

## Cognitions, Metacognitions, and Chronic Pain

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**Purpose:** Although the content of thoughts has received a considerable amount of attention in pain research, the importance of thought processes (metacognitions) has received less attention. **Method:** One hundred twenty-nine individuals with muscular dystrophy and chronic pain completed measures assessing metacognitions and frequency of both catastrophizing and pain control beliefs. **Results:** Greater use of reappraisal and distraction metacognitions were associated with more perceived control over pain, whereas greater use of worry and punishment metacognitions were associated with more catastrophizing. **Conclusions/Implications:** The current findings indicate that metacognitions are associated with both pain control beliefs and catastrophizing and therefore may play an important role in the development or maintenance of pain-related cognitive content thought to influence patient functioning. Research is needed to determine whether treatments that encourage changes in *both* metacognitions and cognitive content are more effective than treatments that focus on cognitive content alone.

**Keywords:** thought control, chronic pain, attributions, catastrophizing, cognitions

### Impact and Implications

- Although the extant literature has focused on the content of thoughts that may influence pain and adjustment to pain, research on how pain-related cognitions are regulated has been neglected. This is the first study that sheds light on the potential importance of metacognitions as predictors of the frequency of two key pain-related cognitions (catastrophizing and control beliefs) in a sample of patients with chronic pain.

- The findings confirm that metacognitions are distinct from cognitive content and are associated with the reported frequency of two key pain-related cognitions thought to influence adjustment to chronic pain.

- Consistent with the practices advocated by contemporary “third wave” therapeutic approaches, clinicians should consider metacognitions as potential therapeutic targets. Future research should examine the extent to which changes in cognitive content versus metacognitions make independent contributions to positive outcomes in pain treatment.

### Introduction

The thoughts and beliefs associated with chronic pain have received considerable attention in chronic pain research. For example, the frequency of catastrophizing cognitions (i.e., thoughts reflecting an exaggerated threat from or negative consequences of pain) has been shown to be associated with higher levels of pain intensity and dysfunction in numerous pain populations (Osborne, Jensen, Ehde, Hanley, & Kraft, 2007; Raichle, Hanley, Jensen, & Cardenas, 2007; Turner, Jensen, & Romano, 2000; Turner, Jensen, Warms, & Cardenas, 2002). Similarly, the endorsement of thoughts reflecting a belief that one has control over pain has been shown to predict higher levels of psychological and physical functioning in individuals with chronic pain (Jensen, Turner, Romano, & Lawler, 1994). These studies emphasize the importance of the *content* of one’s thoughts (e.g., whether they are catastrophic or reassuring) and are consistent with the theories underlying cognitive therapy hypothesizing thoughts as having a causal impact on feelings and behavior (Beck, 1993). Therapies based on

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these models aim to change thought content by teaching patients to monitor and evaluate their thoughts and then revise any maladaptive thoughts into adaptive ones.

In the last two decades there has been an emergence of a number of cognitive-behavioral therapies that place less of an emphasis on thought content, and a greater emphasis on the patient's relationship to his or her thoughts (Hayes, 2004). These so-called "third wave" therapies (Hayes, 2004), including Dialectical Behavior Therapy (Linehan, 1993), Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl & Wilson, 1999), and Mindfulness-Based Cognitive Therapy (MBCT) (Segal, Williams & Teasdale, 2002), teach skills and use exercises that encourage patients to relate differently to their thoughts in ways that will help patients achieve their goals. One of these therapeutic approaches, ACT, has been developed specifically for chronic pain treatment as Contextual Cognitive-Behavioral Therapy (CCBT) for chronic pain (McCracken, 2005).

Although these "third wave" treatments focus on the importance of, and target for treatment, metacognitions over cognitive content, some have argued that traditional CBT, by identifying and challenging irrational thoughts (Hofman & Asmundson, 2008), also influences metacognitions. Thus, "third wave" treatments and traditional CBT may be more similar than has been argued (Herbert & Forman, in press). However, regardless of whether a focus on metacognitions is "new wave" or "old hat" (Hofman & Asmundson, 2008), the fact remains that cognitive content (*what* people think) is distinct from cognitive coping or cognitive processes (*how* people think, or how people manage and relate to cognitive content) (Jensen, 2011). Making the distinction between these two cognitive domains—and measuring them both in future research—may facilitate a better understanding of the relative role that each plays in the experience of pain and the impact that pain has on patients' lives.

