Johnston, Hansen, Birney, & Stough, 2010; Martins, Ramalho, & Morin, 2010; Schutte et al., 2010). Individuals with higher emotional intelligence assessed as an ability through performance measures experience less acute pain (Ruiz-Aranda, Salguero, & Fernandez-Berrocal, 2011) and those with higher trait emotional intelligence, assessed by self-report of typical functioning, report a lower frequency of symptoms of pain (Mavroveli, Petrides, & Rieffe, 2007).

PAIN MANAGEMENT SELF-EFFICACY AND PAIN

Self-efficacy is the belief that one can bring about good outcomes in a realm (Bandura, 1977). Higher self-efficacy in a realm is associated with various positive outcomes in that realm (Hannah, Avolio, Walumbwa, & Chan, 2012; Robbins et al., 2004; Wu, Tang, & Yogo, 2013). Pain management self-efficacy focuses on the expectation of successfully managing pain (Arnstein, Caudill, Mandle, et al., 1999). Greater pain management self-efficacy is associated with less perception of pain and better coping with chronic pain (Nicholas, 2007). For individuals with chronic pain, the lack of belief in ability to cope with pain is a significant predictor of the extent of the disability and depression experienced (Asghari & Nicholas, 2001).

MINDFULNESS, EMOTIONAL INTELLIGENCE, AND PAIN MANAGEMENT SELF-EFFICACY

Mindfulness may promote positive emotional functioning and effective behavioural regulation (Keng et al., 2011). A characteristic that exemplifies positive emotional functioning is emotional intelligence and a characteristic that may underlie behavioural regulation of pain, pain management self-efficacy. Support for this proposition that mindfulness may promote positive adaptive functioning comes from previous research that has found that greater trait mindfulness is related to higher trait emotional intelligence (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003; Schutte & Malouff, 2011). As pain management self-efficacy is the expectation that one can show behaviours relating to managing pain, one might expect that greater trait mindfulness may also be associated with more pain management self-efficacy.

AIM OF THE STUDY

The present study set out to examine connections between mindfulness and experience of chronic pain, mindfulness © 2013 The Australian Psychological Society
and pain management self-efficacy, mindfulness and emotional intelligence, pain management self-efficacy and experience of pain, and emotional intelligence and experience of pain. Further, the study examined whether pain management self-efficacy and emotional intelligence mediate the relationship between mindfulness and experience of pain.

METHOD

Participants and procedure
Two hundred Australian participants experiencing chronic pain were recruited for the study. Only individuals 18 years or older who identified themselves as suffering from chronic pain were invited to participate. Chronic pain was explicitly defined as ‘pain or discomfort, that persisted continuously or intermittently for longer than 3 months,’ an accepted definition of chronic pain (Elliott et al., 1999). The sample consisted of 155 women and 45 men aged between 18 and 88 years (mean = 47.38; standard deviation (SD) = 15.07). Ninety-nine per cent (198 out of 200) of the participants reported having been in pain during the past week, 96% reported current pain while completing the survey, and 87% reported currently taking pain medication.

Participants were recruited from the Chronic Pain Australia website, the Australian Pain Management Association website, the Arthritis Australia website, Facebook, Twitter, pain clinics, and through notice boards at clinics of allied health professionals. Participants were directed to an online survey created for this study.

Measures
Participants completed the following measures as part of the online survey. The Freiburg Mindfulness Inventory short-form (Walach, Buchheld, Buttenmüller, et al., 2006) measures typical or trait mindfulness. The scale assesses the extent to which individuals focus on the present in a non-evaluative manner. A sample item is ‘I am open to the experience of the present moment’. Higher scores indicate more mindfulness. In previous research, this short form of the inventory had internal consistency of 0.86 and evidence of validity such as associations with years of practice of meditation and lower levels of depression and anxiety (Kohls et al., 2009). Previous research has also found online administration of the inventory to be reliable and valid; for example, with internal consistency of 0.84 and expected relationships with other variables found by Howell, Digdon, and Buro (2010). In the current study, online administration of the measure showed internal consistency of $\alpha = 0.88$.

The Assessing Emotions Scale (Schutte, Malouff, & Bhullar, 2009) is a measure of trait emotional intelligence. Across various samples, the reliability of the scale has averaged $\alpha = 0.90$, and the scale has evidence of validity through associations with related constructs (Schutte et al., 2009). A sample item is ‘I know why my emotions change’. Higher scores indicate greater emotional intelligence. Previous online administrations of the measure have showed good reliability (e.g., Schutte & Malouff, 2011, $\alpha = 0.87$) and validity evidence through expected relationships with other constructs (Schutte & Malouff, 2011). In the current study, online administration of the Assessing Emotions Scale showed internal consistency of $\alpha = 0.88$. As suggested by Petrides and Furnham (2000) for this scale, subscales representing factors were also calculated using the items identified by Ciarrochi, Chan, and Bajgar (2001) for perception of emotion, managing own emotion, managing others’ emotion, and utilization of emotion. In the current study, internal consistency ranged from 0.86 for managing own emotion to 0.73 for utilisation of emotion.

