



# Coping with chronic pain: Problem solving and acceptance

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Undoubtedly, pain is the most common experience among all of us. It is a biologically hard-wired phenomenon. It signals us that something is wrong in the body and that we have to take action to prevent further damage. At least, that is what we commonly think it means. Unfortunately, reality is not that simple. The International Association for the Study of Pain (IASP) has come up with one of the most comprehensive definitions of pain stating that it is "... an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merksey, 1986). Indeed, in unfortunate cases, pain may persist beyond expected tissue healing time (usually agreed on to be three months). When it does, it is labeled as chronic pain. Unlike acute pain, chronic pain is less common. According to a recent systematic review of epidemiological studies in Europe, the one-month prevalence of chronic pain was estimated to be 19% (Reid et al., 2011), although prevalence rates have been reported up to about 30% (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006). However, such high prevalence estimates have not been uncritically embraced by all. Verhaak, Kerssens, Dekker, Sorbi, and Benzing (1999), for example, reviewed 15 studies reporting on the prevalence of chronic benign pain in adults and found considerable variance in chronic pain definitions and research methods used. Those differences led to considerable variation in prevalence rate estimates, ranging from 2% to 40%. Similar variation in prevalence estimates of chronic pain, i.e. from 10% to 55.2%, was reported by Ospina and Harstall (2002). In their systematic review of studies on the prevalence of chronic pain, they mainly criticized the use of broad and non-formal definitions of chronic pain across studies, which may lead to distorted results. Without disregarding the flaws in prevalence studies, their review still pointed out that about 11% of the adult population is likely to be affected by severe chronic pain, defined as highly intensive and strongly interfering pain. This may still form a major socio-economic health problem. Not only do chronic pain sufferers report regular use of health care, a significant proportion of costs are also related to change in employment status, lowered productivity and sick leave (Breivik et al., 2006; Juniper, Le, & Mladsi, 2009; Reid et al., 2011). Despite frequent healthcare utilization, not many chronic pain

sufferers report to be sufficiently and effectively treated (Reid et al., 2011; Turk & Okifuji, 2002). In a majority of chronic pain sufferers, pain severely impacts daily living and overall quality of life (Breivik et al., 2006; Lamé, Peters, Vlaeyen, Van Kleef, & Pattijn, 2005). Emotional disturbances, such as depression and anxiety, are not uncommon among those individuals (Breivik et al., 2006; Demyttenaere et al., 2007). It is clear that chronic pain poses a major burden, both on society as well as on the individual suffering from it. Many report physical and emotional disability due to chronic pain. Without any doubt, increasing understanding of the perpetuation of pain and associated disability is of utmost importance. In what follows, we will first give a short overview of accounts on chronic pain and related disability. From this description, we will take on a detailed empirical discussion of the concept of *coping* within the context of chronic pain.

## UNDERSTANDING CHRONIC PAIN

For over years, conceptualizations of pain were heavily influenced by the ideas of famous renaissancist René Descartes who saw body and soul as two separate entities. Pain was considered a direct consequence of physical pathology (e.g., damage in the body). Obviously, over time, it became clear that not all pain phenomena could be accounted for by physical explanations (e.g., Gamsa, 1994). We may quite easily think of striking anomalies with the biomedical view: placebo treatments, phantom limb pain, cultural differences in pain experiences, etc. Importantly, physical pathology has never been sufficient to explain pain-related disability either (e.g., Flor & Turk, 1988). The most favorable development for the study of chronic pain has been the shift from a biomedical towards a biopsychosocial perspective (Engel, 1980; Gatchel, Peng, Peters, Fuchs, & Turk, 2007; Turk & Flor, 1999). This perspective takes into account not only biomedical factors, but also psychological (e.g., behavior, emotions, beliefs, coping strategies) and social variables (e.g., social support, socioeconomic status). It has been an endeavor and the work of many to identify those factors that account for the initiation, exacerbation and/or maintenance of pain and suffering (e.g., Fordyce, 1976; Melzack & Wall, 1965). These efforts have

eventually led to the formulation of the comprehensive cognitive-behavioral perspective on chronic pain (Turk & Rudy, 1992). According to this perspective, people with chronic pain are considered to be active processors of information, and behavior and emotions are believed to be influenced by the interpretation of the experience of pain rather than solely by the characteristics of the pain experience itself. Using this perspective, several psychological constructs have been described and developed over time. Among the ones that have received the most research attention are self-efficacy, helplessness, fear of pain, catastrophizing, and coping strategies. Hereunder, we provide a short overview of these constructs. The latter one will be described in more depth as it is the core of the current thesis.

Self-efficacy refers to a person's confidence in their ability to engage in behavior to accomplish a desired outcome, such as to gain control over pain (Bandura, 1977). Across a wide range of studies, it has been proven that higher levels of self-efficacy are associated with lower levels of pain, and better functional and psychological adjustment (for a review, see Gatchel et al., 2007; Keefe, Rumble, Scipio, Giordano, & Perri, 2004). A construct that may be closely related to self-efficacy is perceived control. It refers to the belief that one can exert influence on the duration, frequency, intensity or unpleasantness of pain (Arntz & Schmidt, 1989). The relevance of having control over pain has always been open to debate. On the one hand, perceived control over pain may have beneficial effects. It has, for instance, been shown that the belief that one has control over pain may have a strong negative influence on disability in patients with chronic pain (Jensen & Karoly, 1991). Conversely, helplessness or a perceived lack of control over pain has been found to be associated with unfavourable outcomes in chronic pain conditions (Koleck, Mazaux, Rasclé, & Bruchon-Schweitzer, 2006; Nicassio, Schuman, Radojevic, & Weisman, 1999; Samwell, Evers, Crul, & Kraaimat, 2006). Helplessness is believed to work by means of a maladaptive adjustment pattern characterized by negative outcome expectancies and the discontinuation of efforts to manage one's disease (Abramson, Seligman, & Teasdale, 1978). On the other hand, however, there may be a downside to trying to control pain. When one fails in gaining control over pain, this may lead to

frustration and preoccupation with pain, and even subsequent disability and distress (Eccleston & Crombez, 2007; McCracken & Eccleston, 2003). Whether it is better to control or not in the context of chronic pain has remained a struggling issue. We will come back to this further on in this chapter.

Another set of factors that has received numerous research attention are those factors that are generally referred to as pain appraisals or beliefs. The difference between these two is only subtle. Appraisals refer to the meaning ascribed to pain. Beliefs are seen as determinants of appraisals and are specific assumptions that shape how pain experiences are to be interpreted (Gatchell et al., 2007). In proposing their common sense model, Leventhal, Meyer, and Nerenz (1980) listed a set of generic beliefs that individuals may endorse about their illness (e.g., beliefs about the cause of illness, about its consequences, etc.). Among individuals diagnosed with arthritis, some of these beliefs have been linked to subsequent adjustment to pain (Orbell, Johnston, Rowley, Espley, & Davey, 1998; Schiaffino & Cea, 1995). However, most research attention has been given to the role of specific pain-related beliefs, and their role in adjustment to pain. Malec, Glasgow, Ely, and Kling (1977), for example, identified beliefs that are concerned with pain being perceived of as a signal of tissue damage leading to disability, and to pain suffering having to be treated medically. According to Phillips (1987), some individuals believe they are at high risk for re-injury or pain exacerbations. In developing a fear to engage in activities, they avoid possible pain-evoking episodes, and may become more and more disabled on the long term. The role of fear-avoidance beliefs has been most articulated in fear-avoidance (FA) models on chronic pain, such as the cognitive-behavioral model of chronic pain (Vlaeyen, Kolesnijders, Boeren, & Van Eek, 1995; Vlaeyen & Linton, 2000). Besides fear, this model also emphasizes the role of catastrophic thinking about pain. In short, the model states that when pain is catastrophically misinterpreted, this will give rise to fearful thoughts, avoidance behavior, and subsequent disability and distress. Eventually, this maladaptive pattern may increase pain and suffering on the long term. In contrast, when pain is not catastrophically interpreted, individuals will be more likely to confront activities and recover (Vlaeyen & Linton, 2000). Although it

also includes other components (e.g., affect and behavior), the cognitive-behavioral model mainly emphasizes the role of beliefs about pain as determinants of one's pain behavior. Research onto the behavioral facets of adjustment to chronic pain has been clustered under the term pain coping or pain coping strategies.

Coping has been one of the most popular psychological variables to be investigated in the area of psychological research. Also in pain research, coping became the focus of study for all those interested in pain behavior. Its attractiveness has also been due to its clear clinical value as it has contributed significantly to treatments that have produced clear benefits (e.g., Eccleston, Morley, Williams, Yorke, & Mastroiannopoulou, 2002; Morley, Eccleston, & Williams, 1999). Despite its successes, the concept of coping has also been a source of continuous debate. Research on coping has been plagued with conceptual as well as empirical difficulties. Within the present thesis, we will adopt an action-oriented, goal-directed, view on coping with chronic pain. Contemporary accounts that are built around goals and self-regulatory processes may help to increase understanding of dysfunctional behavioral patterns and maladjustment to pain. In the next part of this introduction, we will critically review the body of literature on coping and we will highlight the main problems with common approaches on coping. Following, a broader action-oriented, goal-directed perspective on chronic pain will be presented. We will argue that insight into the self-regulatory processes and goals is of utmost importance to understand chronic pain adjustment. Finally, an outline of the research aims of the present thesis will be provided.

### **COPING WITH CHRONIC PAIN: A CHANGE IN APPROACH**

The notion of coping dates back as far as the early 1980's and beyond, but was probably first documented in stress literature. One of the most influential conceptualizations has been proposed by Lazarus and Folkman (1984). According to their transactional model, stress results from the interaction between the environment and personal factors. Whenever individuals perceive a misfit between their personal aims and the environment, stress is believed to arise resulting in

consequent coping. More specifically, they defined coping as any effortful behavior instigated to undo the negative impact of stress. Accordingly, coping with chronic pain has been commonly defined as the effortful attempt to adapt to pain, or manage one's own negative response to pain (Jensen, Turner, Romano, & Karoly, 1991; Keefe, Salley, & Lefebvre, 1992; Tunks & Bellisimo, 1988).

There are plenty of different ways of coping and a variety of coping strategies has been proposed over time. A few examples may suffice to illustrate the multiplicity. Brown and Nicassio (1987) developed the Vanderbilt Pain Management Inventory to assess two types of cognitive and behavioral pain coping strategies: active versus passive strategies. Active strategies are defined as those that require an individual to take responsibility for pain management and include responses such as exercise, activity and ignoring pain sensations. Passive strategies involve the withdrawal and surrendering of control over pain and include responses such as resting or the intake of medication. Another quite similar distinction has been drawn between approach and avoidance coping (Reid, Golbert, & McGrath, 1998). Approach coping involves engaging with the pain and its causes, such as seeking treatment, whereas avoidance coping refers to strategies of engaging efforts away from pain, such as ignoring pain. Another widely used instrument is the Coping Strategies Questionnaire that originally described seven distinct coping strategies: diverting attention, reinterpreting pain sensations, use of coping self-statements, ignoring pain sensations, praying or hoping, catastrophizing, and increasing activity levels (Rosenstiel & Keefe, 1983). Later, factor analyses in chronic pain samples revealed evidence for two factors: coping attempts and pain control, and rational thinking (Keefe et al., 1987). There is also the Ways of Coping Checklist (WCL) that separates a number of subscales and two main ways of coping: problem-focused and emotion-focused coping (Folkman & Lazarus, 1980). In adopting the instrument to chronic pain, Affleck et al. (1999) developed the Daily Pain Coping Inventory. Like the WCL, this instrument assesses distinct coping strategies, i.e. pain reduction attempts, relaxation, distraction, redefinition, vent emotions, seek spiritual comfort and seek emotional support, as well as the major distinction between problem-focused and

emotion-focused coping. In the context of pain, problem-focused coping refers to directing attempts to deal with the pain (e.g., “Did something specific to try to reduce the pain”), whereas emotion-focused coping involves strategies referring to emotional responses to the pain and associated stress (e.g., “Sought emotional support from loved ones, friends, or professionals concerning my pain”).

Throughout literature, there is a general tendency to classify active, problem-focused, approach coping strategies as adaptive, and passive, emotion-focused, avoidant coping strategies as maladaptive. This is based upon a significant body of literature suggesting that active, problem-focused coping strategies are predictive of better adjustment, while passive, emotion-focused coping is more related to dysfunction and difficulty in adaptation (e.g., Carroll, Cassidy, & Cote, 2006; Endler, Corace, Summerfeldt, Johnson, & Rothbart, 2003; Jensen et al., 1991; López-Martínez, Esteve-Zaragaza, & Ramírez-Maestre, 2008). Equally, strategies that are considered as avoidant, such as guarding, resting or restricting activities, have been shown to be related to maladaptive outcomes (e.g., Karsdorp & Vlaeyen, 2009; Tan, Jensen, Robinson-Whelen, Thornby, & Monga, 2001; Tan, Teo, Anderson, & Jensen, 2011), while some other studies found evidence for a negative association between approach strategies, such as persistence, and disability (e.g., Jensen et al., 1991; Jensen, Turner, Romano, & Strom, 1995). However, there is as yet no convincing evidence that one repertoire of coping strategies is clearly more effective than any other for chronic pain patients (McCracken & Eccleston, 2003). Much inconsistency is found regarding the link between certain coping strategies and measures of adjustment to chronic pain (e.g., Jensen & Karoly, 1991; Keefe & Williams, 1990; Sullivan & D'Eon, 1990). Also, for some coping strategies, there is empirical evidence for both beneficial and adverse effects on adjustment. For example, trying to control pain is generally associated with positive outcomes (Keefe et al., 2004), but may have adverse effects when no control over pain is possible (McCracken, 1998; McCracken, Spertus, Janeck, Sinclair, & Wetzel, 1999). Similarly, while persistence has been considered as generally adaptive, excessive persistence may lead to negative effects, such as disability (Hasenbring & Verbunt, 2010; Vlaeyen & Morley, 2009).

Besides empirical problems, classifying coping into categories has also raised some other concerns. First, there may be an issue of conceptual confounding. The most obvious example in this respect is the notion of catastrophizing. Within the Coping Strategies Questionnaire, it is conceptualized as a coping strategy and assessed as the tendency to engage in negativistic thinking and worry in response to pain (Rosenstiel & Keefe, 1983). Other researchers have suggested it to be better considered as an appraisal or a class of emotional distress (Jensen et al., 1991; McCracken & Gross, 1993). Also, categories of coping are not mutually exclusive and strategies may serve several distinct categories (Skinner, Edge, Altman, & Sherwood, 2003). Consider, for example, going to a doctor. While in some situations, this may be a passive, emotion-focused strategy by serving to vent emotions, in other situations, it may be considered an active, problem-focused strategy by getting useful advice in order to deal with the pain. Second, the value of coping strategies in predicting outcomes may be spurious. Items of active, problem-focused coping are often formulated in a positive way, while passive, emotion-focused coping is often framed in a negative way (Skinner et al., 2003). Third, the structural coping approach has been criticized by its heavy reliance on cognitive responses. McCracken and Eccleston (2003) stressed the importance to consider other classes of behavior in adaptation to chronic pain, such as those that are automatic and not aimed at the direct control of the experience of pain. Exemplary in this respect has been the notion of acceptance of chronic pain.

With the introduction of acceptance, attention was diverted away from the dominant tradition to consider the need to control or alter pain as beneficial for well-being. Acceptance is a multi-faceted concept and it has been defined in a number of different ways. One of the dominant approaches relevant for chronic pain stems from behaviorism and defines acceptance as "... a willingness to remain in contact with and to actively experience particular private experiences" (Hayes, Follette, & Dougher, 1994, pp. 34). Within this tradition, McCracken (1998) started research in chronic pain. Research has identified two core components of acceptance of chronic pain: a willingness to live with pain without reaction, disapproval, or attempts to reduce or

avoid it, and an engagement in meaningful life activities (McCracken et al., 1999). Early studies have demonstrated that acceptance is significantly positively associated with adjustment to chronic pain (McCracken, 1998; McCracken et al., 1999). In comparing the predictive utility of a measure of acceptance and a measure of pain coping, McCracken and Eccleston (2003) found that acceptance of chronic pain was associated with less pain, disability, depression and pain-related anxiety, higher daily uptime, and better work status, whereas coping variables were rather unreliably related to pain adjustment variables. Moreover, acceptance of chronic pain accounted for more variance than coping variables. Over the years, acceptance has become a popular and successful construct in explaining adaptation to chronic pain. There exist dissimilarities in how acceptance is conceptualized and measured. However, the reported effects regarding acceptance have been strikingly consistent. Several cross-sectional studies have, for instance, shown that greater acceptance of chronic pain is related to better emotional, physical, and social functioning, less health care and medication use, and better work status (e.g., Evers et al., 2001; McCracken, Vowles, & Eccleston, 2004; Viane, Crombez, Eccleston, Devulder, & De Corte, 2004; Viane et al., 2003). Acceptance of chronic pain has also shown to be related to better adjustment over time (e.g., McCracken & Eccleston, 2005; Vowles & McCracken, 2008). There has also been growing interest in acceptance-based interventions, such as Mindfulness-Based Stress Reduction Programs (MBSR; Kabat-Zinn, Lipworth, & Burney, 1985), or Acceptance and Commitment Therapy (ACT; Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Treatment results suggest that, when focusing upon increasing acceptance, significant improvements in emotional, social, and physical functioning, as well as less healthcare use may be expected (e.g., McCracken, Vowles, & Eccleston, 2005; Thorsell et al., 2011; Vowles, McCracken, & O'Brien, 2011). Acceptance-based treatments have also proven to be good alternatives to or to complement more traditional therapies in improving mental and physical health of patients with chronic pain (e.g., Veehof, Oskam, Schreurs, & Bohlmeijer, 2011; Wetherell et al., 2011).

Above, we stressed some problems in trying to identify specific coping strategies that might be adaptive in chronic pain adjustment. Acceptance has been

introduced to compensate for the dominant focus on responses aimed at the taking control of pain in coping research. Studies convincingly converge in their findings that acceptance is related to improved adjustment to chronic pain. So, are we there yet? Is acceptance always preferable? In the next section, we will introduce a functional approach to coping that may account for different classes of behavior, both strategies aimed at controlling pain as well as acceptance responses. Such an approach has stimulated the development of new conceptual models that attempt to offer a comprehensive view on adjustment to chronic pain. One of such examples is the model of misdirected problem solving, developed by Eccleston and Crombez (2007). The model may also add understanding to the relationship between seemingly related concepts, such as catastrophizing and coping. It is from this model that the research aims of the current thesis will be developed.

### **TOWARDS AN ACTION-ORIENTED, GOAL-DIRECTED VIEW ON COPING WITH CHRONIC PAIN**

In their review on the structure of coping, Skinner et al. (2003) criticized structural classifications of coping in their neglect of the function of behavior in context. They argued that any coping response may emerge to be adaptive, depending on the fit between an individual's ability to execute the coping response and the demands of the environment. They specifically distinguished three classes of adaptive coping responses that aim at improving the fit between an individual and the environment. The first class constitutes of adaptive processes that coordinate an individual's actions with the contingencies in the environment (e.g., problem solving or information-seeking). Another class of adaptive processes concerns those that coordinate the individual's social support seeking to the constraints of the environment (e.g., self-reliance, or support seeking). A third class of adaptive responses concerns those that coordinate an individual's preferences with the options available in the environment. Those responses allow for more flexible and priority-driven action (e.g., acceptance, cognitive restructuring). Central is the idea that neither responses within each of the three classes is always preferable. Problem

solving or attempting to control a stressor, for example, will only prove to be adaptive when it guides an individual towards more effective actions. Equally, acceptance will only be helpful if the adjustment of a person's behavior to the restraints of the environment follows a correct appraisal of one's control over the environment and of the available options.

The idea of functionality of coping within its context is most clearly illustrated within the concept of *action types*. Action typology is articulated in so-called life-span theories, developed to make sense of how individuals adjust to varying life circumstances. Action types refer to flexible behavioral patterns and consist not only of behavior, but also of emotions, attention and goals (e.g., Brandstädter & Renner, 1990). Among the most influential life-span theories are the dual-process model of coping (Brandstädter & Renner, 1990), the model of selection, optimization, and compensation (SOC; Baltes & Baltes, 1990), and the life-span theory of control (Heckhausen & Schulz, 1995). Common to all three theories is the idea that individuals play an active role in adapting to changing life conditions (Boerner & Jopp, 2007). However, life span theories are not unique in their assumption that individuals are active agents in regulating their behavior. Such is also the imperative of self-regulation theories that have been formulated in the domain of personality and social psychology (e.g., Carver & Scheier, 1998; Ford, 1992). Ideas from both self-regulatory and developmental approaches have reinvigorated research onto coping with chronic pain. The action-oriented, goal-directed view on coping with chronic pain that will be followed within the current thesis has been most influenced by the dual-process model as proposed by Brandstädter and Renner (1990), and Carver and Scheier's (1998) control theory of self-regulation. Preparatory to a description of this view, an overview of these theoretical models is provided below.

## Two examples of functional, dynamic theories

**The dual-process model of coping.** The dual-process model of coping was introduced by Brandstädter and Renner (1990) as a theory trying to explain successful ageing. It represents two qualitatively different action types or processes that may occur in response to ageing-related problems: assimilation and accommodation. Assimilative processes refer to efforts to actively solve problems that block one's preferences or goals, and may include activities such as improving one's knowledge or skills, or seeking external support for solving the problem. Accommodative processes are directed at a flexible adjustment of one's preferences or goals to the restraints of the situation and may involve activities such as devaluating a blocked goal, or considering alternative goals (Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002).

Although the model allows overlap between assimilation and accommodation, the processes are believed to operate largely in an opposed manner (Brandstädter & Greve, 1994; Brandstädter, Wentura & Rothermund, 1999). When confronted with a discrepancy between an actual and a desired course of development, an individual will usually employ assimilative coping first (Brandstädter & Renner, 1990). Consider, for instance, the situation in which an individual is confronted with reduced physical fitness. Being physically unfit may impair the attainment of important goals and may increase the discrepancy between desired outcomes and reality. An individual may then engage in several courses of actions, that follow sequentially in time: a) in case the individual has high perceptions of control, h/she is likely to engage in actions to overcome the obstacle (e.g., do muscle strength exercises); b) in case the individual has low perceptions of control, or if self-corrective actions to alter the situation prove to be insufficient, compensatory actions may be undertaken to acquire the necessary skills or knowledge (e.g., read more information on performing muscle strength exercises); and c) in case compensatory actions are futile, external aid or support may be sought to attain the desired outcome (e.g., go to a physiotherapist to increase muscle strength). Characteristic to assimilative processes are the elements of goal-focused attention, increased availability of cognitions that

support goal pursuit, and inhibition of distractive influences (Brandstädter & Rothermund, 2002). If all assimilative actions fail, an individual is believed to go through an intermediate phase characterized by reactions of helplessness or depression (Brandstädter & Renner, 1990; Brandstädter et al., 1999). Unlike other views (e.g., Abramson et al., 1987), the dual-process model does not assume helplessness to be maladaptive and resulting into a discontinuation of coping efforts. Rather, feelings of helplessness or depression are considered as intermediate phenomena that serve a promotion towards accommodative processes (Brandstädter et al., 1999). Accommodative coping involves a devaluation of goals that have become impossible. The essence of accommodation lies in the ability to adjust to the situation and to be able to orient oneself towards new goals or options for development. Accommodative responses may include the adjustment of one's aspirations, priority setting, acceptance, cognitive reappraisals, etc. (Brandstädter & Renner, 1990).

According to the dual-process model, neither assimilation or accommodation is preferable. Assimilative coping is only adaptive to the extent that one has control over one's actions and when the situation is modifiable. Accommodative coping makes sense in situations where one has no or little control and the disengagement from blocked goals is the only viable strategy remaining. Important to note is that accommodation does not terminate assimilative coping either. Rather, accommodative coping establishes new goals or desires that are more attainable and in which one may re-invest efforts (Brandstädter & Rothermund, 2002; Brandstädter et al., 1999). However, the dual-process model also assumes that, as individuals get older, there will be a general tendency to shift from assimilative towards accommodative coping. To investigate this theoretical assumption, Brandstädter and Renner (1990) developed a questionnaire to assess assimilative and accommodative tendencies on a dispositional level. Assimilation and accommodation were operationalized as *tenacious goal pursuit* and *flexible goal adjustment*, respectively. Indeed, a number of empirical studies have confirmed the presumption that accommodation may become increasingly adaptive in old age (Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002; Brandstädter, Wentura, & Greve,

1993). However, accommodation may also play an important role in early age. For example, Brandstädter and Rothermund (1994) found that the downscaling of certain goals in middle-age adults may buffer against the negative effects of loss of control on general perceptions of personal control. The ability to disengage from unattainable goals has also been found to protect against depressive symptoms through a variety of life transitions and ages (e.g., Heckhausen, Wrosch, & Fleeson, 2001; Wrosch, Bauer, & Scheier, 2005; Wrosch, Miller, Scheier, & Brun de Pontet, 2007). Similar beneficial effects of disengaging from unattainable goals have been found in the context of coping with a chronic disease (e.g., Evers et al., 2001; Thompson, Nanni & Levine, 1994). Interestingly, the general tendency to adjust one's goals has also been shown to be beneficial in coping with chronic pain. For example, Schmitz, Saile, and Nilges (1996) found that, in a sample of 120 chronic pain patients, flexible goal adjustment buffered against the negative impact of pain intensity and pain-related disability on depression. Also, pain-related coping strategies, such as action planning or distraction, were associated with less pain-related disability only when flexible goal adjustment was high. Goossens et al. (2010) investigated the associations between pain-threatening perceptions on self, i.e. self-discrepancies, emotions and flexible goal adjustment in patients with work-related upper-extremity pain. They found similar beneficial effects of flexible goal adjustment as it buffered against the negative effects of self-discrepancies on depression.

Action theories, such as the dual-process model, conceptualize individuals as active agents in shaping their own environment. Individuals are believed to construct mental representations of desired outcomes and act upon reducing the discrepancy between these desires and reality. These mental representations of desired outcomes have been referred to as developmental goals or goals of intentional self-development (Brandstädter et al., 1999). The construct of *goals* has been increasingly popular in a variety of domains and a number of different terms have been used to characterize goals, such as personal projects (Little, 1983), life goals (Nurmi, 1992), personal strivings (Emmons, 1986), current concerns (Klinger, 1977), etc. Although there exist dissimilarities in theoretical perspectives on goals, some common assumptions may

be noticed: a) Each individual has its own set of goals, which are generally referred to as internal representations of desired states. Goals differ in terms of how these are constructed, referred to as dimensions (e.g., difficulty, importance, commitment, etc.); b) Goals represent reference values. Discrepancies between a goal and a current state initiate thought, behavior, and emotional reactions; c) Goals are structured in a hierarchical manner. A small set of goals are defined as higher level goals and provide general organization and orientation for life. Beneath these higher level goals are subgoals which are realized in a shorter time frame. These subgoals in turn have subgoals, and so forth; and d) Goal-directed action is a dynamic process and involves processes such as establishing, planning, striving, and revising (for a review of goal constructs, see Austin & Vancouver, 1996). One example of a goal theory, developed within the domain of personality and social psychology, is Carver and Scheier's (1998) control theory of self-regulation.

**The control theory of self-regulation.** Carver and Scheier's (1998) control theory of self-regulation was based upon a control system model proposed by Powers (1973). A control system consists of an input function (perception of an actual state or situation), a reference value (a certain standard, or goal), a comparator (making comparisons between the input function and the reference value), and an output function (self-corrective behavior). In other words, goals serve as reference values to which an individual compares his/her actual state or the progress h/she has made in achieving the goal. The theory further assumes that goals or reference values differ in their level of abstraction and that these are hierarchically organized and linked through negative feedback loops (Carver & Scheier, 1982, 1998). Goals on top of the hierarchy refer to system concepts and are highly abstract, such as the globalized sense of an idealized self. These system concepts provide input for goals at a next lower level, referred to as principles or *be-goals*. These *be-goals* are still abstract and refer to an individual's qualities, such as be honest, be sociable, be responsible, etc. *Be-goals* may be manifested through a variety of acts or behaviors. These behaviors are referred to as programs or *do-goals* and include acts such as prepare dinner, go for a drink with friends, take a walk, etc. These programs act by serving as input for

the lowest level structures, called *motor control goals*. These goals include sequences of movements, such as slicing broccoli. The negative feedback loop within the hierarchy may be applied as follows: when one perceives a discrepancy between how sociable one is and how sociable one wants to be, this may instigate behavior such as going for a drink with friends, which, in turn, increases the sense of being sociable (Carver & Scheier, 1998).

The assumption that goals are hierarchically structured have a number of implications, each of which will prove to be important within the context of coping with chronic pain. First, there may be remarkable flexibility in how goals are to be achieved. This may permit individuals to shift to other means or goals when a given goal has become unattainable. Similarly, a specific behavior may also be performed in the service of different goals. In other words, a given behavior may have different meanings, depending on the purpose it serves (Carver & Scheier, 1998). Note that this view is analogous to the idea of functionality of coping responses as postponed by action theories (e.g., Brandstädter & Renner, 1990). Second, goals that are placed higher in the hierarchy are believed to be more important than goals at lower levels. Also, goals at lower levels may differ in importance. It is believed that a goal is more important, when: a) it is more strongly linked to a higher order value; and b) it contributes to the attainment of several higher order goals at once instead of only one higher order goal. Third, people may either be guided by goals that have to do with approaching something (approach goals), as well as goals that concern the avoidance of states (avoidance goals). These goals may occur at any level of the hierarchy. While approach goals initiate discrepancy-reducing loops (i.e., minimize the distance between the goal and the current state), avoidance goals give rise to discrepancy-enlarging loops (i.e., maximize the distance between the goal and the current state). Fourth, higher order goals are not always exerting a direct influence on behavior. Most often, individuals engage in lower order, program goals making them functionally superordinate or guiding reference values for behavior (Carver & Scheier, 1998).

So far, the control theory of self-regulation mainly characterized goal striving as a rational monitoring process. However, it is assumed that the experience of affect may also guide individuals in striving towards their goals. More specifically, based on the rate of discrepancy reduction (in case of approach goals) or discrepancy enlargement (in case of avoidance goals) in action over time, different feelings will arise. Importantly, when affect turns out to be positive, an individual will feel confident and will likely continue to engage in goal striving. However, when affect is negative, doubt will settle, and individuals will consider giving up goal commitment (Carver & Scheier, 1982, 1998). The issue of persisting in goal attainment or giving up has turned out to be very important in the self-regulation of health and illness behavior. Above, we already discussed some studies that pointed at the beneficial effects of disengaging from unattainable goals in the context of health. Goal researchers have further argued that disengagement is only adaptive when individuals concurrently engage effort in other goals (e.g., Carver & Scheier, 1998; Scheier & Carver, 2001). Wrosch, Scheier, Miller, Schulz, and Carver (2003), for example, showed that high levels of both goal disengagement and goal reengagement predicted lower levels of negative affect in parents whose children were diagnosed with cancer.

### **An action-oriented, goal-directed view on coping with chronic pain**

Chronic pain has many deleterious consequences and is known to interfere severely with people's on-going activities and goals (Hellstrom, Jansson, & Carlsson, 2000; Karoly & Ruehlman, 2007). When chronic pain impedes functioning, individuals will take action to overcome the obstacle of pain. A variety of actions may be undertaken, depending on the appraisal of the interrupted goal and the obstacle (Van Damme, Crombez, & Eccleston, 2008).

Sometimes, individuals will increase their efforts to accomplish the blocked goal. The likely course of action is then to ignore the pain and persist in their tasks or activities (Van Damme et al., 2008). Indeed, there is evidence that some individuals persist in their activities despite pain (Hasenbring & Verbunt, 2010). At first sight, it

seems adaptive to prevent interference by pain and to continue with activities. However, preliminary evidence suggests that excessive persistence in activities despite pain may also come along with costs, such as risk of chronicity of pain (Hasenbring, Marienfeld, Kuhlendahl, & Soyka, 1994; Hasenbring, Plaas, Fishbein, & Willburger, 2006; Hasenbring & Verbunt, 2010).

In other situations, the person's focus may be away from the pursuit of current goals towards efforts at attempting to achieve the goal of controlling or solving pain. These efforts are to be viewed as *assimilative coping* with pain or *problem solving*, as these are directed at attempting to diminish the impact of pain in order to re-engage in activities and goals one was committed to before pain occurred. Depending on the individual's skills, or on specific beliefs about the origin of the pain and its controllability, a variety of different behaviors may emerge. An individual may, for instance, engage in actions to overcome pain (e.g., bed rest, medication intake). If self-corrective actions to solve the problem of pain prove to be insufficient, one may found to be engaged in behaviors to improve one's skills or knowledge (e.g., search for information on the internet, or via patient associations). A perceived lack of control typically results in a search for help from others (e.g., consult a doctor, physiotherapist) (Van Damme et al., 2008). However, there is often no solution to the problem of chronic pain, and problem solving attempts are then likely to persevere and dominate (Aldrich, Eccleston & Crombez, 2000). Recently, Eccleston and Crombez (2007) designed the misdirected problem solving model (see Figure 1) as an attempt to provide a framework on how some individuals may become stuck in trying to solve the problem of pain.

The misdirected problem solving model positions the person with chronic pain as an active problem solver, one who actively searches for solutions to solve the problem of pain. The model assumes that chronic pain causes repeated interruption of a person's daily living which fuels worry about pain and an increased attention towards pain (Aldrich et al., 2000; Eccleston & Crombez, 2007). In essence, worry is defined as an adaptive process that helps to remain vigilant to unresolved threat (Mathews, 1990), such as pain, and to commit oneself in finding a solution to threat

(Davy, Hampton, Farrell, & Davidson, 1992). In case problem solving attempts appear to be futile, worry may progressively intensify and turn into a catastrophic worrying (Davey & Levy, 1998). In this sense, catastrophic thinking about pain may be a manifestation of a dynamic, yet fruitless process of worrying about pain, its causes and consequences (Aldrich et al., 2000). When pain is framed as a biomedical problem, in which an external or medical solution to the problem of pain is expected, problem solving attempts will likely be aimed at solving the problem of pain, either via one's own attempts or via medical help. When such problem solving attempts are successful, worry and pain will stop. However, when attempts are unsuccessful, worry and catastrophic thinking are believed to be fuelled, and may lead to further ineffective problem solving attempts. Problem formulation is believed to become very narrow and inflexible. As a result, individuals may become stuck in a perseverance loop, in which ineffective attempts to solve the problem of pain amplify worry. Chronic worry will further function to find a biomedical solution to the problem of pain that leads to the avoidance, or elimination of pain. To keep searching for a cure will unlikely solve the problem of pain and problem solving efforts will likely become *misdirected*. Consequently, the model poses that the narrowing of the problem frame and the increased effort towards pursuing the goal of pain control may maintain suffering on the long term (Aldrich et al., 2000; Eccleston & Crombez, 2007).

To come out of the perseverance loop, the model proposes an alternative route in which one might have to reframe the problem of chronic pain. Viable options in this respect are to disengage from the goal of pain relief, and to be able to live a valued life in the presence of pain (Eccleston & Crombez, 2007). Such is the core of the *accommodative approach* in coping with chronic pain. Accommodating to the problem of chronic pain is believed to help in resolving negative feelings and suffering that may arise as a result from repeated failure and frustration in gaining control over pain. Individuals may then devalue the importance of pain control, and reengage in other valuable goals that are less affected by pain (Eccleston & Crombez, 2007). This idea is particularly present in formulations of the concept of acceptance of chronic pain, as it has been identified as a willingness to live with pain without reaction,

disapproval, or attempts to reduce or avoid it, and an engagement in meaningful life activities (McCracken et al., 1999, 2004).

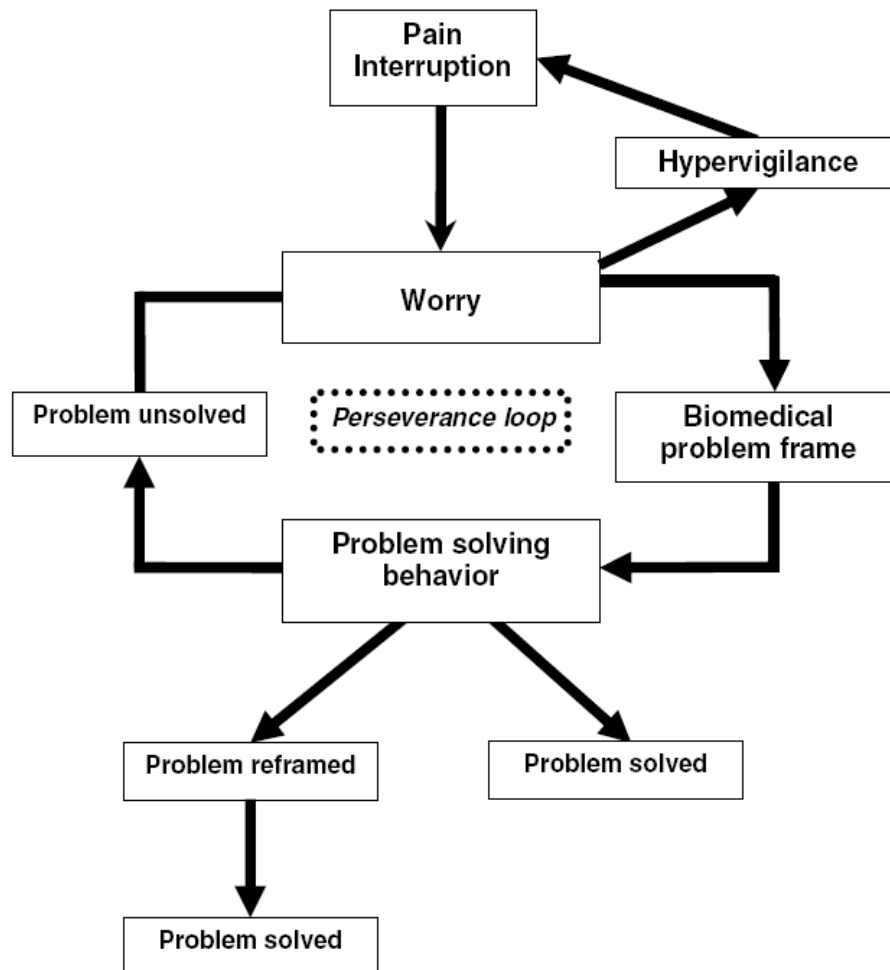


Figure 1. The misdirected problem solving model (Eccleston & Crombez, 2007).

In trying to investigate how patients solve or accept the problem of pain, De Vlieger, Van den Bussche, Eccleston, and Crombez (2006) developed the Pain Solutions Questionnaire (PaSol). The PaSol generally measures attitudes related to attempts to solving pain, acceptance that pain is insoluble, and the engagement with life activities despite the pain. More specifically, it consists of four subscales: (1) solving pain; (2) meaningfulness of life despite pain; (3) acceptance of the insolubility of pain; and (4) belief in a solution. The solving pain scale reflects assimilative coping,

with those scoring high on the subscale persisting in attempts to cure or control pain. We call this *problem solving*. Accommodative coping is captured by the meaningfulness of life despite pain scale and the acceptance of the insolubility of pain scale. These subscales might be perceived of as correlates of *acceptance*. In a self-help sample of people with chronic pain, it was found that attempting to solve or control pain was associated with a heightened attention to pain and higher levels of distress, beyond the effects of pain intensity. Conversely, perceiving life as meaningful despite the pain (acceptance) was uniquely related to lower levels of disability and distress. Moreover, those who catastrophized about pain perceived pain as a problem that needs to be solved, failed to accept that pain was insoluble, and did not believe in the possibility that life might be meaningful despite the pain (De Vlieger et al., 2006). These findings might be interpreted in favour of an action- and goal-oriented view on coping with chronic pain, in that a tenacious pursuit to solve pain may only be adaptive when pain is curable (Eccleston & Crombez, 2007). Instead, being able to accept pain or accommodate to the pain problem may serve to retain one's functioning and well-being (McCracken & Eccleston, 2003; Van Damme et al., 2008). In a subsequent study, Crombez, Eccleston, Van Hamme, and De Vlieger (2008) again found that problem solving accounted for higher levels of distress, disability, and attention to pain, both in individuals with acute as well as chronic pain. Also, problem solving showed to come along with a cost. Trying to solve pain was associated with more catastrophic thinking about pain when pain was chronic.

The present thesis seeks to build further upon these findings. The main aim is to gain insight in how individuals cope with the problem of pain in order to increase understanding of chronic pain suffering. In order to do so, we continue to adopt an action-and goal-oriented view on coping with chronic pain. We evolve from the idea that persisting in trying to solve the problem of pain may be ineffective in the context of chronic pain, whereas acceptance of chronic pain may have beneficial effects. Unravelling the processes of problem solving and acceptance in chronic pain will be the main theme of the research questions addressed in this doctoral thesis. Several distinct aims will be tackled within this doctoral thesis: 1) to investigate the usability

and content of questionnaires aimed at measuring problem solving and acceptance in chronic pain (Studies 1 & 2); 2) to investigate whether biomedical problem framing may instigate problem solving and subsequent costs in pain samples (Study 3); 3) to investigate individual variability in problem solving and acceptance strategies adopted by individuals with chronic pain (Study 4); and 4) to investigate possible reasons underlying attempts to solve or control pain in individuals with chronic pain (Study 5). These main topics will be handled in the current thesis which consists of two psychometric studies (of which one is partly a systematic review and content analysis), three clinical studies (cross-sectional studies), and a general discussion. Below, the studies will be explicitly described and shortly commented on.