McCracken has noted that some metacognitions or thought content control strategies that may appear to be useful on the surface may, in fact, be counterproductive (McCracken, 2005). For example, attempts to directly control (usually, to suppress) maladaptive thoughts such as catastrophizing cognitions can fail, because such attempts can paradoxically increase focus on these negative thoughts (Wegner, Schneider, Carter, & White, 1987). Support for this view, and for the potential negative impact of thought suppression on pain, comes from research demonstrating that efforts to suppress unwanted thoughts are associated with heightened pain experience in response to induced (cold pressor) pain (Gilliam et al., 2010; Sullivan, Rouse, Bishop, & Johnston, 1997). Along this line of reasoning, it is possible that efforts to directly increase adaptive cognitions could potentially be helpful, given that such efforts may increase an individual's focus on adaptive thoughts, and therefore increase the saliency and frequency of these cognitions. In both cases, however, the hypothesized change agent is not the content of the thoughts themselves but how the patient relates to the thoughts in question.

How one relates to one's thought and thought processes (i.e., thinking about thinking) is generally referred to as "metacognitions" (Wells, 2001). Consistent with treatment models that emphasize thought process over thought content, research shows that the beneficial effects of MBCT after depression treatment are mediated by its effects on metacognitions (Teasdale et al., 2002). However, the role that metacognitions play in the frequency, saliency, and impact of cognitions on patient functioning in patients with chronic pain has not yet been studied, and no study to

our knowledge has examined the associations between metacognitions and cognitive content thought to be positive or adaptive.

The purpose of this study was to perform an initial evaluation of the potential importance of metacognitions as predictors of the frequency of two key pain-related cognitions (catastrophizing and control beliefs) in a sample of patients with chronic pain. The patients studied were individuals with one of two forms of muscular dystrophy – Facioscapulohumeral Muscular Dystrophy or Myotonic Muscular Dystrophy. Both conditions are genetic disorders that lead to progressive weakness and dystrophic changes in muscle. Evidence indicates that chronic pain is a common problem in individuals with muscular dystrophy (Engel, Kartin, Carter, Jensen, & Jaffe, 2009; Jensen et al., 2008). Although not yet extensively studied, research also suggests that many of the psychosocial factors that have been shown to play a role in the experience and effects of pain in individuals with pain as a primary presenting problem also play a role in the pain problems of individuals with physical disabilities (Jensen, Moore, Bockow, Ehde & Engel, 2011), including individuals with muscular dystrophy (Hosoi et al., 2010). Based the hypothesis that focusing on thoughts increases their frequency, we hypothesized that metacognitions that target the management of negative cognitions (e.g., catastrophizing) would be associated positively with higher reported rates of negative cognitions, and that metacognitions that target the management of adaptive cognitions would be associated positively with the reported frequency of adaptive thoughts (e.g., pain control cognitions).

## Method

### Participants

The participants in this study came from a sample pool of 270 individuals with muscular dystrophy and chronic pain who had responded to a previous survey on the nature and scope of pain in persons with neuromuscular disease and who had agreed to participate in additional studies (Jensen et al., 2008). Surveys were mailed to the address of record for each of these individuals. Thirty-two of these were returned because of incorrect addresses, three individuals were deceased, and one individual declined to participate. Three of the returned surveys were excluded because of participant ineligibility (unable to verify physician diagnosis), yielding 190 completed and viable surveys (response rate: 70% of the original pool of 270 individuals). Of these, 144 individuals (54% of the original pool) reported experiencing pain in the past three months and were included in the current study.

The majority of the 144 participants with pain had a diagnosis of Facioscapulohumeral Muscular Dystrophy (FSHD; 54.1%) or Myotonic Muscular Dystrophy (MMD; 36.1%). For the current analyses to be consistent with ongoing work in our group we limited the analyses for this study to those participants with these two diagnoses, leaving a final sample size was 129 persons with FSHD or MMD and chronic pain (48% of the original pool). Nearly all respondents' diagnoses were made by a neurologist (92%) and were confirmed with DNA (59%), Muscle biopsy (50%), and/or EMG (76%). A paper examining the associations between alexithymia, pain, and functioning in this sample has been published previously (Hosoi et al., 2010).