The Pain Self Efficacy Questionnaire (Nicholas, 1989) is based on Bandura’s self-efficacy concept and measures a person’s ability to accomplish a range of activities despite the pain he or she is experiencing. Respondents rate their confidence to manage pain on items such as ‘I can cope with my pain in most situations’. Higher scores indicate more pain management self-efficacy. Asghari and Nicholas (2001) reported internal reliability for the scale, with $\alpha = 0.92$, and evidence of validity. This measure has been used in an online format in previous research, e.g., Bender, Radhakrishnan, Diorio, Englesakis, and Jadad (2011), and in the current study, online administration had internal consistency of $\alpha = 0.94$.

The Short-Form McGill Pain Questionnaire (Melzack, 1987) assesses the affective, sensory, and intensity aspects of pain. Respondents rate the severity of different aspects of pain sensations such as shooting and throbbing pain. A low score indicates less experience of pain. The scale has demonstrated test-retest reliability (ranging from 0.62 to 0.95) and validity through sensitivity to change with treatment (Strand, Ljunggren, Bogen, et al., 2008). In the current study, online administration of the questionnaire had internal consistency of $\alpha = 0.85$.

RESULTS

Descriptive statistics
Means and SD for the main variables are shown in Table 1. There was no significant difference between women and men in mindfulness, emotional intelligence, pain management self-efficacy, or perception of pain. Older participants had significantly greater mindfulness, $r (199) = 0.25, p = .01$, higher pain management self-efficacy, $r (199) = 0.17, p = .05$, and less perception of pain, $r (199) = -0.22,$
Table 1 Means and standard deviations for main variables (N = 200)

<table>
<thead>
<tr>
<th>Measures</th>
<th>Mindfulness</th>
<th>Emotional intelligence</th>
<th>Pain management</th>
<th>Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>36.53</td>
<td>122.64</td>
<td>38.18</td>
<td>37.56</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>8.22</td>
<td>17.39</td>
<td>14.26</td>
<td>8.87</td>
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</tbody>
</table>

Table 2 Correlations main variables (N = 200)

<table>
<thead>
<tr>
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<th>Emotional intelligence</th>
<th>Pain management</th>
<th>Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mindfulness</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Emotional intelligence</td>
<td>.70**</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Pain management</td>
<td>.53**</td>
<td>.53**</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Pain</td>
<td>–.23**</td>
<td>–.16*</td>
<td>–.46**</td>
<td>–</td>
</tr>
<tr>
<td>Mean</td>
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</tbody>
</table>

*p = .05, **p = .01.

Note: partial correlations in which the variance accounted for by the demographic variables of age and gender were held constant showed very similar results to the bivariate correlations.

Table 3 Correlations for aspects of emotional intelligence with mindfulness, pain management, and pain (N = 200)

<table>
<thead>
<tr>
<th>Measures</th>
<th>Mindfulness</th>
<th>Pain management</th>
<th>Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of emotion</td>
<td>.45**</td>
<td>.34**</td>
<td>–.12</td>
</tr>
<tr>
<td>Managing own emotion</td>
<td>.77**</td>
<td>.55**</td>
<td>–.17*</td>
</tr>
<tr>
<td>Managing others’ emotion</td>
<td>.51**</td>
<td>.42**</td>
<td>–.08</td>
</tr>
<tr>
<td>Utilisation of emotion</td>
<td>.52**</td>
<td>.52**</td>
<td>–.13</td>
</tr>
</tbody>
</table>

*p = .05, **p = .01.

*p = .01. Age was not significantly related to emotional intelligence.

Main analyses

Greater trait mindfulness was significantly associated with less perception of pain, more pain management self-efficacy, and higher emotional intelligence (see Table 2). More pain management self-efficacy and higher emotional intelligence were significantly associated with less perception of pain. Management of own emotions appeared to be the most relevant aspect of emotional intelligence in relation to mindfulness and experience of pain (see Table 3), but did not show stronger or different associations than emotional intelligence assessed through all components.