## OUTLINE OF THE PRESENT STUDIES

### **Study 1. Can generic correlates of problem solving and acceptance be validly assessed in a chronic pain population?**

The Pain Solutions Questionnaire (PaSol, De Vlieger et al., 2006) was designed to measure assimilation, or a problem solving attitude, and accommodation, or an acceptant attitude. The PaSol is a symptom-specific measure and does not allow comparisons between groups with different symptoms. There exist, however, other measures that are designed to capture similar adjustment processes believed to be involved across a variety of diseases. One such example is the Illness Cognition Questionnaire (ICQ; Evers et al., 2001) that has been developed as a generic measure of attitudinal reevaluations, so called illness beliefs, in adjusting to long-term diseases. The instrument measures three types of cognitive reevaluations. A first type relates to cognitions that emphasize the negative meaning of a stressor and broadly refer to the concept of (loosing) control (i.e., an attitude of helplessness). In this sense, these cognitions may be linked to the intermediate phase between assimilation and accommodation, characterized by a perception of loosing control and not (yet) being able to reengage in valued other activities (e.g., Brandstädter & Renner, 1990). In contrast, a second type of reevaluations relates to cognitions that diminish the

aversive meaning of a stressor (i.e., an accepting attitude). This type of reevaluations may be linked to an accommodative style of coping. A third type of reevaluations relates to cognitions that add a positive meaning to a stressor (i.e., an attitude in which one focuses on the positive consequences of a stressor). In total, the ICQ consists of three subscales: helplessness, acceptance, and disease benefits. Although the ICQ has shown to have good psychometric qualities through a variety of chronic diseases, the question remains whether the factor structure can be replicated in a chronic pain population, or other patient groups characteristic of medically unexplained symptoms, such as chronic fatigue. Therefore, the aims of Study 1 (*Chapter II*) were twofold. First, we investigated the construct validity of the ICQ by means of a confirmatory factor analysis in samples of individuals with chronic pain and chronic fatigue. Second, we investigated the stability of the factor structure across the two groups using a multi-sample analysis.

## **Study 2. Of what features does an acceptance of chronic pain constitute of and how is it commonly operationalized?**

Within our action- and goal-oriented approach of coping with chronic pain, the process of acceptance is conceived of within an accommodative approach to coping. More specifically, it is perceived of as the disengagement from the unattainable goal to control pain, and the reengagement into other valuable goals that are less affected by pain (Eccleston & Crombez, 2007; Van Damme et al., 2008). However, acceptance is a multi-faceted concept and it has also been defined in a number of other ways. Another approach that has been dominant in the field stems from behaviorism and defines acceptance as "... a willingness to remain in contact with and to actively experience particular private experiences" (Hayes et al., 1994, pp. 34). From this approach, McCracken et al. (1999) started research in chronic pain. Two main constituents of acceptance of chronic pain have been proposed over time: willingness to experience pain and reengagement into valued-based activity. There exist several self-report measures of chronic pain acceptance. Differences have been noted in how acceptance is measured across these measures (Reneman, Dijkstra, Geertzen, &

Dijkstra, 2009), possibly resulting from variability in how acceptance is defined. As yet, it is unclear which features of acceptance are measured by available instruments. There is also no research on the (dis)similarities between instruments in their conceptualization of chronic pain acceptance. Therefore, within the second study (*Chapter III*), we examined the item content of chronic pain acceptance instruments and tried to identify which features of acceptance were reflected in and across instruments.

### **Study 3. Does a biomedical framing of the problem of pain instigate attempts at controlling pain, and does this lead to further costs?**

An assimilative style of coping, characterized by attempts at solving pain, has been shown to be related to negative outcomes, such as higher levels of disability and distress (Crombez et al., 2008; De Vlieger et al., 2006). The model of misdirected problem solving states that, if individuals view their pain as a primarily medical problem (biomedical framing), biomedically driven problem solving attempts will be initiated, leading to worse outcomes on the long term (Eccleston & Crombez, 2007). Building upon these propositions, we investigated the role of problem solving style in patients with simple migraine and medication-overuse headache (MOH). MOH is a disorder that is characterized by a worsening of headache pain (most often migraine) through an overuse of analgesic medication. It is yet unclear why such a pattern of medication overuse emerges. Within the third study (*Chapter IV*), we investigated whether patients with MOH would report to be more eager to control or solve their pain when compared to patients with migraine. We also investigated whether MOH patients believed to be in a higher need for medication to control their pain, despite being aware and concerned about its negative consequences.

#### **Study 4. Which strategies do individuals with chronic pain employ in solving the problem of pain?**

The Pain Solutions Questionnaire (PaSol; De Vlieger et al., 2006) has been developed in an aim to assess how individuals solve the problem of pain. The PaSol was specifically developed following the dual-process model of coping (Brandstädter & Renner, 1990) and distinguishes between assimilative coping or problem solving, as captured by the solving pain subscale (e.g., “I keep searching for a solution for my pain”), and accommodative coping or acceptance, as captured by the acceptance of insolubility of pain subscale (e.g., “I can accept that there is no solution for my pain”) and the meaningfulness of life despite pain subscale (e.g., “I try to live with my pain”). Studies with the PaSol have pointed out that individuals with chronic pain who adopt an assimilative coping style, characterized by attempts at solving the problem of pain, not accepting pain to be insoluble, and not believing that a meaningful life is possible despite pain, report more physical and affective distress, and display a higher level of catastrophic thinking about pain (Crombez et al., 2008; De Vlieger et al., 2006). The PaSol remains, however, an instrument of individual’s self-reported attitudes about problem solving. Much remains unknown about what problem solving strategies individuals with chronic pain employ. Also, it is yet unclear whether individuals who have a higher problem solving (assimilative) attitude towards the problem of pain differ in strategies employed when compared to those more accepting (accommodative attitude) of pain. In this fourth study (*Chapter V*), we report on the development of a problem solving task aimed at measuring the strategies individuals employ in solving the problem of chronic pain. We followed an idiographic approach and constructed vignettes that would allow us to capture individual variability in the strategies employed. We adapted the original Means-End Problem Solving Task (Platt & Spivack, 1987) to the end that it required individuals to respond with various means to achieve a goal that is blocked by pain. Finally, we identified which problem solving and acceptance strategies were reflected in the answers of our sample. This was achieved by developing a coding frame mainly based upon the action typology assimilation-accommodation and by coding responses into this frame.

### **Study 5. Why do some individuals become stuck in solving the problem imposed by chronic pain?**

According to the misdirected problem solving model, some individuals may become stuck in a perseverance loop, in which ineffective attempts to solve the problem of pain may increase catastrophic thinking about pain, which, in turn, may maintain rigid and ineffective problem solving (Eccleston & Crombez, 2007). It is believed that such rigidity may increase suffering in the long term (Aldrich et al., 2000; Eccleston & Crombez, 2007). The question arises why some individuals persist in ineffective problem solving, even when doing so promotes suffering. In Study 5 (*Chapter VI*) of the thesis, one possible reason underlying ineffective problem solving is investigated. We emerged from the assumption that perceiving pain as the primary cause of disability may motivate one to pursue the goal of pain control in order to retain functioning. Therefore, we investigated goals and their characteristics in individuals with chronic pain, and were specifically interested in the goal to control pain. We sought answers to three questions: (1) Is the goal to control pain spontaneously reported by individuals with chronic pain?; (2) How do individuals with chronic pain appraise the goal to control pain?; and (3) What is the relative position of the goal to control pain in relation to other non-pain goals? We were also interested in individual differences in how the goal to control pain was appraised and structured as a function of key-concepts involved in misdirected problem solving or reframing, such as catastrophic thinking about pain, solving pain, acceptance, disability and distress.

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## THE CONSTRUCT VALIDITY OF THE ILLNESS COGNITION QUESTIONNAIRE: THE ROBUSTNESS OF THE THREE-FACTOR STRUCTURE ACROSS PATIENTS WITH CHRONIC PAIN AND CHRONIC FATIGUE<sup>1</sup>

### ABSTRACT

The Illness Cognition Questionnaire (ICQ; Evers et al., 2001) assesses three ways of cognitively evaluating the stressful and aversive character of a chronic illness: helplessness, acceptance and perceived benefits. The purpose of the study was to evaluate the construct validity of the ICQ in individuals with chronic pain and patients with chronic fatigue. The ICQ was administered to 821 individuals with chronic pain and 295 patients with chronic fatigue. Confirmatory factor analyses were performed to assess the hypothesized three-factor structure, containing the factors helplessness, acceptance and perceived benefits. A multi-group analysis was performed to investigate the stability of the factor structure in both groups. Results confirmed the three-factor structure in the two samples. The factor structure was invariant across individuals with chronic pain and chronic fatigue. As the three-factor structure provided a good fit in both groups, we confirm the usefulness of the subscale scores in research and clinical practice.

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<sup>1</sup>Based on Lauwerier, E., Crombez, G., Van Damme, S., Goubert, L., Vogelaers, D., & Evers, A.W.M. (2010). The construct validity of the Illness Cognition Questionnaire: The robustness of the three-factor structure in patients with chronic pain and chronic fatigue. *International Journal of Behavioral Medicine*, 17, 90-96. doi: 10.1007/s12529-009-9059-z

## INTRODUCTION

Medically unexplained symptoms, including many forms of chronic pain and chronic fatigue, often have a negative impact on quality of life, affecting physical, psychological, cognitive and social domains of functioning (Anderson & Ferrans, 1997; Niv & Kreitler, 2001). Symptom severity is often insufficient to fully explain their adverse effects upon functioning. Many variables have been identified that may hinder or promote adjustment to a life with chronic symptoms, such as self-efficacy, coping strategies and illness beliefs (Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Vercoolen et al., 1998). Although there is a wide variety of illness beliefs and cognitions (Devellis & Blalock, 1992; Leventhal, Brisette, & Leventhal, 2003; Weinman, Petrie, Moss-Morris, & Horne, 1996) that are relevant for the adjustment to chronic symptoms, in this paper we focus upon the three generic constructs of helplessness, acceptance and experienced benefits of illness.

Some studies found evidence for the beneficial effects of perceived control over symptoms (Buckelew et al., 1994; Jensen & Karoly, 1991). Conversely, the repeated experience of lack of control over aversive events may result in helplessness (Overmier & Seligman, 1967). In line with this, several studies have found that a perceived lack of control is associated with unfavourable outcomes in chronic pain conditions (Koleck, Mazaux, Rascle, & Bruchon-Schweitzer, 2006; Nicassio, Schuman, Radojevic, & Weisman, 1999).

Although there is merit in the idea that having control over symptoms may be associated with better adjustment, research in this respect has yielded inconclusive results (McCracken & Eccleston, 2003). As an example, it has been found that attempting to control or solve pain when actual control is low, may increase fear, worry, catastrophic thinking and hypervigilance (Crombez, Eccleston, Van Hamme, & De Vlieger, 2008; Eccleston & Crombez, 2007). In some situations, abandoning the struggle to control symptoms and accepting the illness may be more adaptive. This idea has been much less studied than the role of perceived control. Nonetheless, acceptance is part of several coping models (Brandstädter & Renner, 1990; Heckhausen & Schulz, 1995; Scheier & Carver, 2003). It has been found that patients

who are accepting of pain reported less depression, anxiety and disability (McCracken, 1998). In a questionnaire study in chronic pain patients, Viane et al. (2003) showed that acceptance was related to better psychological but not physical well-being. In agreement with the above findings, research in patients with chronic fatigue has pointed out that acceptance was related to more emotional stability and less psychological distress (Van Damme, Crombez, Van Houdenhove, Mariman, & Michielsen, 2006).

To reduce the emotional strain of adversity, one can also try to make sense out of the losses the situation has caused. Rather than downgrading the importance of the blocked goal and accepting the constraints of the situation, one can give a new, positive evaluation to the aversive situation. Affleck and Tennen (1996) were one of the first to underline the importance of benefit finding or seeing positive side-effects in otherwise aversive situations. It has already been found that these illness benefits buffer negative effects of perceived health stresses on subjective well-being (Wrosch, Heckhausen, & Lachman, 2000).

Several self-report measures have been developed to assess the above reported concepts of helplessness, acceptance and benefit finding. Some of these instruments are symptom-specific (McCracken, 1998; Flor, Behle, & Birbaumer, 1993; Tennen, Affleck, Urrows, Higgins, & Mendola, 1992) and, hence, do not allow comparisons between groups with different symptoms. An example of a disease-specific instrument is the Perceived Control and Benefits Questionnaire (Tennen et al., 1992), designed to measure personal control and the perception of benefits in patients with chronic pain. Other measures assess the constructs in a trait-like fashion unrelated to specific situations such as chronic illnesses (Beck, Weissman, Lester, & Trexler, 1974; Carver, Scheier, & Weintraub, 1989; Millon, Green, & Meagher, 1982). For example, the COPE Inventory (Carver et al., 1989) assesses coping strategies as relatively stable preferences. With this type of measures, situational influences or constraints may be easily overlooked.

Recently, the Illness Cognition Questionnaire (ICQ) has been developed as a generic measure of illness beliefs (Evers et al., 2001). The instrument consists of

three subscales, i.e. helplessness, acceptance and perceived benefits. It allows comparison across chronic conditions. Furthermore, items and instructions are not formulated in a trait-like manner, potentially allowing to assess situational influences. Evers et al. (2001) investigated the psychometric properties (i.e. reliability and validity) of the ICQ. They conducted a principal components analysis with oblique rotation on ICQ scores derived from 263 patients with rheumatoid arthritis and obtained a three-factor solution accounting for 62% of the total variance. The factors were labelled helplessness, acceptance and perceived benefits. They also performed a confirmatory factor analysis on ICQ scores obtained from 167 patients with multiple sclerosis. Analyses indicated that the three-factor structure of the ICQ provided a satisfactory fit to the data. In sum, the ICQ showed a strong internal consistency, reliability, and good construct and predictive validity. Helplessness was associated with unfavourable changes, whereas acceptance and perceived benefits were related to beneficial changes in physical and psychological health on the long term.

Although the ICQ has shown good psychometric qualities, the question remains whether the factor structure can be replicated in patient groups with medically unexplained symptoms, such as chronic pain and chronic fatigue. Therefore, the aims of this study were twofold. First, we investigated the construct validity of the ICQ by means of a confirmatory factor analysis in samples of individuals with chronic pain and chronic fatigue. Second, we investigated the stability of the factor structure across the two groups using a multi-sample analysis. To invigorate further research and clinical practice, we provided norms for the subscales of the ICQ.

## METHOD

### Participants

Data were collected from two samples who completed the same Dutch version of the Illness Cognition Questionnaire (ICQ). For both samples, no data are available on response rate and reasons for non-participation. Additionally, participants received no reward for participation.

The first sample consisted of 871 Dutch individuals with chronic pain who were a member of one of two self-help groups. For fifty patients, some item scores were missing, reducing our sample to 821 patients (19% males, 81% females), aged between 19 and 99, mean age = 50.75 years,  $SD = 10.4$ . The average pain duration was 183 months,  $SD = 131$ , range 12-732. Most patients reported pain at multiple sites (45.9%), or back pain (28.8%). The majority of the entire sample reported secondary education as highest education level (66.9%), whereas only small groups received either a lower education (6.5%) or a higher education (longer than the age of 18) (26.6%). Within the entire sample, the majority was married or living together (76.3%).

After reduction because of incomplete data, the second sample consisted of 295 Flemish chronic fatigue patients, who were on a waiting list for cognitive-behavioral therapy, and fulfilled all the Center for disease control and prevention-criteria for chronic fatigue syndrome (Fukuda et al., 1994). The sample consisted of 12.5% men and 87.5% women, aged between 18 and 64, mean age = 40.32 years,  $SD = 8$ . A small group reported a lower education as highest education level (8.3%), 56.3% had secondary education and 35.4% received a higher education.

### Measures

**Illness Cognitions.** The Illness Cognition Questionnaire (ICQ; Evers et al., 2001) was used to measure helplessness, acceptance and perceived benefits. This is a 18-item questionnaire that contains three 6-item scales related to the factors helplessness, acceptance and perceived benefits, each with a scoring range of 6-24

(e.g., helplessness, “My illness limits me in everything that is important to me”, “My illness frequently makes me feel helpless”; acceptance, “I have learned to live with my illness”, “I can accept my illness well”; perceived benefits, “Dealing with my illness has made me a stronger person”, “My illness has taught me to enjoy the moment more”). Each item is answered on a 4-point Likert scale to the extent to which one agrees with the item (1 = *not at all*, 2 = *somewhat*, 3 = *to a large extent*, 4 = *completely*).

Exploratory factor analysis in a sample of patients with rheumatoid arthritis ( $n = 263$ ) revealed a three-factor solution accounting for 62% of the variance. Confirmatory factor analysis in a sample of patients with multiple sclerosis ( $n = 167$ ), has confirmed the assumed three-factor structure. Cronbach’s alpha demonstrated adequate internal consistencies for all scales, ranging from .84 to .91 in both samples. Pearson’s correlation coefficients between two administrations of the questionnaire with a 1-year time interval were all above .67, indicating good test-retest reliability for all scales in both samples. Evidence has also been found for good concurrent and predictive validity (Evers et al., 2001).

### **Analytical strategy**

Confirmatory factor analyses were performed using AMOS 7.0 (Arbuckle, 2006). The hypothesized three-factor structure was tested in the chronic pain sample. The chronic fatigue sample was used to cross-validate the structure. The fit of the model was estimated with the maximum likelihood algorithm while allowing the latent variables to correlate. Each item was assumed to load only on one factor. Subsequently, a multi-group analysis was carried out in order to examine the invariance of the factor structure across both groups. Model fit is usually evaluated using the  $\chi^2$  goodness-of-fit statistic and several fit indices (Bollen & Long, 1993). As recommended by Hu and Bentler (1999), we used a strategy combining the following fit indices: the standardized version of Jöreskog and Sörbom’s (1981) root mean square residual (SRMR; Bentler, 1995) and the comparative fit index (CFI; Bentler, 1990).

The  $\chi^2$  goodness-of-fit statistic assesses the overall fit of the model and, in particular, whether a significant amount of observed covariance between items remains unexplained by the model. A significant  $\chi^2$  is indicative of a bad model fit. The main shortcoming of this fit index is its sensitivity to sample size. In a small sample, a poor fit may result in a  $\chi^2$  that is nonsignificant. Equally, it is also possible that in large samples, a good fit results in a statistically significant  $\chi^2$  (Marsh, Balla, & McDonald, 1988). Therefore, for further interpretation, we rather looked at the fit index  $\chi^2/\text{df}$  (CMIN/DF), which is the minimum sample discrepancy divided by the degrees of freedom. According to Marsh and Hovecar (1985), CMIN/DF values between 2 and 5 represent a reasonable model fit.

The standardized version of the Jöreskog and Sörbom's (1981) root mean square residual (SRMR; Bentler, 1995) is an absolute fit index, assessing how well an a priori model reproduces the sample data. Hu and Bentler (1999) found that the SRMR is the most sensitive fit index for models with misspecified factor covariances. Values close to 0 suggest that the data fit the model.

To measure the proportionate improvement in model fit by comparing the target model with a baseline model, we used the comparative fit index (CFI). The CFI is one of the most sensitive indices to models with misspecified factor loading(s). The CFI usually ranges between 0 and 1, with values above .95 indicating a good fit (Hu & Bentler, 1999).

We used a combination of indices to evaluate model fit, in particular CFI and SRMR. A model has a good fit when the CFI value is close to .95 or larger and when the SRMR value is close to .09 or lower. In line with Hu and Bentler (1999), we used the following criteria: for a good model fit,  $\text{CFI} > .94$  and  $\text{SRMR} < .09$ ; for an adequate model fit,  $\text{CFI} > .90$  and  $\text{SRMR} < .09$ ; and for a poor model fit,  $\text{CFI} < .90$  and  $\text{SRMR} > .09$ .

## RESULTS

### Descriptive and correlational statistics

Table 1 reports the means, standard deviations, internal consistencies of the subscales and Pearson correlation coefficients between the subscales of the Illness Cognition Questionnaire (ICQ). The internal consistencies of all subscales in the two groups were good, range = .81 - .91. Overall, the pattern of correlations amongst the subscales of helplessness, acceptance and perceived benefits was as expected.

Helplessness was negatively related to the two other constructs acceptance and perceived benefits, respectively. However, the association with perceived benefits was less pronounced. In contrast, acceptance was positively related to perceived benefits. There were no significant age effects, except for a positive correlation between helplessness and age in chronic pain patients,  $r = .16, p < .001$ , indicating greater helplessness among older patients in the pain sample.

### Confirmatory factor analyses

The standardized factor loadings of the three-factor model for the chronic pain and chronic fatigue sample are presented in Figure 1. As for the individuals with chronic pain, although results showed a significant  $\chi^2$ ,  $\chi^2(132) = 683.176, p < .001$ , CMIN/DF = 5.20, the fit indices supported the adequate fit of the model, CFI = 0.93, SRMR = 0.06. In the chronic fatigue sample, we found significant overall fit,  $\chi^2(132) = 326.84, p < .001$ , CMIN/DF = 2.48, of the three-factor model to the data. The fit indices indicated an adequate fit, CFI = 0.92, SRMR = 0.07. After inspection of the modification indices, a correlated residual between items 7 (i.e., "My illness makes me feel useless at times") and 15 (i.e., "My illness frequently makes me feel helpless") was detected in both samples. This finding indicates that these items have something in common, which is not reflected by the remaining items that load on the helplessness subscale.

Table 1

*Means (M), standard deviations (SD), internal consistencies ( $\alpha$ ), pearson correlation coefficients [and their 95% confidence intervals] among the ICQ subscales helplessness, acceptance and perceived benefits*

	<i>M (SD)</i>	$\alpha$	2	3
Chronic pain				
1. Helplessness (ICQ)	14.52 (4.30)	.88	-.48***[-.53, -.43]	-.07[-.14, 0]
2. Acceptance (ICQ)	14.60 (4.13)	.91	-	.44***[.38, .50]
3. Perceived benefits (ICQ)	15.02 (4.31)	.83	-	-
Chronic fatigue				
1. Helplessness (ICQ)	16.57 (3.86)	.83	-.53*** [-.61, -.45]	-.29***[-.39, -.18]
2. Acceptance (ICQ)	11.95 (3.73)	.90	-	.48***[.39, .57]
3. Perceived benefits (ICQ)	12.50 (4.09)	.81	-	-

*Note.* ICQ = Illness Cognition Questionnaire.

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

The residual may probably be due to content overlap between the items. In both samples, the model was refitted to the data, allowing a free estimation of the error covariance between items 7 and 15. The improvement in fit provided by the model with residual correlation between items 7 and 15 was significant in individuals with chronic pain,  $\Delta\chi^2_{(1)} = 71.37, p < .001$ , CMIN/DF = 4.70, and in individuals with chronic fatigue,  $\Delta\chi^2_{(1)} = 27.90, p < .001$ , CMIN/DF = 2.30. After refitting the model, the three-factor structure had an adequate fit to the data, both in the chronic pain sample, CFI = 0.94, SRMR = 0.06, and in the chronic fatigue sample, CFI = 0.93, SRMR = 0.07. Inspection of the modification indices indicated that other minor improvements were possible in both samples. It was decided not to include these changes because of model parsimony.

### **Invariance of the factor structure**

To examine whether the three-factor structure was invariant across the two chronic conditions, a multi-group analysis was performed. A restrictive model (Hoyle & Smith, 1994), equating the number of factors, the factor loadings, the correlations between the factors and the error variances, was investigated. The overall fit was shown to be significant,  $\chi^2(303) = 1143.800, p < .001$ , CMIN/DF = 3.78. The fit statistics for the restrictive model reflected an adequate fit to the data, CFI = 0.93, SRMR = 0.06.

### **Norms**

Levene's test for equality of variances was conducted in order to examine if equal variances could be assumed. Because equal variances were assumed for the subscale perceived benefits, we used the t-test for equality of variances in order to analyze differences in scores. For the subscales helplessness and perceived benefits, equality of variances could not be assumed. Therefore, we used a t-test for inequality of variances to analyze differences in scores in those subscales.

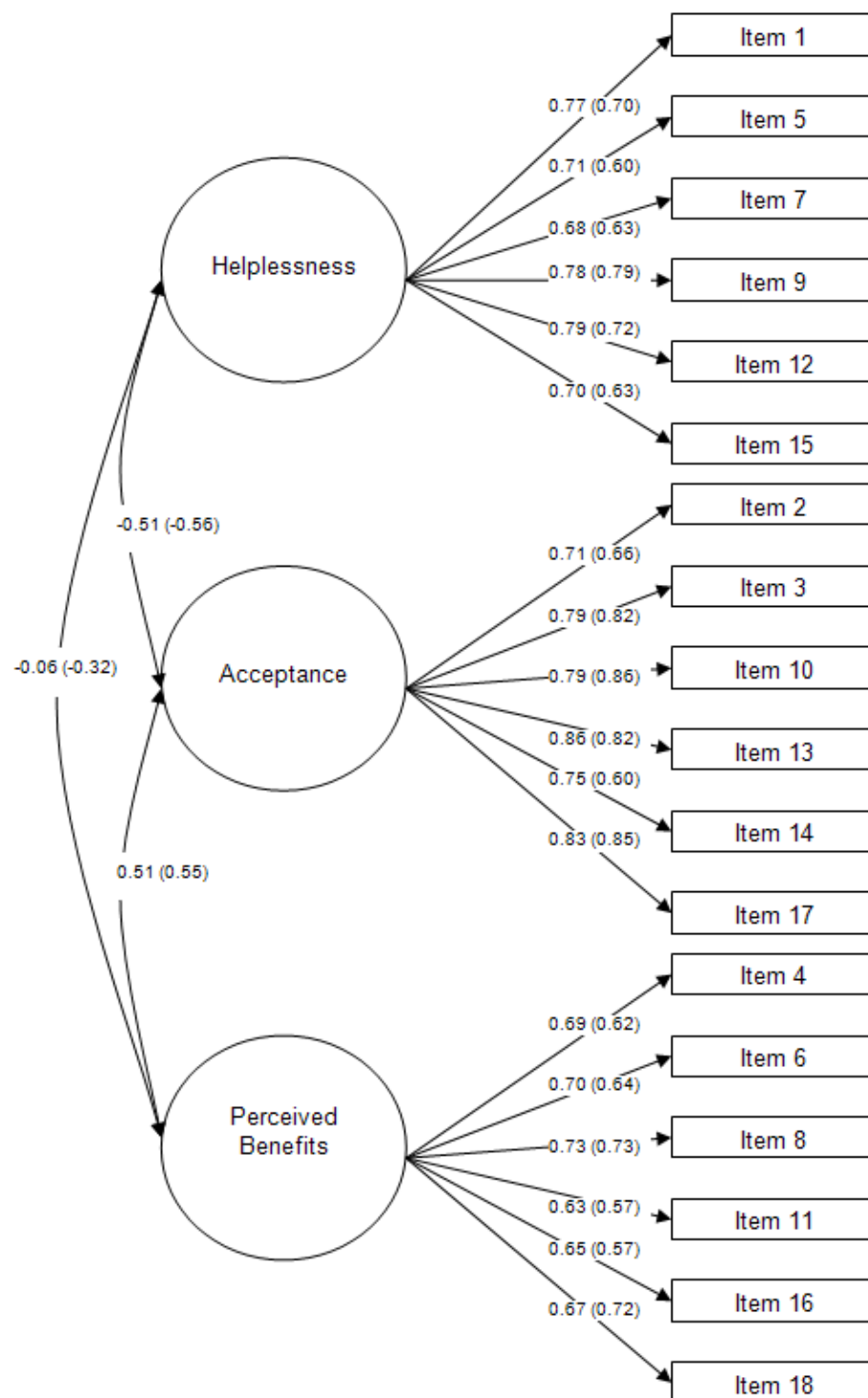


Figure 1. Standardized factor loadings as obtained with confirmatory factor analysis shown for chronic pain patients and patients with chronic fatigue (between parentheses).

Analyses revealed significant differences for the scores on helplessness,  $t(574.5) = -7.59, p < .001$ , acceptance,  $t(570.25) = 10.16, p < .001$ , and perceived benefits,  $t(1114) = 8.70, p < .001$ , between individuals with chronic pain ( $n = 821$ ) and individuals with chronic fatigue ( $n = 295$ ). As a result, separate norms were calculated for the two different chronic conditions (see Table 2).

When examining gender differences, we found a significant difference in scores on acceptance,  $t(731) = 2.68, p < .01$ , with men scoring higher,  $M = 14, SD = 4$ , then women,  $M = 13, SD = 4$ . Scores on helplessness,  $t(731) = .144, ns$ , and perceived benefits,  $t(272.42) = -.64, ns$ , did not differ between the two sexes. To investigate whether the gender effect for acceptance was due to the type of medically unexplained complaint (chronic pain versus chronic fatigue), we performed an (Group x Gender) ANOVA upon the subscale acceptance. The ANOVA showed a significant effect of group,  $F(1,729) = 25.032, p < .001$ . The main effect of gender was not significant,  $F(1,729) = 1.113, p = .29$ . There was also no interaction effect between condition and gender,  $F(1,729) = 0.087, p = .77$ . Results seem to indicate that there is no effect of gender on acceptance.

Table 2

*Deciles and quartiles for the chronic pain (n = 821) and chronic fatigue sample (n = 295)*

	chronic pain			chronic fatigue		
	helpless- ness	acceptance	perceived benefits	helpless- ness	acceptance	perceived benefits
Deciles						
10	9	9	9	7	11.6	7
20	11	11	11	8	13	9
30	12	12	12	10	14	10
40	13	13	14	11	16	11
50	14	14	15	12	17	12
60	15	16	16	12	18	13
70	17	17	17	13.2	19	15
80	18	18	19	15	20	16
90	21	20	21	17	22	18
Quartiles						
25	11	12	12	9	13	9
50	14	14	15	12	17	12
75	18	18	18	14	19	15

## DISCUSSION

The present study investigated the construct validity of the Illness Cognition Questionnaire (ICQ; Evers et al., 2001) using confirmatory factor analysis in two different samples, namely individuals with chronic pain and individuals with chronic fatigue. Furthermore, the invariance of the factor structure across the two groups was examined using a multi-group analysis.

The goodness-of-fit indices of the three-factor solution indicated an adequate fit to the data in both samples. Furthermore, although the chronic pain and chronic fatigue samples differed with regard to the mean scores on the subscales, the factor structure proved to be invariant across the two samples. It seems likely to assume that equivalent illness beliefs, reflected by the subscales of the ICQ, are tapped in both conditions. To our knowledge, the current study is the first to support the invariance

of the factor structure of the ICQ across different samples with medically unexplained symptoms.

Concerning the psychometric properties of the ICQ, results demonstrated adequate internal consistencies for all scales. Intercorrelations between the scales were in line with the expectations and at the same time insignificant to moderate, which revealed their content validity. Based on these findings, we confirm the usefulness of the subscale scores in research and clinical practice. Our norms may be used to describe patient samples in terms of the illness cognitions. Differences in cognitions can be expected between samples from different settings. Furthermore, clinicians may use the upper quartile cut off scores of the illness cognitions for screening and diagnostic purposes.

The results of this study have a number of implications. First, they give support to the idea that the ICQ is an instrument that can be used for individuals with different medically unexplained symptoms. Second, although there are large differences in nature and experience of complaints between chronic pain and chronic fatigue, the ICQ seems to assess the same processes of illness beliefs. Thus, differences in subscale scores between those samples are rather quantitative than qualitative in nature. Third, our results are in line with the idea that acceptance and perceived benefits play a role in the adaptation to uncontrollable symptoms. We endorse the view of Rothermund (2006) stating that, although somewhat neglected in the past, we cannot overlook the importance of disengagement and acceptance in situations where control is low or nonexistent.

The strength of the current study lies in the large sample size for both the chronic pain and chronic fatigue group. That way, the study has adequate statistical power and results in more accurate estimates of the statistics. There are a number of limitations to this study. First, more studies are needed in individuals with chronic pain and chronic fatigue to investigate whether the results generalize to other samples and to investigate the relationships between the ICQ-scales and health-related outcomes. Second, prospective studies are needed to examine the predictive validity of the ICQ scales in long-term adaptation to chronic illness. Third, the stability

over time (i.e., test-retest reliability) was not investigated in the present study and should be looked upon in future studies. Fourth, further research may examine if certain illness beliefs are involved in the maintenance of chronic suffering. There is evidence that, in chronic pain patients, repeating attempts to control or solve the pain problem may fuel negative consequences (Crombez et al., 2008). Beliefs related to the loss of control, like helplessness, may be more prominent in patients who continuously fail in finding a solution for their symptoms, like pain or fatigue. Conversely, the acceptance of illness may buffer against the adverse impact of symptom severity. Finally, research is needed to investigate to what extent treatment is able to change these cognitions, and to what extent these changes mediate treatment success.

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**ABSTRACT**

Several instruments to assess acceptance in chronic pain have been developed and are used. Uninvestigated is to what extent the content of the items reflects acceptance. A content analysis of thirteen instruments that aim to measure acceptance of chronic pain was performed. A coding scheme was used consisting of three acceptance categories, i.e. disengagement, willingness, and engagement, and five contrast categories, i.e., controlling pain, pain costs, pain benefits, unclear, and no fit. Two coders rated to what extent the items fit within these categories. Consensus between raters was satisfactory. But, there were differences between instruments. The strongest consensus was found for the CPAQ-A, AIS, and AIS-P (75%), and the least for the ICQ and the BPCI-I (16.67%). Engagement was found to be the most represented acceptance feature. Disengagement and willingness were underrepresented and controlling pain overrepresented. Using multidimensional scaling, two dimensions were identified that capture well the content of all items across the instruments. One had willingness and controlling pain as endpoints, the other had engagement and pain costs as endpoints. Although acceptance measures are frequently used, our analysis warrants caution with its interpretation. There is a need to reflect on the specific content of acceptance measures and its operationalization.

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<sup>1</sup>Based on Lauwerier, E., Caes, L., Van Damme, S., Goubert, L., Rosseel, Y., & Crombez, G. (submitted). Acceptance questionnaires in chronic pain patients: A content analysis.

## INTRODUCTION

Acceptance has become a popular and successful psychosocial variable in explaining adaptation to pain (McCracken, 1998; McCracken & Velleman, 2010; McCracken & Vowles, 2008; McCracken, Vowles, & Eccleston, 2004, 2005b; Viane, Crombez, Eccleston, Devulder, & De Corte, 2004; Viane et al., 2003). Likewise, there has been growing interest in acceptance-based interventions, such as Mindfulness Based Stress Reduction Programs (MBSR; Kabat-Zinn, Lipworth, & Burney, 1985) or Acceptance and Commitment Therapy (ACT; Hayes, Luoma, Bond, Masuda, & Lillis, 2006). A recent meta-analysis has shown that these interventions are good alternatives to or may complement traditional therapies in improving mental and physical health of patients with chronic pain (Veehof, Oskam, Schreurs, & Bohlmeijer, 2010).

Acceptance is a multi-faceted concept that has been defined in different ways. We recognize at least two dominant approaches. One approach stems from behaviorism, and defines acceptance as "... a willingness to remain in contact with and to actively experience particular private experiences" (Hayes, Jacobson, Follette, & Dougher, 1994, pp.34). Within this tradition, McCracken, Spertus, Janeck, Sinclair, and Wetzel (1999) started research in chronic pain. Research has identified two core constituents of acceptance: a willingness to experience pain, and the engagement into valued-based life activity despite pain (McCracken et al., 2004; Vowles, McCracken, McLeod, & Eccleston, 2008; Wicksell, Olsson, & Melin, 2009). The other approach originates from self-regulatory theories, in which disengagement from blocked goals and reengagement into new actions is considered as an adaptive way of coping with life dynamics (Boerner & Jopp, 2007; Brandstädter & Renner, 1990; Carver & Scheier, 1998; Heckhausen & Schulz, 1995). Within this perspective, acceptance of chronic pain has been reframed as the disengagement from the unattainable goal to control pain, and the reengagement into other valuable goals that are less affected by pain (Eccleston & Crombez, 2007; Evers et al., 2001; Schmitz, Saile, & Nilges, 1996; Van Damme, Crombez, & Eccleston, 2008).

Over time, several self-report measures of chronic pain acceptance have been developed. Differences may be noted in how acceptance is measured across instruments (Reneman, Dijkstra, Geertzen, & Dijkstra, 2009), possibly resulting from considerable variability in how acceptance is defined. For example, Viane et al. (2003) observed only a moderate correlation between the Chronic Pain Acceptance Questionnaire (CPAQ; McCracken et al., 2004) and the Illness Cognition Questionnaire (ICQ; Evers et al., 2001), indicating that acceptance is not alike in these two instruments. As yet, it is unclear which features of acceptance are measured by available instruments. There is also no research on the (dis)similarities between instruments in their conceptualization of chronic pain acceptance. Needed is a critical analysis of the content of the items of these questionnaires, and how they map on the different theoretical perspectives.

This study examined the item content of chronic pain acceptance instruments. We developed a heuristic frame that included the above mentioned accounts of acceptance. We searched for empirical studies using acceptance instruments, and identified the instruments assessing acceptance of chronic pain. Finally, we identified which features of acceptance were reflected in and across instruments. This was achieved by coding items into the categories of our heuristic frame, and by using multidimensional scaling.

## **METHOD**

### **Search strategy**

Studies were collected through a search of the Medline, Psycinfo and Web of Science databases using the search terms 'acceptance' combined with 'chronic pain', and 'questionnaire' or 'assessment' or 'self-report'. The search was conducted until the 10<sup>th</sup> of May 2012. An initial set of 688 articles was identified.

### **Inclusion criteria**

The following inclusion criteria were used:

- 1) The study was published as a peer-reviewed article in English language;
- 2) The study described a questionnaire assessing acceptance of chronic pain or chronic illness. Studies describing measures of coping were only included if acceptance was one of the subscales; and
- 3) Participants were child, adolescent or adult chronic pain sufferers.

### **Study selection**

The abstracts of the studies as provided in the databases were screened for eligibility. A multiple-stage search strategy was developed, informed by guidance of the Cochrane Collaboration and previous systematic reviews undertaken (Eccleston, Jordan, & Crombez, 2006; Eccleston, Morley, Williams, Yorke, & Mastroiannopoulou, 2002). The review of individual studies was limited to the early 1980's since several decades were then covered and it was likely that our computerized search identified all relevant studies conducted from that period onwards. From the initial set of 688 articles, 409 were recovered after removing duplicates and articles that were published before 1 January 1980. Further, 308 articles were removed because they did not fulfil the inclusion criteria (e.g., book chapters, conference papers, studies conducted in student or healthy populations). After screening the full-text articles, an additional number of 14 articles were excluded. These were mainly studies that included participants with recurrent pain (Compas et al., 2006), studies that used (semi-) structured interviewing techniques (La Cour, 2012), and studies that measured acceptance of stress but not chronic pain or chronic illness (Groarke, Curtis, Coughlan, & Gsel, 2004). Additionally, the reference sections of the full-text articles were searched to identify other eligible studies or instruments for inclusion. Three additional studies were identified but excluded because they did not entail a measure of acceptance of chronic pain or chronic illness. The final number of studies was 87. A detailed, schematic overview of the different stages in selecting the studies can be found in Figure 1.

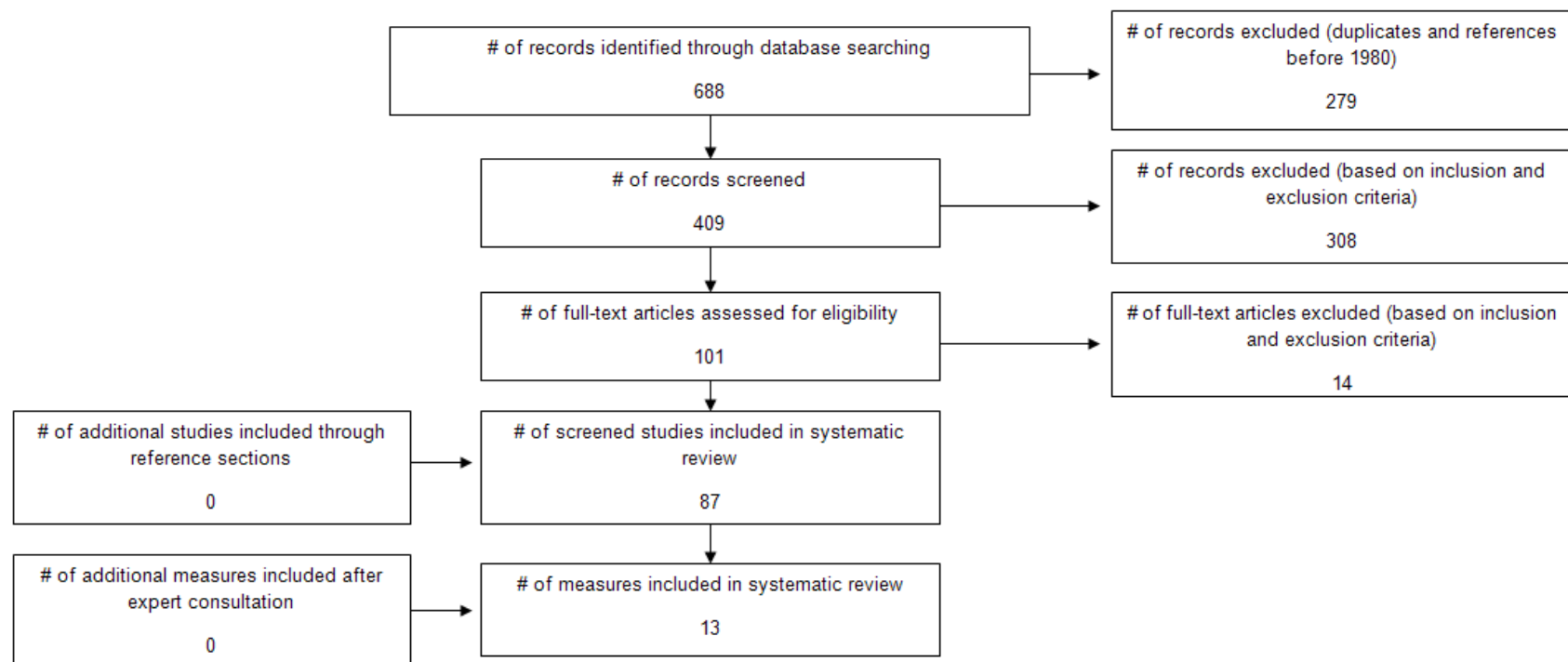


Figure 1. Flow of information through the different phases of the search strategy.

## **Instrument selection**

Out of the 87 articles identified, 18 different instruments had been used. Five of those did not measure acceptance of chronic pain or chronic illness, and were not included in the study (e.g., the Acceptance and Action Questionnaire-I; Hayes et al., 2004). There were some instruments that were adaptations of previous instruments used in the context of chronic pain. We included a modified version of an instrument as a separate measure when the number of items was changed, or when the content of one or more items was different. To further validate our search, a number of authors of articles describing the development of an acceptance instrument and key researchers whose work was of relevance to the topic of the study, were contacted and asked to identify other instruments suitable for inclusion in the study (see Figure 1). Twelve additional instruments were proposed of which none was included in the review because they did not meet inclusion criteria: instruments assessing acceptance of loss; instruments assessing coping in response to stress; and instruments assessing other constructs (i.e., mindfulness, cognitive defusion, values). The latter constructs may be conceptualized as related to acceptance, but are not considered to be the same (Hayes, Strosahl, & Wilson, 1999). This left us with a final sample of 13 instruments. All instruments and the primary articles reporting their development were collected.