The average age of the participants in the present study ( $n = 129$ ) was 52.0 years ( $SD, 12.4$ , range = 22–85). Fifty-six percent of the sample was female ( $n = 72$ ). Most of the participants were Caucasian (98%) and married (67%). The most common pain sites for both diagnostic groups were the lower back (66% MMD, 71% FSHD), and legs (71% MMD, 71% FSHD).

## Measures

**Demographic information.** Participants were asked to provide demographic information regarding their age, gender, level of education, current employment status, ethnicity/race, and marital status. They were also asked to provide information related to their NMD, including NMD diagnosis, the specialization of the diagnosing physician, and nature of diagnosis confirmation (e.g., DNA testing, EMG testing).

**Pain intensity.** Study participants rated the average intensity of their pain in the past week on a 0 (*no pain*) to 10 (*pain as bad as it could be*) (Jensen, Karoly, & Braver, 1986) Numerical Rating Scale (NRS). Such scales are commonly used in pain research and have a great deal of evidence supporting their reliability and validity (Jensen & Karoly, 2001).

**Metacognitions.** The Thought Control Questionnaire (TCQ) (Wells & Davies, 1994) was used to assess metacognitions about pain-related thoughts. The TCQ was developed to assess metacognitive thought control strategies used for thought control when experiencing negative affect (i.e., anxiety and depression), and has five subscales, each of which has six items, that assess (1) Worry (e.g., “I focus on different negative thoughts”), (2) Punishment (e.g., “I punish myself for thinking the thought”), (3) Reappraisal (e.g., “I try to reinterpret the thought”), Distraction (e.g., “I do something that I enjoy”), and (4) Social Control (e.g., “I ask my friends if they have similar thoughts”) metacognitions. Respondents indicate the frequency with which they engage in these metacognitive thought control strategies on a four-point Likert scale, ranging from *never* (1) to *almost always* (4). TCQ scores are calculated by computing the sum of all items, such that higher scores indicate more frequent use of each strategy. The range of possible scores is 6–36. The TCQ scales have demonstrated good to acceptable internal consistency coefficients (Cronbach’s alphas = .65–.78) (Reynolds & Wells, 1999) as well as significant associations with measures of unwanted thoughts (e.g., obsessive ideas, worrisome thoughts) and psychological functioning (anxiety and depression symptoms) in clinical populations (Coles & Heimberg, 2005; Reynolds & Wells, 1999). In the current sample, the internal consistencies of the TCQ scales were also generally good—.69 for the Punishment scale, .72 for the Worry scale, .78 for the Reappraisal scale, and .79 for the Distraction Scale. One notable exception was the Social Control scale, which demonstrated low internal consistency ( $\alpha = .39$ ). Because of the very low internal consistency coefficient for the Social Control scale, as well as the fact that we did not have any specific hypotheses regarding this scale (see below), we did not include the Social Control scale in any of the subsequent analyses.

As discussed previously, we hypothesized that metacognitions targeting the management of negative cognitions would be associated positively with higher reported rates of negative cognitions, and that metacognitions targeting the management of adaptive cognitions would be associated positively with the reported fre-

quency of adaptive thoughts. For the purposes of this study, we identified the TCQ Punishment and Worry scales as assessing metacognitions that focus on negative cognitions, and Reappraisal and Distraction as metacognitions that focus on adaptive cognitions. We did not have an a priori hypothesis about the associations between the TCQ Social Control scale and measures of catastrophizing or control cognitions, because this scale assesses how often the respondent talks with others about thoughts without regard to increasing positive or decreasing negative cognitions.

**Pain catastrophizing.** The PCS (Sullivan, Bishop & Pivik, 1995) was used to measure the frequency of catastrophic thoughts related to pain. The PCS consists of 13 items describing various thoughts that individuals might experience when they are in pain. Respondents indicate the frequency with which they experience catastrophic thoughts on a five-point Likert scale, ranging from *Not at all* (0) to *All the time* (4). Although the original version of this scale yield three different subscales (rumination, magnification, and helplessness), for this study we adopted a single summary score, with higher score indicating higher frequency of catastrophic thoughts. The range of possible scores is 0–52. The PCS has been shown to have high internal consistency (Cronbach’s alpha = .87) and to be associated with heightened pain, disability, as well as employment status (Sullivan et al., 1995; Sullivan, M.J.L. Stanish, Waite, Sullivan M. & Tripp, 1998; Sullivan & Stanish, 2003). In the current sample, the Cronbach’s alpha for the PCS was .93.