A multiple mediation regression using Preacher and Hayes’ (2008) approach to mediation examined the mediating effects of pain management self-efficacy and emotional intelligence in the relationship between mindfulness and experience of pain. Together, mindfulness, emotional intelligence, and pain management self-efficacy accounted for significant variability in pain, $R^2 = 0.21$, adjusted $R^2 = 0.21$, $F(3,196) = 18.46, p = .001$. Holding constant the variance accounted for by age and gender by entering these demographic variables in the first step of the regression did not much change the variance accounted for by the main predictor variables, $R^2 = 0.24$, adjusted $R^2 = 0.22$, $F(5,194) = 12.28, p = .001$. Pain management self-efficacy was a significant mediator between mindfulness and pain, with $Z = -4.83, p = .001$, and emotional intelligence was a significant mediator between mindfulness and pain, with $Z = 2.09, p = .03$. Mindfulness was a significant predictor of pain before examining the effects of the mediating variables. When pain management self-efficacy and emotional intelligence were included in the regression, mindfulness was no longer a statistically significant predictor, providing evidence for a full mediation effect (see Baron & Kenny, 1986). The relationship between mindfulness and pain after inclusion of the mediators was $\beta = 0.12$, standard error $= 0.11$, $p > .05$.

DISCUSSION

This study aimed to investigate whether pain management self-efficacy and emotional intelligence mediate this relationship in individuals experiencing chronic pain. Among individuals with chronic pain, greater mindfulness was associated with more pain management self-efficacy, higher emotional intelligence, and less experience of pain. More pain management self-efficacy and higher emotional intelligence were associated with less experience of pain. These results are consistent with previous findings. For example, the finding that greater mindfulness was associated with less experience of pain is consistent with findings by Brown et al. (2007), Grant and Rainville (2009), Grant, Courtemanche, Duerden, et al. (2010), and Zeidan, Martucci, Kraft, et al. (2011). The finding that higher emotional intelligence was associated with less experience of pain is consistent with findings by Extremera and Fernandez-Berrocal (2002) and by Mavroveli et al. (2007). Examination of subfactors of emotional intelligence suggested that management of one’s own emotions was most relevant to pain management and experience of pain. The finding that more pain management self-efficacy was associated with less experience of pain is consistent with findings by Nicholas (2007).

The findings of the present study are also congruent with an extensive review of research concluded that mindfulness is connected to positive emotional functioning and effective behavioural regulation (Keng et al., 2011). In the present study, positive emotional functioning was represented by emotional intelligence, and effective behavioural regulation was represented by pain management self-efficacy. The connection of mindfulness with emotional intelligence and
pain management self-efficacy might be due to aspects of emotional functioning and behavioural regulation being products of mindfulness, or it might be that mindfulness prompts processes that lead to adaptive emotional functioning and behavioural regulation. Mindfulness may prompt processes such as increased metacognitive awareness, more control over attention, and more engagement with valued behaviours (Keng et al., 2011), and these in turn may lead to the development of higher emotional intelligence and greater pain management self-efficacy.

Emotional intelligence and pain management self-efficacy mediated the relationship between mindfulness and experience of pain. This suggests that the connection between greater mindfulness and less experience of pain might in part be due to mindfulness providing a foundation for emotional functioning and behavioural regulation, which in turn influence the experience of pain. This interpretation is in line with growing evidence that mindfulness is a mechanism prompting beneficial cognitive, emotional, and physical changes. This evidence ranges from that obtained through intervention studies aimed at increasing mindfulness to reduce experience of pain (Chiesa & Serretti, 2009; Kabat-Zinn et al., 1985; Rosenzweig et al., 2010) to the meta-analytic finding that mindfulness-based interventions result in improved telomerase enzyme functioning, which, through its influence on telomere length, is associated with health and mortality (Schutte & Malouff, 2013c). Information regarding the processes through which mindfulness may exert its beneficial effects in different realms provides a stepping stone to tailoring mindfulness training for optimal benefits in realms such as pain management.

The concurrent data collection design used in the present study does not allow definite conclusions regarding causality. Future studies employing experimental designs may provide more evidence regarding the causal role of mindfulness training in increasing positive emotional functioning and behavioural regulation as processes that then lead to less perception of pain. Such experimental research could also examine possible paths through other aspects of positive emotional functioning, such as experience of positive affect, and other behavioural regulation processes, such as intrinsically motivated behaviour regulation, that may link mindfulness and perception of pain.

The findings of the present study provide a foundation for future treatment research examining the impact of interventions that focus on the facilitation of emotional functioning and behavioural regulation through mindfulness and how such facilitation impacts the experience of pain. Previous research indicates that interventions can influence mindfulness (Kabat-Zinn et al., 1985; Rosenzweig et al., 2010), emotional intelligence (Nelis et al., 2011; Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009; Schutte & Malouff, 2012, 2013a), and pain management self-efficacy (Nicholas et al., 2013). Treatments combining the approaches of interventions from these three areas might have optimal outcomes. Such treatment studies and their implications for the treatment of pain may hold promise for the many worldwide sufferers of chronic pain.

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associated with decreased cognitive control and increased sensory processing in the brain. Cerebral Cortex, 22, 2692–2702.


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