## **Analysis, coding system and coding decisions**

First, note was taken of the full name of the instrument, acronym, basic reference, primary content, relevant subscale(s), and the number of times a measure was used. Second, we examined the sample for which the instrument initially was developed. In particular, we were interested in whether an instrument had been developed for a chronic illness or a chronic pain population. Third, we analyzed the content of instruments by coding the selected items of the instruments within the categories of our heuristic frame.

In deciding whether to include items, we looked at the initial description of the (sub)scales and whether its items were particularly developed to assess acceptance

features. Out of a total of 209 items across 13 instruments, 154 were included for subsequent analysis. Overall, items were excluded from our analysis on a subscale level. In particular, we excluded subscales that were not developed to measure acceptance (i.e., the subscales helplessness and disease benefits of the Illness Cognition Questionnaire developed by Evers et al., 2001; and the subscales confrontation and avoidance of the Medical Coping Modes Questionnaire developed by Feifel, Strack, & Nagy, 1987). In two specific cases, we excluded particular items of certain (sub)scales. One, we excluded items reflecting cognitive-behaviorally based responses of the Brief Pain Coping Inventory (BPCI; McCracken, Eccleston, & Bell, 2005a) and the Brief Pain Coping Inventory-II (BPCI-II; McCracken & Vowles, 2007), because, in primary articles, it was stated explicitly that these items did not measure acceptance. Two, we excluded ten items of the Chronic Pain Acceptance Questionnaire-34 (Geiser, 1992). Those items have been consistently removed from total score calculation, because these were not considered to tap on the overall construct of acceptance (Geiser, 1992). For some (sub)scales, no reference was made as to which specific items out of the total pool reflected features of acceptance. This was the case for the Brief Pain Response Inventory (BPRI; McCracken, Vowles, & Zhao-O'Brien, 2010b), and the Psychological Inflexibility in Pain Scale (PIPS; Wicksell, Renöfält, Olsson, Bond, & Melin, 2008). Because of this lack of information, we consistently decided to include all items of those (sub)scales for analysis. Details on item exclusion can be found in Table 1. Finally, of a total of 154 items, 42 items were duplicates. Those arose when comparing item content of original instruments with their subsequent adaptations (i.e., 24 items of the Chronic Pain Acceptance Questionnaire with the 20-item, 8-item and adolescent CPAQ-versions; the 5-item Brief Pain Coping Inventory with the Brief Pain Coping Inventory-II and the Brief Pain Response Inventory; and the Acceptance of Illness Scale with the Acceptance of Illness Scale - adapted for pain). The final number of items included was 112.

We developed a standard coding protocol. This protocol was constructed and operationalized in an iterative process. Initially, we developed a heuristic frame that included all possible features of acceptance. We distributed this frame amongst

senior research experts working in the field of chronic pain, and invited them to provide feedback. Hereafter, the frame was adapted and we developed a coding protocol. Subsequent versions of the heuristic frame and coding protocol were discussed among authors and research collaborators. We further tested the interpretability of our heuristic frame by creating sample items for each category of the coding protocol. These were piloted amongst a few research collaborators and led to a further adaptation of the categories. Discussion was repeated until a consensus amongst the authors was reached.

As mentioned above, the heuristic frame was built around two dominant accounts that have been used to describe acceptance of chronic pain. Those accounts identified the following acceptance features: disengagement from unattainable goals and reengagement into valued other goals (Eccleston & Crombez, 2007; Evers et al., 2001; Schmitz et al., 1996; Van Damme et al., 2008), willingness (i.e., a willingness to remain in contact with and to actively experience particular private experiences), and valued-based activity (i.e., the ability to commit in activities that are congruent with one's values) (McCracken et al., 2004; Vowles et al., 2008; Wicksell et al., 2009). In general, these two approaches share the notion of engagement in activity. Although disengagement has been perceived of as conceptually similar to willingness (Kranz, Bollinger, & Nilges, 2010), we decided to treat these as separate features based on differences in the original definitions. We thus derived three acceptance features, and applied these to the context of chronic pain. These were: (1) *Disengagement from pain control*, i.e. items represent (factors related to) an attempt or a sequence of attempts to let go or give up the goal of pain control; (2) *Willingness to experience pain*, i.e. items represent (factors related to) a willingness to experience pain without the need to reduce, avoid, or otherwise change it (e.g., McCracken, 1998); and (3) *Engagement in activities other than pain control*, i.e. items represent (factors related to) an attempt or a sequence of attempts to engage in other activities or goals than (the goal of) controlling pain. Of note is that we did not use strict definitions. Items may also reflect factors, such as attitudes, beliefs and behavior related to the features. Some extra categories were added that did not represent the key features of acceptance.

These were rationally derived and served as possible contrast categories of acceptance: (1) *Controlling pain*, i.e. items represent (factors related to) an attempt or a sequence of attempts to control pain; (2) *Pain costs*, i.e. items represent the hindrance or interference of pain on one's functioning and/or the costs of pain itself; (3) *Pain benefits*, i.e. items represent the positive effect that pain may have on one's functioning and/or the benefits of pain itself; (4) *Unclear*, i.e. items of which their content could not be classified into the above mentioned categories; and (5) *No fit*, i.e. items that did not fit into one of the other categories. In sum, the coding protocol consisted of eight categories. All eight categories and sample items per category are presented in the Appendix of this chapter.

Two raters (EL and LC) independently coded the items. To do so, they were provided with the items, a coding sheet and a coding manual explaining the procedure. A soft clustering method was used, in which each specific item was allowed to load on several categories at once. For each item, raters divided a total of ten points over the eight possible categories. By this, we avoided high rates of no fit-items as many items may contain elements of different categories. An additional advantage of soft clustering is that it produces scores that are more amenable to data-analytic strategies (e.g., factor analysis, multidimensional scaling) when compared to forced-choice procedures, which allow each item to load on only one specific category.

Agreement between raters was calculated as follows. Each rater coded all items. Whenever there was exact consensus between raters (i.e., an exact distribution pattern of a total of 10 points across eight categories), this was noted. Summing exact consensus scores over all items yielded a general agreement score. Overall, exact agreement between raters was found for 59 of the 112 items (53%). Among the main differences in coding were the extent to which items were judged to be unclear (15/112, 13.4%), the extent to which items were judged to have no fit (9/112, 8%), the choice between categorizing an item as either controlling pain or pain costs (9/112, 8%), and the choice between categorizing an item as either disengagement from pain control or willingness (8/112, 7%). Calculating exact agreement scores is a

very strict index. Raters may, for instance, not agree in the exact amount of points that should be assigned to each category, but more or less agree in assigning points to certain categories and not to others. Therefore, we also calculated whether the mean difference of points assigned across all categories differed between the two raters. We found no statistically significant difference between the raters regarding total points assigned across categories,  $F(7,216) = 1.16, p = .326$ . Furthermore, we looked at whether the raters differed in points assigned for each category separately. For example, we examined whether rater one assigned a similar amount of points to willingness compared to rater two. We used spearman correlations because our data were not on an interval level, i.e. there was non-continuous variation in points assigned to a category (Field, 2005). Associations between raters were significantly positively associated for all eight categories, i.e. disengagement,  $r_s = .43, p < .001$ , willingness,  $r_s = .58, p < .001$ , engagement,  $r_s = .74, p < .001$ , controlling pain,  $r_s = .80, p < .001$ , pain costs,  $r_s = .79, p < .001$ , pain benefits,  $r_s = .81, p < .001$ , unclear,  $r_s = .20, p = .032$ , no fit,  $r_s = .35, p < .001$ . This means that raters rank-ordered items in a similar manner within each category. In order to reach consensus, difficulties and observed differences were discussed among raters. In subsequent analyses, we used the data set as obtained after consensus between the two raters.

## RESULTS

### Instrument characteristics

Table 1 presents a summary of all instruments identified, their authorship, description of general content, number of items, development population, and the number of times used.

Table 1

*Details of acceptance measures used in chronic pain populations*

Name	Acronym	Basic Reference	Description	Factors (Number of items)	Development population	Times used
Chronic Pain Acceptance Questionnaire	CPAQ-34	Geiser, 1992	measures acceptance of pain	1 total score ( <b>24</b> /34) <sup>a</sup>	chronic pain population	13
<i>Revised version of the Chronic Pain Acceptance Questionnaire</i>	CPAQ-20	McCracken et al., 2004	measures acceptance of pain	2 activity engagement ( <b>11</b> ) pain willingness( <b>9</b> ) total score (20)	chronic pain population	57
<i>Adolescent version of the Chronic Pain Acceptance Questionnaire</i>	CPAQ-A	McCracken et al., 2010	measures acceptance of pain	2 activity engagement ( <b>11</b> ) pain willingness ( <b>9</b> ) total score (20)	adolescent chronic pain population	5
<i>Revised version of the Chronic Pain Acceptance Questionnaire-20</i>	CPAQ-8	Fish et al., 2010	measures acceptance of pain	2 activity engagement ( <b>4</b> ) pain willingness ( <b>4</b> ) total score (8)	chronic pain population	1
Illness Cognition Questionnaire	ICQ	Evers et al., 2001	measures three generic illness cognitions among which one of these is acceptance, i.e. the way to diminish the aversive meaning of the illness	3 helplessness (6) acceptance ( <b>6</b> ) disease benefits (6)	chronic illness population	10

Table 1. *Continued*

Name	Acronym	Basic Reference	Description	Factors (Number of items)	Development population	Times used
Acceptance of Illness Scale	AIS	Felton & Revenson, 1984	measures acceptance of illness	1 total score ( <b>8</b> )	chronic illness population	2
<i>Acceptance of Illness Scale, adapted to pain</i>	AIS-P	Rankin & Holtum, 2003	measures respondents' success in feeling acceptant and valuable in spite of the problems and losses occasioned by the painful condition	1 total score ( <b>8</b> )	chronic pain population	2
Brief Pain Coping Inventory	BPCI	McCracken et al., 2005	measures a range of self-regulatory responses to pain including acceptance-based responses and cognitive-behavioral based responses	item-level analysis ( <b>5/18</b> ) ( <b>2,4,11,16,17</b> )	chronic pain population	2

Table 1. *Continued*

Name	Acronym	Basic Reference	Description	Factors (Number of items)	Development population	Times used
<i>Brief Pain Coping Inventory -2</i>	BPCI-II	McCracken et al., 2007	measures acceptance-based responses and cognitive-behavioral based responses	2 pain Management strategies (8) psychological flexibility (6/11) <sup>b</sup>	chronic pain population	1
<i>Brief Pain Response Inventory</i>	BPRI	McCracken et al., 2010	measures psychological flexibility in response to pain	2 flexible Action (8) willing Engagement (7) total score (15)	chronic pain population	1
Psychological Inflexibility in Pain Scale	PIPS	Wicksell et al., 2008	measures psychological inflexibility in response to pain	2 avoidance (10) cognitive Fusion (6) Total score: 16 <sup>c</sup>	chronic pain population	2
Pain Solutions Questionnaire	PaSol	De Vlieger et al., 2006	measures efforts at problem solving and acceptance responses to problems associated with pain	4 <sup>d</sup> solving Pain (4) meaningfulness of life despite pain (5) acceptance of the insolubility of pain(3) belief in a solution (2) total assimilation score (12)	chronic pain population	3

Table 1. *Continued*

Name	Acronym	Basic Reference	Description	Factors (Number of items)	Development population	Times used
Medical Coping Modes Questionnaire	MCMQ	Feifel et al., 1987	measures coping responses in face of chronic illness	3 confrontation (8) avoidance (7) acceptance-resignation(4)	chronic illness population	1

*Note.* Bold numbers represent items that are included in the analysis; <sup>a</sup>According to the original scoring proposed by Geiser (1992), 24 items out of the total item pool of 34 items are used to calculate a total acceptance score. As such, ten items were systematically excluded from scale calculation (items 8, 11, 13, 15, 18, 21, 25, 26, 29 and 33). McCracken et al. (1999) subsequently examined the factor structure of the original 34-item pool. They found evidence for a three-factor structure constituting of the subscales: (1) engaging in normal life activities (10 items); (2) recognizing that pain may not change (4 items); and (3) needing to avoid or control pain (8 items). A fourth factor, i.e., believing that controlling thoughts controls pain (5 items), was identified. These items were found to be divergent from the overall construct of acceptance and were excluded from scale calculation. The scoring procedure described by Geiser (1992) did not include these five items either. The item selection and scoring procedure proposed by McCracken et al. (1999) nearly resembled the original one proposed by Geiser. While the original scoring included 24 of the 34 items, the one proposed by McCracken et al. (1999) included 21 of the 24 selected by Geiser and one item (i.e., item 15) that was not originally selected. The total number of items included by the scoring of McCracken et al. (1999) was 22 (excluding the 5 items belonging to the factor believing that controlling thoughts controls pain). Most published studies reporting on the use of the 34-item CPAQ version used the original scoring by Geiser. Therefore, in our review, we opted to include those items, i.e. 24, that are most commonly used for total score calculation; <sup>b</sup>In the original article by McCracken and Vowles (2007), PCA showed a solution with 3 factors that were labeled pain management strategies, pain acceptance and awareness and values-based action. The latter factors were subsequently combined and labeled psychological flexibility. Because of the purpose of this study, we will specifically focus upon the items that originally belonged to the factor pain acceptance, i.e. items 2, 4, 7, 11, 17 and 24; <sup>c</sup>Since items were originally generated out of a pool of items, i.e. a total number of 36, reflecting a mix of avoidance, cognitive fusion, acceptance, and values orientation, we decided to include all items in the analysis; <sup>d</sup>According to Crombez, Eccleston, Van Hamme, and De Vlieger (2008), each of the subscales can be used in isolation, or an assimilative compound score can be calculated by summing the scores of the solving pain subscale and the reversed scores of both the “meaningfulness of life despite pain and acceptance of the insolubility of pain subscales. As such, the solving pain subscale, as a correlate of control-based responses (assimilation) might entail some similarities with an unwillingness to experience pain, reversed to the acceptance-related responses (accommodation) of the other two subscales. Therefore, we opted to include the items of the solving pain subscale into our analyses. The belief in a solution subscale might be perceived of as a determinant of an individual’s assimilative responses to pain. Therefore, we chose to include those items as well.

Of the 13 instruments identified, ten were specifically developed for use in chronic pain populations and three for use in chronic illness populations (i.e., Illness Cognition Questionnaire (Evers et al., 2001); Acceptance of Illness Scale (Felton & Revenson, 1984); and Medical Coping Modes Questionnaire (Feifel et al., 1987)). The latter three instruments had at least one psychometric evaluation in a chronic pain sample. Furthermore, all instruments were originally developed for use with adult populations, except for one that was designed for use with adolescent populations, i.e. the Adolescent Version of the Chronic Pain Acceptance Questionnaire (CPAQ-A; McCracken, Gauntlett-Gilbert, & Eccleston, 2010a).

The most commonly used acceptance of chronic pain instrument, used in 57 of the 87 articles, is the 20-item Chronic Pain Acceptance Questionnaire (CPAQ-20; McCracken et al., 2004). This two-factor instrument was validated following a factor analysis of the original Chronic Pain Acceptance Questionnaire (Geiser, 1992). The original CPAQ has been used in 13 out of the 87 articles found. Further on, an adolescent version of the Chronic Pain Acceptance Questionnaire (McCracken et al., 2010a) was adapted from the 20-item adult version. This instrument is the only available instrument for adolescents, and is not yet frequently used, i.e. in 5 of the 87 articles. Recently, Fish, McGuire, Hogan, Morrison, and Stewart (2010) developed a short form, i.e. 8-item adult version, of the Chronic Pain Acceptance Questionnaire-20. These authors replicated the original 2-factor solution in the instrument. Another common used instrument, i.e. tracked in 10 out of the 87 articles, is the Illness Cognition Questionnaire (ICQ; Evers et al., 2001). This instrument has been developed for use in a chronic illness population, and consists of three subscales, of which one measures acceptance. All other instruments, either designed for chronic pain or chronic illness populations, have been rarely used, i.e. in one or two of the 87 articles.

For each instrument, we identified the items that yielded exactly the same scores over raters, i.e. exact distribution of points assigned across the eight categories. Whenever this was the case, a score of 1 was given. A score of 0 was given in case of a difference between the scores. We then summed the consensus scores of

all items of a given instrument. Agreement percentages were calculated by weighting the sum with the total number of items of the respective instrument, multiplied by 100. Seven out of ten instruments showed average to high agreement scores. The strongest agreement scores (75%) were found for the CPAQ-A (Chronic Pain Acceptance Questionnaire - Adult Version), AIS (Acceptance of Illness Scale), and AIS-P (Acceptance of Illness Scale-Adapted for Pain), followed by the CPAQ-20 (Chronic Pain Acceptance Questionnaire - 20 item version) (70%). Both the original and 8-item version of the CPAQ showed moderate agreement (62.5%). Moderate agreement was also found for the PaSol (Pain Solutions Questionnaire) (50%). For the remaining six instruments, agreement scores were below average. Scores of 40% and 37.5% were found for the BPCR (Brief Pain Coping Response) and the PIPS (Psychological Inflexibility for Pain Scale), respectively. The least agreement was found for the MCMQ (Medical Coping Modes Questionnaire) (25%), the BPRI (Brief Pain Response Inventory) (20%), the BPCI-II (Brief Pain Coping Inventory-II) (16.67%), and the ICQ (Illness Cognition Questionnaire (16.67%).

### **Instrument content**

For each item, we noted the distribution of points of each item over the eight main categories, i.e. three main and five contrast categories. For each instrument, we then summed all points of a specific category over all its respective items, and divided this by the total points assigned (number of items x 10). This score produced percentages reflecting the degree to which the items of an instrument covered each of the eight categories (see Table 2).

**Acceptance.** Overall, we found that most instruments loaded for a significant degree on the acceptance categories of our heuristic frame. The highest percentages were noted for the BPCI (60%), CPAQ-A (55%), and CPAQ-20 (53.5%). Low to very low percentages were noted for the BPCI-II (33.33%), MCMQ (20%), AIS (2.5%), AIS-P (0%), and PIPS (0%). The only two instruments that had equal high, albeit moderate loadings on the three acceptance features, i.e. disengagement from pain control, willingness, and engagement in activities other than pain control, were the

original CPAQ and the PaSol. The CPAQ-20, CPAQ-A, and CPAQ-8 tended to load less on the categories disengagement from pain control and willingness, but instead more on engagement in activities other than pain control when compared to the original CPAQ. A significant amount of instruments loaded moderately to high on engagement in activities other than pain control. This was especially the case for the CPAQ-20, CPAQ-A and CPAQ-8 that loaded respectively for 42%, 45.5% and 46.25% on that category. Noteworthy, the categories disengagement from pain control and willingness were underrepresented across instruments. An exception to this were the items of the ICQ that loaded for 43.33% on willingness.

**Contrast categories.** Items of a considerable amount of instruments loaded to a large extent on the contrast category controlling pain (e.g., CPAQ-34, CPAQ-20, CPAQ-A, CPAQ-8, BPCI, BPCI-II, BPRI, PaSol, and PIPS). The PIPS showed the highest percentage (44.38%). One instrument loaded entirely on the exclusion categories (i.e., AIS-P). Two other instruments loaded almost entirely on exclusion categories. These were the AIS (98.5%), and the MCMQ (80%). Items of the AIS and AIS-P loaded strongly on pain costs (e.g. “Because of my illness, I miss the things I like to do best” (AIS); or “My pain makes me feel useless at times” (AIS-P)). Also the PIPS loaded to a great extent on pain costs (35%). Items of the MCMQ loaded mainly on no fit (e.g., “How often do you feel that you don’t care what happens to you?” (MCMQ)). An instrument that had high loadings on the category unclear was the ICQ (50%) (e.g., “I can handle the problems related to my illness”, or “I can cope effectively with my illness”). The other instruments (i.e., CPAQ-34, CPAQ-20, CPAQ-A, CPAQ-8, BPCI, BPCI-II, BPRI, PaSol) loaded to a minor extent on the exclusion category unclear, with the CPAQ-A showing the lowest loading (2%), and the BPCI-II the highest among these (15%). Finally, of the above mentioned instruments, all CPAQ-versions loaded to a minor part on the exclusion category no fit, with the CPAQ-8 showing the highest percentage among these (10%).

Table 2

*Percentages of points assigned to all separate coding categories for each instrument*

Instrument	<i>n</i>	Main categories			Contrast categories				
		disengagement from pain control	willingness	engagement	controlling pain	pain costs	pain benefits	unclear	no fit
CPAQ-34	24	14.58%	14.58%	16.66%	25%	3.33%	0%	7.08%	4.58%
CPAQ-20	20	6.5%	5%	42%	35%	4%	0%	3.5%	4%
CPAQ-A	20	3.5%	6%	45.5%	35%	4%	0%	2%	4%
CPAQ-8	8	0%	0%	46.25%	37.5%	2.5%	0%	3.75%	10%
ICQ	6	0%	43.33%	6.67%	0%	0%	0%	50%	0%
AIS	8	0%	2.5%	0%	0%	72.5%	0%	0%	25%
AIS-P	8	0%	0%	0%	0%	70%	0%	5%	25%
BPCI	5	0%	28%	32%	30%	0%	0%	10%	0%
BPCI-II	6	0%	5%	28.33%	38.33%	0%	13.33%	15%	0%
BPRI	15	3.33%	24%	22.67%	22%	8.67%	4.67%	14.67%	0%
PIPS	16	0%	0%	0%	44.38%	35%	0%	15.62%	5%
PaSol	14	15.71%	10.71%	19.29%	42.86%	0%	0%	11.29%	0%
MCMQ	4	20%	0%	0%	0%	17.5%	0%	7.5%	55%

*Note.* CPAQ-34 = Chronic Pain Acceptance Questionnaire - 34-item version; CPAQ-20 = Chronic Pain Acceptance Questionnaire - 20-item version; CPAQ-A = Chronic Pain Acceptance Questionnaire - Adolescent version; CPAQ-8 = Chronic Pain Acceptance Questionnaire - 8-item version; ICQ = Illness Cognition Questionnaire; AIS = Acceptance of Illness Scale; AIS-P = Acceptance of Illness Scale – adapted for pain; BPCI = Brief Pain Coping Inventory-I; BPCI-II = Brief Pain Coping Inventory-II; BPRI = Brief Pain Response Inventory; PIPS = Psychological Inflexibility for Pain Scale; PaSol = Pain Solutions Questionnaire; MCMQ = Medical Coping Modes Questionnaire.

## Multidimensional scaling

**The multidimensional scaling solution.** Multidimensional scaling (MDS) was used to identify underlying dimensions of the obtained data. MDS represents the items in a geometrical configuration of points in such a manner that highly similar items are placed close to each other, and items with low similarity are placed at a greater distance from each other. We used the isoMDS command available in R (R Development Core Team, 2011) which implements one form of non-metric multidimensional scaling (Venables & Ripley, 2002). To avoid numerical problems with identical cases, a small amount of fuzz (normally distributed noise with standard deviation equal to 0.001) was added to the data before the analysis. The MDS-analyses produced solutions in one to ten dimensions. The scree plot (see Figure 2) showed a *stress elbow* at two dimensions, with an observed value of 0.25, accounting for 75% of the variance in the obtained data set. Figure 3 situates each item within the two-dimensional representation of the MDS-solution, as determined by the coordinates in each dimension. Theoretically, the stress elbow indicates that the third dimension does not add any significant change to the explanatory power of the data. Conversely, according to the goodness-of-fit criteria proposed by Kruskal (1964), our obtained solution would poorly fit the data since the stress value exceeds 0.20. As such, a three-dimensional solution would fit our data better, with an observed value of 0.14, accounting for 86% of the variance. However, the utility of this, rather rough, guideline has been questioned over time (Borg & Groenen, 2005). It has, for instance, been argued that stress values tend to be higher with an increasing number of data points relative to the number of dimensions. Also, a solution may have a high stress as a consequence of high error in the data. Kruskal and Wish (1978) argued further that the interpretability of the dimensional solution is an equal or even more important decision criterion in MDS. As dimensions increase, solutions tend to be more difficult to comprehend. Altogether, since our primary aim was to reveal clear scientific interpretable value out of the data, the two-dimensional solution was decided on in the present data set.

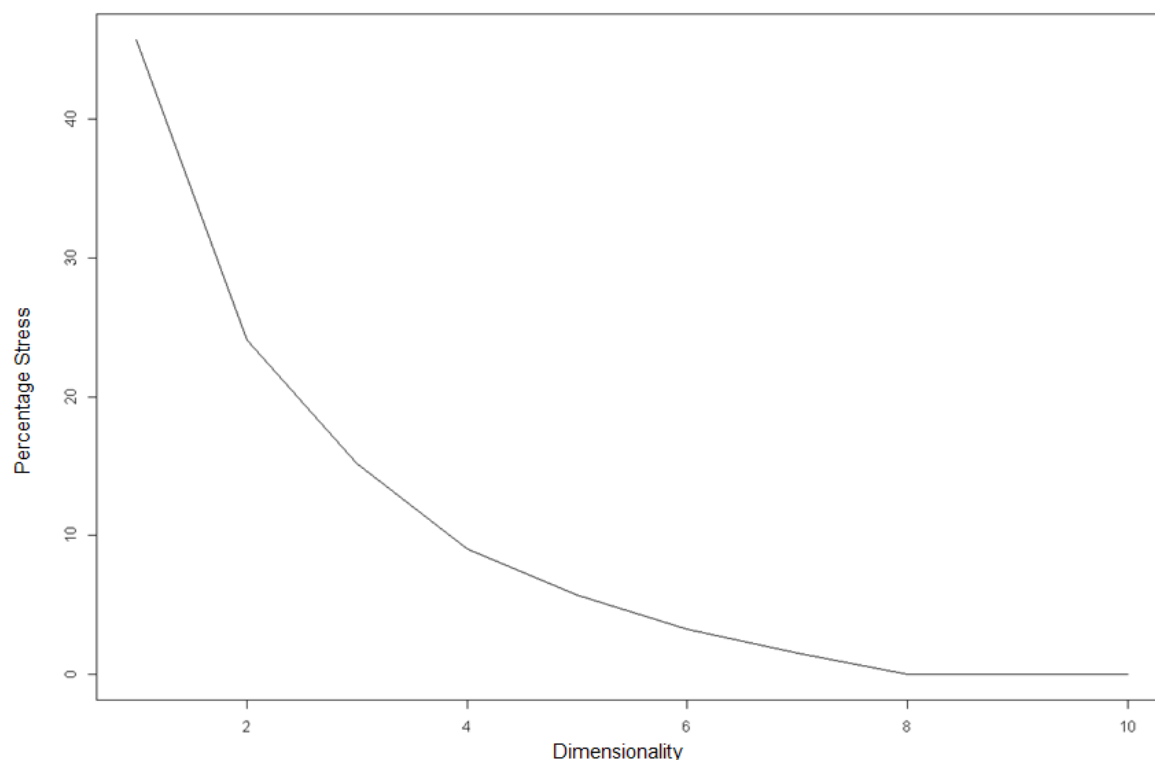
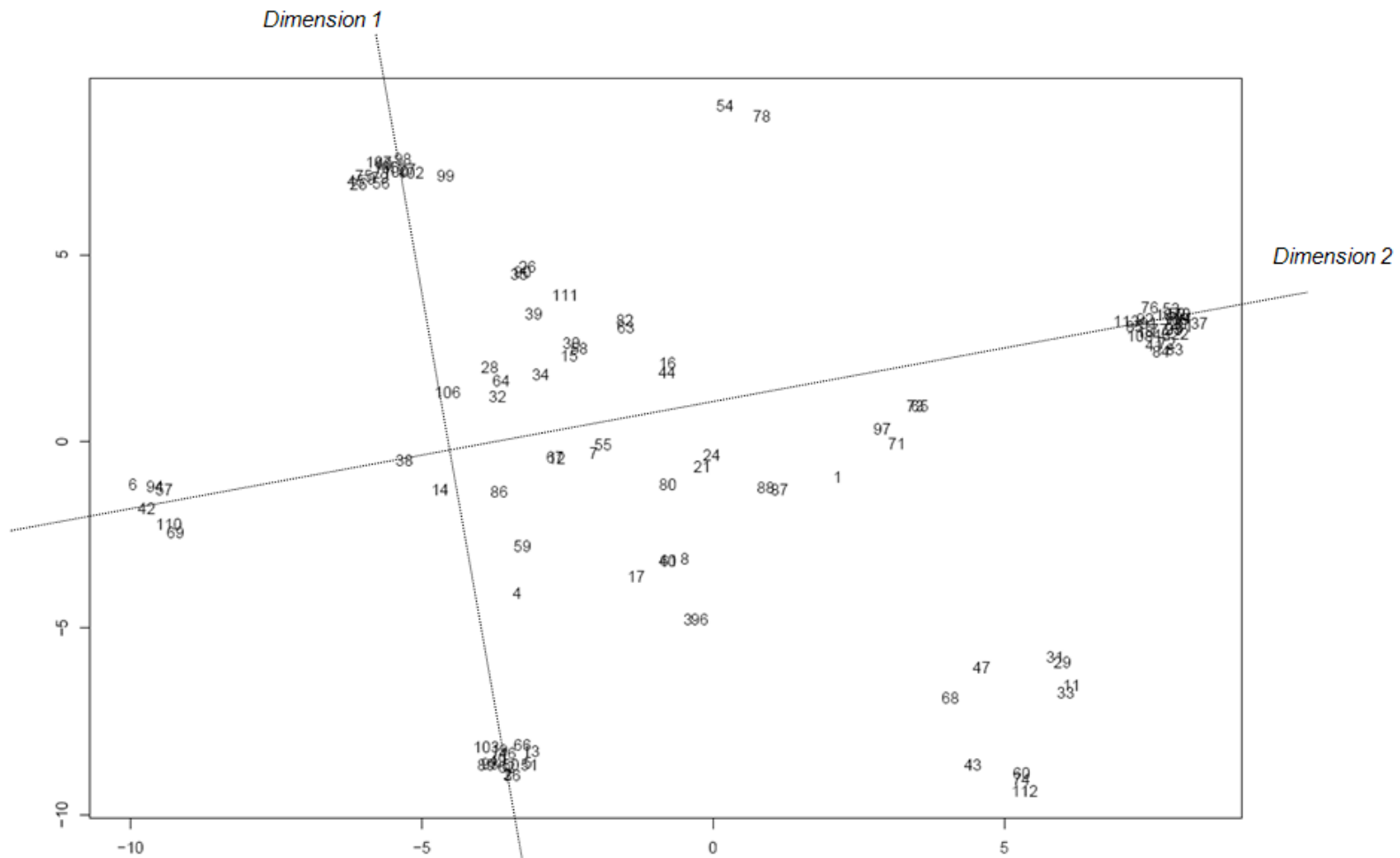


Figure 2. A scree plot of the multidimensional scaling solution.

**Labeling.** Labels were assigned to the obtained dimensions by examining the items on their both ends. For the first dimension, some examples of items on one end point were: “Although things have changed, I am living a normal life despite my chronic pain” (CPAQ-34, CPAQ-20, CPAQ-8); “When my pain increases, I can still do things I have to do” (CPAQ-A); and “Kept doing what I was doing without letting pain stop me” (BPCI, BPCI-II, BPRI). On the other end point, the following items were present: “My illness makes me a burden on family and friends” (AIS); “I think people are often uncomfortable around me because of my pain” (AIS-P); and “It is not me that controls my life, it is my pain” (PIPS). Items are thus represented on a dimension from “engagement in activities despite pain” towards “pain interference or pain costs”. On the one side, they refer to engaging in activities despite pain control. The further we move alongside the dimension, items are represented that reveal the costs associated with pain or, in other words, pain-related disability. Consequently, this dimension was labeled *valued-based activity - pain-related disability*. The one end, i.e.

valued-based activity, mainly consisted of items of the CPAQ-34, CPAQ-20, CPAQ-8, CPAQ-A, BPCR and PaSol, whereas the other end clustered items of the PIPS, AIS and AIS-P. For the second dimension, one endpoint consisted of items such as: “Accepted the pain and realized I did not need to change it” (BPCI); “It’s OK to experience pain” (CPAQ-34, CPAQ-20, CPAQ-8, CPAQ-A); and “I have learned to accept the limitations imposed by my illness” (ICQ). On the other side, the following items were situated: “Keeping my pain under control is the most important thing whenever I am doing something” (CPAQ-A); “Sacrificed something important to control my pain” (BPRI); and “I would do anything to be without pain” (PaSol). Items are represented on a dimension from “willingness” to “controlling pain”. On the willingness side, they refer to thoughts and feelings that express a willingness to experience pain without the need to change, avoid or control it. On the opposite side, items represent attempts aimed at controlling pain. Consequently, this dimension was labeled *willingness - controlling pain*. The one endpoint, i.e. willingness, contained items of the ICQ, and some items of the CPAQ-34, BPCI-I, BPCI-II and BPRI. The other end, i.e. controlling pain, formed a mixed combination with items from the PIPS, CPAQ-34, CPAQ-20, CPAQ-A, CPAQ-8, BPCI-I, BPCI-II, BPCR and PaSol.



*Figure 3.* A two-dimensional scaling solution. Dimension 1 reached from the endpoint engagement (upper part of the figure) to the endpoint pain costs (lower part of the figure). Dimension 2 reached from the endpoint willingness (left part of the figure) to the endpoint controlling pain (right part of the figure).

## DISCUSSION

This study investigated which features of acceptance are reflected in instruments that assess acceptance in chronic pain patients. We found a diversity of acceptance instruments available for use. Thirteen instruments have been used in research, published in 87 studies in individuals with chronic pain. Three of these were developed for chronic illnesses, but further tested in chronic pain samples. Most frequently used was the 20-item version of the Chronic Pain Acceptance Questionnaire (CPAQ-20; McCracken et al., 2004). Of critical importance to this study was the extent to which items of instruments, and the instruments themselves loaded on categories that we identified as key constituents of acceptance (i.e., disengagement from pain control and/or willingness, and engagement in activities other than pain control), or on contrast categories that were not considered as acceptance.

Consensus between raters was satisfactory, but there were substantial differences between instruments. The strongest consensus on item content was found for the CPAQ-A, AIS, and AIS-P (75%). Least agreement was found for the ICQ and the BPCI-I (16.67%). To what extent the different features of acceptance are represented in questionnaires also varies. The original version of the CPAQ and PaSol had items on all acceptance features. Across instruments, items related to an engagement in activities other than pain control were best represented. Least represented by items were disengagement and willingness. Of note, some instruments had many items on contrast categories. Items for controlling pain were found to be overrepresented. The ICQ had many items that were considered as unclear in content. The PIPS and AIS had many items that were indicative of pain costs.

Using multidimensional scaling, we were able to identify two dimensions that capture the content of a total sum of 112 items across the available instruments. The endpoint of one dimension represented a willingness to experience pain without the need to control, avoid, or otherwise change it. This is akin to the original definition of acceptance as provided by Hayes et al. (1994). The endpoint of the second dimension represented engagement into valued-based activity. In later writings, Hayes et al. (1999, 2006) stated that willingness serves the engagement in valued-based activity.

Over time, both features have become core elements of how acceptance of chronic pain is defined (McCracken et al., 2004). Willingness represents the motivational/attitudinal component of acceptance, whereas engagement concerns the behavioral component (McCracken et al., 2004; Vowles et al., 2008). The view that willingness and engagement are quintessential for understanding acceptance is similar to cultural notions of acceptance of chronic pain (Risdon, Eccleston, Crombez, & McCracken, 2003). Other accounts also consider disengagement from the unattainable goal of pain control as a key constituent of acceptance (Eccleston & Crombez, 2007; Evers et al., 2001; Schmitz et al., 1996; Van Damme et al., 2008). Disengagement, however, did not emerge as a distinct feature assessed among our instruments. There were also not many items that were coded within this category (e.g., "I've decided the hassle of trying to get rid of this pain just isn't worth it, I'll live with it" (CPAQ-34)). Future research will have to address this issue.

Although our data show that engagement and willingness are two key-features of the items that measure acceptance, not many instruments adequately assessed those. Some instruments did not cover any of these features. Examples are the Acceptance of Illness Scale for Pain (AIS-P; Rankin & Holtum, 2003), the Medical Coping Modes Questionnaire (MCMQ; Feifel et al., 1987), and the Psychological Inflexibility for Pain Scale (PIPS; Wicksell et al., 2008). Admittedly, the PIPS was not designed to only measure acceptance (Wicksell et al., 2008). Nevertheless, no single item of that instrument seemed to reflect acceptance. One instrument did not have items that represented the willingness feature of acceptance (i.e., CPAQ-8). Noteworthy, our results indicated that in the process of psychometric validation, the content of the CPAQ has changed over time. The original instrument is a 34-item version developed by Geiser in 1992. Using principal component analysis, McCracken et al. (1999) found evidence for a three-factor structure consisting of: (1) engaging in normal life activities; (2) recognizing the chronicity of pain; and (3) needing to avoid or control pain. Items that belonged to a factor labeled believing that controlling thoughts controls pain, were found not to fit the structure, and were eliminated from subscale calculation (McCracken et al., 1999). Later research favoured two instead of

three factors, i.e. engagement and willingness (McCracken et al., 2004). In an attempt to increase time efficiency, Fish et al. (2010) further reduced the item pool into a compact 8-item version, consisting of four items for the willingness component, and four items for engagement. In this process of modification and adaptation, items representing willingness have become underrepresented. We may ponder on the idea whether these modifications still measure acceptance, or, at least, the same notion of acceptance.

A further finding of our study was that many items of acceptance instruments reflect the opposite of acceptance. This is well-illustrated by our multidimensional scaling, which revealed two dimensions. One dimension consisted of willingness and controlling pain as endpoints, whereas the other dimension consisted of engagement and pain costs as endpoints. Our study confirms that willingness is measured in many instruments (e.g., CPAQ-34, CPAQ-20, CPAQ-A, CPAQ-8, BPCI-II, and BPRI) by reverse-coding items that represent attempts to control pain. At the same time, engagement seems to be sometimes measured by items that represent the reverse of the extent to which pain interferes with activities (pain costs, or disability; e.g., CPAQ-34, CPAQ-20, CPAQ-A, CPAQ-8). Some problems may arise with this approach. First, it may distract clinicians and researchers from the actual construct that is at stake. For example, attempts to avoid or control pain, but not willingness, will easily be framed within a fear avoidance model (Crombez, Eccleston, Van Damme, Vlaeyen, & Karoly, 2012; Vlaeyen & Linton, 2000). Second, it may lead to spurious correlations with particular outcomes. Although it may go unnoticed, it is not surprising to find negative correlations between willingness and avoidance. More devastating is the idea that negative correlations between engagement and disability may simply be spurious.

This study has some implications. First, we have to be cautious in using particular instruments for clinical and research purposes. Some questionnaires do not, or only to a small degree, assess key features of acceptance (e.g., AIS, AIS-P, MCMQ). Second, we should consider relabeling some (sub)scales. We advocate to label (sub)scales in a manner that directly matches the content of its items. From now on, we propose that willingness is labeled pain control. The situation may change

when the percentage of reverse-scoring items substantially drops. Third, acceptance is bound to consist of two elements: willingness and re-engagement. The idea that the second element is conditional upon the first one, as argued by Hayes et al. (1999), is currently not addressed in instruments. Simply summing the scores of the two subscales that measure willingness or re-engagement does not capture this conditionality. Other scoring rules should be considered and developed. A possibility is the use of multiplicative rules. Fourth, there is a need to reflect on how acceptance is best measured. It may well be that we should go back one step in order to develop adequate measures. A core set of items that captures well the different features of acceptance may be selected across instruments. The items of the original version of the CPAQ (Geiser, 1992) still remain an excellent starting point. Items from other instruments may be added. Good candidates are items representing disengagement and/or willingness from the PaSol (De Vlieger, Van den Bussche, Eccleston, & Crombez, 2006), and items representing willingness of the BPCI (McCracken et al., 2005a) and the BPRI (McCracken et al., 2010b).

There are some limitations to this study. First, in focusing upon instruments that have been used in patients with chronic pain, we may have ignored instruments of potential value in measuring acceptance features. For example, future research may focus on the value of the Goal Adjustment Scale (Wrosch, Scheier, Miller, Schulz, & Carver, 2003), which is a generic measure of goal disengagement and reengagement capabilities. Second, we did not include instruments that use other than a questionnaire format. One example is the Clinical Pain Acceptance Q-Sort (La Cour, 2012), a semi-structured interviewing method aimed at assessing acceptance in daily clinical practice. Third, we chose to include instruments that were developed to measure acceptance features. If acceptance wants to survive as a valuable construct, it will be important to differentiate its key-constituents from other constructs that are related to acceptance but are not the same. We may think about mindfulness, cognitive defusion, values, or psychological flexibility (Hayes et al., 1999, 2006). Fourth, our heuristic frame to analyze the item content of instruments is coherent, but probably others are possible. Indeed, there was a substantial number of items

that were coded as unclear or no fit. This may indicate other notions of acceptance. Fifth, we only analyzed the content validity. We are well aware of the fact that other psychometric properties are equally important in judging the validity and utility of an instrument (Terwee et al., 2007). We advocate, however, that the investigation of construct and predictive validity only makes sense for instruments with a sound content validity.

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## APPENDIX

### CODING CATEGORIES AND THEIR SAMPLE ITEMS

#### Main acceptance categories

##### 1. Disengagement from pain control

*Category description:* Item represents (factors related to) an attempt or a sequence of attempts to let go or give up pain control

*Sample item:* I think it's useless to try to control my pain

##### 2. Willingness

*Category description:* Item represents (factors related to) a willingness to experience pain without the need to reduce, avoid, or otherwise change it

*Sample item:* I accept my pain as it is

##### 3. Engagement in activities other than pain control

*Category description:* Item represents (factors related to) an attempt or a sequence of attempts to engage in other goals than the goal of controlling pain.