**Control beliefs.** In this study, we used a brief (two-item) version of the Survey of Pain Attitudes (SOPA) Control Scale (Jensen, Keefe, Lefebvre, Romano, & Turner, 2003) to assess the frequency of thoughts related to perceived control over pain. The two items state (1) “There is little I can do to ease my pain” (note, this item is reverse-scored) and (2) “I have learned to control my pain.” Respondents indicate their agreement with these thoughts on a five-point Likert scale, ranging from *This is very untrue for me* (0) to *This is very true for me* (4). The SOPA score is calculated by computing the arithmetic mean of the two items (after the first item reverse-scored), such that higher scores indicate greater perceived control. The reliability and validity of the parent scale of SOPA Control Scale has been found to be good to excellent (Jensen et al., 1994; Strong, Ashton, & Chant, 1992). The two-item version of the scale has demonstrated a very strong association with the parent scale ( $r_s = .83$  and  $.87$  before and after multidisciplinary pain treatment, respectively), an ability to detect change in control beliefs with multidisciplinary pain treatment, and a pattern of negative associations with validity criterion measures such as depression, pain disability, and pain intensity that is consistent with that of the parent scale (Jensen et al., 2003).

## Procedures

All of the potential participants in this study had participated in a previous study completed two years before the current survey and had indicated that they would be interested in being contacted for further research opportunities. They were sent a second return-by-mail survey assessing clinical, demographic, and adjustment variables related to NMD and NMD-associated pain, including the measures described above. The surveys took approximately one hour to complete, and participants were compensated \$25 on survey return. In the case of missing or incomplete responses, research assistants followed up with survey respondents over the

phone to obtain the most complete data set possible. The University of Washington Human Subjects Review committee approved all study procedures, and all subjects provided informed consent for their participation. The order of measures as presented to the participants was as follows: (1) Demographic/descriptive variables; (2) TCQ; (3) Pain intensity ratings; (4) PCS; (5) and pain control belief items (from the SOPA).

## Data Analyses

As indicated previously, the TCQ Social Control was not included in analyses because of its low internal consistency as well as the fact that we did not have specific hypotheses about the association between this measure and the criterion variables in this study. We examined the actual ranges and distributions of the remaining study variables to ensure that they had a sufficient range and adequately normal distributions for meeting the assumptions of the planned analyses. Next we examined the zero-order associations among the other TCQ subscales and measures of catastrophizing, control beliefs by computing Pearson correlation coefficients. We then performed two regression analyses to determine the extent to which the TCQ scales could predict either (1) catastrophizing or (2) perceived control over pain, after controlling for baseline pain level.

## Results

A summary of statistical properties of key outcome measures is presented in Table 1. As can be seen, there was an adequate range of responding (often covering the entire possible range of the scales) and adequately normal distributions of these variables, allowing us to continue with the planned analyses. The Pearson correlation coefficients between the TCQ scales and both catastrophizing and control beliefs are presented in Table 2. Consistent with the study hypotheses, the TCQ Worry and Punishment scales were both significantly and positively associated with greater catastrophizing, and the TCQ Reappraisal and Distraction scales were significantly and positively associated with perceived control over pain.

The results of the regression analyses predicting catastrophizing are presented in Table 3. Controlling for pain intensity, the TCQ scales made a significant (10% additional variance accounted for) contribution to the prediction of catastrophizing after controlling for average pain intensity. The Punishment scale was the only TCQ scale to make a significant and independent contribution to

Table 2  
Zero-Order Correlation Coefficients Between the TCQ Scales and Both Catastrophizing and Control Beliefs

TCQ scale	Catastrophizing (PCS)	Control beliefs (SOPA)
Worry	.25**	.06
Punishment	.37***	-.02
Reappraisal	.03	.34***
Distraction	.04	.29**

Note. TCQ = Thought Control Questionnaire; PCS = Pain Catastrophizing Scale; SOPA = Survey of Pain Attitudes.