*Sample item:* There are many activities I do when I feel pain

#### Contrast categories

##### 1. Controlling pain

*Category description:* Item represents (factors related to) an attempt or a sequence of attempts to control pain

*Sample item:* I would do everything to control my pain

## 2. Pain costs

*Category description:* Item represents a negative relationship between pain and other goals and/or the costs of pain itself

*Sample item:* My pain causes me a lot of frustration

## 3. Pain benefits

*Category description:* Item represents a positive relationship between pain and other goals and/or the benefits of pain itself

*Sample item:* Because of my pain, I value more in life

## 4. Unclear

*Category description:* It is unclear what the item content is about

## 5. No fit

*Category description:* Item does not fit into one of the categories above



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MEDICATION USE IN PATIENTS WITH  
MIGRAINE AND MEDICATION-OVERUSE  
HEADACHE: THE ROLE OF PROBLEM SOLVING  
AND ATTITUDES ABOUT PAIN MEDICATION<sup>1</sup>

**ABSTRACT**

Excessive medication intake is a risk factor for the development of medication-overuse headache (MOH), a condition characterized by an increase of headache frequency to a daily or near-daily pattern. As yet, it is largely unknown why some patients overuse medication. In this study, we examined to what extent attitudes about pain medication, especially perceived need and concerns, and problem solving are related to MOH. Patients with migraine ( $n=133$ ) and MOH with a history of migraine ( $n=42$ ) were recruited from a tertiary headache referral center and completed questionnaires measuring problem solving and attitudes about pain medication. A problem solving mode aimed at solving pain was associated with a higher need for and concerns about medication intake. Interestingly, in a model accounting for demographic factors and pain intensity, attempts to control pain, need for medication and concerns about scrutiny by others because of medication intake all had a unique value in accounting for MOH. Results are discussed in terms of how repeated attempts to solve pain may trigger overuse of medication, even in the presence of clear negative consequences.

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<sup>1</sup>Based on Lauwerier, E., Paemeleire, K., Van Damme, S., Goubert, L., & Crombez, G. (2011). Medication use in patients with migraine and medication-overuse headache: On the role of problem solving and attitudes about pain medication. *Pain*, 152, 1334-1339. doi: 10.1016/j.pain.2011.02.014

## INTRODUCTION

Acute and preventive pharmacological treatment has proven effective in reducing the frequency, severity and duration of migraine attacks (Silberstein, 2000, 2005; Tepper & Tepper, 2010). However, overuse of acute medication may bring along negative consequences, and eventually result in medication-overuse headache (MOH; Dodick & Silberstein, 2008). This is a disorder characterized by increased headache frequency up to a daily or almost daily pattern (Silberstein, 2005). The prevalence rates of MOH across different European countries range from 0,7 to 1,7% (Aaseth et al., 2008; Colás, Muñoz, Temprano, Gómez, & Pascual, 2004; Straube et al., 2009; Wiendels et al., 2006a; Zwart et al., 2004). In tertiary care, up to 30% of patients in Europe and more than 50% in the USA present with MOH (Bigal, Rapoport, Sheftell, Tepper, & Lipton, 2004; Jensen & Bendtsen, 2008; Mathew, 1997; Saper, Dodick, & Gladstone, 2005). MOH may have severe effects on quality of life (Bigal & Lipton, 2008; Wiendels et al., 2006b).

To date, it remains unclear why some patients overuse medication. Functional and structural changes in the brain may be involved in the development of MOH (Evers & Marziniak, 2010; Tepper & Tepper, 2010), and explain why MOH occurs frequently in patients with episodic migraine (Bigal & Lipton, 2008, Colás et al., 2004; Dodick & Silberstein, 2008). However, a largely neglected issue relates to the psychological determinants of medication use. According to Horne and Weinman (1999), medication intake depends upon a cost-benefit analysis of the need for medication against its perceived costs. In particular, increasing medication use may be beneficial in reducing the pain temporarily, but may also lead to obvious costs such as somatic, neurological and/or psychological complications (Evers et al., 1999; Evers, Voss, Bauer, Sörös, & Husstedt, 1998; Ludolph, Husstedt, Schlake, Grotemeyer, & Brune, 1988; Roon et al., 2000). When such negative effects prevail, Horne and Weinman (1999) would predict a decrease of medication intake. However, this does not seem to be the case in patients with MOH. It seems that those patients are inclined to medication overuse despite being aware of its negative consequences (Tepper & Tepper, 2010). Even after a successful treatment, most often consisting of psycho-

education and a withdrawal protocol, the relapse rate is about 25 to 30% (Fritsche, Eberl, Katsarava, Limmroth, & Diener, 2001; Katsarava, Limmroth, Finke, Diener, & Fritsche, 2003; Katsarava et al., 2005; Pini, Cicero, & Sandrini, 2001).

In an attempt to further our understanding of this apparently paradoxical behavior in MOH, we adopt a functional coping perspective (Eccleston & Crombez, 2007; Van Damme, Crombez, & Eccleston, 2008) that is based upon the dual-process model of coping (Brandstädter & Renner, 1990). According to this model, there are two modes of coping with adversity, such as pain: assimilative and accommodative coping. When pain interferes with valued activities (Karoly & Ruehlman, 2007), patients in the assimilative mode focus their attention and efforts upon solving pain, such as by taking medication, in order to resume daily life. In the accommodative mode, patients disengage from persistent attempts to solve pain, and (re-) engage in the pursuit of valued life goals that are less affected by their pain. Often, patients are then more willing to accept that there is no solution, and that pain will last for a longer duration. It has been proposed that many patients with chronic pain become stuck in the assimilative mode, and thus persevere in attempting to solve an insoluble problem (Eccleston & Crombez, 2007; Van Damme et al., 2008). Such ineffective problem solving fuels and exacerbates hypervigilance, distress and disability (Crombez, Eccleston, De Vlieger, Van Damme, & De Clercq, 2008a; Crombez, Eccleston, Van Hamme, & De Vlieger, 2008b).

Building upon these arguments, we expect that patients with MOH will more frequently adopt an assimilative coping mode than patients with episodic migraine. Related, we expect that, in comparison with patients with episodic migraine, patients with MOH would believe to be in more need for medication to control their pain, despite being aware and concerned about its negative consequences.

## METHOD

### Participants

The study was approved by the Medical Ethics Committee of the Ghent University Hospital, Belgium. Participants were recruited from the Headache Clinic of the Department of Neurology at the Ghent University Hospital. 490 consecutive patients with an episodic migraine diagnosis, or with a diagnosis of MOH with a history of migraine, were invited by their treating physician at the Headache Clinic. They received a letter containing information about the study, an informed consent letter and the questionnaires. When patients consented to participate, they signed the informed consent letter, filled out the questionnaires at home and sent both back to the Headache clinic by regular mail.

Migraine diagnosis was consistent with the criteria of the International Headache Society (IHS; Headache Classification Committee of The International Headache Society, 2004). The diagnosis of MOH was based upon the revised ICHD-II criteria, proposed by the IHS (Headache Classification Committee of The International Headache Society, 2006). According to these criteria, MOH is diagnosed in patients who report headache on  $\geq 15$  days/month for  $> 3$  months and who use ergotamine, triptans, or combination analgesics on  $\geq 10$  days/month, or simple analgesics or any combination of ergotamine, triptans, analgesics and opioids on  $\geq 15$  days/month. One hundred and eighty eight patients returned the questionnaires (38%). Compared to a complete patient database that has been held in the Headache Clinic of the Department of Neurology since October 2004 and in which the overall ratio of migraine over MOH was 2.8 (73% migraine patients, 27% MOH), we found no differential response rate between patients with migraine and MOH patients in the present study (76% migraine patients, 24% MOH). No data are available on those patients who failed to complete the questionnaires. Subsequently, headache classification was double-checked by one of the authors (KP). Based on a verification of headache diagnosis, thirteen patients were excluded, resulting in a final sample of 175 patients.

The sample of migraine patients comprised of 133 patients (84.2% female), aged between 17 and 68, mean age = 38.86 years,  $SD = 12.04$ . Further, 63.4% had a higher education (longer than the age of 18 years). More than half of the patients (67.7%) was in paid employment, whilst only 4.8% received state supported income replacement because of their pain.

The MOH sample consisted of 42 patients (83.3% female), aged between 23 and 75 years, mean age = 45.57 years,  $SD = 11.45$ . Approximately half of the patients (45.2%) had a higher education (longer than the age of 18 years). Further, 65.8% was working and 7.9% was recipient of disablement insurance benefits. Of the total MOH sample, 7 patients fulfilled the ICHD- II criteria (Headache Classification Committee of The International Headache Society, 2006) of analgesic-overuse headache, 4 patients those of triptan-overuse headache and 2 patients those of opioid-overuse headache. The other 29 MOH patients could not be subclassified as they used at least 2 classes of medications.

## Measures

**Medication intake.** Information was collected about medication intake during the past three months. Patients were asked to indicate on how many days during the past three months they had been using pain medication. Patients were also asked to report about the names of the pain medication they used, the exact dose and daily and monthly frequency of intake of each individual medication. The medication information was used to calculate the different classes of medications and the number of active constituents being taken for pain. Active constituents were classified as ergotamine, triptans, simple analgesics (NSAID's, acetylsalicylic acid, paracetamol), opioids, barbiturates or coffeine.

**Pain frequency, pain intensity and disability.** The Migraine Disability Assessment Questionnaire (MIDAS; Stewart et al., 1999) measures headache-related disability, frequency of headaches and the intensity of headache pain. Headache-related disability during the past three months is measured by means of five disability questions. Patients record the number of missed days due to headache on three

questions concerning school or paid work (i.e., “On how many days in the last 3 months did you miss work or school because of your headaches?”), household work (i.e., “On how many days in the last 3 months did you not do household work because of your headaches?”) and family, social or leisure activities (i.e., “On how many days in the last 3 months did you miss family, social, or leisure activities because of your headaches?”). Two further questions assess the number of additional days with significant limitations to activity (defined as at least 50% reduced productivity) in the domains of employment (i.e., “How many days in the last 3 months was your productivity at work or school reduced by half or more because of your headaches?”) and household work (i.e., “How many days in the last 3 months was your productivity in household work reduced by half or more because of your headaches?”). Disability is assessed as the sum of lost days due to headache recorded for all of the above questions. Two additional questions assessed the frequency of headaches (i.e., “On how many days in the last 3 months did you have any headache (if a headache lasted more than one day, count each day)?”) and the intensity of the headache pain (i.e., “On a scale from 0 to 10, on average how painful were these headaches?”). The latter question is scored on a 11-point scale, ranging from 0, *no pain at all*, to 10, *pain is as bad as it can be*. The MIDAS has demonstrated good reliability and validity (Stewart et al., 1999). Cronbach’s alpha for the summed disability measure in this study was  $\alpha = .85$ .

**Problem solving and acceptance.** The Pain Solutions Questionnaire (PaSol; De Vlieger, Van den Bussche, Eccleston, & Crombez, 2006) measures efforts at changing, solving or accepting pain and the problems associated with pain. The PaSol has 14 items grouped into four interrelated scales: (1) solving pain scale (4 items; e.g., “I try everything to get rid of my pain”); (2) meaningfulness of life despite pain scale (5 items; e.g., “Even when I have severe pain, I still find my life meaningful”); (3) acceptance of the insolubility of pain scale (3 items; e.g., “I can live with the idea that there is no solution for my pain”); and (4) belief in a solution scale (2 items; e.g., “I am convinced that there is a treatment for my pain”). Whereas the solving pain subscale is an indicator of a problem solving or assimilative approach, both the

meaningfulness of life despite pain and acceptance of the insolubility of pain subscales represent the accommodative mode of coping. Each item is answered on a 7-point Likert scale, ranging from 0, *not at all applicable*, to 6, *highly applicable*. The PaSol has demonstrated good reliability and validity (De Vlieger et al., 2006). Cronbach's alpha's in this study ranged from .82 to .88.

**Attitudes about pain medication.** The Pain Medication and Attitudes Questionnaire (PMAQ; McCracken, Hoskins, & Eccleston, 2006) assesses perceived need and concerns held by patients regarding their use of medication. The PMAQ has 47 items grouped into seven scales: (1) addiction (5 items; e.g., "I worry about becoming addicted to my pain medication/s"); (2) need (8 items; e.g., "I rely on my pain medication/s"); (3) scrutiny (8 items; e.g., "I worry about how other people view my use of pain medication/s"); (4) side effects (7 items; e.g., "I have concerns about the side effects from my pain medication/s"); (5) tolerance (6 items; e.g., "I worry that over time I will need more pain medication/s"); (6) mistrust of doctors (7 items; e.g., "I worry that I have been told different information about my pain medication/s by different doctors"); and (7) withdrawal (6 items; e.g., "I worry that I will have some withdrawal symptoms if I stop my medication"). Each item is answered on a 6-point Likert scale, ranging from 0, *never true*, to 6, *always true*. The PMAQ has demonstrated good reliability and validity (McCracken et al., 2006). Cronbach's alpha's in this study ranged from .64 (mistrust of doctors) to .91 (addiction).

### **Data - analytical strategy**

Statistical analyses were performed using SPSS 15.0 for Windows. First, descriptive statistics were calculated to investigate differences in pain frequency, pain intensity, disability and intake of medication between the two patient groups. Correlational analyses were carried out in order to examine the relations of problem solving and acceptance with attitudes about pain medication. Second, the value of demographic variables, pain intensity, problem solving, acceptance and attitudes about pain medication in explaining MOH were assessed by means of separate univariate logistic regression analyses. Finally, we investigated the unique value of

problem solving and attitudes about pain medication in explaining MOH using a multivariate logistic regression analysis, while accounting for the effects of demographic variables and pain intensity.

## RESULTS

### Descriptive and correlational statistics

A series of t-tests for independent samples was used to assess differences in pain frequency, pain intensity, headache-related disability, and amount of active constituents taken between the two patient groups. Whenever the assumption of normality was violated, the mann-whitney U statistic instead of the student t-statistic was used. MOH patients reported more frequent headaches,  $u = 832.5$ ,  $p < .001$ ,  $d = -1.54$ , and more intense pain,  $t(166) = 1.79$ ,  $p < .05$ ,  $d = 0.33$ , compared to migraine patients. No significant difference in headache-related disability was found,  $u = 1549$ ,  $ns$ ,  $d = -0.32$ . Furthermore, analyses revealed significant differences in the number of active constituents taken,  $t(55.271) = -4.29$ ,  $p < .001$ ,  $d = -0.89$ , with MOH patients taking a greater number of active constituents,  $M = 3.36$ ,  $SD = 1.67$ , compared to migraine patients,  $M = 2.17$ ,  $SD = 1.21$ . Furthermore, we analysed whether there was a significant difference in the proportion of patients who had a higher education between the migraine and the MOH sample (63.4% versus 45.2%). The chi-square test just failed significance,  $\chi^2(1) = 3.87$ ,  $p = .05$ .

Chi-square tests and fisher's exact test were used to assess differences in the distribution of medication type intake between both patient groups (see Table 1). The intake of opioids,  $\chi^2(1) = 18.52$ ,  $p < .001$ , and preparations containing caffeine,  $\chi^2(1) = 7.27$ ,  $p < .01$ , was found to be higher in MOH patients compared to migraine patients. Fisher's exact test comparing ergotamine intake between patient groups reached significance ( $p = .06$ ). No significant differences were found concerning the intake of triptans,  $\chi^2(1) = 0.01$ ,  $ns$ , and analgesics,  $\chi^2(1) = 0.02$ ,  $ns$ . Within the entire sample, there were no patients taking barbiturates.

Table 1

*Percentages of medication type intake in patients with migraine and MOH*

	migraine (n=133)	MOH (n=42)
Ergotamine	3.8%	11.9% <sup>(*)</sup>
Triptans	57.9%	57.1%
Simple analgesics	84.2%	83.3%
Opioids	9.8%	38.1% <sup>***</sup>
Barbiturates	0%	0%
Coffeine	9.8%	26.2% <sup>**</sup>

*Note.* MOH = medication-overuse headache.*\*p* < .05. *\*\*p* < .01. *\*\*\*p* < .001.

Correlational analyses were carried out in order to examine the relations of problem solving and acceptance with attitudes about pain medication. Interestingly, solving pain was positively related to perceived need for medication,  $r = .30$ ,  $p < .001$ , concerns about tolerance,  $r = .26$ ,  $p < .01$ , and concerns about withdrawal,  $r = .15$ ,  $p < .05$ . Acceptance of the insolubility of pain showed moderate negative associations with concerns about scrutiny,  $r = -.26$ ,  $p < .01$ , concerns about tolerance,  $r = -.17$ ,  $p < .05$ , and concerns about withdrawal,  $r = -.16$ ,  $p < .05$ . Meaningfulness of life despite pain was negatively related to perceived need for medication,  $r = -.27$ ,  $p < .001$ , concerns about addiction,  $r = -.24$ ,  $p < .01$ , concerns about scrutiny,  $r = -.35$ ,  $p < .001$ , concerns about tolerance,  $r = -.26$ ,  $p < .01$ , concerns about mistrust of doctors,  $r = -.30$ ,  $p < .001$ , and concerns about withdrawal,  $r = -.34$ ,  $p < .001$ . Lastly, belief in a solution was negatively related to concerns about scrutiny,  $r = -.25$ ,  $p < .01$ , concerns about tolerance,  $r = -.16$ ,  $p < .05$ , and concerns about mistrust of doctors,  $r = -.31$ ,  $p < .001$ .

### **Value of demographic variables, pain intensity, problem solving, acceptance and attitudes about pain medication in explaining MOH**

First, a series of separate univariate logistic regression analyses were performed to investigate the value of age, gender (0 = male; 1 = female), pain intensity, problem solving, acceptance and attitudes about pain medication in explaining MOH (0 = migraine; 1 = MOH). Table 2 summarizes the results of these analyses. As expected, MOH was significantly associated with a higher age. No association was found between pain intensity and the diagnosis of MOH. Furthermore, the values of *OR* indicated that an increase of one unit on problem solving increased the odds of being diagnosed with MOH (relative to being diagnosed with migraine) with a factor of 1.14 (Field, 2000). Also, an increase of one unit on meaningfulness of life despite pain decreased the odds of being diagnosed with MOH with a factor of 0.95. Finally, need for medication and all concerns about pain medication had significant value in explaining MOH, with *OR*'s ranging from 1.10 to 1.24.

Second, a multivariate logistic regression analysis was executed to investigate the unique value of problem solving and attitudes about pain medication in explaining MOH, while accounting for the effects of demographic variables and pain intensity. Variance-inflation factors suggested that there was no problem of collinearity. As shown in Table 2, need for medication had a significant value in explaining MOH diagnosis: an increase of one unit on need for medication increased the odds of being diagnosed with MOH with a factor of 1.24. Furthermore, concerns about scrutiny also made a significant contribution in explaining MOH. Results showed that an increase of one unit in experiencing concerns about unfavourable scrutiny by others because of medication intake increased the odds of being diagnosed with MOH with a factor of 1.12. Interestingly, problem solving had unique value in accounting for MOH diagnosis. The *OR* showed that an increase of one unit on problem solving increased the odds of being diagnosed with MOH with a factor of 1.23.

Table 2

*Summary of the univariate and multivariate logistic regression analyses with diagnosis (0 = migraine, 1 = MOH) as dependent variable and demographic variables, pain intensity, problem solving, acceptance and attitudes about pain medication as independent variables*

Criterion variable	Predictor	Univariate analysis		Multivariate analysis <sup>a</sup>	
		OR	[95% CI]	OR	[95% CI]
Diagnosis	Age	1.05**	[1.02, 1.08]	1.03	[0.98, 1.09]
	Gender	1.07	[0.42, 2.72]	0.54	[0.11, 2.72]
	Pain intensity	0.84	[0.69, 1.02]	0.82	[0.61, 1.12]
	Solving pain	1.14*	[1.02, 1.29]	1.23*	[1.01, 1.50]
	Meaningfulness	0.95*	[0.91, 0.99]	0.96	[0.86, 1.07]
	Acceptance	1.00	[0.93, 1.07]	1.07	[0.92, 1.23]
	Belief	0.95	[0.86, 1.05]	1.10	[0.90, 1.35]
	Addiction	1.20***	[1.12, 1.27]	1.09	[0.96, 1.24]
	Need	1.24***	[1.15, 1.34]	1.24**	[1.08, 1.42]
	Scrutiny	1.14***	[1.08, 1.20]	1.12*	[1.01, 1.24]
	Side effects	1.10**	[1.04, 1.16]	0.93	[0.83, 1.05]
	Tolerance	1.12***	[1.05, 1.18]	0.90	[0.81, 1.01]
	Mistrust of doctors	1.12**	[1.03, 1.22]	1.12	[0.97, 1.28]
	Withdrawal	1.17***	[1.10, 1.24]	1.05	[0.95, 1.17]

*Note.* <sup>a</sup>  $\chi^2(14) = 73.628$ ,  $p < .001$ ; .38 (Cox & Snell); .57 (Nagelkerke); 95% CI = 95% Confidence Interval; OR = odds ratio, an OR > 1 reflects a higher probability of MOH and an OR < 1 reflects a lower probability of MOH, compared to episodic migraine.

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

## DISCUSSION

The present study aimed at clarifying the role of problem solving (assimilative coping mode) and beliefs about pain medication in relationship to MOH. The results can be readily summarized. First, an assimilative coping mode aimed at solving pain was related to a higher perceived need for medication and higher levels of concerns about tolerance to medication and withdrawal symptoms. Second, attempts to solve pain, need for medication and concerns about pain medication were positively related to MOH. Third, after controlling for demographic variables and pain intensity,

attempts to solve pain, need for medication and concerns about unfavorable scrutiny by others were found to have unique value in explaining MOH.

Of particular interest to this study was the finding that a problem solving mode aimed at a solution or control over the problem of pain was uniquely related to MOH. Correlational analyses further showed that attempts at solving pain were related to a higher perceived need for medication and higher levels of concerns about tolerance and withdrawal. This is in line with earlier findings in which patients with MOH were found to have a negative attitude towards analgesics but believed that they could not cope without (Gerber, Miltner, & Niederberger, 1988). Our findings point out that patients who frame the problem of pain as one that has to be solved, may be at a higher risk of developing MOH. The role of problem solving, as an indicator of assimilative coping, is in line with the dual-process model of coping as outlined by Brandstädter and Renner (1990). A problem approach that is characterized by persistent attempts to solve the pain may increase the need for medication, despite clear negative consequences. An important issue pertains to the reasons for this behavioral pattern. There are at least two possible reasons. First, the pain-relieving effect of medication in the short term may be more salient than its long-term negative consequences. As such, it may provide a sense of control over pain that is not easily relinquished. Second, it may be that the ongoing activities and goals that are interrupted by pain are of central importance in a patient's life. A patient may then prefer to search for a solution instead of giving up highly valued goals (Van Damme et al., 2008). Paradoxically, a focus on solving pain may inadvertently heighten attention to pain and may add to the problem. This mechanism may partially explain why some MOH patients persevere in using medication, and relapse in medication overuse after successful withdrawal. In accordance with this line of reasoning is the finding that patients reporting their life as meaningful despite the pain, were less likely being diagnosed with MOH. These patients may have been successful in adapting their goals in a way that pain interferes less with goal attainment (Van Damme et al., 2008).

Although univariate regression analyses showed that all medication concerns were positively related to MOH, only concerns about unfavorable scrutiny by others

had unique value in explaining MOH. This is in line with the findings of McCracken et al. (2006), who found that overuse was predominantly predicted by perceiving medication as needed and secondarily related to concerns about negative scrutiny in chronic pain patients. It is possible that patients overusing their medication become ashamed and embarrassed because they cannot maintain an optimal level of dosing.

Our results argue for an action-oriented and goal-dependent theory that allows us to gain insight into how patients deal with the interference of life activities by persistent headache. This view may complement other explanations of MOH. For example, some studies focus upon an addiction or dependence component in a subgroup of MOH patients. Indeed, some drugs taken by patients contain substances with psychotropic effects, i.e. barbiturates, opioids, and caffeine (Ferrari et al., 2006; Lundqvist, Aaseth, Grande, Benth, & Russell, 2009; Radat et al., 2007; Radat, Creac'h, & Swendsen, 2005). Although some patients may be classified as addicted to their medication, this may not apply to all patients. First, there is still some doubt whether drugs like triptans and simple analgesics may result in pharmacological dependence (Evers & Marziniak, 2010). Second, some studies did not find any difference in self-reported dependence-related behavior between patients with MOH on the one hand and patients with episodic migraine or healthy individuals on the other hand (Sances et al., 2010). Third, the uncritical use of the DSM-IV or ICD-10 criteria for substance-related disorders in patients with MOH, may result in an inflation of cases. MOH patients with long-term drug use may easily fulfill some of the defining features of addiction, such as tolerance, withdrawal symptoms, use of medication in a larger amount or for a longer period than intended, unsuccessful efforts to cut down or control the use despite harmful consequences and a high priority given to drug use (American Psychiatric Association, 1994; World Health Organization, 2007). However, often overlooked is that for a diagnosis of addiction, drug use needs to be associated with a progressive increase of time in obtaining or taking the drug or an increased recovery from the effects of the drug. Moreover, addiction is often characterized by a progressive neglect of alternative pleasures or interests because of drug use and may result in a reduction of social, occupational or recreational

activities. This is often not the case in MOH patients. Instead, our results may point out that MOH patients overuse their medication in order to retain functioning. Further studies are needed to validly assess the relative contribution of dependence in MOH. A recent PET-study, for example, showed hypo-function in the orbitofrontal cortex, a brain region known for its role in substance dependence, after 3 weeks drug withdrawal, but more so in patients overusing combination analgesics (Fumal et al., 2006). Besides neuroimaging data, recent neurobiological and pharmacogenetic studies appear to support the existence of dependence in some patients with MOH (for an overview, see Radat and Lanteri-Minet, 2010). This all might reflect an underlying susceptibility predisposing specific subgroups of MOH patients to substance dependence.

The results of this study may have a number of implications. When pain blocks valued goals, patients may be highly motivated to solve or control their pain, and may engage in medication use, despite clear negative consequences and risks. As a consequence, withdrawal of medication, commonly accepted as the first and primordial step in treating MOH (Bigal et al., 2004; Paemeleire, Crevits, Goadsby, & Kaube, 2006), may only be partially effective in those patients. At least, education of patients about the problem seems to be an important treatment component (Cupini, Sarchielli, & Calabresi, 2010; Evers & Marziniak, 2010; Tepper & Tepper, 2010). Additionally, some patients may benefit from techniques within traditional programs of cognitive-behavioral therapy aimed at increasing problem solving skills and changing the functional approach to pain in order to cope more effectively with disability, discomfort and distress (Andrasik, Grazzi, Usai, Buse, & Bussone, 2009; Fritsche et al., 2010). Such techniques may be compatible with the therapeutic approach of acceptance in behavior therapy (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Within the pain literature, acceptance refers to “... a willingness to experience continuing pain without needing to reduce, avoid or otherwise change it” (McCracken, Vowles, & Eccleston, 2004). Similar to acceptance, we found that a coping mode directed at relinquishing pain control was associated with less need for medication, less concerns about intake and an overall lesser chance of being diagnosed with MOH.

Still, these results are preliminary and further studies examining the effects of acceptance of pain in chronic headache samples are awaiting. Lastly, effective preventive medication in order to treat the underlying migraine condition and reduce the number of headache attacks and/or the early assessment of behavioral and psychological co-factors are recommended (Evers & Marziniak, 2010; Katíc, Krause, Tepper, Hu, & Bigal, 2009; Lipton et al., 2007; Paemeleire et al., 2006).

This study has a number of limitations, each of which point to directions for future research. First, all findings are based on cross-sectional and correlational data. No causal interpretations about the order of relationships can be made. Studies with longitudinal designs are needed to provide evidence on the temporal relations between the variables. Second, the overall response rate was relatively low. We believe that the main reason is to be found in the use of a strict recruitment protocol in which all consecutive patients from a headache clinic were invited. Nevertheless, more studies are needed, and our results need to be confirmed by large-scale studies. Third, the assessment of variables in this study relied on patient self-report. Further research may benefit from the adaptation of experimental paradigms designed to measure (correlates of) problem solving behavior (Van Damme, Crombez, Goubert, & Eccleston, 2009). A fourth limitation is that the mechanism we propose is probably not the only one contributing to the problem of MOH. Overall, observed effects in this study were relatively small, leaving a substantial amount of variance unexplained. More research is needed on the interplay between the somatic pathophysiology, such as the role of genetic susceptibility and endocrine and neurotransmitter function (for an overview, see Evers and Marziniak, 2010), and the psychological mechanisms underlying MOH. Lastly, we performed no subgroup analyses according to the type of overused medication among the patients with MOH. However, the development of the disorder and prognosis after withdrawal seem to be dependent upon which type of medication patients are overusing (Katsarava et al., 2005; Limmroth, Katsarava, Fritsche, Przywara, & Diener, 2002). In general, more research is needed that could unravel the relative contribution of diverse psychological mechanisms, such as substance dependence and a functional coping perspective. It would, for example, be

particularly helpful to study the contributing factors to relapse after successful withdrawal in different subgroups of MOH patients and to test these findings in prospective studies.

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**ABSTRACT**

It has been argued that some individuals with chronic pain persist in attempts to solve the problem of pain (problem solving), while others engage in non-pain related goals despite pain being present (acceptance). As yet, it remains unclear which strategies individuals employ in solving the problem of pain. The aim of the current study was to develop a new measure that enabled to capture individual variability in solving the problem of pain. 59 individuals with chronic pain were recruited from self-help samples and completed our new vignette-based measure, the Means-End Problem Solving Task for Pain (*MepsforPain*), requiring to self-generate means to achieve a desired goal that is blocked by pain. We also administrated questionnaires assessing pain intensity, attitudes towards problem solving and acceptance, catastrophizing, disability, and distress. The *MepsforPain* was readily recognized and accepted by participants. Further, the measure was able to elicit problem solving and acceptance responses, as well as a variety of other coping responses. We identified three distinct groups based upon the report of problem solving and acceptance responses. Those groups differed in their reported necessity to solve pain across vignettes, as well as in the rated effectiveness of their answers. Scores on the *MepsforPain* did not correlate with measures of pain intensity, attitudes towards solving the problem of pain, catastrophizing, disability, or distress. The *MepsforPain* appears to be a well-suited measure to elicit problem solving and acceptance responses in individuals with chronic pain. However, in order to warrant its utility as a diagnostic and research tool, we propose some suggestions to its further adaptation.

## INTRODUCTION

For a minority of people, pain persists and develops into a chronic condition (Elliot, Smith, Penny, Smith, & Chambers, 1999). This group of chronic pain sufferers is markedly heterogeneous. Some are severely distressed and have followed a wide range of treatments, and others seem to adapt (Jamison, Rudy, Penzien, & Mosley, 1994; Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Turk & Rudy, 1988). This heterogeneity has often been traced to dissimilarities in behavioral attempts to alter, avoid, or adapt to the experience of pain, labeled as *coping*. Originally, the concept of coping stems from the stress literature where it has been defined as effortful behavior in response to a stressor (Lazarus & Folkman, 1984).

Coping is one of the most attractive and studied concepts. Given the many possible ways of coping, a variety of classification systems has been proposed over time. Most known are distinctions between active versus passive (Brown & Nicassio, 1987), approach versus avoidance (Reid, Golbert, & McGrath, 1998), and problem-focused versus emotion-focused coping (Affleck et al., 1999; Folkman & Lazarus, 1980). In the literature, there is a tendency to favor active, approach, problem-focused strategies in explaining successful adaptation to chronic pain. As yet, this presumption has no firm empirical ground. There is no coping strategy that has emerged as clearly more effective than another for individuals with chronic pain (McCracken & Eccleston, 2003). Strategies aimed to control pain, for example, have long been linked to beneficial outcomes (Keefe et al., 2004), but may have negative effects when control is low (Eccleston & Crombez, 2007). Another approach to classification is the use of action types. Originally arising from theories on life-span development (e.g., Brandstädter & Renner, 1990; Heckhausen & Schulz, 1995), action types refer to flexible behavioral patterns incorporating not only behavior, but also emotions, attention and goals. Central to these theories is the dynamic and action-oriented construction of coping (Skinner, Edge, Altman, & Sherwood, 2003).

The action type approach to coping with chronic pain is well-articulated by the adoption of the dual-process model of Brandstädter and Renner (1990) (e.g., Kranz, Bollinger, & Nilges, 2010; Schmitz, Saile, & Nilges, 1996; Van Damme, Crombez, &

Eccleston, 2008). The model was originally developed to make sense of how ageing individuals manage to adapt to varying life circumstances characterized by an increase in physical limitations. It distinguishes two action types: assimilation and accommodation. Assimilative coping involves attempts to meet unmet or blocked goals by maximizing efforts at changing the obstacle or situation (Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002). In pain, for example, interference of pain at work may lead to medication use. A perceived lack of control may typically result in a search for help from others (e.g., doctor consults). Common to these coping efforts is the overall attempt to diminish pain in order to adhere to activities or goals as before pain occurred (Van Damme et al., 2008). Assimilative actions may not always be functional. When attempts to control pain have become ineffective, individuals may need to accept that pain cannot be cured, give up the struggle to pursue unachievable goals, and reorient themselves to different goals (McCracken, Vowles, & Eccleston, 2004). These coping efforts are referred to as accommodative coping. They involve a resolution of the problem by changing one's standards or goals instead of focusing on the obstacle to be removed (Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002).

One of the implications of the dual-process model relevant for the problem of chronic pain is that individuals may persist in assimilative efforts even though the problem is insoluble. This pattern has been called *misdirected problem solving* (Aldrich, Eccleston, & Crombez, 2000; Eccleston & Crombez, 2007). It is believed to result from an over-involvement or fixedness in framing the problem of chronic pain as one that requires the singular solution of relief and cure. This may increase vigilance to and worry about pain. An interesting picture has been proposed of the individual with chronic pain who, despite failure and distress, continues in trying to solve the problem of pain (Eccleston & Crombez, 2007). Crucial to this theorizing is then to investigate whether successful adaptation to chronic pain may be hampered by the lack of adequate problem solving. Noticeable in this respect are two distinct lines of research: one following a more generic approach to problem solving and the other being domain-specific.

On a generic level, research has focused on general processes of problem solving, such as the ability or skills to solve problems, or confidence in being capable of solving problems (Nezu, Nezu, & Jain, 2008). Different measures have been used to assess problem solving in the research domain of pain, such as the Problem Solving Inventory (PSI; Heppner, 1988), or the Social-Problem Solving Inventory-Revised (SPSI-R; D’Zurilla, Nezu, & Maydeu-Olivares, 2002). So far, the evidence regarding the role of general problem solving upon adaptation to chronic pain is inconclusive. Van den Hout, Vlaeyen, Heuts, Sillen, and Willen (2001) found no evidence for the unique value of problem solving in predicting disability in individuals with chronic low back pain. Likewise, De Vlieger, Crombez, and Eccleston (2006a) found problem solving not to uniquely predict depressive mood in individuals with chronic pain. Also, in their study, they found no difference in problem solving style when comparing chronic pain patients with people with pain who did not identify as patients, as well as compared to published non-pain norms. However, there are studies reporting some evidence on low problem solving confidence to be related to increases in pain, disability, and depression (Kerns, Rosenberg, & Otis, 2002; Witty, Heppner, Bernard, & Thoreson, 2001).

Others have followed a different approach and have tried to focus upon measuring problem solving of pain-related situations. One of these is the study of De Vlieger, Van den Bussche, Eccleston, and Crombez (2006b) who report the development of an instrument, labeled the Pain Solutions Questionnaire (PaSol), designed to measure individual’s attitudes to solving the problem of pain. The PaSol was specifically developed following the dual-process model of coping (Brandstädter & Renner, 1990) and distinguishes between assimilative coping or problem solving, as captured by the solving pain subscale (e.g., “I keep searching for a solution for my pain”), and accommodative coping or acceptance, as captured by the acceptance of the insolubility of pain subscale (e.g., “I can accept that there is no solution for my pain”) and the meaningfulness of life despite pain subscale (e.g., “I try to live with my pain”). Studies with the PaSol have revealed that individuals with chronic pain who adopt an assimilative coping style, characterized by attempts at solving the problem

of pain, not accepting pain to be insoluble, and not believing that a meaningful life is possible despite pain, report more physical and affective distress, and display a higher level of catastrophic thinking about pain (Crombez, Eccleston, Van Hamme, & De Vlieger, 2008; De Vlieger et al., 2006b). These studies, however, report on individual's self-reported attitudes. Less is known about which problem solving strategies individuals with chronic pain employ. Also, it is yet unclear whether individuals who have a higher problem solving (assimilative) attitude towards the problem of pain differ in strategies employed when compared to those more accepting (accommodative attitude) of pain.

In this study, we report the development of a problem solving task aimed at measuring the strategies individuals employ in solving the problem of chronic pain. We followed an idiographic approach (Barlow & Nock, 2012) and constructed vignettes that would allow us to capture individual variability in the strategies employed. We adapted the Means-Ends Problem Solving Task (Platt & Spivack, 1987) and required individuals to respond with various means to achieve a goal that is blocked by pain. Finally, we identified which problem solving strategies were reflected in the answers of our sample. This was achieved by developing a coding frame mainly based upon the action typology assimilation-accommodation and by coding responses into this frame.

## **METHOD**

### **Participants**

Participants were recruited from a Flemish patient association from December 2009 until January 2010. Inclusion criteria were: (a) non-malignant pain that lasted for six months or more; (b) aged between 18 and 65 years old; and (c) sufficient fluency in Dutch to be able to complete the measures. Exclusion criteria were: (a) headache pain as primary diagnosis; and (b) a self-reported psychiatric disorder (e.g., major depression or psychosis). Of thousand members of patient associations who were informed about the study, 197 expressed interest in being contacted about the

study. Because the main aim of the study was to test correlations, we assumed a small medium value of  $r = 0.35$ ,  $\alpha = 0.05$  and a power = 0.80 to generate a required sample size of 60. Of a total of 101 participants that we contacted, ten did not meet inclusion criteria and were excluded from the study, eight could not be reached, and 83 were eligible for the study. Seventy-one of those (response rate 85.54%) agreed to participate in the study. Main reasons for non-participation were distance to the research unit, physical constraints, and lack of time. Eleven patients refrained from participation mainly owing to health problems and lack of time, leaving a final sample of 60 participants. One participant was above 65 years of age at the moment of testing, leading to exclusion from further analyses. The final sample consisted of 59 participants (41 females, 19 males,  $M_{age} = 48.88$  years, age range = 20 to 64 years). Most of the patients (62%) was married or lived together. 37.9% had a higher education (longer than the age of 18 years). Only 22.4% was in paid employment, while more than half of the patients (62.7%) received disablement insurance benefits. The mean pain duration was 13.07 years ( $SD = 9.1$ ). Because no data were collected before the research appointment occurred, detailed information on non-participants is not available. The Local Ethics Committee of Ghent University approved the research protocol.

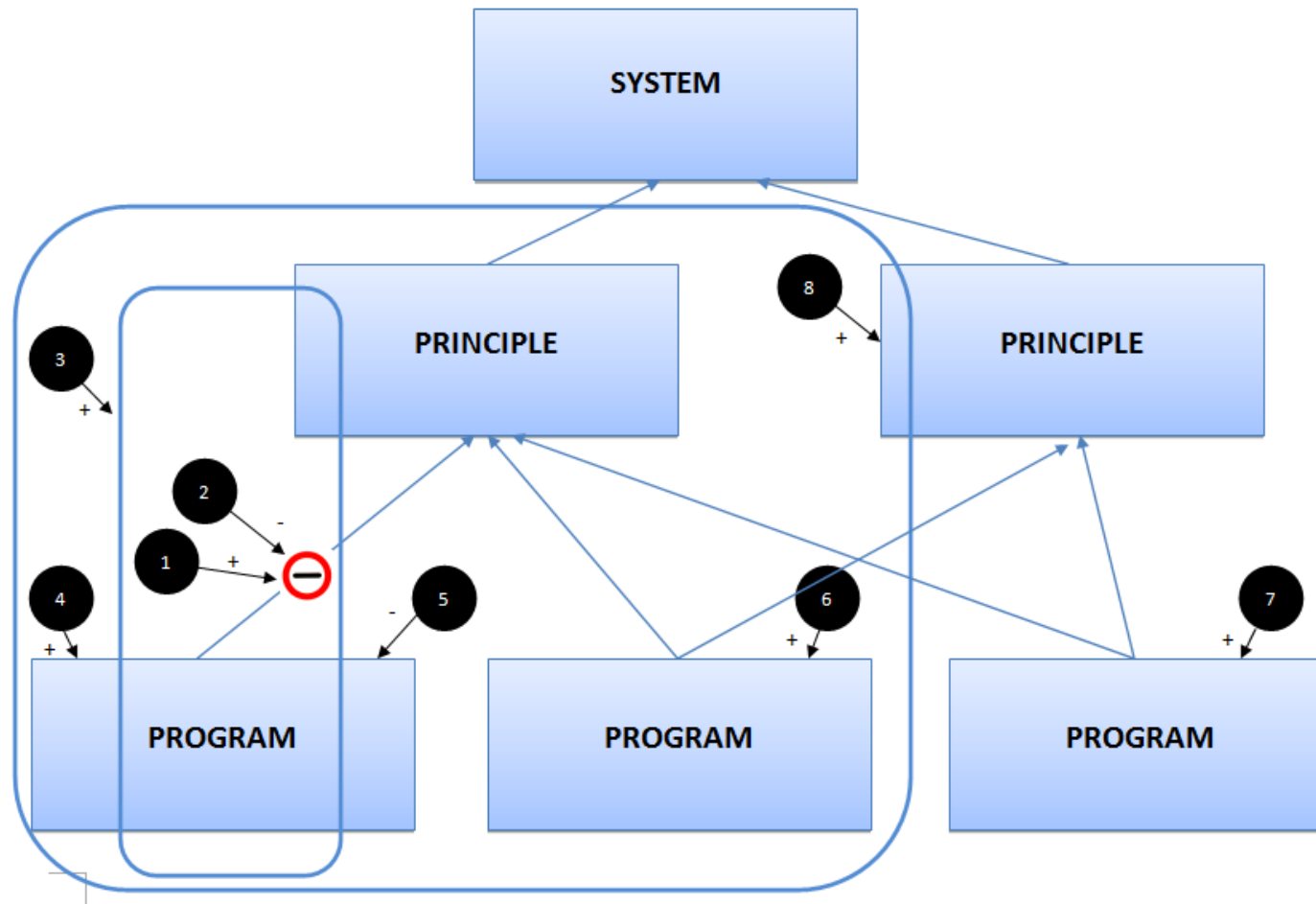
## Measures

**Demographics.** Basic demographic and clinical data were collected from the participants: age, gender, marital status, education level, job status, pain duration, main diagnosis, pain treatment and use of medication.

**The Means-End Problem Solving Task for Pain (MEPS<sub>forPain</sub>).** To assess how individuals solve the problem of pain, we adapted the Means-Ends Problem Solving Task (MEPS; Platt & Spivack, 1975). The original MEPS is an instrument designed to measure social or real-life problem solving. More specifically, it assesses an individual's ability to provide the means or the sequence of steps that may be necessary to carry one from a problem needing resolution, to the point where the problem is solved. The MEPS stimuli are stories each starting with the main character

facing a problem, which is then followed by a successful ending. One is then asked to connect the beginning of the story (the problem) with the end (the solution), so to describe strategies for solving the particular problem. We adapted the stories as to represent vignettes regarding problems related to chronic pain, requiring participants to respond with solutions or strategies to overcome these.

**Structure.** The structure of the MEPS<sub>forPain</sub> vignettes was developed based on a hierarchical model of goals. We defined goals as desired end-states that one wants to attain or avoid (Austin & Vancouver, 1996). Goals may differ in their level of abstraction and are commonly placed within a goal hierarchy (Carver & Scheier, 1998). As illustrated in Figure 1, goals on top of the hierarchy refer to system concepts and are the most abstract, such as relatedness. Below the system concepts are principles, also referred to as *be-goals*. Those goals can be thought of as elements of the system concept that characterize how an individual wishes to be (e.g., “to be a social person”). To realize these goals, it is necessary to have also more concrete goals. These concrete goals are referred to as *do-goals* or programs. Do-goals are the things we do to achieve principles (e.g., “to have social contact with colleagues”). At the lowest level, there are sequences or movements that are necessary to fulfill programs, so called motor control goals. One of the important features of the hierarchy is that the achievement of principles can be met through the execution of a number of programs. This allows for flexibility in achieving principles: if a person is no longer able to carry out a specific program, other programs in order to move towards the desired principle are likely. This idea is particularly relevant when a program has become blocked. Within our conceptualization, we considered pain as a barrier in carrying out a program and, hence, in the attainment of the associated principle. We then thought that one could come up with several possible solutions to undo the interference of pain. The MEPS<sub>forPain</sub> aims to measure the solutions participants provide when pain blocks goals at the program level.



*Figure 1.* A schematic overview of Carver and Scheier's (1998) structure of a goal hierarchy used to develop items for the MepsforPain. The motor control level was not considered in the current study. Across the figure, the pathways are listed that we identified as different scoring responses.

**Design.** As a first step, we identified system concepts as the basis of our vignettes. We chose three distinct system concepts: relatedness, autonomy and competence. These are assumed to be innate psychological needs that all people adhere to (Deci & Ryan, 2000). Next, we linked each of the system concepts to principle goals with which we expected most people to be familiar. The following principle goals were chosen to be represented: to be loved (relatedness); to be free and independent (autonomy); and to be competent and capable (competence). Finally, we matched these principle goals to concrete program goals, specifying an action that leads to achieving the principle (e.g., the principle to be loved was linked to the program to have social contact with colleagues).

Initially, we constructed nine vignettes, three for each system concept/principle goal. Vignettes referring to the same system concept/principle goal varied with respect to the program goal specified. For each program goal, we generated a scenario in which its attainment was blocked by the presence of pain, followed by an end point that indicated that the principal character in the story was no longer troubled by the problem, and instructions for the participant to complete the vignette. Vignettes differed with regard to the context in which they occurred (e.g., work, interpersonal encounters). For instance, the principle to be loved was linked to three distinct programs: to have social contact with colleagues, to have dinner with the partner, or to play tennis in a club. Also, vignettes differed with respect to the pain location (e.g., back pain, headache pain, pain in the legs, etc.).

After piloting in a sample of chronic pain patients recruited from a tertiary care center ( $N=9$ ), we decided to restrict the number of vignettes to three in order to avoid cognitive overload and fatigue in patients. We selected those vignettes that appeared most relevant and that were rated as most clear by patients during piloting. Further, in order to match the vignettes to the lived experience of individuals with chronic pain, we adapted these in a way that it was clear the principal character in the vignette had already undertaken several attempts to solve the problem of pain, without success. In addition, we created a set of questions that mainly served to provide quantitative data regarding each vignette. A second piloting in a sample of

chronic pain patients recruited from a tertiary pain center ( $N=8$ ) led to some final adaptations in the exact phrasing of the MEPSforPain vignettes and the questions asked.

In total, there were three MEPSforPain vignettes and 18 associated questions, six per vignette. The questions concerned the following: (1) The link between the program goal and the principle goal (e.g., “To what extent is it necessary for George to have social contact in order to feel loved again?”); (2) The importance of the principle goal (e.g., “How important is it for George to feel loved again?”); (3) The interference of pain in pursuing the program goal (e.g., “To what extent does the pain hinder George in having social contact with colleagues?”); (4) The interference of pain in achieving the principle goal (e.g., “To what extent does the pain hinder George in feeling loved again?”); (5) The extent to which the achievement of the principle goal is conditional upon solving the pain (e.g., “To what extent is it necessary for George to solve pain in order to feel loved again?”); and (6) The extent to which participants recognize themselves in the story (e.g., “To what extent do you recognize yourself in the situation of George?”). Questions were rated on a 5-point Likert scale, ranging from 1, *not at all*, to 5, *very much*. The upper part of Table 1 provides details of the rules used to construct the vignettes with an example of one vignette. The MEPSforPain and the associated questions are given in the Appendix. In further analyses, we used sum scores of the questions in which scores on each question were summed across the three vignettes.

**Administration.** In administering the MEPSforPain, we followed the original guidelines proposed by Platt and Spivack (1975). Instructions were explained to participants. Vignettes were presented on index cards and participants were required to read the vignettes out loud. After each vignette and when needed, the interviewer repeated the core of the vignette to insure understanding. Participants were then required to tell their solutions, which were audio recorded for later transcription.

Table 1

*The upper part of the table shows the rules for constructing the MepsforPain items with an accompanying example. The lower part of the table illustrates the scoring rules used with illustrative examples*

<b>MepsforPain item</b>	<b>Example</b>
1. Statement of the problem that includes reference to the blocking of a program goal due to pain	George suffers from persistent back pain. He already has consulted several doctors, but the pain remains. He feels himself to be dragged through the day. His work requires him to sit down for very long periods, which is very painful for him. He feels too tired to have social contact with colleagues.
2. Statement relating to the blocking of a principle goal	When he talks with them, he feels he is just complaining. He feels alone, unhappy and, above all, not loved. George always saw himself as a social person. He liked to have social contact with colleagues.
3. Ending which states that the problem has been resolved that includes reference to the principle goal remaining intact	The story continues. It ends with George feeling loved again after a while.
4. Instructions for completing the story	What would George have done to feel loved again?

Scoring responses	Example
1. Controlling pain, active attempts to remove or control pain or its impact ( <i>remove/control pain</i> )	George sees a physician who helps his back problem to get better
2. Ignore or avoid pain ( <i>ignore/avoid</i> )	George should not be nagging
3. Change context to the experience of pain ( <i>change context</i> )	Georges colleagues should understand his problem and offer help for him to feel better
4. Program persistence ( <i>persistence</i> )	George continues to have social contact with his colleagues despite his back pain
5. Program abandonment ( <i>program abandonment</i> )	George should not be bothered about having social contact with colleagues
6. Alternative program but retaining context and principle goal ( <i>alternative program-same context</i> )	George organizes a meeting with his colleagues to explain his problem in order to come to a solution
7. Alternative program and context but retaining principle goal ( <i>alternative program-other context</i> )	George decides to spend more time with his family in order to feel loved again
8. Alternative principle ( <i>alternative principle</i> )	George decides to focus on improving his performance and feel competent instead of feeling beloved

*Note.* Stories of participants were read and divided into different components whenever a new response was provided. Then, each component was connected to the scoring response it reflected by adding the numbers of the scoring response categories (1 to 8). Multiple response scoring within one category was possible whenever responses added something new to what was said before (e.g., “George should organize a meeting and explain his problem in order to come to a solution” (response category 6); and “George should organize a dinner party for his colleagues in order to be able to talk it over and feel loved again” (response category 6)).

**Scoring.** The scoring protocol of the MEPS<sub>forPain</sub> was constructed and operationalized in an iterative process. It was created resulting from repeated discussion among authors. Application of the protocol to sample answers of participants led to subsequent adaptations. The protocol was further discussed among authors until consensus regarding coding categories was reached. Our main scoring responses were derived from the application of Brandstädter and Renner's dual-process model of coping (1990) around the self-regulatory framework of Carver and Scheier (1998). If progression towards a goal at the program level (e.g., "to have social contact with colleagues") and consequently at the principle level (e.g., "to be loved") is blocked due to pain, several options are possible. If the goal is important, one may simply persist in the blocked goal (persistence; e.g., "continue to have social contact"), or try to ignore or avoid pain (ignore/avoid; e.g., "to stop nagging about pain"). One may also aim for a solution at removing the obstacle in order to retain functioning, which can be regarded to as an assimilative or problem solving response. Therefore, any strategy that is directed at attempting to remove or control pain would constitute an assimilative response or problem solving (remove/control pain; e.g., "go to see a physician"). Another option is accommodation which is related to the reevaluation of the importance of one's goals and the adaptation to the problem imposed by pain. Core to an acceptance or accommodation would be the disengagement from unattainable goals and the reengagement into goals that are still feasible (Wrosch, Scheier, Miller, Schulz, & Carver, 2003). Responses would then be the disengagement from the goal that has become impossible due to pain (program abandonment; e.g., "to resist from having regular social contact with colleagues"), the adoption of a new program goal to achieve the same principle (alternative program, same or other context; e.g., "to meet with colleagues after work" or "to enjoy social contact with friends"), or a shift of the goal at the principle level (alternative principle; e.g., "to focus on feeling competent at work"). We also identified responses that are aimed at fitting the situation to the experience of pain, which we labeled as change context (e.g., "to make colleagues understand one's pain problem").

Figure 1 provides a schematic representation of the application of the coding categories to the structure of the vignettes. In sum, our coding frame consisted of eight coding categories, that we labeled as: remove/control pain (pathway 1), ignore/avoid pain (pathway 2), change context (pathway 3), persistence (pathway 4), program abandonment (pathway 5), alternative program-same context (pathway 6), alternative program-other context (pathway 7), and alternative principle (pathway 8). Detailed rules to determine scoring responses are given in the lower part of Table 1.

In addition, we also scored the effectiveness of responses to each vignette on a 5-point scale. The overall response on a story was given a low effectiveness rating (1) when the story description was very poor and no suggestion was given that a principle goal would be achieved. High effectiveness ratings (5) were given to stories that were well-developed and contained a clear statement that a principle goal would be achieved. Our notion of effectiveness largely related to our theoretical frame in that accommodative responses, i.e. reflected as the giving up of a goal blocked by pain and the meaningful reengagement into goals that are still possible despite pain, were rated as more effective compared to answers concerned with removing or alleviating the pain (assimilation). Effectiveness scores per participant result from averaging the sum of effectiveness scores of each rater across three vignettes (range 3 to 15).

**Coding.** All responses to the MEPS<sub>forPain</sub> were recorded and transcribed, and transcripts were coded by the first author (EL) and two other coders (MH and HK). In a first meeting, scoring rules were explained to the coders, vignettes of three randomly chosen participants were mutually coded and discussed. Finally, coders were provided a scoring manual and were asked to independently code vignettes of six other randomly chosen participants. In a second meeting, coding of the vignettes and related difficulties were discussed in order to obtain consistency in coding. Then, all raters separately coded all vignettes. In order to reach subsequent consensus in coding, difficulties and observed differences were discussed among raters. This resulted in the adoption of an additional coding category, labeled acceptance of pain, containing responses concerned with the acceptance of the experience of pain (e.g.,

“He/she should try to cope with the pain and accept that it will never go away”). In subsequent analyses, we used the data set as obtained after consensus between the three raters. To obtain total response scores, we summed responses referring to the same category across vignettes. Noticeable is that none of the participants mentioned responses related to the category alternative principle, excluding it from further analyses.

**Pain intensity.** The two-item pain severity subscale of the Dutch version of the Multidimensional Pain Inventory (MPI; Lousberg et al, 1999) was used (i.e., “Rate the level of your pain at the present moment”, and “On average, how severe has your pain been during the last week”). Ratings are made on a 7-point scale (from 0 to 6). The sum score of the two items may range between 0 and 12. The MPI has been shown to have good reliability and validity (Lousberg et al., 1999). Cronbach’s alpha in this study was  $\alpha = .83$ .

**Controlled Word Association Test (COWAT).** We used the COWAT (Lezak, 1995) to measure verbal fluency as a possible confound for the measure of problem solving. The COWAT requires participants to generate as many words as possible beginning with the letters F, A and S (excluding proper nouns, numbers and words with the same suffix) in three one-minute trials. The total number of admissible responses for each letter is summed to give a total verbal fluency score.

**Problem solving and acceptance.** We used a modified version of the Pain Solutions Questionnaire (PaSol; De Vlieger et al., 2006b), that measures efforts at changing, solving or accepting pain and the problems associated with pain. The original PaSol has 14 items grouped into four interrelated scales: (1) solving pain scale (4 items; e.g., “I try everything to get rid of my pain”); (2) meaningfulness of life despite pain scale (5 items; e.g., “Even when I have severe pain, I still find my life meaningful”); (3) acceptance of the insolubility of pain scale (3 items; e.g., “I can live with the idea that there is no solution for my pain”); and (4) belief in a solution scale (2 items; e.g., “I am convinced that there is a treatment for my pain”). Participants are instructed to describe the degree to which each statement applies to them. Each item is answered on a 7-point Likert scale, ranging from 0, *not at all applicable*, to 6, *highly*

*applicable*. The original PaSol has demonstrated good reliability and validity (De Vlieger et al., 2006b). However, subscale results also tend to be heavily skewed in chronic pain populations (Crombez et al., 2008). For example, the item “I try everything to get rid of my pain” (solving pain subscale) will most likely elicit affirmative responses in individuals with persistent pain. The item “Even if I have severe pain, I find my life meaningful” (meaningfulness of life despite pain subscale) will most probably lead to more negative responding. In order to avoid further statistical problems, we decided to make some items more extreme (e.g., “I would try absolutely everything to get rid of my pain”; or “Even with my pain, I still find my life meaningful”). Cronbach’s alpha’s in this study were  $\alpha = .88, .81, .82$  and  $.89$ , respectively for the four scales. All subscales met criteria for normal distribution.

**Catastrophizing about pain.** The Dutch version of the Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995; PCS-DV; Crombez, Eccleston, Baeyens, & Eelen, 1998) was used to measure catastrophic thinking about pain. It is a 13-item scale for both non-clinical and clinical populations. Participants are asked to reflect on past painful experiences and to indicate the degree to which they experienced each of the 13 thoughts or feelings during pain on a 5-point scale (e.g., “I can’t seem to keep it out of my mind”, “I become afraid that the pain may get worse”). Scores range from 0 to 4. The PCS has shown to be valid and highly reliable (Osman et al., 2000; Van Damme, Crombez, Bijttebier, Goubert, & Van Houdenhove, 2002). Cronbach’s alpha in this study was  $\alpha = .92$ .

**Disability.** The Dutch version of the Pain Disability Index (PDI; Pollard, 1984) was used to measure pain-related disability. The PDI is a 7-item scale measuring the degree of disability individuals experience in each of seven different life domains. Ratings are made on an 11-point scale. The PDI has shown to have good reliability and validity (Tait, Chibnall, & Krause, 1990). Cronbach’s alpha in this study was  $\alpha = .83$ .

**Distress.** The Dutch version of the Hospital Anxiety and Depression Scale (HADS; Spinhoven et al., 1997) is a 14-item self-report screening scale for identifying affective distress. It contains two 7-item scales: one for anxiety and one for

depression, both with a scoring range of 0 to 21. The HADS has been shown to have acceptable reliability and validity (Spinhoven et al., 1997). In further analyses we used the total HADS score as an index of general affective distress (Spinhoven et al., 1997). In this study, Cronbach's alpha was  $\alpha = .87$ .

## Procedure

Participants were recruited by telephone and after consent was given, an arrangement was made to interview them at the university. Before the interview took place, they were invited to fill in a first set of paper-back questionnaires at home (i.e., HADS, PCS, PDI). At the research appointment, following the consent procedure, they were requested to provide socio-demographic information and completed some brief questions concerning their pain. This was followed by the administration of the MPI, the COWAT and the MEPS<sub>forPain</sub>. The three MEPS<sub>forPain</sub> vignettes were presented in a fixed order for each participant, and answers were recorded for later transcription. Administration of the three vignettes was followed by completion of the MEPS questions. Finally, we asked to complete the adapted PaSol. The whole procedure took about two hours to complete. The Local Ethics Committee of the Faculty of Psychology and Educational Sciences (Ghent University) approved the study protocol.

## RESULTS

### Validity check

All participants rated both program goals,  $M = 4.42$ ,  $SD = 0.56$ , range = 2.33 – 5.00, as well as principle goals,  $M = 4.51$ ,  $SD = 0.54$ , range = 3.00 – 5.00, to be important to achieve for the characters in the vignettes. Also, pain was rated to be interfering in achieving both program goals,  $M = 4.18$ ,  $SD = 0.57$ , range = 2.00 – 5.00, as well as principle goals,  $M = 4.07$ ,  $SD = 0.72$ , range = 2.00 – 5.00, across vignettes. Vignettes were also rated as highly recognizable for participants,  $M = 4.34$ ,  $SD = 0.71$ , range = 2.00 – 5.00. To examine whether the ratings differed across vignettes, we performed a series of non-parametric kruskall-wallis tests with importance of

program, importance of principle, interference of pain with program, interference of pain with principle, and recognizability as dependent variables. Vignette was entered as between-subjects factor. We found no difference in participants' reports across vignettes regarding the rated importance of the program goal,  $H(2) = 1.59, p = .451$ , importance of principle goal,  $H(2) = 2.82, p = .244$ , interference of pain with program goal,  $H(2) = 2.29, p = .318$ , interference of pain with principle goal,  $H(2) = 2.28, p = .320$ , or recognizability in stories,  $H(2) = 5.60, p = .061$ .

### **Problem solving, acceptance and verbal fluency**

We tested whether verbal fluency scores could confound performance on the MepsforPain. Therefore, we calculated spearman correlations between participants' verbal fluency scores (total number of generated words) and the number of (problem solving and acceptance) responses generated. We found no significant associations between the total number of generated words and the number of responses generated,  $r = -.12, p = .376$ .

### **Frequency of responses**

Figure 2 presents the percentages of participants who at least generated one problem solving, acceptance or other response related to the various coding categories. Means, standard deviations and range of responses per category are presented in Table 2.

**Problem solving and acceptance.** More than half of the participants (66.10%) mentioned at least one problem solving response (remove/control) across stories. The following examples exemplify some of these responses: "Take a pain killer"; "Consult other physicians"; "Get acupuncture"; "Take regular rest to relieve pain"; "Take a hot bath"; or "Get back exercises". As can be seen in Table 2, the mean number of problem solving responses was found to be low, but relatively high when compared to acceptance and other responses,  $M = 2.24, SD = 0.32, \text{range} = 0-8$ . Among the most mentioned acceptance responses were those related to alternative program

- same context (74.58%),  $M = 1.93$ ,  $SD = 0.27$ , range = 0-9 (e.g., "Try to seek for other solutions to meet with colleagues"; "Seek solutions at work so you can keep doing the things you love to do"; or "Try to pace activities and do the household chores you are still able to do"). About half of the participants (50.85%),  $M = 0.88$ ,  $SD = 0.14$ , range = 0-4, reported acceptance responses related to alternative program - other context, such as "Try to do something else other than household chores by which you can still feel competent", "Meet with fellow sufferers so that you can feel loved by them", or "Engage in other things, such as reading a book or watching a documentary, so that you can still feel independent in doing what you want to do". The least mentioned were acceptance responses related to program abandonment (22.03%) (e.g., "Accept the physical limitations"; "Accept the fact you are losing control"; "Learn to accept the fact you lose qualities or are worse in doing activities that you used to be good at").

**Acceptance of pain.** About 17% of the participants mentioned responses related to the ad hoc category acceptance of pain (e.g., "Pay attention to pain and what it does to you and learn to cope with it"; "Think positive about the pain"; or "Learn to accept the fact that pain will never go away").

**Persistence.** About 19% of the participants mentioned at least one response related to persistence in the blocked activity or goal despite pain being present,  $M = 0.24$ ,  $SD = 0.07$ , range = 0-3. Exemplary responses were: "Keep on doing the same work"; "Do as much as you can"; or "Try to persist as long as possible".

**Ignore/avoid.** About one fourth of the participants (23.73%) reported at least one response related to ignorance or avoidance of pain,  $M = 0.29$ ,  $SD = 0.07$ , range = 0-2. Exemplary responses appeared to be more representative of an ignorance or the active hiding of pain (e.g., "Get over the pain"; "Hide pain"; "Don't talk about pain"; or "Stop nagging about the pain").

**Change context.** Often mentioned (74.57%) were responses related to fitting the situation to the experience of pain,  $M = 1.81$ ,  $SD = 0.23$ , range = 0-9. "Seek social support so that everyone understands the problem", "Ask others to take pain into account", "Ask others for help whenever something has become impossible to do", or

“Make others to understand you and the pain” are some of the exemplary responses within this category.

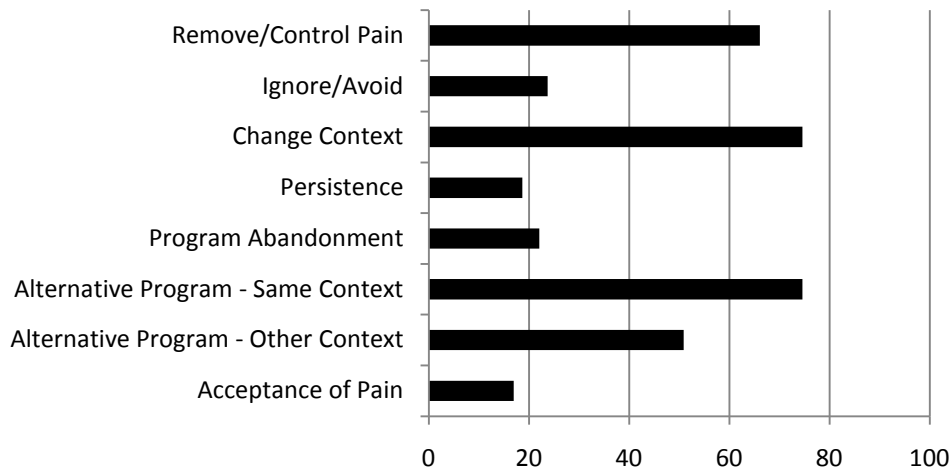


Figure 2. Percentages of participants who generated at least one problem solving, acceptance or other response pertaining to the various coding categories.

### Response patterns and exemplary cases

**Patterns of problem solving and acceptance.** We were most interested in whether the MepsforPain would enable us to identify characteristic response patterns that are either problem solving or acceptance. To this end, we divided participants into three groups, based on their sum scores on the categories related to problem solving (remove/control) and acceptance (program abandonment, alternative program - same context, and alternative program - other context): (1) Problem solving group, i.e. participants showed more problem solving responses compared to acceptance responses ( $n = 17$ ); (2) Balance group, i.e. participants showed an equal number of problem solving and acceptance responses ( $n = 13$ ); and (3) Acceptance group, i.e. participants showed more acceptance responses compared to problem solving responses ( $n = 29$ ). Chi square tests revealed that groups did not differ in gender,  $\chi^2(2) = 3.28$ ,  $p = .194$ , education level,  $\chi^2(6) = 10.04$ ,  $p = .123$ , or work status,  $\chi^2(16) = 16.18$ ,  $p = .440$ . Further, a series of one-way ANOVA's did not reveal groups

to differ in age, pain duration, pain intensity, attitudes towards solving or accepting pain, catastrophic thinking about pain, disability and distress. Two individuals highly exemplified the problem solving group as they showed a high number of problem solving responses (7 or 8) and no acceptance responses (0). Some examples may illustrate their pattern of answers:

*"... I think that the physicians she has visited did not help her enough to alleviate her pain... She will have to put a lot more effort in visiting other physicians... and also go to an osteopath... or maybe acupuncture... she has to do anything to get rid of the pain... Maybe also search on the Internet for new techniques, go to a university hospital... there will definitely be something that would help her..."*

[woman, 64 years, retired]

*"... If I would be her, I would definitely try to consult another physician, someone she hasn't tried before, or an orthopedist...she has got to try to get rid of the pain..."*

[woman, 31 years, work invalidation due to pain]

In contrast, three individuals showed a high number of acceptance responses (7 or 9) and no problem solving responses (0). We illustrate some responses together with summary information on the participants below.

*"... he has to limit his time at work, work fewer hours a day, and he has try to think of ways to adapt his work environment in an ergonomic way... Then he will be able to continue doing his job, in a pleasant way, and feel good again..."*

[man, 46 years, work invalidation due to pain]

*"... I think she has to ask for help... professional help and support from family or friends... and I think that in the end she will be able to take up some tasks herself... and by taking it slow and pacing activities, she will feel successful and independent again..."*

[woman, 53 years, work invalidation due to pain]

*"... she has to do work she is still able to do... so she has to have a conversation with her boss to see what would still be possible... and then choose work that she thinks is challenging and in which she can feel competent in doing..."*

[woman, 48 years, work invalidation due to pain]

**Intercorrelations between MepsforPain responses.** We computed spearman correlations to investigate associations between problem solving, acceptance and other responses (see Table 2). We found no negative association between problem solving and acceptance responses, nor did we find acceptance categories to be interrelated. We found a negative association between change context and alternative program - same context,  $r = -.34$ ,  $p = .008$ . Also, change context was positively associated with acceptance of pain,  $r = .43$ ,  $p = .001$ . Persistence was also found to be negatively associated with alternative program - same context,  $r = -.33$ ,  $p = .01$ .

**Additional correlations.** Spearman correlations were computed to examine the associations between all separate MepsforPain problem solving, acceptance and other responses and measures of pain intensity, pain duration, attitudes about problem solving and acceptance, catastrophizing, disability and distress. No significant associations were found with pain intensity, pain duration, or distress. To our surprise, persistence, and not problem solving, correlated positively with the solving pain subscale of the PaSol,  $r = .34$ ,  $p < .01$ . Alternative solution-same context correlated negatively with both the solving pain subscale,  $r = -.32$ ,  $p < .01$ , and the belief in a solution subscale,  $r = -.34$ ,  $p < .01$ . Further, a negative correlation was found between the number of program abandonment responses and catastrophic thinking about pain (PCS),  $r = -.29$ ,  $p = .024$ . Also, we found a positive correlation between the number of alternative program - other context responses and the level of disability (PDI),  $r = .29$ ,  $p = .025$ .

**MepsforPain: effectiveness and necessity to solve pain**

**Necessity to solve pain.** A one-way ANOVA was performed to examine whether participants who showed different patterns of problem solving and acceptance (see above) differed in the level of necessity to solve pain across stories. We found a significant difference between groups,  $F(2,56) = 16.08, p < .001$ . Tukey post hoc comparisons revealed that both the problem solving group,  $M = 4.84$ , 95% CI [4.35, 5.34], and the balance group,  $M = 4.51$ , 95% CI [3.95, 5.08], expressed greater necessity to solve pain across vignettes than the acceptance group,  $M = 3.22$ , 95% CI [2.84, 3.60]. There was no statistically significant difference concerning necessity in solving pain between the problem solving and balance group. Spearman correlations also revealed a significant positive association between persistence and necessity to solve pain across vignettes,  $r = .43, p < .001$ . We also found necessity to solve pain to be positively related to the solving pain subscale of the PaSol,  $r = .27, p = .037$ . We found no significant associations with pain intensity, catastrophizing, disability or distress.

**Effectiveness.** Differences in effectiveness scores in participants with distinct patterns of problem solving and acceptance were also examined by means of one-way ANOVA. A significant difference was found between groups,  $F(2,56) = 3.38, p = .04$ . Tukey post hoc comparisons revealed that the responses of the problem solving group,  $M = 8.17$ , 95% CI [7.33, 9.00], were rated as less effective in comparison with those of the acceptance group,  $M = 9.51$ , 95% CI [8.57, 10.15].

Further, higher effectiveness scores were correlated with less persistence responses,  $r = -.31, p = .016$ , and more alternative program - same context (acceptance) responses generated by participants,  $r = .55, p < .001$ . Lastly, effectiveness ratings were negatively associated with the solving pain subscale (PaSol),  $r = -.29, p = .025$ . No associations were found with pain intensity, catastrophizing, disability or distress.

Table 2

*Descriptive statistics and correlation coefficients between responses coded within the participants' stories and participants' ratings of the necessity to solve pain within the vignettes. Categories represent summed responses over stories*

	<i>N</i>	<i>M(SD)</i>	min- max	2	3	4	5	6	7	8	9
1.Remov/Contr Pain	59	2.24(0.32)	0-8	-.02	-.03	.19	.06	-.10	-.07	-.22	.51***
2.Ignore/Avoid	59	0.29(0.07)	0-2	1	-.06	.13	-.12	-.13	-.24	-.04	.07
3.Change Context	59	1.81(0.23)	0-9		1	-.01	-.10	-.34**	-.10	.43**	-.06
4.Persistence	59	0.24(0.07)	0-3			1	-.14	-.33*	-.23	.02	.43**
5.Progr Abandonm	59	0.25(0.07)	0-2				1	.22	-.20	-.04	-.07
6.Altern progr – SC	59	1.93(0.27)	0-9					1	.05	-.17	-.26*
7.Altern progr – OC	59	0.88(0.14)	0-4						1	.10	-.31*
8.Acceptance of Pain	59	0.22(0.07)	0-2							1	-.18
9.Necessity to solve pain	59	3.97(1.25)	1-5								1

*Note.* Remov/Contr Pain = remove/control pain; Ignore/Avoid = ignore or avoid pain; Change Context = change context to the experience of pain; Persistence = program persistence; Progr Abandonm = program abandonment; Altern progr – SC = alternative program but retaining context and principle goal; Altern progr – OC = alternative program and context but retaining principle goal.

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

Below, a sample of responses is provided of individuals rated lowest (< 6) and highest (> 12) on effectiveness across vignettes. Sample answers are given for each vignette separately (see Appendix for a full description of the vignettes).

In response to the vignette in which the principal character's goal of having social contact with colleagues in order to feel loved was blocked by pain, some individuals responded with the following:

*"... Gosh... that's hard... I think she will have had a conversation with her colleagues to convince them that something is wrong... to make sure the colleagues know she does not make things up... That it's not between her two ears... Many people think that this is the case... And then they will probably understand her... Yes... I can't think of something else... It's hard..."*

[woman, 47 years, work compensation due to pain, low effectiveness]

*"... I think, initially, he will force himself in order to be able to maintain those contacts... to have their attention... but, eventually, he will have less contact with colleagues because of him being absent from work... and he will then go to parties at work or the New Year's reception, but all that will not last... his pain needs to be eliminated or he will never feel loved again... If you can't participate in activities at work, you will become isolated... So, I think, he can only dream about becoming loved again, but he will never succeed at it unless he is able to participate again..."*

[man, 47 years, work compensation due to pain, low effectiveness]

*"... Uhum... I think that she will have had a conversation with her colleagues and will have explained the fact that she is in pain and that this is the reason why she has less social contact at work... And I think her colleagues will have responded positively and will have encouraged her to talk with them whenever she feels bad, so that she will have felt better over time... And I think that she regularly will have had contact with one or more of her colleagues after work and will have had the feeling to be accepted, so she*

*felt loved again... You have to have some social contact with colleagues, it helps you to feel better, so..."*

[woman, 29 years, work status unknown, high effectiveness]

*"... The solution obviously is not to consult doctors... and I think there is a multitude of other factors that may be playing here... I think it is most probably that he does not feel good with himself... And there may be a variety of things he can do, such as to lower work pressure or to work part-time, albeit temporarily... so that he can recuperate a bit from his pain... and it will give him the time to think of possible solutions and to make the choice that is best on the longer term, such as maybe choose to work part-time from then on... So I think that he will have to feel good, with his pain... and then also think of ways to set up social contact with his colleagues... I think that by trying to seek for multiple solutions, that he will be able to get to know himself better...and that he will be able to cope better with the situation... Above all, he will also have to be acceptant... empathize with others... I think, in the end, if he feels better with himself, he will also be able to have better social contact with colleagues..."*

[man, 50 years, work invalidation due to pain, high effectiveness]

In response to the vignette in which the principal character's goal of doing the household chores in order to feel independent and free was blocked by pain, some individuals responded with the following:

*"... I'm in the same situation as her... and my pain does not improve... so I really can't think of anything she could have done... She could try to use an electric bicycle... but that didn't help me either... so... I can't even drive the car anymore... it keeps on getting worse and worse... not being able to drive the car, then a wheelchair... yes... I can't think of anything else..."*

[woman, 47 years, work compensation due to pain, low effectiveness]

*"... I think that he asked for help... He could have asked his friends for help, but that will not have lasted... He will have talked about it and have sought help... from other people..."*

[man, 47 years, work compensation due to pain, low effectiveness]

*"... I think that she has begun to realize that the pain causes some limitations and that she will have decided to seek for help and support... maybe from people in her direct environment, family, friends, or maybe someone in paid employment... And I think that if someone could have helped her in doing tasks that have become too heavy, such as ironing, she will have had more time to do other things that are still possible... Because if you can still do other tasks in a good way, you can still feel independent... Then you have the feeling that you are the one who decides in what to do... and that you can take your own decisions... It is very recognizable..."*

[woman, 29 years, work status unknown, high effectiveness]

*"... Uhm... yes... I would consider it important for him to discuss with someone, whether it his partner, or friend, or a professional worker, how to better organize his daily schedule... so that he can stop torturing himself in doing tasks that are not possible anymore... in order to be able to do this, he will have to accept his condition of course... but there is no sense of doing things that have become impossible to do and that prevent one in seeing other possibilities... And maybe, in doing so, he will start to see things he did not see before... maybe he is good in listening to other people, so he can do that and feel good at doing it... There may be plenty of possibilities to do... The most important thing is that he does not get stuck in doing something that is not possible... And maybe, in doing so and feeling better over time, some techniques that he tried earlier in relieving the pain may become helpful again... For example, he can try to take up physiotherapy again which could have failed earlier... Maybe, in feeling better again, he will again feel able to take up some exercises... I truly believe that if you feel bad, some things that might be helpful may not succeed because of your negative mood... Also, if he*

*feels better again, he can reconsider doing some household chores again, the ones that are not too heavy..."*

[man, 50 years, work invalidation due to pain, high effectiveness]

In response to the vignette in which the principal character's goal of doing work precisely in order to feel competent was blocked by pain, some individuals responded with the following:

*"... Maybe she could ask her boss to get other tasks... I look at it from a different angle... Her story is positive... and in my mind, it's negative... so I find it difficult to think of something positive... The negative thing is that, eventually, one has to quit the job... Or she could work less hours, but that it is not beneficial for her either... so no, I cannot say anything positive about it..."*

[woman, 47 years, work compensation due to pain, low effectiveness]

*"... I think that he has done what I am going to do... And it's not going to help him with his pain and all... but he will go and find other work... that he is still able to do... do tasks that aren't that difficult... but enable him to keep on doing work... maybe paid less... but that doesn't matter... yes... I can't think of anything else..."*

[man, 47 years, work compensation due to pain, low effectiveness]

*"... I think two things are possible... First, I think that she has come to the point of realizing that this job is not possible anymore, that it has become too difficult for her... So maybe she informed herself of the possibility to do part-time work... So I think she has made a choice which has enabled her to maintain some joy and satisfaction at work... and that she has realized that, although she works less hours or she switched to other tasks, she still can feel competent and valuable at work..."*

[woman, 29 years, work status unknown, high effectiveness]

*"... There are plenty of things he could do... He could consult doctors and ask them why his pain has exacerbated lately and try to seek for options to alleviate the burden of pain... And maybe it's also a good thing to have a conversation with his boss and to discuss whether he could not do other tasks at work, tasks that are not that heavy... He could also go and talk with a psychologist, about what the pain does to him... he could use some help in learning to accept the fact that he will always have some limitations due to pain... I think it is all a matter of energy... He has to work towards feeling better, putting everything into perspective... On the one side, this will mean that he has to accept that things have changed... On the other side, he has to have courage that there will be other possibilities at work... In the end, he will have all the key-ingredients to make a new start... There has to be a harmony between home, work, and himself..."*

[man, 50 years, work invalidation due to pain, high effectiveness]

## DISCUSSION

This study aimed at identifying strategies that individuals use to solve the problem of chronic pain. We adapted the Means-Ends Problem Solving Task (Platt & Spivack, 1975) to the end that it required individuals to think of means in order to solve problems in which pain blocked the attainment of desired activities or goals. Our task, labeled the *MepsforPain*, consisted of three vignettes with a standard structure of pain blocking middle-level goals assumed to be essential in attaining core higher-level or identity goals (Carver & Scheier, 1998). Our coding scheme was mainly developed following the dual-process model of coping, introduced by Brandstädter and Renner (1990), that identifies two opposing modes of coping: assimilation and accommodation. Assimilation involves attempts to change the situation or obstacle that prevents one from achieving one's goals, whereas accommodation relates to adapting one's goals to the restraints imposed by the obstacle. Assimilation within the *MepsforPain* is captured by the number of responses coded as remove/control pain. Accommodation is captured by the number of responses coded as program abandonment, alternative program - same context, and

alternative program - other context. We labeled assimilation as problem solving and accommodation as acceptance.

The *MepsforPain* is distinctive as a measure of coping with pain so far as it is constructed from an action-oriented view on how people construct and seek solutions to the problem of pain. Traditional approaches to coping often take a structural approach, and have focused on either topological distinctions between strategies (active vs. passive, or approach vs. avoidance), or their presumed target (problem-focused vs. emotion-focused). Such accounts have been shown to be limited when it comes to explaining adaptation to pain. The adaptive value of coping, as has been argued by Skinner et al. (2003), is likely to be context-dependent. Therefore, the study of the success of a coping strategy has to take into account the match between the construction of a problem and its solution. For example, a tenacious pursuit of solving the problem of pain is likely to be appropriate when pain is curable. However, the unswerving pursuit to cure or solve pain may well become misdirected when pain is persistent and insoluble (Aldrich et al., 2000; Eccleston & Crombez, 2007). Indeed, there is evidence that a rigid pursuit of the problem of pain as one that requires a singular solution of cure may lead to more problems (Crombez et al., 2008; De Vlieger et al., 2006b). As such, differences in how individuals construct and seek solutions to the problem of chronic pain may be of importance in explaining adaptation to persistent pain. The PaSol has been an interesting and useful tool in assessing how individuals construct and seek solutions to the problem of pain. There is a call for more mixed idiographic-nomothetic approaches that enable to examine between-person variations in “real-time” coping efforts (e.g., Tennen, Affleck, Armeli, & Carney, 2000). A useful candidate may be the *MepsforPain*. Many participants commented on the recognition of the problems presented. When vignettes did not appear to have immediate resonance, participants often imputed new material to account for how the person in the vignette would have solved the problem. This new material frequently included elements of their own concerns and worries. Also, vignettes appeared to activate cognitive activity that was emotionally valenced, resulting in a range of emotions (e.g., distress, frustration, etc.) evidenced in our sample. These

observations may attest to the fact that the vignettes reflect the vivid experience of individuals with chronic pain.

In this self-help sample of people with chronic pain, we identified three groups that differed in their response patterns in either favoring problem solving, or acceptance, or both. These groups differed significantly in their ratings of the necessity of solving pain across vignettes. The problem solving group expressed the greatest level of necessity and the acceptance group the lowest. Also, responses of the problem solving group were rated as significantly less effective by experts when compared to the rating of responses of the acceptance group. Those who reported equal amounts of problem solving and acceptance did not differ from the other groups. Unclear however is the link between response patterns and adjustment. Although we would have expected the problem solving group to fare less well, i.e. express higher catastrophic thinking, disability and distress, than the other groups, there were no differences between groups.

In addition, we noted only low and sporadic correlations between our measure and the PaSol. Unlike our measure, research with the PaSol found consistent, albeit correlational, evidence on the negative impact of attempts to solve pain in individuals with chronic headache (Lauwerier, Paemeleire, Van Damme, Goubert, & Crombez, 2011) and chronic non-headache pain (Crombez et al., 2008; De Vlieger et al., 2006b). Such findings are not restricted to the research domain of pain. Various life span theories converge on the idea that, at some points in time, it might be better to stop fighting encountered obstacles (e.g., reduction in physical fitness) and redirect focus towards other valued aspects of life (e.g., social encounters) (e.g., Boerner & Jopp, 2007; Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002; Heckhausen & Schulz, 1995). Disengagement from barren goals is also an essential aspect of self-regulation (e.g., Carver & Scheier, 1990, 1998). There is evidence that both the disengagement from unattainable goals and a reengagement in other valuable goals are beneficial in preserving well-being (Wrosch et al., 2003). As a parallel, a more viable option to the problem of chronic pain may be to relinquish ineffective attempts to solve the problem of pain (e.g., cure, control) and engage in other goals that are still

possible despite pain (Eccleston & Crombez, 2007; Van Damme et al., 2008). Such is the prerequisite of an acceptance of pain, defined as being willing to experience pain without the need to control, avoid or change it, and engaging in valued-based activity despite pain being present (McCracken et al., 2004).