\*\*  $p < .01$ . \*\*\*  $p < .001$ .

the prediction of catastrophizing when controlling for all of the other TCQ scales. The TCQ scales made a significant contribution to the prediction of perceived control over pain (13% additional variance accounted for; see Table 4), even when controlling for average pain intensity. The Reappraisal scale was the only TCQ scale to make a significant and independent (controlling for the other TCQ scales) contribution to the prediction of perceived control over pain.

## Discussion

The findings support the hypothesis that metacognitions as assessed by the TCQ are associated with the reported frequency of or agreement with two key pain-related cognitions (catastrophizing and control beliefs). The implications of these findings are discussed below.

## Adaptive and Maladaptive Thought Control Strategies

We hypothesized that the thoughts that are the focus of attention, whether the intent is to decrease or increase those thoughts, leads to an increase in their frequency or intensity. Consistent with this hypothesis, the correlation analyses indicated that thought control strategies associated with attempts to directly decrease negative cognitions were associated positively with more catastrophizing cognitions, and thought control strategies associated with attempts to manage or increase positive cognitions were associated positively with more pain-related control cognitions.

The pattern of findings is consistent with (but does not prove, given the correlational nature of the data) the possibilities that (1) there may be metacognitions that influence the frequency or occurrence of

Table 1  
Summary of Statistical Properties of Key Outcome Measures

Measure	Mean (SD)	Item range (scale range)	Response range	Skew	Kurtosis
Pain intensity	4.6 (2.4)	0–10 (0–10)	0–10	0.18	–0.68
Thought Control Questionnaire					
Worry subscale	1.6 (0.4)	1–4 (1–4)	1.0–3.0	0.54	0.05
Punishment subscale	1.5 (0.4)	1–4 (1–4)	1.0–2.8	1.25	1.66
Reappraisal subscale	2.2 (0.6)	1–4 (1–4)	1.0–3.4	0.09	–0.55
Distraction subscale	2.5 (0.7)	1–4 (1–4)	1.0–4.0	–0.05	–0.56
Pain Catastrophizing Scale	0.89 (0.8)	0–4 (0–4)	0.0–3.5	0.98	0.46
Survey of pain attitudes					
Control subscale	2.3 (0.9)	0–4 (0–4)	0.0–4.0	–0.11	–0.62

Table 3  
Regression Analysis Results Predicting Catastrophizing (PCS)  
From TCQ Scores, Controlling for Average Pain Intensity

Step and variables	Total R <sup>2</sup>	R <sup>2</sup> change	F change	Beta to enter
1. Average pain intensity	.21	.21	32.79***	.46***
2. TCQ scales	.31	.10	4.27*	
Worry				.09
Punishment				.27**
Reappraisal				-.08
Distraction				.05

Note. TCQ = Thought Control Questionnaire; PCS = Pain Catastrophizing Scale.

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

specific thoughts and (2) thought control strategies might be more or less adaptive. For example, ruminating about negative outcomes (as reflected by the Worry scale of the TCQ), while possibly engaged in to help prepare for future negative events (Wells, 2001), might actually contribute to distress because of the focus on negative outcomes. In addition, direct efforts to decrease negative thinking by punishing oneself (as reflected by the Punishing scale of the TCQ) may paradoxically increase negative thoughts. After all, efforts to *not* think a specific thought require that it remain in one's consciousness (McCracken, 2005). On the other hand, pondering reassuring thoughts may be adaptive, in that this metacognitive strategy could lead to a higher frequency of adaptive thoughts.

The possibility that thought control strategies influence cognitions is consistent with research showing that worry and punishment have shown positive associations with the frequency of worrisome thoughts in patients with Generalized Anxiety Disorder (Coles & Heimberg, 2005) and obsessive ideas in patients with Obsessive-Compulsive Disorder (Abramowitz, Whiteside, Kalsy, & Tolin, 2003). Although previous research using the TCQ has focused entirely on negative cognitions (e.g., worrisome thoughts and obsessive ideation) and examined the (maladaptive) thought control strategies that may facilitate them, we were unable to identify any published studies that have investigated the associations between metacognitions and the frequency of positive or adaptive thoughts. This is the first study that sheds light on the possibility that certain thought control strategies may enhance positive cognitions; specifically, those thought control strategies that focus on positive thoughts.