Several possible reasons may account for the low or lack of correlations between our measure and established measures of problem solving and acceptance, catastrophic thinking, disability, and distress. First, our measure allowed us to meticulously capture an array of distinct coping strategies. In addition, our coding approach was distinctive and valuable as strategies were coded based upon their function within the context of the vignettes. This may however come with a cost. Some answers may not entail all the necessary information to infer the function of strategies proposed by participants. An example may illustrate this. Consider one to pace activity whenever tasks have become impossible to do because of pain. Pacing may represent acceptance, if we presume it to occur as a mean to be able to do other tasks. It may also be regarded as problem solving when it is meant as the avoidance of back-straining activities and, thus, the controlling of pain. Lack of precise information on the function of strategies within a given context may thus endanger reliability in coding. Second, we also rated the overall effectiveness of participants' responses. We found that acceptance related answers were consistently rated as more effective compared to answers that were predominantly directed at solving or controlling the problem of pain. Those effectiveness ratings did, however, not take into account the number or exact content of responses generated. Instead, focus of examination was the coherence of the overall answer and the presumed fit between the proposed means and the solution that was possible given the context of chronic pain. Most probably, a sole coding of responses into categories does not allow to capture the heart of coping with chronic pain. Third, coping is stressed to be a dynamic process that shifts in nature from stage to stage (Carver, Scheier, & Weintraub, 1989; Lazarus & Folkman, 1984). Likewise, the nature of coping with pain will also vary, depending on the interaction between both the characteristics of the pain experience (e.g., pain intensity), and the characteristics of the other goals individuals pursue. Also, the

intensity of pain and associated interference varies over the course of a day and over days (Eccleston & Crombez, 1999). At its current instantiation, the *MepsforPain* is not able to account for the possible dynamic relationship of coping and pain over time within an individual. Fourth, another confounding factor may be the context of the research setting. That is, although most participants commented on the parallels between the vignettes and their own experiences, we may not ascertain them to have responded as to their own experiences. Fifth, and lastly, there are also substantial differences between the *MepsforPain* and the other measures used that may have confounded results, such as dissimilarities regarding assessment method (i.e., likert scale responding vs. self-generation of responses) or content (i.e., attitudinal beliefs vs. behavioral intentions).

There are a number of useful recommendations to make on the current instantiation of the *MepsforPain* that may further theoretical and clinical understanding of coping and adaptation to chronic pain. First, we followed a mixed idiographic-nomothetic approach and were able to capture idiosyncratic experiences of participants. We advocate such an approach and recommend further improvements, such as by letting participants self-generate problems related to chronic pain. However, we also had problems in coding some of the responses. This may be resolved by asking additional questions (e.g., asking why a strategy is proposed in order to get to know the function). Second, the *MepsforPain* may be useful in understanding the interplay between problem solving or acceptance, and other ways of coping with the problem of pain, such as persistence or support seeking. Persistence has received scarce attention and, when documented, it has been mainly conceived of as adaptive behavior in response to pain (e.g., Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995; Vlaeyen & Linton, 2000). Most intriguing are then our findings as persistence was associated with a higher necessity to solve pain, a higher problem solving attitude towards pain and less effective responses, all of which rather point at a misdirected pursuit of pain control. These results are more in line with recent research pointing at the detrimental effects of persistence on disability and well-being (e.g., Hasenbring & Verbunt, 2010; Vlaeyen & Morley, 2004).

So far, however, there is no convincing evidence of the potentially devastating effects of persistence within the context of chronic pain (e.g., Hasenbring, Hallner, & Rusu, 2009; Kindermans et al., 2011). Lastly, the *MepsforPain* may serve as a diagnostic tool. Some participants made, for example, notion of an acceptance of chronic pain. This may represent a readiness to change one's problem frame onto a reorientation towards other valued aspects of life (e.g., McCracken et al., 2004). Insight into the conditions of such an acceptance may help to improve therapeutic approaches.

There are some limitations to this study. First, we have only explored the *MepsforPain* within a self-defined chronic pain population, which may not be a representative sample. Further study is needed with different samples of individuals with chronic pain, such as patients recruited from tertiary care. Second, the *MepsforPain* is a verbal, self-report measure and, therefore, may suffer from common threats to internal validity, such as faking, problems with comprehensibility, expectancy effects, etc. Of interest in the future, may be the use of methods that allow assessment of coping in daily life. We would propose momentary sampling methods, such as the experience sampling method (Csikszentmihalyi & Larsen, 1987) or the daily reconstruction method (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). Such methods would also allow to study the dynamic unfolding of coping over time and account for the limits of cross-sectional research designs.

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## APPENDIX

### **MepsforPain items**

#### ***Vignette 1. George***

***System concept*** – relatedness

***Principle goal*** – be a social and well-loved person

***Program goal*** – to have social contact with colleagues

***Context*** – work

George suffers from persistent back pain. He already has consulted several doctors, but the pain remains. He feels himself to be dragged through the day. His work requires him to sit down for very long periods, which is very painful for him. He feels too tired to have social contact with colleagues. When he talks with them, he feels he is just complaining. He feels alone, unhappy and, above all, not loved. George always saw himself as a social person. He liked to have social contact with colleagues. The story continues. It ends with George feeling loved again after a while. What would George have done to feel loved again?

#### ***Vignette 2. Kirk***

***System concept*** – autonomy

***Principle goal*** – be independent and free

***Program goal*** – to do the household chores

***Context*** – home

Kirk suffers from persistent pain in both legs. In the beginning, he thought that the pain would disappear itself. When he noticed that this did not happen, he tried a lot to get rid of the pain. He went to consult several doctors. Though, the pain remains and causes more and more restrictions. Kirk can't do the household chores anymore. Tasks that used to be effortless, become impossible to do. Kirk has the feeling he loses all control. He doesn't feel free anymore in what to do. Kirk always perceived

himself as being an independent and autonomous person. The story continues. It ends with Kirk feeling independent and free again in what to do. What would Kirk have done to feel independent and free again?

### ***Vignette 3. John***

***System concept*** – competence

***Principle goal*** – be competent and capable

***Program goal*** – to do work precisely

***Context*** – work

John suffers from persistent back pain. In the beginning, he took it easy. He even took a sick leave period to see if the pain would diminish. The pain became bearable and he went back to work. Since a few years, the pain has become worse again. He has already taken several treatments, but nothing seems to help. He tries to continue at work, but all efforts carry him a lot of weight. He is less precise in his tasks. John feels inadequate in his work. He feels increasingly incompetent at work. John always saw himself as being passionate about his work and capable in what he had to do. The story continues. It ends with John feeling competent and capable again after a while. What would John have done to feel competent and capable again?

### **MepsforPain questions**

#### ***In the story that you wrote about George...***

1. To what extent is it necessary for George to have social contact in order to feel loved again?
2. How important is it for George to feel loved again?
3. To what extent does the pain hinder George in having social contact with colleagues?
4. To what extent does the pain hinder George in feeling loved again?

5. To what extent is it necessary for George to solve pain in order to feel loved again?
6. To what extent do you recognize yourself in the situation of George?

***In the story that you wrote about Kirk...***

1. To what extent is it necessary for Kirk to do the household chores in order to feel independent and free again?
2. How important is it for Kirk to feel independent and free again?
3. To what extent does the pain hinder Kirk in doing the household chores?
4. To what extent does the pain hinder Kirk in feeling independent and free again?
5. To what extent is it necessary for Kirk to solve the pain in order to feel independent and free again?
6. To what extent do you recognize yourself in the situation of Kirk?

***In the story that you wrote about John...***

1. To what extent is it necessary for John to do his tasks precisely in order to feel competent and capable again?
2. How important is it for John to feel competent and capable again?
3. To what extent does the pain hinder John in doing tasks precisely?
4. To what extent does the pain hinder John in feeling competent and capable again?
5. To what extent is it necessary for John to solve the pain in order to feel competent and capable again?
6. To what extent do you recognize yourself in the situation of John?

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THE MIXED BLESSINGS OF ATTEMPTS TO  
CONTROL PAIN IN CHRONIC PAIN:  
A CLINICAL STUDY<sup>1</sup>**ABSTRACT**

Attempts to control pain may become ineffective in chronic pain patients. It is yet unclear why some patients persist in these attempts. Here, we examine how individuals with chronic pain construct and appraise the goal to control pain. Specifically, we investigate how the pursuit of a pain control goal facilitates the pursuit of other goals (e.g., *controlling pain* allows me *to go to work*), or interferes with these goals (e.g., *controlling pain* hinders me *to go out*). Seventy-three individuals with chronic pain (48 females, mean age = 49.85 years, age range = 22 to 64 years) were recruited from a patient association group. We used the Personal Project Analysis method to elicit goals and goal appraisals. Intergoal interference and facilitation were assessed using an adapted version of the Intergoal Relations Questionnaire. Self-report instruments were used to measure pain intensity, pain catastrophizing, problem solving, acceptance, disability and distress. Although the goal to control pain was spontaneously reported by less than half of the sample, all participants rated this goal as highly important and valuable. Participants assigned slightly less favorable appraisals to the goal to control pain as compared to their non-pain goals. Interestingly, those who catastrophized more about pain, were less accepting of pain, and experienced more distress, perceived the goal of pain control as conditional upon the pursuit of other goals. This study shows that perseverant attempts to control pain can be understood in light of the pursuit of other personal goals. Implications for both research and clinic are discussed.

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<sup>1</sup>Based on Lauwerier, E., Van Damme, S., Goubert, L., & Crombez, G. (submitted). The mixed blessings of attempts to control pain in chronic pain: A clinical study

## INTRODUCTION

We live in an era where scientists dream of the ability to redesign humans: manipulating genes for diseases not to occur or for lives to prolong. How hard is it then to live with a disease or illness that cannot be controlled? Living with chronic pain is one of those illnesses (Turk, 2005). Some chronic pain sufferers seem to adjust well to their pain and have a satisfying life despite their pain (McCracken & Eccleston, 2003, 2005; Viane et al., 2003). Others seem to get stuck in their attempts to take control over pain, and report increasing suffering over time (Aldrich, Eccleston, & Crombez, 2000; Crombez, Eccleston, Van Hamme, & De Vlieger, 2008b). In trying to understand these various approaches to the problem of pain, we take a motivational/self-regulatory perspective on pain suffering (Crombez, Eccleston, Van Damme, Vlaeyen, & Karoly, 2012; Eccleston & Crombez, 2007; Karoly, 1999; Van Damme, Crombez, & Eccleston, 2008).

Central to a motivational/self-regulatory view is the idea that the experience of pain hinders the pursuit of personal goals (Eccleston & Crombez, 1999). When pain is a sensation of short duration, it likely has no enduring effect on the attainment of goals. But when pain lasts, it may profoundly interfere with daily goal pursuit (Karoly & Ruelman, 2007). People will start to worry about pain (Eccleston & Crombez, 2007), and will take actions to undo the interference by pain (Carver & Scheier, 1998; Karoly, 1985, 1993, 1999). One course of action may be to engage in attempts to control pain. The problem of pain is typically framed as a biomedical one (Eccleston & Crombez, 2007), and people will likely engage in behavior that may lead to physical pain relief, such as medication use, bed rest, or avoidance of pain-evoking episodes.

Attempts to control pain are not easily given up. When they fail, people often try harder and narrow their focus further onto the pain problem to be solved, largely at the expense of engagement in other activities (Crombez, Eccleston, De Vlieger, Van Damme, & De Clercq, 2008a; Crombez, Van Damme, & Eccleston, 2005). When pain does not abate, catastrophic thinking about pain may be fueled, and distress and disability promoted (Aldrich et al., 2000). This is an anomaly. Why would patients

persist in misdirected attempts to solve the insoluble problem of pain when doing so promotes suffering? The simplest explanation is that pain is a biologically hard-wired signal of threat that demands to be removed (Crombez, Eccleston, Baeyens, & Eelen, 1997; Eccleston, 1995). Another explanation may be that pain is believed to be inextricably linked to disability or harm. Such a biomedical belief on pain is dominant in Western societies and positions pain as the obstacle in achieving valued goals. It is a belief that functioning can only be regained by removing the pain. A different approach may be to reframe the problem of pain. Acceptance as a therapeutic process, for example, aims at enabling patients to disengage from the unachievable goal of pain control and to build up a valued life in the presence of pain (McCracken & Eccleston, 2003). A further understanding of the processes underlying these approaches requires an examination of how people frame the goal of controlling pain. We believe that much is to be learned by examining the role of goals, and especially the goal to control pain, in chronic pain suffering.

The assessment of goals in chronic pain is not a well-studied area. Only a limited number of studies are available, for example studies focusing on the assessment of non-pain goals in chronic pain (Affleck et al., 1998, 2001; Hardy, Crofford, & Segerstrom, 2011; Karoly & Lecci, 1997; Karoly, Okun, Ruehlman, & Pugliese, 2008; Karoly & Ruehlman, 1996). A synthesis of this research suggests that chronic pain relates to less favorable goal process representations, such as lower valuations of goals, lower self-efficacy for pursuing goals or a heightened perception of conflict between goals (Karoly & Lecci, 1997; Karoly et al., 2008; Karoly & Ruehlman, 1996). Other researchers have used prospective designs and unraveled dynamic relations between pain, affect, and measures of goal progress and effort (Affleck et al., 1998, 2001; Hardy et al., 2011). In all of the above studies, the specific content of goals patients provided was not the primary focus of study. Nor were patients asked to report upon their pain-related goals, such as the goal to control pain. To our knowledge, there is only one study that specifically focused upon the content of pain-related goals. Hamilton, Karoly, and Zautra (2005) investigated how women with fibromyalgia (FM) prioritized different types of pain-related goals and

how this related to indices of adjustment. They found that those who prioritized goals related to pain control/treatment seeking (e.g., “To simply feel less pain than I do now”; or “To find a way to control my symptoms”), reported more weekly pain compared to those who focused on other pain-related goals (e.g., “To learn to get on with life despite FM”; or “To find a way to increase my energy level”). This study, however, did not assess how patients construct and appraise the goal to control pain. Also uninvestigated is how the goal to control pain is related to the pursuit of non-pain goals.

In the present study, we focused on whether the goal to control pain is salient in individuals with chronic pain and how it is appraised. In order to do so, we adopted the method developed within Personal Project Analysis (PPA; Little, 1983). PPA is a method that is available to assess individual’s goals, or personal projects, and their characteristics. Goals are typically assessed, first, by asking respondents to list all goals that are currently important to them, and, second, to let them rate these on a number of goal dimensions or appraisals. Typical examples of such appraisals include the extent to which one judges projects as difficult, important or stressful, whether one perceives having control over projects, spending a lot of time in the pursuit of projects, being satisfied with progress towards projects, and whether one rates projects as valuable, and self-identified (Austin & Vancouver, 1996; Little, 1989, 1998). We followed the same procedure, with one exception. We introduced the goal to control pain to be rated by participants whenever they did not spontaneously provide it. We also aimed to assess how the goal to control pain is related to the pursuit of other, non-pain goals. On the basis of a review of available methods (Emmons & King, 1988; Little, 1983; Sheldon & Kasser, 1995), we chose to adopt the Intergoal Relations Questionnaire (IRQ; Riediger & Freund, 2004). This method allows for the idea that goals may simultaneously influence each other in a positive (intergoal facilitation) and negative way (intergoal interference). By this, we were able to investigate whether the goal to control pain facilitates other goals (e.g., “to control pain allows me to go to work”), or interferes with these goals (e.g., “to control pain hinders me to go out with friends”).

Given the current state of affairs, we opted for an inductive, exploratory, and sometimes descriptive investigation of goals, specifically the goal to control pain, and their characteristics (Rozin, 2009). In summary, we sought answers to three questions: (1) Is the goal to control pain spontaneously reported by individuals with chronic pain?; (2) How do individuals with chronic pain appraise the goal to control pain?; and (3) What is the relative position of the goal to control pain in relation to other non-pain goals? We were also interested in individual differences in how the goal to control pain was appraised and structured as a function of key-concepts involved in misdirected problem solving or reframing, such as catastrophic thinking about pain, solving pain, acceptance, disability and distress. In line with the exploratory nature of the study, we made no a priori assumptions with respect to how goal characteristics would relate to these measures. However, we were interested in whether the above associations would emerge even when controlling for the effect of pain intensity.

## METHOD

### Participants

The present study was part of the Ghent Pain and Disability Study-I (GPD-I) consisting of three studies on chronic pain and functioning. Participants were recruited from Flemish patient associations from December 2010 onwards over a 4-month period. Inclusion criteria were: (a) being aged between 18 and 65 years old; (b) having sufficient Dutch language skills to fill out questionnaires; and (c) suffering from pain that lasted for 6 months or more. Exclusion criteria were: (a) headache; (b) a self-reported psychiatric disorder except for chronic pain disorder (e.g., major depression or psychosis); and c) physical limitations that made it impossible to participate in computer tasks. Of three thousand members of patient associations who were informed about the project, 315 expressed interest in being informed on future studies. As the main aim of the study was to test correlations, we assumed a medium value of  $r = 0.35$ ,  $\alpha = 0.05$  and a power = 0.80 to generate a required sample

size of at least 60. Of a total of 267 participants that we contacted, 32 did not meet inclusion criteria and were excluded from the study, 63 could not be reached, and 172 were eligible for the study. Eighty-two of those (response rate 47.67%) agreed to participate in the study. Main reasons for non-participation were distance to the research unit, health issues, and lack of interest or time. Eight patients refrained from participating owing to health problems, leaving a sample of 74 participants. One participant reported no pain at the moment of testing, leading to exclusion from further analyses. The final sample consisted of 73 participants (48 females, 25 males, mean age = 49.85 years ( $SD=9.72$ ), age range = 22 to 64 years). Most patients were married or living together (69.9%), and 39.4% had a higher education (longer than the age of 18 years). Only 18.1% was in paid employment or followed education, 7% was in unpaid employment, 13.9% was retired, and 4.2% was unemployed. All others (56.9%) received disablement insurance benefits or were legally trying to receive one. The mean pain duration was 14.04 years ( $SD=9.37$ ). Socio-demographic information on non-participants was not available.

## Measures

Socio-demographic information (i.e., age, gender, profession, education level, work status) and pain duration was assessed. Participants also completed a battery of questionnaires measuring the following constructs: type of goals, goal appraisals, intergoal interference and facilitation, pain intensity, problem solving and acceptance, catastrophizing about pain, disability and distress.

### **Type of goals, goal appraisals and intergoal interference and facilitation**

**Type of goals.** We followed the guidelines of the Personal Project Analysis (PPA; Little, 1983) and conducted a semi-structured interview in which clarifications, prompts and feedback are provided to elicit goals. Participants were asked to list all their current goals. Instructions stated that: "People typically have ideas of how they want to live their life, of what they want to attain or to avoid. Below, we refer to such ideas as *goals*. Everybody has his or her unique set of personal goals. Such goals can pertain to different life domains, for example, finances, travel, health, politics, family,

leisure time, friends, education, partnership, profession, and so forth.” Further on, some examples of goals were provided, such as: “Keep in touch with friends”, “Clean the house”, “Be a good parent”, “Find a part-time job”, “Have less discussion with the partner”, or “Do exercises more regularly”. We then asked participants to report as many personal goals as possible that they had for the near future, currently judged to be important, and still expected to be important in the upcoming months. In order for goals to become sufficiently salient for participants, we asked them to describe and write down their goals with a few words or short sentences (Ogilvie, Rose, & Heppen, 2001).

Goals were coded into 12 categories. We followed a standard coding procedure. Two independent raters were asked to do the initial coding. Whenever there was disagreement, a third rater was assigned and recoded until consensus was achieved. The coding was based on existing taxonomies of goals (Chulef, Read, & Walsh, 2001). There are a few main categories that are generally identified: general interpersonal goals (e.g., to keep in touch with friends), general intrapersonal goals (e.g., to be loving), health/physical domain goals (e.g., to lose weight), work/education goals (e.g., to do voluntary work), financial goals (e.g., to be financially independent), leisure/entertainment-related goals (e.g., to travel more), and psychological/mental well-being goals (e.g., to be full of energy). When examining the list of personal goals participants provided, we decided to add three other categories: one that encompassed goals related to house-holding (e.g., to clean the house), one that consisted of exercise goals (e.g., to walk on a daily basis), and one consisting of social validation goals, i.e. goals that have to do with gaining recognition from significant others about one’s pain (e.g., to be believed that the pain is real). Pain control goals, i.e. goals that consist of activities directed at altering pain, were classed in a separate pain control category (e.g., to have less pain). Lastly, there was a rest category, consisting of all goals that could not be classified into one of the 11 categories above. The inter-rater reliability was high (Cohen’s Kappa = .77,  $p < .001$ ) and there was an overall simple agreement coefficient of 79.5% (421-86/ 421).

Whenever the goal to control pain was not mentioned during free-elicitation, we introduced it to participants and asked them to briefly describe it ("Goals that are related to pain may take different forms. Patients may try to get rid of their pain or try to control their pain. One may try to pursue these goals by, for instance, taking medication, undergoing operations, consulting physicians, etc. Think of which goal related to pain you engage in. Try to briefly describe this goal."). Following the standard coding procedure described above, we coded the goal to control pain as either encompassing the need to get rid of the pain (1 = elimination of pain) or to manage pain (2 = manage or control pain). Three participants did not manage to comprehensively specify their goal to control pain. Therefore, results were limited to 70 participants. There was a high inter-rater reliability in coding (Cohen's kappa = .93,  $p < .001$ ; overall simple agreement coefficient = 97.14 (70-2/ 70)).

**Goal appraisals.** Conform PPA guidelines (Little, 1983), participants were asked to select their two most important goals. We also asked them to select their goal to control pain. They were asked to rate these goals on a number of appraisals (Austin & Vancouver, 1996; Little, 1989, 1998): (1) Importance ("This goal is important to me"); (2) Difficulty ("I find it hard to achieve this goal"); (3) Control ("I feel I am in control of this goal"); (4) Stressfulness ("I find it stressful to pursue this goal"); (5) Time ("I spend a lot of time in pursuing this goal"); (6) Satisfaction with progress ("I am satisfied with the progression I made in achieving this goal"); (7) Self-Identity ("This goal says a lot about who I am"); and (8) Value ("This goal is highly valuable to me"). Each appraisal had to be rated on a 7-point Likert scale, ranging from 0, *not at all*, to 6, *completely*.

**Intergoal interference and facilitation.** Using an adapted version of the Intergoal Relations Questionnaire (IRQ; Riediger & Freund, 2004), we measured intergoal interference and facilitation. In the original IRQ, participants are instructed to pair a restricted number of four goals (e.g., goal A, B, C and D) and to respond for each of these 12 goal pairs to the IRQ. The IRQ measures interference among goals in terms of: (a) time constraints, (b) energy constraints, (c) financial constraints (e.g., "How often can it happen that, because of the pursuit of goal A, you do not invest as

much time/energy/money into goal B as you would like to?”), and (d) incompatible goal attainment strategies (e.g., “How often can it happen that you do something in the pursuit of goal A that is incompatible with goal B?”). Intergoal facilitation is measured in terms of: (a) instrumental goal relations (e.g., “The pursuit of goal A sets the stage for the realization of goal B”), and (b) overlap of goal attainment strategies (e.g., “How often can it happen that you do something in the pursuit of goal A that is simultaneously beneficial for goal B?”). After extensive piloting in a sample of chronic pain patients recruited from a tertiary care center within a university hospital ( $N=15$ ), we decided to simplify the wording of the original items in order to increase comprehensibility. We created a set of three items that were understood by patients and appeared to match their experiences. In the current study, participants were instructed to pair a restricted number of three goals (i.e., their two most important goals (A and B), and their goal to control pain (C)) and to respond for each of these six goal pairs to the three items. Participants were asked to write down their three goals on a summary sheet to enlarge visualization and avoid cognitive overload. The three items reflected intergoal interference (e.g., “To what extent does the pursuit of goal A have a negative influence on the pursuit of goal B?”), intergoal facilitation (e.g., “To what extent does goal A have a positive influence on the pursuit of goal B?”), and goal necessity as a measure of conditional (facilitatory) goal achievement (e.g., “To what extent is it necessary to achieve goal A in order to be able to achieve goal B?”). In all, participants responded to a total of 18 items. Items had to be rated on a 5-point Likert scale, ranging from 1, *not at all*, to 5, *very much*. In the present study, we were interested in the interrelationship between the goal to control pain and the non-pain goals. Therefore, we averaged the ratings of the two non-pain goals. More specifically, pain goal interference was calculated by averaging the interference items of the goal to control pain on both other non-pain goals. The same procedure was used to calculate pain goal facilitation and pain goal necessity.

**Pain intensity.** The two-item pain severity subscale of the Dutch version of the Multidimensional Pain Inventory (MPI; Lousberg et al., 1999) was used (i.e., “Rate the level of your pain at the present moment”, and “On average, how severe has your

pain been during the last week”). Ratings are made on a 7-point scale (from 0 to 6). The sum score of the two items may range between 0 and 12. The MPI has been shown to have good reliability and validity (Lousberg et al., 1999). Cronbach’s alpha in this study was  $\alpha = .72$ .

**Problem solving and acceptance.** We used a modified version of the Pain Solutions Questionnaire (PaSol; De Vlieger, Van den Bussche, Eccleston, & Crombez, 2006), that measures efforts at changing, solving or accepting pain and the problems associated with pain. The original PaSol has 14 items grouped into four interrelated scales: (1) solving pain scale (4 items; e.g., “I try everything to get rid of my pain”); (2) meaningfulness of life despite pain scale (5 items; e.g., “Even when I have severe pain, I still find my life meaningful”); (3) acceptance of the insolubility of pain scale (3 items; e.g., “I can live with the idea that there is no solution for my pain”); and (4) belief in a solution scale (2 items; e.g., “I am convinced that there is a treatment for my pain”). Participants are instructed to describe the degree to which each statement applies to them. Each item is answered on a 7-point Likert scale, ranging from 0, *not at all applicable*, to 6, *highly applicable*. Although the original PaSol has demonstrated good reliability and validity (De Vlieger et al., 2006), subscale scores tend to be heavily skewed in chronic pain populations (Crombez et al., 2008b). Therefore, we decided to slightly adjust the wording of items out of the original item pool and tried to formulate them in a more straightforward manner. Some examples include the following: (1) solving pain (e.g., “I would try really everything to get rid of my pain”); (2) meaningfulness of life despite pain (e.g., “Even with pain, I still find my life meaningful”); (3) acceptance of the insolubility of pain (e.g., “I can live with the idea that there exists no solution for my pain”); and (4) belief in a solution (e.g., “I am truly convinced that there is a treatment for my pain”). Cronbach’s alpha’s in this study were  $\alpha = .85, .86, .78$  and  $.86$ , respectively for the four scales. Subsequent analyses showed that 3 (i.e., solving pain, acceptance of the insolubility of pain, and belief in a solution) out of the 4 subscales met criteria for normal distribution.

**Catastrophizing about pain.** The Dutch version of the Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995; PCS-DV; Crombez, Eccleston, Baeyens, &

Eelen, 1998) was used to measure catastrophic thinking about pain. It is a 13-item scale for both non-clinical and clinical populations. Participants are asked to reflect on past painful experiences and to indicate the degree to which they experienced each of the 13 thoughts or feelings during pain on a 5-point scale (e.g., “I can’t seem to keep it out of my mind”, or “I become afraid that the pain may get worse”). Scores range from 0 to 4. The PCS has shown to be valid and highly reliable (Osman et al., 2000; Van Damme, Crombez, Bijttebier, Goubert, & Van Houdenhove, 2002). Cronbach’s alpha in this study was  $\alpha = .90$ .

**Disability.** The Dutch version of the Pain Disability Index (PDI; Pollard, 1984) was used to measure pain-related disability. The PDI is a 7-item scale measuring the degree of disability individuals experience in each of seven different life domains. Ratings are made on an 11-point scale. The PDI has shown to have good reliability and validity (Tait, Chibnall, & Krause, 1990). Cronbach’s alpha in this study was  $\alpha = .79$ .

**Distress.** The Dutch version of the Hospital Anxiety and Depression Scale (HADS; Spinhoven et al., 1997) is a 14-item self-report screening scale for identifying affective distress. It contains two 7-item scales: one for anxiety and one for depression, both with a scoring range of 0 to 21. The HADS has been shown to have acceptable reliability and validity. In further analyses we used the total HADS score as an index of general affective distress (Spinhoven et al., 1997). In this study, Cronbach’s alpha was  $\alpha = .88$ .

## Procedure

We relied on the employment of self-report assessment and a semi-structured interview. First, participants were invited to fill in a first set of questionnaires at home (i.e., MPI, HADS, PCS, PDI). They had the choice to complete the questionnaires online ( $n=62$ ) or on paper ( $n=11$ ). Next, a three-hour appointment was made at the university consisting of three sequentially scheduled studies, with short breaks in between, of which the last study was the current one described. After participants were informed about the study and provided written consent, they were requested to

provide socio-demographic information and completed some brief questions concerning their pain. Subsequently, a semi-structured interview was assessed to measure types of goals, goal appraisals and intergoal interference and facilitation. Lastly, participants were asked to complete the adapted PaSol. The Local Ethics Committee of the Faculty Psychology and Educational Sciences (Ghent University) approved the study protocol.

### Statistical strategy

Data were analyzed using the Statistical Package for Social Sciences (SPSS 20.0) and Microsoft Excell 2007 for Windows (Microsoft ® Office Excell ® 2007). Prior to quantitative analyses, the distribution of the data were checked and data were checked for possible outliers. For some variables, skewness and kurtosis deviated from the acceptable range (-0.80 to 0.80 respectively -1 to 1). For these variables, non-parametric analyses were performed.

**Type of goals.** Counting the number of times a participant mentioned at least one goal of a specific category and calculating relative percentages, enabled us to investigate the distribution of goal types reported by our sample.

**Goal appraisals.** Descriptive statistics (mean, *SD*) were calculated for each of the goal appraisals of both the goal to control pain as well as the non-pain goals (averaged). Further, a series of pairwise t-tests or non-parametric wilcoxon-signed rank tests was conducted to examine whether there was a significant difference in goal appraisals of the goal to control pain compared to appraisals concerning non-pain goals. To obtain an objective and standardized measure of the magnitude of the observed effects, namely a standardized difference between two means, effect sizes (Cohen's *d*) for independent samples were calculated using Morris and DeShon's formula (Borenstein, Hedges, Higgins, & Rothstein, 2009). The 95% confidence interval (95% CI) was also calculated. Cohen's *d* is an effect size that is not design-dependent and conventional norms are available (Field, 2005). We determined whether Cohen's *d* was small (0.20), medium (0.50), or large (0.80) (Cohen, 1988). Lastly, pearson correlations or non-parametric kendall's tau correlations were

calculated to describe the association between goal appraisals on the one hand and problem solving, acceptance, and catastrophizing about pain on the other hand. Furthermore, partial pearson correlations or kendall's tau correlations were calculated to investigate whether associations remained when controlling for pain intensity.

**Interference and facilitation between goals.** In order to examine whether participants reported sufficient high levels of pain goal interference, facilitation and necessity, we calculated frequencies and proportions of response options across the sample. We used response options  $\geq 4$  as indicators of high levels (Riediger & Freund, 2004). Furthermore, pearson or kendall's tau correlations were calculated to assess associations between intergoal variables. Lastly, pearson or kendall's tau correlations were calculated to examine associations between pain goal interference, facilitation and necessity on the one hand and problem solving, acceptance, catastrophizing, disability and distress on the other hand. Also, partial pearson or kendall's tau correlations were calculated to examine whether those associations remained when controlling for pain intensity.

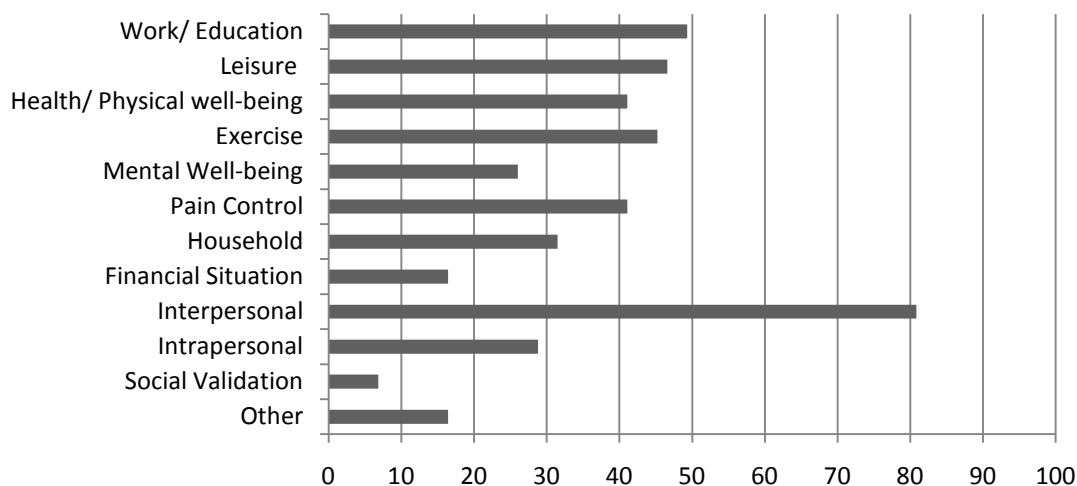
## RESULTS

### General descriptive information

Descriptive information regarding the questionnaires assessing problem solving, acceptance, catastrophizing, disability and distress, is presented in Table 4.

### Type of goals

In the elicitation stage, participants listed an average of 5.76 goals (range 3 to 12). Figure 1 shows the percentages of participants who reported at least one goal pertaining to the various life domains.



*Figure 1.* Percentages of participants who reported at least one goal pertaining to the various life domains.

We found that 41.1% of the participants reported at least one goal to control pain (pain control). Also, participants frequently reported one or more goal in the following life domains: interpersonal (80.82%); work/education (49.32%); leisure time (46.58%); exercise (45.21%); and health/ physical well-being (41.10%). The least mentioned were goals related to social validation (6.85%). Table 1 shows examples of goals reported for each goal domain. We also investigated how participants formulated their goal to control pain. We found that very few participants (6; 11.3%) wanted to eliminate their pain. The majority described their pain goal as wanting to manage or control pain (63; 88.7%). Furthermore, most participants described this goal in terms of active approach-oriented strategies, such as taking medication, consulting doctors, or taking physiotherapy. Rarely mentioned were strategies that are directed at the escape or avoidance of pain, such as resting, not going to work or reducing activities.

Table 1

*Sample goals across all life domains*

Life domains	Sample goals
Pain control	To have less pain To live without pain
Interpersonal	To build up social contact To maintain contact with friends
Intrapersonal	To get to know and live with my limitations To be less anxious in contact with other people
Health/physical well-being	To lose weight To sleep better
Work/education	To be able to work again To volunteer in helping students pass their language courses
Finances	To have no financial worries To save money to be able to buy a car
Leisure time	To travel To do cultural stuff (e.g., concerts, musicals, expositions)
House holding	To clean the house To be able to do the cooking
Psychological/mental well-being	To be able to enjoy pleasant things (e.g., watching kids play together) To feel useful again
Exercise	To be able to keep on doing exercise (e.g., swimming, walking) To improve walking condition
Social validation	To have others to know what pain is about To be believed by other people
Other	To grow old To hope for a good future for everybody

**Goal appraisals**

Table 2 and Table 3 display descriptive statistics on goal appraisals for participants' goal to control pain and their non-pain goals (averaged), respectively. Overall, goals related to controlling pain were rated as highly important and valuable, difficult to achieve, time-consuming and relatively stressful to pursue. Also, participants reported to have only moderate control over this goal. On average, other goals were evaluated as highly important and valuable, rated as moderately stressful

and controllable, and reasonably difficult to achieve. Participants reported to spend a lot of time in pursuing these goals. Furthermore, participants stated to be only fairly satisfied with progression in achieving both their goal to control pain as well as their non-pain goals. Lastly, participants identified themselves strongly with their non-pain goals, and to a lesser extent with their goal to control pain.

A series of pairwise t-tests or non-parametric wilcoxon-signed rank tests was conducted to examine whether there was a significant difference in goal appraisals between the goal to control pain and non-pain goals. Significant differences in goal appraisals were found for difficulty in achieving goals,  $t(72) = -2.80, p = .007$ , Cohen's  $d = 0.38$ , 95% CI [0.11, 0.66], stress while pursuing goals,  $t(72) = -2.09, p = .04$ , Cohen's  $d = .27$ , 95% CI [0.01, 0.52], time-investment into goals,  $Z = -2.48, p = .013$ , Cohen's  $d = -0.29$ , 95% CI [-0.01, 0.58], and extent to which goals were rated as self-identified,  $t(72) = 2.85, p = .006$ , Cohen's  $d = -0.38$ , 95% CI [-0.65, -0.11]. Overall, goals related to controlling pain are perceived of as more difficult to achieve and more stressful while pursuing, compared to non-pain goals. Also, contrary to non-pain goals, participants commit more time towards the pain control goal, but are less satisfied with progress in achieving this goal. Lastly, non-pain goals are perceived of as more self-identified in comparison with goals related to controlling pain. No significant differences in goal appraisals between the goal to control pain and non-pain goals were found for importance,  $Z = -.90, p = .367$ , control,  $Z = -.64, p = .523$ , satisfaction with progress,  $Z = -1.84, p = .066$ , and value,  $Z = -.53, p = .595$ .

Table 2

*Descriptive statistics and correlation coefficients between goal appraisals with regard to the goal to control pain and problem solving, acceptance and catastrophizing. Coefficients between brackets are partial correlation coefficients in which we accounted for the effect of pain intensity*

	<i>N</i>	<i>M</i>	<i>SD</i>	Solving pain (PaSol)	Meaningfulness <sup>b</sup> (PaSol)	Acceptance (PaSol)	Catastrophizing (PCS)
Importance <sup>b</sup>	73	5.66	0.67	.26* (.26*)	.12 (.12)	-.09 (-.09)	-.07 (-.08)
Difficulty <sup>a</sup>	73	4.08	1.57	.09 (-.02)	-.12 (-.08)	-.20 (-.14)	.19 (.10)
Control <sup>b</sup>	73	2.92	1.67	-.03 (-.01)	.20* (.19)	.24** (.23)	-.16 (-.15)
Stress <sup>a</sup>	73	3.37	1.70	.11 (.10)	-.18* (-.19)	-.20 (-.19)	.35** (.35**)
Time <sup>b</sup>	73	4.32	1.51	.32*** (.27*)	.04 (.10)	-.03 (.01)	.06 (.01)
Progress <sup>b</sup>	73	2.74	1.90	-.17 (-.12)	.38*** (.36**)	.28** (.26*)	-.28** (-.26*)
Identity <sup>a</sup>	73	3.78	1.79	.06 (.11)	.17 (.16)	.17 (.14)	-.20 (-.17)
Value <sup>b</sup>	73	5.51	0.99	.29** (.29*)	.16 (.17)	.10 (.11)	-.02 (-.03)

*Note.* <sup>a</sup>pearson (partial) correlations; <sup>b</sup>kendall's tau (partial) correlations; PaSol = Pain Solutions Questionnaire; PCS = Pain Catastrophizing Scale.

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

Table 3

*Descriptive statistics and correlation coefficients between goal appraisals with regard to non-pain goals (averaged) and problem solving, acceptance and catastrophizing. Coefficients between brackets are partial correlation coefficients in which we accounted for the effect of pain intensity*

	<i>N</i>	<i>M</i>	<i>SD</i>	Solving pain (PaSol)	Meaningfulness <sup>b</sup> (Pasol)	Acceptance (Pasol)	Catastrophizing (PCS)
Importance <sup>b</sup>	73	5.61	0.47	.08 (.07)	.08 (.09)	-.01 (.00)	-.06 (-.07)
Difficulty <sup>a</sup>	73	3.50	1.44	.25* (.20)	-.18* (-.16)	-.30* (-.27*)	.37** (.33**)
Control <sup>a</sup>	73	3.08	1.40	-.21 (-.17)	.25** (.23)	.30* (.28*)	-.15 (-.11)
Stress <sup>a</sup>	73	2.92	1.68	.19 (.09)	-.32*** (-.29*)	-.40*** (-.35**)	.43*** (.36**)
Time <sup>a</sup>	73	3.95	1.01	.13 (.11)	.16 (.17)	.12 (.15)	.05 (.01)
Progress <sup>a</sup>	73	3.21	1.50	-.16 (-.11)	.41*** (.40***)	.43*** (.41***)	-.39*** (-.36**)
Identity <sup>a</sup>	73	4.37	1.17	-.18 (-.15)	.21* (.21)	.25* (.23)	-.21 (-.18)
Value <sup>b</sup>	73	5.62	0.49	.00 (-.02)	.12 (.13)	-.04 (-.03)	-.02 (-.03)

*Note.* <sup>a</sup>pearson (partial) correlations; <sup>b</sup>kendall's tau (partial) correlations; PaSol = Pain Solutions Questionnaire; PCS = Pain Catastrophizing Scale.

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

Furthermore, (partial) pearson or kendall's tau correlations were calculated to investigate the association between goal appraisals and measures of problem solving, acceptance and catastrophic thinking about pain (see Table 2 and 3). Solving the problem of pain (PaSol) was positively related to appraisals concerning the goal to control pain. More specifically, higher levels of pain solving attempts were related to rating the goal to control pain as more important and more valuable, and to a higher time-investment, over and above the effects of pain intensity. Acceptance, i.e. acceptance of the insolubility of pain (PaSol) and meaningfulness of life despite pain (PaSol), was found to be positively related to satisfaction with progress in achieving goals, both the goal to control pain as well as non-pain goals. Also, acceptance was found to be associated with lower ratings of stress in pursuing non-pain goals. These associations remained when controlling for the effect of pain intensity. Lastly, catastrophizing about pain (PCS) was related to more stress while pursuing goals, both the goal to control pain as well as non-pain goals, and lower ratings of satisfaction with progress in achieving both kind of goals. Catastrophizing was also related to higher ratings of difficulty in achieving non-pain goals. All the above associations remained after controlling for the effect of pain intensity.

### **Interference and facilitation between goals**

**Descriptive statistics and intercorrelations.** High levels of pain goal interference were reported by 50% of the participants, 80.15% reported high amounts of pain goal facilitation, and 59.55% showed high pain goal necessity.

Subsequently, pearson correlations or non-parametric kendall's tau correlations were calculated to assess intercorrelations between intergoal variables. Pain goal interference was found to be unrelated to pain goal facilitation,  $\tau = .09$ ,  $p = .357$ . Also, and surprisingly, no significant association was found between pain goal facilitation and pain goal necessity,  $\tau = .08$ ,  $p = .397$ .

**Partial correlations between intergoal variables, and problem solving, acceptance, catastrophizing, disability and distress.** Table 4 presents the results of the correlational analyses between pain goal interference, facilitation and necessity

on the one hand, and problem solving, acceptance, catastrophizing, distress and disability on the other hand. Partial correlation coefficients, in which we accounted for the effect of pain intensity, are also presented. Attempting to solve pain (PaSol) was associated with higher levels of facilitation of the goal to control pain on non-pain goals, over and above the effect of pain intensity. Acceptance, i.e. acceptance of the insolubility of pain (PaSol) and meaningfulness of life despite pain (PaSol), was related to lower levels of necessity of the achievement of the goal to control pain upon the achievement of non-pain goals. After controlling for pain intensity, only the association with meaningfulness despite pain remained significant. In contrast, catastrophizing about pain (PCS) and distress (HADS) were related to higher levels of necessity of the achievement of the goal to control pain upon the achievement of non-pain goals, even when controlling for the effects of pain intensity. Disability (PDI) was found to have no significant associations with any of the intergoal variables.

Table 4

*Results of correlational analyses between pain goal interference, facilitation and necessity, and problem solving, acceptance, catastrophizing, disability and distress. Coefficients between brackets are partial correlation coefficients in which we accounted for the effect of pain intensity*

	<i>M (SD)</i>	Solving pain (PaSol) <sup>a</sup>	Meaningfulness (PaSol) <sup>b</sup>	Acceptance (PaSol) <sup>a</sup>	Catastrophizing (PCS) <sup>a</sup>	Disability (PDI) <sup>a</sup>	Distress (HADS) <sup>a</sup>
Interference <sup>a</sup>	3.16 (1.04)	.23(.19)	-.08 (-.06)	-.21 (-.16)	.09 (.06)	.05 (-.08)	.13 (.05)
Facilitation <sup>b</sup>	4.00 (0.84)	.26** (.26*)	.04 (.05)	-.02 (-.02)	.05 (.05)	.03 (.02)	.01 (-.01)
Necessity <sup>a</sup>	3.58 (1.04)	.07 (.00)	-.20* (-.17)	-.31** (-.28*)	.40*** (.37**)	.01 (-.13)	.39** (.34**)
<i>M</i>		16.53	20.88	8.78	23.25	39.87	17.04
<i>SD</i>		5.62	5.60	4.56	10.06	10.91	7.22

*Note.* <sup>a</sup>pearson (partial) correlations; <sup>b</sup>kendall's tau (partial) correlations; PaSol = Pain Solutions Questionnaire; PCS = Pain Catastrophizing Scale; PDI = Pain Disability Index; HADS = Hospital Anxiety and Symptoms Scale.

\* p< .05. \*\* p < .01.

## DISCUSSION

The current study aimed at providing answers to the following three questions using self-reports: (1) Is the goal to control pain salient in individuals with chronic pain?; (2) How do individuals with chronic pain appraise the goal to control pain?; and (3) What is the relative position of the goal to control pain in relation to other non-pain goals? We were also interested in whether there were individual differences in appraising and structuring the goal to control pain as a function of the concepts catastrophic thinking about pain, solving pain, acceptance, distress and disability. Our results can be summarized as follows. While less than half of our sample spontaneously reported the goal to control pain, it was rated as highly important and valuable by all participants. Participants assigned slightly less favorable appraisals to the goal to control pain as compared to their non-pain goals. Solving pain was related to rating the goal to control pain as more valuable and important, and to higher time-investment into the goal to control pain. Catastrophic thinking about pain was related to more stress while pursuing non-pain goals, more difficulty in achieving non-pain goals, and less satisfaction with progress towards non-pain goals, beyond the effect of pain intensity. Acceptance showed the reverse pattern of associations with non-pain goals. Lastly and intriguingly, those who catastrophized more about pain, reported more distress, and showed less acceptance, reported the pursuit of other goals to be conditional upon the achievement of the goal to control pain. These associations emerged beyond the effect of pain intensity.

Overall, our findings that goal appraisals and their interrelations vary as a function of differences in how individuals approach the problem of pain and associated psychological outcomes, are consistent with a self-regulatory/motivational perspective on pain suffering (Crombez et al., 2012; Eccleston & Crombez, 2007; Karoly, 1999; Van Damme et al., 2008). The recently formulated misdirected problem solving model is an interesting model in this respect (Eccleston & Crombez, 2007). The model explains how the interference of pain may lead individuals to become trapped in a vicious loop and consequent suffering and disability. To bring our findings into sharper focus, we will narrate our results through the model.

The model starts with the interference of pain and subsequent worry about pain and its possible future consequences. Worry sets the stage for people to think over possible solutions to undo the interference by pain. Together with worry, vigilance to pain will arise that helps to narrow attention to the pain problem to be solved. The problem of pain is typically framed as a biomedical problem in which pain is seen as the primary cause of disability. This leads easily to solutions aimed at relieving the pain. Such a problem solving approach is essentially normal and suffices when pain is acute and controllable (Eccleston & Crombez, 2007). Relieving pain will not necessarily solve the problem of chronic pain (Aldrich et al., 2000). Clinically, however, it may be observed that attempts at solving the problem of pain are not easily given up. Individuals with chronic pain are often as tenacious in attempting to solve pain as those with acute pain (Crombez et al., 2008b). We would then expect the goal to control pain to be a focal or salient goal to be achieved (Van Damme et al., 2008). Surprisingly, we found that less than half of our sample spontaneously reported pursuing the goal to control pain. However, when explicitly prompted with the goal to control pain, all participants rated it as highly valuable and important. Moreover, almost all participants reported to aim for pain to become manageable, instead of pain to be relieved. These results may be due to sample bias. We did not study a patient group, but individuals with chronic pain. The goal to control pain may be more salient in other samples, such as in those with chronic pain attending a specialist clinic or rehabilitation centre. Indeed, it has already been found that, in comparison with individuals with chronic pain recruited from self-help groups, patients show a greater tenacity in trying to solve their pain and were less acceptant of pain (Crombez et al., 2008b).

The misdirected problem solving model further shows how some individuals may become stuck in a perseverance loop in which failure to solve the problem of pain may fuel catastrophic thinking about pain or an exaggerated negative orientation towards pain. Those patients are believed to dominantly frame the problem of pain as one that requires the solution of pain relief or control. Eventually, this may increase disability and distress over time (Aldrich et al., 2000; Crombez et al., 2008b; Eccleston

& Crombez, 2007). In support of this view, we found, albeit correlationally, that solving pain was related to perceiving the goal to control pain as more important and valuable, and to higher perceived time-investment into the goal to control pain. Intriguingly, catastrophizing about pain was also related to higher reports of stress in pursuing non-pain goals, and less satisfaction with progression towards achieving those non-pain goals. Moreover, we found that catastrophizing about pain was related to perceiving the goal of pain control as a necessary condition for the pursuit of other non-pain goals, beyond the effect of pain intensity. This finding is in line with earlier studies on the relation between catastrophizing and prioritizing the goal to control pain (De Vlieger et al., 2006). Reporting pain control as a necessary condition in achieving other goals was also associated with less acceptance and more distress. Our findings support an emerging picture of those who catastrophize about pain actively trying to solve the problem of pain in order to retain functioning. Those patients seem to perceive the attainment of pain control as a necessary condition for reengaging in other goals that are blocked by pain (Lauwerier, Paemeleire, Van Damme, Goubert, & Crombez, 2011). These findings resemble earlier views on the role of erroneous beliefs in accounting for disability and distress. In delineating “myths about pain”, for instance, Malec, Glasgow, Ely, and Kling (1977) argued that most of the myths about pain relate to the belief that pain is an unambiguous signal of tissue damage that inevitably leads to disability, and that pain-related suffering can only be treated medically.

There exist other models assuming that the framing of the problem of pain in biomedical terms may lead to greater suffering and disability. The most influential example in this respect is the fear-avoidance model (FA) of pain (Vlaeyen & Linton, 2000). In essence, this model states that some individuals, when confronted with pain, will catastrophically interpret pain as a sign of serious injury or pathology over which one has little or no control. Catastrophizing may then lead to an excessive fear of pain that gradually extends to a fear of physical movements such that people will avoid those physical activities that are presumed to worsen their problem. Persistent avoidance of activities is dysfunctional and may lead to more pain, disability and

suffering over time. The FA model was originally developed from the cognitive-behavioral treatment of anxiety disorders and phobia (Leeuw et al., 2007), and largely positions pain behavior as a part of phobic behavior (Kori, Miller, & Todd, 1990). Within the model, catastrophizing about pain is seen as an erroneous misinterpretation, leading to increased fear and subsequent suffering. Our findings may expand this view beyond the object of fear. Catastrophizing may also result from the extent to which pain interferes with functioning or valued goals (see also, Eccleston & Crombez, 2007).

Although intriguing and new in the field of chronic pain, there already exists evidence for the relationship between conditional goal achievement and persistent, though misdirected, goal pursuit in other conditions, such as in depression (Crane, Barnhofer, & Hargus, 2010; Hadley & McLeod, 2010; Street, O'Connor, & Robinson, 2007). The theory used in these studies is conditional goal setting theory (CGS), developed as a way to understand why individuals may remain attached to goals that they consider as being relatively unattainable (Street, 2002). CGS is based on a hierarchical model of goals, stating that goals are hierarchically linked with the most concrete goals at the bottom (motor control goals; e.g., slice beef), the abstract goals on top (be-goals; e.g., be a good person), and intermediate goals in between (do-goals; e.g., prepare dinner) (Carver & Scheier, 1998). According to CGS, problems arise when the attainment of happiness is seen as conditional upon achieving particular lower order goals. Parallel to chronic pain, problems may arise when patients perceive their higher order goals (be-goals) to be conditional upon pain to be resolved or controlled (do-goal). This mechanism may further aid to understand the link between identity and emotional well-being in chronic pain. For instance, it has been shown that patients who perceive the achievement of their hoped-for self, i.e. how one hopes to become in the future, to be conditional upon the absence of pain, report higher levels of depression and less acceptance of pain (Morley, Davies, & Barton, 2005; Sutherland & Morley, 2007). Perhaps, the relationship between pain, identity and emotional disruption is largely dependent upon the way patients experience the achievement of their higher-order goals to be conditional upon achieving the goal to control pain.

Further research should unravel the behavioral consequences of goal setting. We found that those who believed that the attainment of other goals is conditional upon the pursuit of the goal to control pain, showed an assimilative coping style characterized by high levels of catastrophizing and low levels of acceptance. On a behavioral level, however, there was no link between necessity to control pain and disability. At further inspection, we think this might be due to the fact that beliefs about conditional goal achievement are rather higher-order constructs, i.e. relate to cognitive higher-order processes, whereas disability is a lower-order construct, measured at a behavioral level (e.g., the extent to which pain interferes with doing household chores). In order to overcome this problem, it might be worthwhile to think of methods to measure conditional goal achievement on a lower level by, for example, focusing on activities. Or, to measure disability on a higher level by, for example, assessing the interference of pain with valued goals.

When the unsuccessful search for a solution for pain dominates life, individuals might benefit from reframing the problem of pain (Eccleston & Crombez, 2007). This process is particularly present in the idea of acceptance of pain, which has been defined as "... being willing to experience pain without the need to control, avoid or otherwise change it, and reengaging into other valued goals" (McCracken & Eccleston, 2003). Consistent with this, we found that those who were more accepting of pain, reported less necessity to achieve their goal to control pain in order to be able to pursue other goals. The critical issue seems to be that the pursuit of other goals is no longer viewed as conditional upon the achievement of the goal to control pain. This tenet is akin to ideas applied in acceptance-based treatments, in which it is aimed to break the persistent struggle to control pain, and to help individuals to engage in valued-based activity despite pain being present (Hayes, 2004; McCracken & Yang, 2006). However, we should mention that we did not find any link between acceptance and reports of diminished value, importance, and time-investment concerning the goal of controlling pain. Instead, acceptance was related to the report of being more satisfied with progression towards goals, both the goal to control pain as well as non-pain goals. Also, we found that acceptance was related to lower levels

of perceived stress while pursuing non-pain goals. Perhaps, in some individuals, acceptance involves the giving up of non-pain goals that are too ambitious and the ability to adjust these or adopt more feasible ones that can be pursued in the presence of pain (Lauwerier et al., 2012; Van Damme et al., 2008). In other cases, attempts to control pain are readily misdirected and the pursuit of pain control is at the expense of other valued goals. In such instances, it may have merit to help individuals to give up the goal to control pain or at least their exclusive focus on it (Eccleston & Crombez, 2007).

Finally, we need to be aware of some study limitations. First, results of this study are based on cross-sectional data, so that we cannot provide cause-effect directions. We have been discussing the impact of goal appraisals and goal structure on adjustment. An alternative interpretation of the data might be that the experience of pain, catastrophic thinking and distress may have shaped goal processes. For example, it might be less difficult for individuals with low levels of distress to strive for non-pain goals, independent from the goal to control pain. The employment of moment-to-moment assessment by, for instance, diary approaches and the use of longitudinal designs will be necessary to allow causal inferences. A second limitation relates to sample characteristics. Within this study, we have explored goals and its characteristics in a self-defined chronic pain population, which may not be a representative sample of pain patients. Further study is needed with different populations, for instance patients with chronic pain attending specialist care or rehabilitation units. A final limitation is related to our method of eliciting goals. Although our methodology allowed us to investigate most forms of pain control goals, it is unsure whether it is suited to assess the more passive pain control goals. As these include activities a person does not do (anymore) to prevent increases of pain (e.g., to stop walking the dog out), other, more subtle, assessment methods may be required. Also, we may want to comment on the type of pain-related goals we focused on. Although our focus on the goal to control pain was derived from our research aim, we do not claim that other pain-related goals might not be equal or even more important to investigate. Future research might benefit from including other types of pain-

related goals (see also, Hamilton et al., 2005) and to examine their characteristics with respect to self-regulation and well-being.

In sum, our findings, albeit preliminary, provide ground for the idea that the assessment of pain-related goals in a context of multiple, valued non-pain goals may help both researcher and practitioner to understand the complexity of chronic pain suffering.

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Contemporary action-theoretical thinking about coping with chronic pain has emphasized that persistent attempts to solve the problem of pain may become misdirected and fuel further suffering when pain happens to be insoluble. A more viable option would then be to reframe the problem of pain and engage in valued activities despite the pain being present (e.g., Eccleston & Crombez, 2007; Hayes, Strosahl, & Wilson, 1999; McCracken & Eccleston, 2003; Van Damme, Crombez, & Eccleston, 2008). The present thesis sought to increase understanding of the processes of problem solving and acceptance, and their role in explaining adaptation to chronic pain. More specifically, we started from the dual-process model developed by Brandstädter and Renner (1990), and distinguished two modes of coping: assimilation and accommodation. Assimilative coping involves attempts to diminish the impact of pain in order to re-engage in activities and goals one was committed to before pain occurred. We labeled this as problem solving. Accommodation represents the devaluation of the importance of pain control, and the reengagement in other valuable goals that are less affected by pain. We labeled this way of coping as acceptance. Taking this perspective, we examined the utility of existing questionnaires aimed at measuring problem solving and acceptance in chronic pain (**Chapters II and III**), the role of the problem frame in solving the problem of pain (**Chapter IV**), and individual variability in problem solving and acceptance strategies (**Chapter V**). Furthermore, this thesis aimed to contribute to the lack of understanding on the reasons behind persistent, yet futile, problem solving attempts in some individuals with chronic pain (**Chapter VI**). The current chapter intends to provide a summary and integrative discussion of the findings that were described in the previous chapters. Also, theoretical and clinical implications, future research directions, and limitations will be considered.

## SUMMARY OF THE MAIN FINDINGS

### Utility of self-report measures assessing problem solving and acceptance

In **Chapter II**, we examined the utility of the Illness Cognitions Questionnaire (ICQ; Evers et al., 2001), being a measure of generic attitudinal reevaluations. These are also called illness beliefs and are believed to be implied in adjustment to a variety of long-term diseases. The instrument distinguishes between three types of illness beliefs: 1) cognitions that emphasize the negative meaning of a stressor (i.e., helplessness); 2) cognitions that diminish the aversive meaning of a stressor (i.e., acceptance); and 3) cognitions that add a positive meaning to a stressor (i.e., benefit finding). These cognitions represent possible distinct reactions that are believed to mediate the relationship between stress and psychological and physical outcomes (e.g., Lazarus & Folkman, 1984). The first type of cognitions may be linked to the intermediate phase between assimilation and accommodation, characterized by a perception of losing control and not (yet) being able to reengage in valued other activities (e.g., Brandstädter & Renner, 1990). The second type of illness cognitions are more representative of an accommodative style of coping as these refer to a decrease of negative thinking about illness. It remained to be investigated whether the three-factor structure of the ICQ could be validly and reliably assessed in samples of individuals faced with an aversive, persisting condition with a high degree of uncontrollability and unpredictability. Our results supported the three-factor illness cognition structure in our samples of individuals with chronic pain and chronic fatigue. Also, we found an invariant internal structure in individuals with chronic pain and chronic fatigue, which reveals a closely corresponding, reliable pattern of cognitive reactions to both largely unpredictable and uncontrollable conditions. Overall, Chapter II offered support for the distinction between control-related and acceptance-related responses to chronic pain by demonstrating that these two dimensions or mechanisms could be validly replicated in our sample of investigation.

In **Chapter III**, we aimed at investigating the content of questionnaires that are developed to measure acceptance of chronic pain. This study was predominantly

motivated from the observation that various self-report measures that are used to assess chronic pain acceptance differ considerably in their definition of acceptance and show little overlap (e.g., Reneman, Dijkstra, Geertzen, & Dijkstra, 2009; Viane et al., 2003). Therefore, there was need to examine which features of acceptance are measured by available instruments, as well as to map (dis)similarities between measures in their conceptualization of chronic pain acceptance. We developed a heuristic frame that included main categories referring to accounts of acceptance, as well as contrast categories that were not considered as acceptance. According to our action-theoretical view on acceptance, influenced by formulations within various self-regulatory and developmental theories (e.g., Boerner & Jopp, 2007; Brandstädter & Renner, 1990; Carver & Scheier, 1998; Heckhausen & Schulz, 1995), chronic pain acceptance is defined as the *disengagement* from the unattainable goal to control pain, and the *reengagement* into other valuable goals that are less affected by pain (Eccleston & Crombez, 2007; Evers et al., 2001; Schmitz, Saile, & Nilges, 1996; Van Damme et al., 2008). There exists yet another account on acceptance that stems from a behaviorist tradition (Hayes, Jacobson, Follette, & Dougher, 1994). Research on chronic pain within this tradition has focused on two core constituents of acceptance: a *willingness* to experience pain, and the *engagement into valued-based life activity* despite pain (McCracken et al., 2003; Vowles, McCracken, McLeod, & Eccleston, 2008; Wicksell, Olsson, & Melin, 2009). Our heuristic frame therefore included facets of acceptance as presented by the above accounts: disengagement from pain control, engagement in activities other than pain control, and willingness. Further reflections on the parallel between these accounts will appear later on in this chapter. Separate items of questionnaires were coded with respect to their loadings on the categories of the heuristic frame. Furthermore, we conducted multidimensional scaling (MDS) to examine the extent to which items of the questionnaires loaded on the acceptance categories, or on contrast categories. Two interpretable dimensions resulted from our MDS-analysis. At one endpoint, those dimensions reflected willingness and engagement as core facets of acceptance (McCracken et al., 2003; Vowles et al., 2008; Wicksell et al., 2009). Many items, however, also measured the opposite of

acceptance, as revealed by the other endpoints of the dimensions: controlling pain and disability. Furthermore, a considerable number of measures loaded to a high extent on contrast categories, and few seemed to load on pre-intended acceptance categories. Taken together, our results raised important concerns about the content validity of current self-report measures assessing chronic pain acceptance. There were also encouraging exceptions, such as the Chronic Pain Acceptance Questionnaire (CPAQ-34; Geiser, 1992), Brief Pain Coping Inventory (BPCI; McCracken, Eccleston, & Bell, 2005a), and the Pain Solutions Questionnaire (PaSol; De Vlieger, Van den Bussche, Eccleston, & Crombez, 2006). This may favor further work with these instruments in subsequent research.

### **Empirical studies regarding the problem frame, individual variability in problem solving and acceptance strategies, and reasons behind attempts to solve the problem of pain**

In **Chapters IV, V, and VI**, empirical studies were conducted to substantiate some theoretical implications evolving from the model of misdirected problem solving developed by Eccleston and Crombez (2007). The model is mainly fed by the action typology as proposed within the dual-process model of coping of Brandstädter and Renner (1990) as it includes different paths of coping with the obstacle of pain: to engage in problem solving attempts (assimilation or problem solving) or to reframe the problem (accommodation or acceptance).

**Chapter IV** aimed at investigating the assumption that individuals may become involved in ineffective problem solving as a result of a narrow and biomedical problem formulation solely directed towards the cure or alleviation of pain. To this end, we empirically investigated problem solving in two patient samples: one consisting of patients diagnosed with episodic migraine and the other diagnosed with medication-overuse headache (MOH). MOH is a disorder that is characterized by an increased headache frequency up to a daily or near-daily pattern (Silberstein, 2005). One of the typical diagnostic criteria for MOH is the implication of an overuse of acute medication in the exacerbation of headache. MOH occurs frequently in patients with

episodic migraine (Bigal & Lipton, 2008; Colás, Muñoz, Temprano, Gómez, & Pascual, 2004; Dodick & Silberstein, 2008), but, as yet, there is no conclusive evidence on why some patients develop a pattern of medication overuse. Clinical practice teaches us that patients often overuse their medication despite being aware of the fact that immediate outcomes of such behavior are negative (Tepper & Tepper, 2010). To us, it appeared valuable to re-interpret and study this paradoxical behavior from a functional, action-theoretical perspective on coping with pain. In line with our hypotheses, we found that those with MOH reported more attempts at solving the problem of pain, expressed to be in higher need for pain medication, and inclined to be more concerned about tolerance to medication and withdrawal symptoms, compared to those diagnosed with episodic migraine. Also, attempts to solve pain, need for medication and concerns about unfavorable scrutiny by others all seemed to be uniquely associated with MOH, even after controlling for demographic variables and pain intensity. Despite limitations concerning the cross-sectional design and the relatively small observed effects in this study, it offers evidence on the devastating effects of framing the problem of pain as one that requires instant medical resolution. Notwithstanding complementary explanations, we suggested it to be likely that those who frame the problem of pain as one that has to be solved may engage in persistent attempts to solve pain, despite and at further risk of negative consequences and concomitant suffering.

In **Chapter V**, we aimed at investigating which strategies individuals with chronic pain employ in solving the problem of pain. Research has demonstrated that individuals with chronic pain who adopt an assimilative coping style, characterized by attempts at solving the problem of pain, not accepting pain to be insoluble, and not believing that a meaningful life is possible despite pain, report more physical and affective distress, and display a higher level of catastrophic thinking about pain (Crombez, Eccleston, Van Hamme, & De Vlieger, 2008; De Vlieger et al., 2006). These studies, however, report on individual's self-reported attitudes on how to solve the problem of chronic pain. In addition, participants are required to report on these attitudes in general, and the specific context of chronic pain is not provided.

Therefore, we developed a problem solving task aimed at the assessment of the strategies individuals employ in solving the problem of chronic pain. We modified the Means-Ends Problem Solving Task (Platt & Spivack, 1975) for its applicability to the context of chronic pain. Our task, labeled the Means-End Problem Solving Task for Pain (*MepsforPain*), consisted of three vignettes with a standard structure that was based on the idea of goal hierarchy as proposed by Carver and Scheier (1998). Within the vignettes, pain blocked the attainment of middle-level goals, i.e. goals that include activities one is willing to undertake, assumed to be essential in attaining higher-level goals, i.e. goals that involve what person one wants to be. The task required participants to respond with various means to achieve the desired higher-level goal again. Answers were coded according to a frame that mainly included the distinction between the two opposed modes of coping as outlined within the dual-process model of coping proposed by Brandstädter and Renner (1990). Assimilation was captured by the number of responses related to the removal or controlling of pain and was labeled as problem solving. Accommodation was labeled as acceptance and contained the number of responses related to the relinquishment of the blocked activity, the modification of the activity, and/or the adoption of a new activity in order to come to resolve the problem situation and attain the higher-order goal. We divided participants into three groups based upon their response patterns. There was the problem solving group, i.e. more problem solving responses, the balance group, i.e. equal numbers of problem solving and acceptance responses, and the acceptance group, i.e. more acceptance responses. Results demonstrated that the groups differed significantly in their ratings of the extent to which solving pain was necessary for the resolution of the problem situation, with the problem solving group showing the highest ratings, and the acceptance group the lowest. Also, responses of the problem solving group were rated as significantly less effective by experts when compared to those of the acceptance group. Effectiveness ratings of those who reported equal amounts of problem solving and acceptance responses did not differ from both the other groups. Unexpected was the finding that groups did not differ in (correlates) of adaptation to pain, i.e. catastrophic thinking about pain, disability, and distress.

Furthermore, we only found sporadic correlations between the *MepsforPain* and the *PaSol*, which assesses attitudes towards problem solving and acceptance of chronic pain. Only the number of responses related to the modification of the activity was negatively associated with attitudes about having to solve the pain and beliefs about the solubility of pain. Lastly, besides problem solving and acceptance, we also identified a variety of other coping responses. Most intriguingly were the results regarding responses aimed at a persistence with the same activity. Our results pointed out that persistence was associated with a higher necessity to solve pain, a higher problem solving attitude towards pain and less effective responses. This may raise the possibility that persistence may also occur out of a pursuit to control pain. Given some methodological concerns (see discussion section Chapter V), caution is warranted regarding the interpretation of observed associations or the lack of associations. Nevertheless, the study appears to have merit in being one of the first attempts to capture the variety of ways in how individuals solve the problem of chronic pain. It seems appropriate to fine-tune the measure in future research in order to enhance its applicability for the assessment of problem solving and acceptance in chronic pain.

**Chapter VI**, finally, describes the findings of an empirical study on the reasons underlying attempts to solve the problem of pain. It has already been evidenced that trying to solve the problem of pain may become ineffective in individuals with chronic pain and may lead to further costs and suffering (Crombez et al., 2008; De Vlieger et al., 2006). This has been called misdirected problem solving (Aldrich, Eccleston, & Crombez, 2000; Eccleston & Crombez, 2007). The reasons underlying this paradoxical behavior are not understood. We corroborated from the idea that a biomedical belief on pain primarily instigates persistent problem solving. This belief may consist of the idea that pain hinders functioning which can only be regained by solving the problem of pain (Aldrich et al., 2000; Eccleston & Crombez, 2007; Malec, Glasgow, & Kling, 1977). Acceptance, on the other hand, means the disengagement from the goal to solve the problem of pain towards building up a valued life in the presence of pain (McCracken et al., 2003). Within this chapter, we followed an

idiographic-nomothetic approach and sought answers to exploratory questions concerning the elicitation, representation and structure of the goal to solve or control pain and other life goals in individuals with chronic pain. Nevertheless the fact that only half of our sample spontaneously reported the goal to solve or control pain, this goal was rated as highly important and valuable by all. Though, its attainment and the progress towards the goal were also perceived as less favorable when compared to how individuals rated their non-pain goals. We also noticed individual differences in how individuals perceive their goals. An attitude towards solving pain was related to rating the goal to solve or control pain as more valuable and important, and to higher time-investment into this goal. Catastrophic thinking about pain was related to more stress while pursuing non-pain goals, more difficulty in achieving non-pain goals, and less satisfaction with progress towards non-pain goals, beyond the effect of pain intensity. Acceptance showed the reverse pattern of associations with non-pain goals. Lastly, those who catastrophized more about pain, reported more distress, and showed less acceptance, reported the pursuit of non-pain goals to be conditional upon the achievement of the goal to solve or control pain. These associations emerged beyond the effects of pain intensity. Despite limitations pertaining to the correlational design and the restricted sample of individuals with chronic pain, this study has valuable merit in studying the significance of attempts to solve or control pain in relation to a multiplicity of valued non-pain goals. Based on our preliminary findings, it may be suggested that, for some individuals, attempts to control pain may serve high value because of the link with valued other goals to be obtained. In chronic pain, the inability to solve the problem of pain may be associated with more catastrophic thinking about pain and more distress.

## INTEGRATIVE DISCUSSION AND THEORETICAL IMPLICATIONS OF THE MAIN FINDINGS

### **An action-oriented, goal-directed view on coping with pain**

**Coping and self-regulation: A mix of two approaches.** Being one of the most active areas of psychological enquiry, considerate evidence has been gathered on the important role of coping in explaining adaptation to pain (e.g., Jensen, Turner, Romano, & Karoly, 1991; Tan, Jensen, Robinson-Whelen, Thornby, & Monga, 2001). For many years, however, coping research has mainly focused upon the question whether certain coping strategies are *more effective* in promoting well-being than others. Regardless of the plethora of ways in which coping has been defined, the central idea has long been that gaining control over pain is most beneficial and always leads to better outcomes. This idea has been criticized and it has been argued that the adaptiveness of coping depends upon the *specific context* in and *function for which* it is being used (e.g., Skinner, Edge, Altman, & Sherwood, 2003).

This thesis entails a renewed view on coping with chronic pain, which is heavily influenced by the dual-process model of coping as proposed by Brandstädter and Renner (1990). Being an action-oriented model, it assumes individuals to be actively involved in shaping their development within the *context* of their own potential and limitations. The model describes that, as individuals get older, it is natural to remove efforts to solve encountered problems that block developmental goals toward efforts to adapt goals in order to become more achievable. The first coping approach is called assimilation, whereas the latter is called accommodation (Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002). Assimilation in the context of pain entails attempts directed at solving the problem of pain in order to restore pre-pain functioning (problem solving). Accommodation rather means the devaluation of the importance of pain control, and the reengagement into other valuable goals that are less affected by pain (acceptance) (Eccleston & Crombez, 2007; Van Damme et al., 2008). Although it is presumed that neither of these two coping approaches are always functional, we also consented from the idea that

individuals may become stuck in problem solving when pain happens to be insoluble. This pattern has been called *misdirected problem solving* (Aldrich et al., 2000; Eccleston & Crombez, 2007).

Above all, the theoretical thinking adopted in this thesis represents one of the scarce attempts to integrate coping processes within the theoretical framework of self-regulation (see also, Leventhal, Meyer, & Nerenz, 1980). Self-regulation broadly refers to efforts adopted by individuals to alter their thoughts, feelings, and actions in the perspective of long-term, higher-order goals (Carver & Scheier, 1998). Like coping theories, self-regulation models of behavior are equally concerned with actions that individuals undertake to overcome undesirable states. The trademark of self-regulation theory is however the idea that *goals* energize behavior and give meaning to life (e.g., Austin & Vancouver, 1996; Karoly, 1993). One of the most influential self-regulation theories concerns the cybernetic control theory developed by Carver and Scheier (e.g., Carver & Scheier, 1990, 1998). A simplified description of the model would entail that an individual acts upon eliminating a perceived discrepancy between one's current state and one's goal. Further on, it is assumed that goals are linked in a hierarchical manner. They propose a hierarchical structure of higher-order system concepts and be-goals, followed by middle-level do-goals, with low-level motor-control goals at the bottom. Goals at a lower level of hierarchy are believed to provide the means in achieving higher-level goals. Also, the higher in the hierarchy, the closer the link with one's sense of self or identity and the more an individual is committed to this goal. Focus of investigation in this thesis are goals at the middle-level of hierarchy, either assumed implicitly (Chapters *III*, *IV*, *V*) or assessed explicitly (Chapter *VI*). Lastly, the function of the control system is to reduce discrepancy and promote goal striving. However, in case goals happen to be unattainable, disengagement may occur together with a re-engagement into more favourable goals (Wrosch, Scheier, Miller, Schulz, & Carver, 2003b). This dual-component notion of disengagement and reengagement is clearly articulated within our concept of an acceptance of chronic pain (Chapters *III*, *IV*, *V*, *VI*).

### Unit of analysis

***Generic versus disease-specific.*** In the current thesis, we prominently focused on behavior in context. This calls for congruence between the conceptual frame and the unit of analysis.

Differential processes in adjusting to chronic disease have been proposed to be captured by investigating the way in which individuals think about their disease (e.g., Evers et al., 2001; Leventhal & Nerenz, 1985; Weinman, Petrie, Moss-Morris, & Horne, 1996). Among these attempts, the development of the Illness Cognition Questionnaire (ICQ; Evers et al., 2001) was most resonant with the aims of the current thesis, as it is modeled after action-theoretical thinking about adaptation to adversity (e.g., Brandstädter & Renner, 1990; Heckhausen & Schulz, 1995; Thompson, Nanni, & Levine, 1994). The instrument measures three distinct ways of cognitively re-evaluating a chronic disease: helplessness, acceptance and disease benefits. Helplessness relates to emphasizing the negative meaning of a stressor. In this sense, it may be linked to the intermediate phase between assimilation and accommodation, characterized by a perception of losing control and not (yet) being able to reengage in valued other activities. Acceptance refers to a decrease of negative thinking about one's disease and may be linked to our notion of accommodation or acceptance. In Chapter II, we found evidence for the validity of its three-factor structure in a sample of chronic pain patients and patients with chronic fatigue. The ICQ was specifically developed for the assessment of both maladaptive and adaptive processes in a variety of chronic diseases. As such, it constitutes a particular good instrument to compare different conditions and to study possible common mechanisms that contribute to individual differences in well-being and adaption (e.g., Evers et al., 2001; Felton & Revenson, 1984). Nevertheless, the reverse side of the instrument is that it might serve as a less good tool for studying the particular ways in which individuals adapt to chronic pain. In Chapter III, for example, we examined the content of self-report instruments designed to assess acceptance of chronic pain. Three out of thirteen instruments examined were generic and measured acceptance of illness, i.e. the ICQ (Evers et al., 2001), the Acceptance of Illness Scale (AIS; Felton & Revenson, 1984),

and the Medical Coping Modes Questionnaire (MCMQ; Feifel, Strack, & Nagy, 1987). In order to be able to measure acceptance of pain, Rankin and Holtum (2003) adapted the AIS to the situation of pain and labeled it the Acceptance of Illness Scale for Pain (AIS-P). It is questionable whether the AIS-P represents a true pain-specific measure as it only involved a modification of the AIS by replacing the word “illness” with the word “pain” for each item. We found that many instruments loaded on categories that did not represent acceptance. However, also noticeable was the fact that the content of generic instruments was to a great extent coded as unclear and/or not encompassing any notion of acceptance. More precisely, more than half of the MCMQ and about one fourth of the AIS and AIS-P did not seem to cover any notion of acceptance, and half of the item content of the ICQ was coded as unclear. This may suggest that these instruments are less responsive in measuring what is commonly understood as the acceptance of chronic pain.

In line with the assumptions of the dual-process model of coping as proposed by Brandstädter and Renner (1990), De Vlieger et al. (2006) developed the Pain Solutions Questionnaire (PaSol). This 14-item instrument was specifically designed to measure attitudes towards solving the problem of pain. Assimilation (problem solving) is captured by the solving pain subscale as it assesses beliefs regarding attempts to solve or control the problem of pain, whereas accommodation (acceptance) is captured by the meaningfulness of life despite pain and the acceptance of the insolubility of pain subscales as these assess beliefs regarding the insolubility of pain and the engagement with life activities despite the pain. The PaSol can be reliably and validly assessed in chronic pain populations (De Vlieger et al., 2006), and it has tested utility in accounting for the variability in disability and affective distress (Crombez et al., 2008; De Vlieger et al., 2006). Furthermore, the instrument seems to possess good internal consistency. Cronbach’s alpha’s of the four subscales across all empirical studies within the current thesis were above .78 (see Chapters IV, V, and VI). Still, instrument development is an ongoing process and some aspects of its reliability and validity have yet to be tested or confirmed, such as its psychometric study in other chronic pain populations, ceiling effects, sensitivity to

change, etc., as recently evidenced by Reneman et al. (2009). In contrast to their study, however, the results of Chapter *III* confirm the content validity of the PaSol as its item content reasonably sampled the concepts of interest. Therefore, it seems advisable to incorporate the measure in future studies that aim to examine problem solving and acceptance in the context of chronic pain. Its main strength, above other measures of pain coping, such as the Vanderbilt Pain Management Inventory (Brown & Nicassio, 1987), or the Coping Strategies Questionnaire (Rosenstiel & Keefe, 1983), lies in the fact that it explicitly takes into account the context of chronic pain. As such, ecological validity increases. In addition, concerns have also been raised about the confounded assessment of coping and other constructs, such as catastrophic thinking about pain (e.g., Jensen et al., 1991; McCracken & Eccleston, 2003). While constructing the PaSol, however, it was explicitly taken into account that there was no item overlap with both outcome measures (i.e., distress, disability), and process measures (i.e., attention, catastrophizing) (De Vlieger et al., 2006). Moreover, it will be further argued in this chapter that catastrophizing is best be conceived as an extreme instantiation of worry, instead of a coping strategy (Eccleston, Crombez, & Aldrich, 2001).

The aim of the study described in Chapter *V* was to develop an instrument that enabled to capture individual variability in problem solving and acceptance strategies employed by individuals. Vignettes were designed that required individuals to generate responses or solutions to the problem of chronic pain. The design of the measure was modeled after the Means-Ends Problem Solving Task (MEPS; Platt & Spivack, 1975). We labeled our measure the *MepsforPain*. This measure could offer a triple advantage. First, it takes into account the context of chronic pain and the vignettes are ecologically representative. In support of this, during administration of the *MepsforPain*, it showed that the vignettes contained material relevant to the individual's experiences (see discussion section Chapter *V*). Second, the fact that individuals are required to self-generate responses may make the *MepsforPain* a useful clinical tool as the assessment experience itself becomes something that is personally evocative. Administration of the *MepsforPain* showed material presented

to be emotionally valenced which often led to personal reflection of participants (see discussion section Chapter V). Third, the MepsforPain allows for a conjoint assessment of data both on an individual as well as group level. This latter point also requires a sound coding of idiographic data, which may be one of the major weaknesses of the MepsforPain at this point. This and other methodological concerns will be tackled later in this chapter.

***“Context” towards “person-in-context”.*** Central to the above attempts is that coping strategies adopted by individuals are perceived of as *contextual units*. A critical extension would be to consider *person-in-context units*. Coping, as already positioned by Lazarus and Folkman in 1984, is a process that particularly unfolds in the context of a condition that is appraised as personally significant and as taxing or exceeding an individual’s resources. It follows that a unit of analysis should allow to tackle person-context relationships. One way to achieve this is to consider the *personal constructs* through which individuals view themselves and their contexts. There exist numerous theories that all differ in their conceptual framing of these personal constructs. Also, several terms have been proposed to tag these constructs, such as *current concerns*, *personal projects*, *personal strivings*, *life tasks*, or *goals* (Cantor & Zirkel, 1990; Emmons, 1986; Klinger, 1977; Little, 1983; Locke & Latham, 1990). Within the current thesis, goals are defined as desired end-states that one wants to attain or avoid (Austin & Vancouver, 1996). As already mentioned before, this thesis focuses on middle-level units of analysis or *do-goals* (see also, Carver & Scheier, 1998). Further, a phenomenological stance is taken and it is assumed that individuals are readily aware of their goals and are able to make constructions of their content, structure, and various unfolding processes. Several instruments have been proposed to measure goals as person-in-context units of analysis, such as the Goal Systems Assessment Battery (GASB; Karoly & Ruehlman, 1995), the assessment of current concerns (Klinger, Barta, & Maxeiner, 1981), or Personal Project Analysis (Little & Gee, 2007). Focus has not only been on assessing what people want (i.e., the content of goals), but also on how people think about or construe what they want (i.e., goal dimensions or representations, structure, or other processes). Such constructions

likely provide the impetus for voluntary action or coping. The study described in Chapter VI describes data gathered by use of Personal Project Analysis (PPA). PPA methodology requires individuals to first generate a listing of their own personal projects, which are then asked to be appraised on a set of dimensions. Chapter VI describes this standard procedure complemented with optional measures based upon the research purpose of the study. PPA is a method that is suitable to allow a person-in-context analysis. There are several advantages to its use, amongst which the free elicitation of personally salient and evocative goals without being primed by the researcher, the ecological representativeness of action in context, and the conjoint assessment of individual and group levels of measurement (for a detailed discussion, see Little, 2000). A detailed integration of results as well as methodological concerns and future research directions will be discussed further in this chapter.

### **Problem solving and acceptance: emerging empirical facts**

**The misdirected pursuit of solving the problem of pain.** Within the current thesis, we sought to further investigate the idea that how one approaches the problem of pain may have differential effects on adaptation to pain. More specifically, it has been assumed that a biomedical framing of the problem of pain may instigate problem solving attempts primarily directed towards the relief or control of pain (Aldrich et al., 2000; Eccleston & Crombez, 2007). We found that a problem solving mode aimed at the singular solution of pain relief was uniquely related to the diagnosis of medication-overuse headache, a condition exemplified by an increase of headache frequency and concomitant suffering. Aside from alternate explanations, this finding is also in line with studies on coping with chronic non-headache pain. Those studies found that a problem solving approach that is primarily characterized by attempts to solve the problem of pain is associated with cognitive, affective and/or physical consequences, such as heightened distress, disability, or vigilance to pain (Crombez et al., 2008; De Vlieger et al., 2006). Solving the problem of pain when pain happens to be insoluble – in case of chronic uncontrollable pain - or when attempts to solve the problem bring along further costs – in case of, often treatable, headache

pain – are likely to become misdirected. The dysfunctional pattern by which suffering is installed has been called misdirected problem solving (Aldrich et al., 2000; Eccleston & Crombez, 2007). Another approach to the problem of pain is to reframe or accept the problem. This may be achieved by disengaging from the unfruitful pursuit to control pain and engaging in other valuable life goals regardless of pain (Eccleston & Crombez, 2007; Van Damme et al., 2008). There are also other approaches to acceptance. It has, for example, also been defined as a willingness to experience pain without the need to alter, avoid or control pain, and a reengagement in valued-based activity despite pain being present (McCracken et al., 2003; Vowles et al., 2008; Wicksell et al., 2009). Reflections on how to model and measure acceptance will be discussed later in this chapter. In our headache sample, we indeed found that an acceptant attitude towards the problem of pain was related to a lower perceived need for medication and lesser concerns about medication use.