Although all four of the TCQ scales examined demonstrated significant associations with the measures of catastrophizing and pain control beliefs as hypothesized, in the regression analyses, only the TCQ Punishment scale (predicting catastrophizing) and TCQ Reappraisal scale (predicting pain control beliefs) remained statistically significant when controlling for pain intensity and all of the other TCQ scales. As the regression analyses represent a more conservative test of the study hypotheses, these results do not necessarily mean that only punishment and reappraisal metacognitions are important, and that worry and distraction play no role in the content of patients' pain-related thoughts. However, these results do suggest that punishment and reappraisal may be particularly important, and perhaps should be the target of future experimental research that could determine whether changes in metacognitions influence the frequency of adaptive and maladaptive cognitions.

## Distinctions Between Metacognition and Cognitive Content Measures

The modest correlations we found between the TCQ scales and measures of catastrophizing and pain beliefs provide clear evidence that they do not measure the same thing. That is, the TCQ scales assess domains that differ in important ways from measures of pain beliefs and catastrophizing, although our study indicates that they are related. This raises the possibility that the TCQ and perhaps other measures of metacognitions may contribute to our understanding of pain and the impact of pain on people's lives over and above the contribution made by measures of cognitive content and coping responses alone. Future research should consider adding measures of metacognitions, such as the TCQ, in studies that examine their contributions to pain and pain interference.

Catastrophizing has been viewed as both a (usually maladaptive) coping response (Sullivan et al., 2001) and a cognition domain (Jensen, Turner, Romano, & Karoly, 1991; Stroud, Thorn, Jensen, & Boothby, 2000). If catastrophizing is viewed as a type of cognition, an interesting question is whether it better represents cognitive content or a type of metacognition. An examination of the specific items of the PCS—a common measure of catastrophizing (Sullivan et al., 2001)—suggests that the domain of catastrophizing as measured by this scale may in fact represent a combination of metacognitions and cognitive content; that is, excessive focus and rumination (metacognition) about negative pain-related thoughts (content). Thus, neither thinking the occasional negative thought (“I briefly thought last week about how much I hurt”) or ruminating about neutral or positive thoughts (“I keep thinking about how lucky I am”) would be considered catastrophizing. Altering catastrophizing, then, might be achieved by focusing on changes in content (so that patients mostly think neutral or reassuring thoughts) or changing cognitive processes (so that patients ruminate less with any negative thoughts that remain). Future research could examine the relative impact of content-focused versus process-focused interventions on measures of pain-related catastrophizing.

## Clinical Significance

Given that the findings indicate that metacognitions are distinct from cognitive content, clinicians who target both with treatment may get better outcomes than clinicians who target just one or the other. If one wants to lose weight, it is possible to focus on

Table 4  
Regression Analysis Results Predicting SOPA Control Beliefs  
From TCQ Scores, Controlling for Average Pain Intensity

Step and variables	Total R <sup>2</sup>	R <sup>2</sup> change	F change	Beta to enter
1. Average pain intensity	.09	.09	12.33***	-.30***
2. TCQ scales	.22	.13	4.83*	
Worry				.07
Punishment				-.10
Reappraisal				.28**
Distraction				.12

Note. TCQ = Thought Control Questionnaire; SOPA = Survey of Pain Attitudes.

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

changing the food that is in the refrigerator (refrigerator content) or changing what you do with the food that is in the refrigerator (refrigerator “process”). Ultimately, people may lose more weight if they both keep the refrigerator stocked mostly with healthy food, *and* learn strategies to choose healthy food over high calorie desserts when faced with this choice. Cognitive content and metacognitions may operate in a similar way. By targeting *both* in treatment, clinicians increase their opportunity to facilitate positive change.

Although some of the proponents of “third wave” therapies might suggest that targeting cognitive processes (metacognitions) is more effective than targeting cognitive content, conclusions regarding the relative efficacy of interventions that alter each must await empirical study. It is possible that the relative importance of each treatment target may depend on person or other contextual factors; some patients may find it easier to change cognitive content, whereas others may find it easier and more practical to change cognitive processes. Until research results clearly indicate that changes in one or the other is more beneficial than changes in both, in our view, clinicians should target both cognitive content and metacognitions. Ultimately, the most effective clinician may be the one who is able to flexibly use both traditional and more contemporary therapeutic approaches to target the cognitive variables that are most important for each individual patient (Jensen, 2011).

When targeting cognitive content for change, many cognitive restructuring interventions (e.g., Ehde & Jensen, 2004) teach two strategies to increase the frequency of adaptive cognitions and decrease the frequency of maladaptive cognitions: (1) thought-stopping strategies to inhibit negative cognitions and (2) skills to develop and increase the frequency of reassuring cognitions. The current findings are consistent with the possibility that the first strategy (negative thought-stopping) alone may not necessarily lead to positive thought enhancement. Specifically, interventions that focus an individual’s attention on examining thoughts from a detached viewpoint (as reflected by the Reappraisal scale of the TCQ) may result in thoughts incompatible with pessimism and negative mood, and ultimately prove to be the more effective component of cognitive restructuring interventions. Research is needed to further test this hypothesis.

### Limitations and Future Directions

A primary limitation of the current study is the cross sectional nature of the data. Although cross sectional data can potentially be used to rule *out* causal relationships, given that the presence of an association is a necessary but not sufficient condition for causality, such data may not be used to prove causality. Thus, we cannot say based on this study that the metacognitions measured by the TCQ influence the content of cognitions directly. The findings would also be consistent with the possibility that thought content influences metacognitions, or that there are other variables not measured in the current study (e.g., traits such as dispositional optimism) that themselves influence both metacognitions and cognitive content and that therefore may explain some or all of the associations found between these variables. Experimental research is needed to examine how manipulating one domain (e.g., focusing on changing thought control strategies without directly seeking to alter content, or alternatively, focusing on changing content without changing process) may have a causal influence on the other

domain and ultimately impact patient functioning. The current findings indicate that such research is warranted.

A second limitation of the study concerns the sample. The data for this study were collected as a part of a survey study of pain problems in individuals with disabilities, specifically, individuals with neuromuscular disease. Individuals with neuromuscular diseases often have to deal with a large number of medical issues, including that fact that they have a disease that has negative long-term implications for health and function. Although the presence of chronic pain is a problem for many of these individuals, other symptoms, such as fatigue, as well as significant disability associated with muscle weakness, can also contribute to dysfunction. Therefore, thoughts about pain may not be as much of a concern for many of these patients, relative to other ongoing health issues. These and other factors that make patients with neuromuscular disorders unique mean that the findings do not necessarily generalize to other patient populations. Research is needed to determine which of the current results generalize to other patient populations.

A third limitation of the study concerns the issue of potential selection bias. Not all of the potential participants in this study provided responses to the survey. The participants may therefore differ in some important (and unknown) way from the population of individuals with muscular dystrophy. Therefore, additional research with other samples of patients with muscular dystrophy is needed to help determine the generalizability of the current findings.

Despite the limitations of the study, the findings support the idea that metacognitive thought control strategies are associated with the reported frequency of both adaptive and maladaptive pain-related cognitions. Specifically, the findings suggest that the cognitions people focus on (whether their intent is to increase or decrease the frequency or impact of those cognitions) may increase in frequency and impact. If future experimental research demonstrates that the process of *focusing* on thoughts, regardless of intent, actually increases the frequency of thoughts, this would suggest that cognitive treatments should include strategies that decrease patient use of metacognitive strategies that focus on eliminating maladaptive thoughts (e.g., worry and punishment strategies) and increase patient use of metacognitive strategies that focus on adaptive thought content (i.e., reappraisal and distraction strategies). The findings from this study also suggest that research testing this hypothesis is warranted.

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### **Correction to Yoshida, Molton, Jensen, Nakamura, Arimura, Kubo, and Hosoi (2012)**

In the article “Cognitions, metacognitions, and chronic pain” by Toshiyuki Yoshida, Ivan R. Molton, Mark P. Jensen, Tomoyasu Nakamura, Tatsuyuki Arimura, Chiharu Kubo, and Masako Hosoi (*Rehabilitation Psychology*, Vol. 57, No. 3, pp. 207–213), the affiliation of author Tomoyasu Nakamura was incorrectly listed. Professor Nakamura’s correct affiliation is Faculty of Human-Environment Studies, Kyushu University, 6-19-1 Hakozaki, Higashiku, Fukuoka, 812–8581, Japan.

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