In a broader sense, our findings are also in line with action-theoretical views on coping. The current thesis is mostly influenced by the dual-process model of Brandstädter and Renner (1990). Like other life-span theories, such as the model of selection, optimization and compensation model (SOC; Baltes & Baltes, 1990) or the life-span theory of control (Heckhausen & Schulz, 1995), the model has contributed significantly to explaining differential patterns in adaptation to major life change and loss. All three theories have generated numerous studies, which convincingly point at the beneficial role of reorientation towards other meaning in life whenever confronted with a blocked goal that cannot be attained (Boerner & Jopp, 2004). Fascinating is then our finding that some individuals with migraine persist in solving the problem of pain, despite obvious costs. In a similar vein, it has been found that individuals with chronic non-headache pain often approach the problem of pain as one that requires instant solution without believing that such a solution will ever be forthcoming (De Vlieger et al., 2006). This may be called a *perseveration paradox* and may have several reasons (see further). The idea that one can become stuck in ineffective attempts to solve the problem pain has also been articulated in other views on chronic pain adaptation. A large bunch of research, for example, stems from

a behaviorist tradition and is recently articulated within Acceptance and Commitment Therapy (Hayes et al., 1999). Research within this tradition has recast attempts to solve pain as forms of experiential avoidance (McCracken, 1998; McCracken, Spertus, Janeck, Sinclair, & Wetzel, 1999). Within such a view, attempts to solve the problem of chronic pain are considered as narrow and inflexible behavioral actions primarily instigated by an unwillingness to experience pain. In trying to solve the problem of pain, individuals are likely to engage in behavioral repertoires that produce short-term relief (e.g., avoiding back-straining activities, or taking analgesics), preventing them from engaging in valued-based activities (e.g., interpersonal encounters) (McCracken, 1998; McCracken et al., 1999; McCracken, Vowles, & Eccleston, 2004). It is further stated that when actions to produce relief are ineffective, it may be more useful to accept the pain. This behaviorist view on acceptance has led to the development of treatment developments of which their applicability to chronic pain appears to be increasingly compelling (for a review, see Veehof, Oskam, Schreurs, & Bohlmeijer, 2011). We will discuss these in more detail when reflecting upon the practical implications of the current thesis.

**The dynamic nature of suffering and disability.** The idea that framing a chronic pain problem in biomedical terms may lead to greater suffering is not new. Malec et al. (1977), for example, found many of these beliefs, which they labeled as “pain myths”, to be related to the idea that pain is an unambiguous signal of tissue damage that leads to disability. Some have stressed the idea of a fear of pain and/or movement (e.g., Kori, Miller, & Todd, 1989; Phillips, 1987). This idea has been most clearly articulated in the fear avoidance model of pain (Vlaeyen & Linton, 2000). At its core, this model states that some individuals, when confronted with pain, will catastrophically interpret pain as a sign of serious injury or pathology over which one has little or no control. This may lead to an excessive fear of pain that gradually extends to a fear of physical movements such that people will avoid those physical activities that are presumed to worsen their problem. Persistent avoidance of activities is dysfunctional and may lead to more pain, disability and suffering over time. At this time, there is ample evidence to support the validity of fear and

catastrophic thinking in predicting disability in chronic pain populations (for a review, see Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Turk, 2005). The main corollary of the fear avoidance model is that it are the beliefs about pain that impact the experience about pain and guide behavior and responses. It may, however, well be that not beliefs about the pain experience as such, but rather the extent to which pain interferes with daily functioning guides responses and behavior (see also, Crombez, Eccleston, Van Damme, Vlaeyen, & Karoly, 2012; Karoly & Ruehlman, 2007; Van Damme et al., 2008). Such beliefs have also been identified in patients and relate to the idea that pain is the primary cause for disability which may only be resolved by the singular solution of pain relief (Malec et al., 1977). In our headache sample, we found that patients with medication-overuse headache did not display higher levels of disability compared to migraine patients, despite their greater tenacity to solve the problem of pain. It may well be that their attempts to solve the problem of pain, despite being costly, enable them to maintain their level of functioning. The same reasoning may apply to why those attempts may not be easily relinquished, as well as the observation of high withdrawal rates after successful treatment (Fritsche et al., 2010; Katsarava, Limmroth, Finke, Diener, & Fritsche, 2003; Katsarava et al., 2005; Pini, Cicero, & Sandrini, 2001).

This illuminates another view on some well-researched variables in adaptation to chronic pain, such as catastrophic thinking about pain. Within the fear avoidance model, catastrophizing is viewed as an erroneous misinterpretation, leading to increased fear and subsequent suffering. There is also an ongoing debate about classifying catastrophic thinking as a class of coping (for a review, see Sullivan et al., 2001). Following an action-theoretical framework on coping with chronic pain, however, we argue catastrophizing to be best conceived as an extreme instantiation of worry about pain (see also, Eccleston et al., 2001; Eccleston & Crombez, 2007). When confronted with acute, controllable pain, worry about pain may have high adaptive value as it guides effective problem solving. However, where problem solving attempts fail, worry is believed to be fueled and may further instigate ineffective, futile attempts to solve the problem of pain (Aldrich et al., 2000; Eccleston

& Crombez, 2007). In line with this, catastrophic thinking about pain has been found to be related to primarily approaching the problem of pain as one that has to be solved (De Vlieger et al., 2006). In Chapter VI, we found catastrophizing to be related to how individuals with chronic pain make constructions of the pursuit and achievement of valued non-pain goals. We found catastrophizing to be related to more stress in pursuing those goals as well as less satisfaction with progress towards those goals. The idea that individual differences in adaptation to pain may be linked to how individuals construct meaning in life brings into perspective a dynamic view on disability and suffering. As such, coping may better be examined in a context of multiple valued goals to which people strive for.

**Coping with pain in a context of multiple valued goals.** Individuals with chronic pain may have a hard time in juggling between the aim for pain control and other valued life goals. In line with this reasoning, it has been found that the experience of pain often coincides with substantial goal frustration and goal conflict (Karoly & Ruehlman, 1996; Massey, Garnefski, & Gebhardt, 2009). Much is to be learned by studying how individuals with chronic pain construct and structure their goals. There are several views that converge on the putative role of patients' goals as key moderators of long-term adaptive success to chronic pain (e.g., Eccleston & Crombez, 2007; Karoly, 1999; Karoly & Lecci, 1997; Karoly & Ruehlman, 1996; Van Damme et al., 2008; Vlaeyen & Morley, 2004). While most studies mainly focused on the assessment of non-pain goals in chronic pain (for a detailed discussion of this research, see introduction Chapter VI), the current thesis aimed at unraveling how individuals represent the goal to control pain (see results and discussion section Chapter VI). Above all, it was examined how individuals structure the goal to control pain against other valued non-pain goals. It was found that those who catastrophized more about pain, were less acceptant of pain, and experienced more distress, perceived the attainment of other goals to be conditional upon the pursuit of pain control. This finding may be interesting as a possible reason for the development of a rigidity in solving the problem of pain and concomitant suffering. Related to this finding, empirical studies have shown that when the attainment of one goal is

positively linked to the attainment of others, goal persistence is likely (Riediger & Freund, 2004). However, this may come with a cost when the goal to be achieved appears to be unattainable. Our results are more in line with studies on enmeshment in chronic pain showing that individuals who maintain conditional links between pain and central identity goals may be more prone to the experience of distress (Morley, Davies, & Barton, 2005; Sutherland & Morley, 2008). Interestingly and related, there is evidence on the link between conditional goal achievement and persistent, though misdirected, goal pursuit in other conditions, such as depression (Crane, Barnhofer, & Hargus, 2010; Hadley & McLeod, 2010; Street, O'Connor, & Robinson, 2007). Those studies are based upon the tenets of conditional goal setting theory (CGS; Street, 2002), stating that suffering may arise when individuals perceive the attainment of happiness to be conditional upon the achievement of particular goals. This idea may be promising within the context of chronic pain and deserves further investigation.

**Modeling and measuring acceptance of chronic pain.** Throughout this thesis, it was found that an approach by which individuals are able to loosen the aim for pain control and to perceive life as meaningful despite the pain may be more beneficial. This is in line with theories within developmental and personality psychology pointing at the buffering effects of flexibly adjusting goals in the context of (life) obstacles or losses (e.g., Brandstädter & Renner, 1990; Carver & Scheier, 1998; Heckhausen & Schulz, 1995). Goal adjustment has been crystallized into processes of goal disengagement, i.e. the reduction of effort and commitment towards unattainable goals, and goal reengagement, i.e. commitment towards other goals. There is accumulating evidence that the adoption of both processes may promote adaptive well-being in response to goal failure (Wrosch, Scheier, Carver & Schulz, 2003a; Wrosch et al., 2003b). Using this perspective, acceptance of chronic pain has been reframed as the disengagement from the unattainable goal to control pain, and the reengagement into other valuable goals that are less affected by pain (Eccleston & Crombez, 2007; Schmitz et al., 1996; Van Damme, et al., 2008). Acceptance may become particularly relevant when one has become stuck in unfruitful attempts to solve the problem of pain. There exist yet another approach to acceptance. This

approach stems from behaviorism and defines acceptance as "... a willingness to remain in contact with and to actively experience particular private experiences" (Hayes et al., 1994, pp.34). Within this tradition, McCracken et al. (1999) started research in chronic pain. Research has identified two core constituents of acceptance: a willingness to experience pain, and the engagement into valued-based life activity despite pain (McCracken et al., 2003; Vowles et al., 2008; Wicksell et al., 2009). An extensive body of research now suggests that acceptance may reduce the negative impact of pain on both mental and physical well-being (e.g., McCracken, 1998; McCracken & Velleman, 2010; McCracken & Vowles, 2007; McCracken et al., 2004; McCracken, Vowles, & Eccleston, 2005b; Viane, Crombez, Eccleston, Devulder, & De Corte, 2004; Viane et al., 2003).

There are notable differences between a self-regulatory and behaviorist view on acceptance and each has its particular strengths. The behaviorist idea of acceptance has been successfully articulated in promising treatment approaches (Veehof et al., 2010). A self-regulatory approach to acceptance may, on the other hand, have great potential for a programmatic investigation of dysfunctional behavior, and help to increase insight into the conditions of high distress and disability. However, there are also similarities. Both are resonant with emerging functional-contextualistic or social-ecological views on human behavior (e.g., Hayes, Barnes-Holmes, & Wilson, 2012; Little, 1983). The communality of such views is the focus on the behavior of individuals interacting in and with a context. It is assumed that a study of behavioral actions cannot be separated from their context, making it so-called *acts-in-context*.

The down-side of differences in how acceptance has been conceptualized is that, over time, a plethora of different ways to measure acceptance have been developed. The findings within the current thesis seem to suggest that attempts to measure the concept have been plagued by various difficulties in operationalisation. Some self-report measures do not, or only to a small degree, measure what is commonly understood as the acceptance of chronic pain (see discussion section Chapter III). In addition, the idiographic method presented in this thesis that was

designed to capture and operationalize goal adjustment strategies –among problem solving- did not seem feasible (see discussion section Chapter V). Future research should aim at increasing understanding of what an acceptance of chronic pain constitutes of and how to measure it. Also, further studies may need to be conducted on which goal adjustment strategies individuals with chronic pain use when confronted with goal frustration and goal conflict.

### **FUTURE RESEARCH DIRECTIONS**

Based on the combination of findings presented in the current thesis and other research results on the study of coping and self-regulatory processes in adaptation to chronic pain, several directions of future research may be proposed.

First, findings of the current thesis and other research results (e.g., Crombez et al., 2008; De Vlieger et al., 2006; McCracken & Eccleston, 2003) emphasize the need to examine coping with chronic pain within the specific stressing context in which it occurs. The approach adopted in the current thesis to evaluate the fit between coping and the context of pain was heavily influenced by the dual-process model of coping (Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002) and distinguishes between two ways of coping: assimilation or problem solving and accommodation or acceptance. By no means, however, this distinction is meant to be exhaustive and leaves open the possibility for the influence of *other ways of coping*. Another course of action in dealing with interfering pain would, for example, be to ignore the pain and try harder to accomplish the goal (persistence). There is evidence suggesting that some chronic pain patients persist in their activities despite pain (Crombez, Vervaeke, Lysens, Baeyens, & Eelen, 1998; Hasenbring & Verbunt, 2010). As yet, it is unknown whether persistence is better conceived of as a maladaptive response to pain (Hasenbring, Marienfeld, Kuhlendahl, & Soyka, 1994; Hasenbring, Plaas, Fishbein, & Willburger, 2006), or not (e.g., Huijnen et al., 2011; Kindermans et al., 2011). More systematic research on the effects of persistence in the context of chronic pain are needed. A contextual, goal-directed re-analysis of persistence behavior may help to gain new insight into this topic (see also, Crombez et al., 2012; Van Damme et al.,

2008). It is, for example, possible that some individuals, in trying to pursue their goals, become less sensitive to pain and become more prone to developing a dysfunctional pattern of persistence. Also, it might be that those who are able to manage their life despite pain are more successful in balancing between commitment towards goals and pain control strategies and, therefore, limiting the physical toll of over-activity.

Second, from its initial formulation onwards, coping is defined as a dynamic process that shifts in nature from stage to stage (Carver, Scheier, & Weintraub, 1989; Lazarus & Folkman, 1984). Likewise, the nature of coping with pain will also vary, depending on the interaction between both the characteristics of the pain experience (e.g., pain intensity), and the characteristics of the other goals an individual pursues. Also, the intensity of pain and associated interference vary over the course of a day and over days (Eccleston & Crombez, 1999). Therefore, an important aspect to coping with chronic pain could be the ability to flexibly switch between the use of a variety of strategies, e.g. problem solving, acceptance, etc., rather than the rigid use of a selected number of strategies (e.g., Schmitz et al., 1996). To measure *coping flexibility*, one may take several distinct approaches. One may, for instance, stress the important role of executive functioning, more precisely mental flexibility, as a necessary prerequisite for being successful in switching between coping strategies. This idea has, however, not been fully studied in chronic pain. An interesting related study in this respect is one developed by Karp et al. (2006) who found that more severe pain was associated with lower levels of general mental flexibility in a sample of older adults suffering from persistent pain. Another option is to examine whether individuals differ in the ability to modify coping responses to varying situational demands. Vriezekolk et al. (2012), for example, investigated whether patients with chronic rheumatic diseases differed in their coping flexibility ability and developed a trait-like self-report measure, named the Coping Flexibility Questionnaire (COFLEX). Their study provided initial interesting results on the relation between an individual's ability to switch between strategies on adaptation to chronic pain. A related bunch of research within the domain of chronic pain stems from the assumptions of Acceptance and

Commitment Therapy (ACT; Hayes et al., 1999). In the ACT model, *psychological flexibility* is about being aware of thoughts and feelings in the present moment without defense, and engaging in behavior that is in accordance with central values. Several processes are believed to be involved in psychological flexibility, such as acceptance, contact with the present moment, values-based action, committed action, self-as-context, and cognitive defusion (Hayes, Luoma, Bond, Masuda, & Lillis, 2004). Aim of ACT is to increase psychological flexibility by methods that are built around and based upon these processes. Increasing numbers of studies in individuals with chronic pain have provided support for the role of various components of psychological flexibility, as well as psychological flexibility as a whole, in explaining well-being and disability (e.g., McCracken, 1998; McCracken & Eccleston, 2004; McCracken, Gauntlet-Gilbert, & Vowles, 2007; McCracken, Guttiérrez-Martinez, & Smyth, 2012; McCracken & Vowles, 2007; McCracken & Yang, 2006). The study of flexibility in the context of chronic pain may well remain a promising further avenue for future research (see also, Hayes et al., 2012; Kashdan & Rottenberg, 2010). Also valuable in this respect will be the parallel development of methods that are resonant with the assumption of flexibility in coping and that are able to capture momentary variations of pain intensity, coping, and other variables under investigation (e.g., diary methods).

Third, an issue that has remained unexplored until yet is how coping with chronic pain and its relation to adaptation unfolds over the *course of a life-span*. There is common agreement, across various life-span theories, that the prevalence of adaptive processes changes over the life span. However, there are dissimilarities between theories in terms of their predictions concerning changes in the use of coping strategies (Boerner & Jopp, 2004). The dual-process model, for example, predicts a decrease in assimilation or problem solving with increasing age (Brandstädter & Renner, 1990). Other models expect an age-related decrease of all adaptation strategies over the life span (e.g., Freund & Baltes, 2002). It would be interesting to examine whether and how problem solving and acceptance strategies in response to the problem of chronic pain differ in various ages. The embedment of

coping strategies within a self-regulatory perspective may even offer additional insights. Which goals individuals pursue and how goals are represented and processed may vary with age (e.g., Massey et al., 2009; Nurmi, Poole, & Kalakoski, 1994; Riediger & Freund, 2004). It would then be particularly interesting to investigate whether and how the relation between individuals' constructions and representations of their goals (i.e., pain and non-pain goals) and coping strategies would vary as a function of age.

Another question that presents itself from this thesis concerns the role of *catastrophic thinking* about pain in adaptation to chronic pain. According to the theorizing adopted in this thesis, catastrophic thinking is believed to be interwoven with ineffective attempts at solving the problem of chronic pain. This idea results from a framing of catastrophic thinking as an extreme instantiation of worry about pain (Eccleston & Crombez, 2007; Eccleston et al., 2001). It remains, however, to be empirically tested whether catastrophic thinking is a predisposing factor to, or rather a consequence of repetitive attempts to seek a solution to the insoluble problem of chronic pain. Future studies may need customized research designs to test this (e.g., longitudinal or prospective studies).

Lastly, within the current thesis, we have explored dysfunctional behavioral patterns in the context of an individual's *goals*. Our method appeared feasible and shed new light on the connection between coping and the construction of the goal to control pain and its embedment in an individual's goal structure. A pursuit of this research line may increase further understanding on the role of goal content and structure in adaptation to chronic pain. Building upon the findings within the current thesis, it would, for example, be particularly interesting to examine whether the belief that the attainment of valued non-pain goals is conditional upon the realization of the goal of pain control is related to the experience of suffering in individuals with chronic pain. Furthermore, in addition to the role of catastrophic thinking about pain, it would further be particularly interesting to examine whether and how other key-constructs believed to be involved in chronic pain adaptation, i.e. pain-related fear, avoidance and hypervigilance, are related to individual's goal constructions and

representations (e.g., Crombez et al., 2012). Interesting in this respect is, for example, the study of Karoly, Okun, Ruehlman and Pugliese (2008) who found evidence for the role of pain-induced fear as a mediator in the relationship between goal conflict and goal self-efficacy on physical disability and depression. In the current thesis, the focus was essentially on cognitive representations of goals, and the positive and negative affective states that may be related to and impact goal pursuit have not been taken into account (e.g., Carver & Scheier, 1990, 1998). An additional important avenue for further research may thus be the relationship between emotion, cognition, and adaptation to pain. Also, as the intensity of pain and associated interference are believed to vary over the course of a day and across days, it would be interesting to investigate whether goal properties, i.e. content, representations or structure, may impact or moderate these within-subject variations. This requires extended repeated assessment methods, such as diaries or momentary sampling at random time points. Furthermore, we only explored individual's goal constructions at one moment in time. Interesting would be to investigate whether and how goal construction and related processes change over time, for example, before and after intervention trials.

### **LIMITATIONS**

One limitation of the current thesis lies in the cross-sectional design of the empirical studies in examining the role of problem solving and acceptance in patient adaptation. Therefore, no assertions can be made concerning the direction of effects between problem solving, acceptance, goal constructions, catastrophizing, disability, and distress. The most ideal situation would be to set up prospective study designs that allow to gather longitudinal data on the exacerbation of chronic pain. Recently, some well-designed studies are available that test the sequential relations between variables that are presented in the fear avoidance model of pain (e.g., Gheldof et al., 2010; Wideman, Adams, & Sullivan, 2009). In the study of Wideman et al. (2009), for example, individuals with musculoskeletal injuries participated in a 10-week pain management intervention and completed measures on catastrophic thinking and fear avoidance pre-, mid-, and post-treatment. Interestingly, it was found that changes in

catastrophizing and fear predicted return to work rates. Based on these results, we may ponder on the possible precipitating role of catastrophizing and/or fear in coping, but detailed studies are needed that also include other variables of interest. Most probably, however, the link between coping, catastrophizing, fear, goal constructions, distress, and disability is far more complex and dynamic. Examining this requires other methods that allow for more intensive data collection at random time points, such as ecological momentary assessment (Csikszentmihalyi & Larsen, 1987) or a daily reconstruction method (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004).

A second limitation is that the measures reported in the studies relied on self-report. In addition, the studies are limited in a sense that our measures reflected individual's attitudinal beliefs towards problem solving and acceptance. Future research will have to address this issue by including more direct (e.g., avoidance behavior, pain control behavior, adjustment behavior) measures of responses to pain in studies that aim to examine the interplay between goal constructions, beliefs about pain, disability, distress and coping responses.

A third limitation relates to the representativeness of the samples included in this thesis. We have explored variability in coping responses and goal characteristics in self-defined chronic pain populations, which may not be representative samples of pain patients. Indeed, a comparison of studies has pointed out that, in comparison with patients presenting in health care, individuals with chronic pain recruited from self-help groups show less tenacity in trying to solve pain and are more acceptant of pain (Crombez et al., 2008; De Vlieger et al., 2006). Consequently, our findings on variability in coping responses and constructing the aim of pain control and other non-pain goals may well have looked different when including other patient samples. The same issue of representativeness may hold for the recruitment of the sample of headache patients in one study of this thesis. In that particular study, overall response rate was relatively low, possibly due to a strict recruitment protocol. In sum, future research studies should study coping and self-regulatory processes in other patient samples and/or results may need to be confirmed by large-scale studies.

## PRACTICAL IMPLICATIONS

The findings within the current thesis warrant further investigation and replication, as it represents still one of the scarce attempts to analyze dysfunctional behavioral patterns in chronic pain from a self-regulatory, goal-directed point of view. Nevertheless, a few and significant practical implications may evolve from the findings presented within this thesis.

Usually, treatment techniques for individuals with chronic pain, i.e. physical, pharmacological or surgical, are primarily employed in the pursuit of pain relief. These techniques may well be effective in relieving pain to some significant degree. Though, these techniques may also be limited in some individuals as these are primarily concerned with altering the pain and its interruptive qualities and do not help to disconfirm the problem frame in which pain relief is the single desired solution. A sole reliance on strategies to solve the problem of pain may specifically be problematic in situations where there is no definite solution to pain, or in treatable cases where pain control strategies have long-term negative consequences (e.g., headache).

In such instances, physicians and other health care workers may do well in correctly informing individuals about the adverse effects of persistent, and often futile, strategies to obtain pain relief. Education alone may, however, not be sufficient for changing one's problem frame and, often, other psychological approaches are required. Cognitive-behavioral treatment techniques may be particularly helpful in this respect. For instance, techniques of exposure to pain-inducing activity may help to confront one with disconfirmatory information that might change the problem frame. Graded exposure therapy has been proven to be an effective treatment in reducing disconfirmations of expected consequences of physical activity (e.g., Boersma & Linton, 2004; Leeuw et al., 2007; Vlaeyen, de Jong, Geilen, Heuts, & van Breukelen, 2002). By gradually exposing individuals to previously avoided activities, their catastrophic misinterpretations can be corrected and disability be reduced. Also, developments in cognitive therapy may help to change aspects of worry, in particular by using techniques to control catastrophic thinking (Thorn, 2004). In addition, we

found that, for some individuals, the aim for pain control may be a frustrating and dissatisfying experience. Therefore, some techniques implicated in traditional programs of cognitive-behavioral therapies (e.g., coping skills training, see Morley, Eccleston, & Williams, 1999 for a review on the effectiveness of some techniques) and/or self-regulation programs (e.g., problem solving skills, see Brady, Kruger, Helmick, Callahan, & Boutagh, 2003) may help to increase one's confidence in coping with pain disability and may be usefully implied in treatment. Based upon our findings on the role of goal appraisals and intergoal relations, we may also wonder about the additional successes of incorporating a careful assessment of individual's goals in treatment programs. For instance, if an individual relates the attainment of valued goals to the achievement of pain control, it may well be helpful that treatment also takes into account this process of goal organization. Also, it may be worthwhile to not only take into account how individuals frame the aim for pain control, but also how non-pain goals are perceived of. When pain blocks the attainment of important non-pain goals, it might be needed to help individuals to disengage from these goals and reengage in other valuable goals by, for instance, the use of goal setting techniques.

In recent years, acceptance-based treatments for chronic pain, such as Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) or mindfulness-based stress reduction programs (MBSR; Kabat-Zinn, Lipworth, & Burney, 1985) are more and more offered as alternatives for CBT. Such treatments are more directed at enhancing acceptance processes instead of focusing on reducing attempts to control pain. The central aim of ACT, for instance, is to increase psychological flexibility predominantly by learning individuals to stay in contact with unpleasant emotions sensations and thoughts. The ability to contact the present moment more fully would help to promote behavioral actions that are in line with one's values. To achieve this, ACT employs several methods and exercises build around several elements of which psychological flexibility is believed to constitute of, i.e. acceptance, contact with the present moment, values, cognitive defusion, committed action, and self-as-context. ACT is distinct from CBT in that the aim is not to change the content of beliefs related

to pain, but rather to decrease avoidance of unpleasant thoughts and to increase willing embrace and awareness (Dahl, Wilson, & Nilsson, 2004). MBSR includes different types of mindfulness exercises, such as yoga or meditation practice, and aims at increasing the ability of an intentional and non-judgmental present moment awareness. This is achieved by disentangling from the content of one's thoughts and being able to contact the present moment with full awareness (Shapiro, Carlson, Astin, & Freedman, 2006). Although there are differences in techniques used, ACT and MBSR share the therapeutic approach to foster disengagement from the aim for pain relief and to enhance valued-based activity in the presence of pain. There is indeed increasing evidence for the beneficial role of the processes specified by ACT and MBSR in adaptation to chronic pain (e.g., McCracken et al., 2007; Vowles, McCracken & O'Brien, 2011; Vowles, Wetherell, & Sorrell, 2008). Furthermore, a recent meta-analysis has shown that these treatments may be good alternatives to or may complement traditional CBT interventions in improving mental and physical health of patients with chronic pain (Veehof et al., 2010).

Of course, in order to test the effectiveness of treatments and to be able to detect clinical change, there is also a need for instruments that have practical utility. As it concerns measuring acceptance, results within the current thesis pointed out that, although a wide variety of instruments is available, none appears completely sufficient to capture what is commonly understood as acceptance. It is therefore recommended to go back one step in order to develop feasible measures. The particular idea to depart from a core set of items that represent well the features of acceptance may be a good option. Also, to increase apprehensibility, it should be considered to re-label (subscales of) measures in a way that it matches the content of its items (e.g., in terms of acceptance or adjustment strategies). Furthermore, assessment should probably best be extended with the possibility to capture the dynamics of behavior in the context of pain and disability. This may require complementary use of other assessment techniques (e.g., ecological momentary assessment methods).

## CONCLUSION

In sum, the studies reported in the current thesis make a number of significant contributions to research on coping with chronic pain. When the problem of chronic pain is brought back to the chronic search for pain relief or control, attempts at solving the problem of pain may be considered as misdirected. A better option is then to reframe or accept the problem of pain. This implies a different approach to the problem of pain, one that is not dominated by pain relief but instead directed towards valued-based life activity. Interventions aimed at changing the problem frame may then well be preferred. The present thesis also provides one of the first and scarce attempts to explore the dynamics underlying coping with chronic pain, and addressed the need for additional research on goal constructions and processes. Hopefully, the present thesis provides several starting points for future research and encourages researchers to further study the interplay between goals, thoughts, and coping strategies in order to increase understanding on chronic pain adaptation.

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Pijn is een alombekende ervaring. Het kan best gezien worden als een alarm dat in werking treedt om het lichaam attent te maken op dreiging of schade. Vaak volstaat het dan om te rusten of een korte behandeling te ondergaan, waardoor de pijn al snel weer verdwijnt. Pijn is echter niet altijd van voorbijgaande aard. Er is een beperkt aandeel van de bevolking dat continu pijn ervaart. Bij deze groep lijken behandelingen of pogingen om vat te krijgen op de pijn over het algemeen weinig te baten. Wanneer pijn blijft aanhouden (langer dan drie maanden) spreken we over chronische pijn. Deze groep van mensen die chronische pijn ervaart, is allerm minst homogeen. Bij sommigen kan de pijn sterk beslag leggen op het leven en zorgen voor heel wat lichamelijke en emotionele belemmeringen. Een specifiek kenmerk is dikwijls de grote vraag naar een oplossing voor de pijn, die zich vaak vertaalt in het ondergaan van een hele resem, vaak vruchteloze, behandelingen. Hiernaast lijken er mensen te zijn die niet zozeer gefocust zijn op het wegwerken van de pijn, maar zich eerder aan de pijn te hebben aangepast.

Verschillen in hoe mensen zich aanpassen aan de situatie van chronische pijn is in onderzoek vaak teruggebracht naar het bestuderen van de manier waarop mensen omgaan met hun pijn. In de onderzoeksliteratuur wordt het omgaan met pijn benoemd als *coping*. Eerdere literatuur rond coping met pijn is vooral descriptief van aard en ging uit van een categoriale beschrijving van copingstrategieën. Er werd dan geschreven vanuit een beoordelende, vaak aanmanende positie, waarbij op een haast onderrichtende manier werd gewezen op adaptieve dan wel maladaptieve strategieën. Deze laatste, vaak omschreven als passieve (Brown & Nicassio, 1987), emotioneel-gerichte (Affleck et al., 1999; Folkman & Lazarus, 1980), of vermijdende strategieën (Reid, Golbert, & McGrath, 1998), moesten absoluut worden vermeden, wou de patiënt zich succesvol aanpassen aan pijn. Tot op heden is er nog geen vaststaande evidentie voorhanden die erop wijst dat een bepaald repertoire strategieën altijd te verkiezen is (McCracken & Eccleston, 2003). Ook is het zo dat

strategieën vaak zowel positieve als negatieve gevolgen kunnen hebben, afhankelijk van de context waarin deze zich voordoen. Het controleren van de pijn, bijvoorbeeld, lijkt nuttig wanneer pijn van kortdurende aard en controleerbaar is (e.g., Keefe, Rumble, Scipio, Giordano, & Perri, 2004), maar kan ingrijpende negatieve gevolgen hebben wanneer pijn maar moeilijk te controleren valt (e.g., Eccleston & Crombez, 2007; McCracken, 1998; McCracken, Spertus, Janeck, Sinclair, & Wetzel, 1999). In hun kritische analyse omtrent de structuur van coping, pleitten Skinner, Edge, Altman en Sherwood (2003) voor een contextueel-functionele visie op coping. De mate waarin een strategie voordelen kan opleveren is vanuit deze visie volledig afhankelijk van de context waarbinnen deze zich voordoet (voor een uitvoerige kritische bespreking, zie Skinner et al., 2003).

De contextueel-functionele benadering van coping in dit proefschrift werd grotendeels beïnvloed door het dual-process model, dat werd ontwikkeld door Brandstädter en Renner (1990). Dit model werd oorspronkelijk ontwikkeld als poging om te verklaren hoe het komt dat ouderen vaak geen verminderde kwaliteit van leven rapporteren ondanks steeds toenemende fysieke beperkingen. Het model schetst twee verschillende zelf-regulatie processen die kunnen optreden wanneer men geconfronteerd wordt met obstakels in functioneren: assimilatie en accommodatie. Assimilatie verwijst naar pogingen om het probleem op te lossen en het obstakel weg te werken. Accommodatie betekent eerder dat iemand zich aanpast aan het obstakel of de beperkingen (Brandstädter & Renner, 1990; Brandstädter & Rothermund, 2002). Zelfregulatie-theorieën stellen verder dat de acties die individuen ondernemen voornamelijk gedreven worden vanuit een onmogelijkheid om eigen waardevolle doelen te bereiken (e.g., Carver & Scheier, 1998). Een doel wordt vaak gedefinieerd als een mentale representatie die verwijst naar wat mensen wensen te bereiken, of juist vermijden (Austin & Vancouver, 1996).

Bovenstaande theoretische inzichten kunnen worden toegepast op de situatie waarin iemand wordt geconfronteerd met chronische pijn. De continue interruptie en interferentie van chronische pijn in het dagelijkse leven van individuen zorgt er vaak voor dat gewenste doelen onhaalbaar blijken (Karoly & Ruehlman, 2007). Er zijn dan

verschillende acties die individuen kunnen ondernemen. Initieel zal men proberen om de pijn weg te werken in een poging om doelen die geblokkeerd zijn door pijn terug te kunnen opnemen. Dergelijke acties kunnen benoemd worden als *probleem oplossen*. Dit is de assimilatieve lus. Er is echter vaak geen afdoende oplossing voor het probleem van chronische pijn en mensen kunnen zo komen vast te zitten in hun pogingen om het pijnprobleem te verhelpen. Een perseveratie in ineffectieve pogingen om het probleem van chronische pijn op te lossen, wordt ook wel *misgericht probleem oplossen* genoemd (Aldrich, Eccleston, & Crombez, 2000; Eccleston & Crombez, 2007). Het model rond misgericht probleem oplossen, ontwikkeld door Eccleston en Crombez (2007), beschrijft een mogelijk pad waarlangs perseveratie kan geschieden. Het model stelt dat, wanneer men wordt geconfronteerd met pijn, men zal beginnen piekeren en oplossingen zoeken om de pijn weg te werken. In geval van chronische pijn kan dit piekeren echter de vorm aannemen van een overdreven bezorgdheid en focus op het pijnprobleem. Pijn wordt hierbij doorgaans gezien als dé centrale oorzaak voor het lijden. Het pijnprobleem verengt in deze zin vaak tot een biomedisch gegeven waarbij men zich richt op het vinden van een externe of medische oplossing voor pijn. Heil wordt dan ook vaak gezocht in middelen die erop gericht zijn om het pijnprobleem definitief te verhelpen of te controleren. Het proberen oplossen van een in wezen onoplosbaar pijnprobleem kan paradoxaal genoeg het lijden verder sterk verhogen (voor empirische evidentie, zie Crombez, Eccleston, Van Hamme, & De Vlieger, 2008; De Vlieger, Van den Bussche, Eccleston, & Crombez, 2006). Een alternatief pad is het herkaderen van het probleem van chronische pijn. Dit is de accommodatieve lus en kan benoemd worden als *acceptatie*. Individuen gaan dan het belang van het willen controleren van pijn eerder devalueren en zich richten op alternatieve doelen die wel nog bereikbaar zijn, ondanks de pijn (Eccleston & Crombez, 2007; Hayes, Strosahl, & Wilson, 1999; McCracken & Eccleston, 2003; Van Damme, Crombez, & Eccleston, 2008).

Het huidige werk situeert zich binnen bovenstaande contextueel-functionele herkadering van coping met chronische pijn. De algemene doelstelling van het proefschrift was te onderzoeken hoe mensen het probleem van pijn trachten op te

lossen dan wel te accepteren, om het eventuele lijden aan chronische pijn beter te kunnen begrijpen. Deze algemene doelstelling werd verder vertaald in concrete vragen gericht op het onderzoeken van: 1) het nut en de inhoud van vragenlijsten die ontworpen zijn om probleem-oplossing en acceptatie bij chronische pijn te meten (*Hoofdstukken II & III*); 2) het verband tussen het biomedisch kaderen van het probleem van pijn en pogingen om dit op te lossen, en de eventuele kosten die hiermee gepaard gaan (*Hoofdstuk IV*); 3) de individuele variabiliteit in strategieën gericht op probleem-oplossing en acceptatie die individuen gebruiken in het omgaan met het probleem van chronische pijn (*Hoofdstuk V*); en 4) de onderliggende redenen van pogingen om pijn op te lossen of te controleren (*Hoofdstuk VI*).

In **Hoofdstuk II** onderzochten we de bruikbaarheid van de Ziekte-Cognitie-Lijst (ZCL; Evers et al., 2001) binnen een populatie van individuen met chronische onverklaarde klachten, i.e. chronische pijn en chronische vermoeidheid. De ZCL is een instrument dat ontworpen werd om een set van generische cognities te meten wanneer mensen geconfronteerd worden met langdurige aandoeningen. Dergelijke cognities worden verondersteld de relatie te mediëren tussen een stressor en daaropvolgende psychologische en fysieke uitkomsten (e.g., Lazarus & Folkman, 1984). Het instrument onderscheidt drie types van ziektecognities: a) cognities die de negatieve toon van een stressor benadrukken (i.e., hulpeloosheid); b) cognities die het aversieve karakter van een stressor verminderen (i.e., acceptatie); en c) cognities die een positieve betekenis aan een stressor toevoegen (i.e., zoeken van voordeel in ziekte). Hulpeloosheid houdt verband met de overgang tussen een assimilatieve en accommodatieve manier van coping met ziekte vermits deze gerelateerd is aan het verlies van controle en het negatief inkleuren van ziekte. Acceptatie is representatief voor een accommodatieve wijze van coping met ziekte. De resultaten ondersteunden de validiteit en robuustheid van de drie-factoren structuur van de ZCL bij individuen met chronische pijn en chronische vermoeidheid. De studie ondersteunde verder het belang van een simultaan bevragen van controle-gerelateerde dan wel acceptatie-gerichte responsen bij chronische onverklaarde aandoeningen, zoals chronische pijn.

**Hoofdstuk III** omvatte een inhoudsanalyse van vragenlijsten ontwikkeld om acceptatie van chronische pijn te meten. Deze studie werd voornamelijk ondernomen vanuit een nood om te onderzoeken welke aspecten van acceptatie gemeten worden door bestaande instrumenten. Ook trachtte deze studie verschillen en/of gelijkenissen in kaart te brengen rond hoe acceptatie geconceptualiseerd wordt overheen instrumenten. Het heuristisch kader dat hiervoor werd gebruikt, was gebaseerd op twee onderzoeksperspectieven. Het ene perspectief is vooral vormgegeven vanuit zelf-regulatie en ontwikkelingspsychologische theorieën (e.g., Brandstädter & Renner, 1990; Carver & Scheier, 1998; Heckhausen & Schulz, 1995) en ondersteunt een actie-georiënteerde, doelgerichte visie op acceptatie. Van hieruit kan acceptatie van chronische pijn best gezien worden als *het loslaten van het doel om pijn te controleren* en het *zich richten op andere waardevolle doelen, los van de pijn* (Eccleston & Crombez, 2007; Evers et al., 2001; Schmitz, Saile, & Nilges, 1996; Van Damme et al., 2008). Het andere perspectief heeft zijn oorsprong in een gedragsmatige traditie (Hayes, Jacobson, Follette, & Dougher, 1994), waarbinnen acceptatie eerder wordt gezien als een *bereidheid om pijn te ervaren* en het *zich engageren in activiteiten conform iemands waarden* (McCracken, Vowles, & Eccleston, 2004; Vowles, McCracken, McLeod, & Eccleston, 2008; Wicksell, Olsson, & Melin, 2009). Het heuristische kader omvatte bovenstaande verschillende facetten of categorieën van acceptatie, alsook contrast categorieën die geen direct verband hebben met wat acceptatie inhoudt. Resultaten werden verkregen door items van acceptatie-instrumenten te laten laden op de diverse categorieën. Ook werd multi-dimensionele schaling toegepast op de categorie-lading van items om potentiële dimensies te onderscheiden in de inhoud van de items. We onderscheidden twee dimensies in de inhoud van items. Aan de ene zijde reflecteerden deze dimensies kernaspecten van acceptatie, namelijk de bereidheid om pijn te ervaren, alsook het zich engageren in waardevolle activiteiten (McCracken et al., 2004; Vowles et al., 2008; Wicksell et al., 2009). De andere zijde van de dimensies toonde aan dat vele items ook leken te laden op andere categorieën dan acceptatie, met name het willen controleren van pijn en belemmering. Op vragenlijst-niveau leken veel instrumenten

te laden op contrast categorieën en maar weinig op acceptatie-facetten die ze beoogden te meten. Deze bevindingen roepen vragen op bij de inhoudsvaliditeit van bestaande acceptatie-lijsten. Een aantal lijsten vormden hierop een positieve uitzondering, zoals de Chronic Pain Acceptance Questionnaire (CPAQ-34; Geiser, 1992), de Brief Pain Coping Inventory (BPCI; McCracken, Eccleston, & Bell, 2005), en de Pain Solutions Questionnaire (PaSol; De Vlieger et al., 2006). De inhoud van deze lijsten kan de basis bieden voor een herwerking van bestaande instrumenten.

In **Hoofdstuk IV** werd onderzocht of het biomedisch kaderen van het probleem van pijn verband houdt met pogingen om pijn op te lossen of te verlichten, en ook met meer kosten. Deze studie richtte zich specifiek op patiënten met migraine enerzijds en hoofdpijn door overgebruik van medicatie anderzijds. Een bepaald deel van de patiënten met migraine ontwikkelt na verloop van tijd hoofdpijn door overgebruik van medicatie (e.g., Bigal & Lipton, 2008). Weinig is geweten over de factoren die leiden tot deze verergering van hoofdpijn. Het onderzoeken van hoe deze groepen het probleem van pijn kaderen en trachten op te lossen kon hierin meer inzicht verschaffen. De resultaten toonden aan dat patiënten met hoofdpijn door overgebruik van medicatie meer aangaven het probleem van pijn te willen oplossen. Deze groep rapporteerde ook meer nood te hebben aan pijnmedicatie, en drukten tegelijkertijd meer zorgen uit om tolerant te worden aan hun medicatie, alsook zorgen omtrent ontwenningverschijnselen bij het verminderen van inname, in vergelijking met migrainepatiënten. Verder bleken pogingen om het pijnprobleem op te lossen, nood aan medicatie en zorgen over afkeuring door anderen omtrent de inname van medicatie uniek gerelateerd te zijn aan de diagnose van hoofdpijn door overgebruik van medicatie. De studie had een aantal beperkingen, waaronder het cross-sectionele karakter en de relatief lage effect-sizes binnen de studie. Desalniettemin lijken de bevindingen te suggereren dat het biomedisch kaderen van pijn als een probleem dat een externe of medische oplossing vraagt, te kunnen bijdragen aan een verergering van de problematiek. Sommige patiënten lijken zich vast te klampen aan het willen oplossen van pijn, ondanks de voor de hand liggende nadelen die ermee gepaard gaan en de zorgen die ze daaromtrent zelf hebben.

**Hoofdstuk V** richtte zich op het onderzoeken van strategieën die individuen aanwenden in het oplossen van het probleem van chronische pijn. Eerder onderzoek maakte gebruik van de Pain Solutions Questionnaire (PaSol; De Vlieger et al., 2006), een instrument dat attitudes bevraagt omtrent het oplossen en accepteren van pijn. Deze studie richtte zich dan ook op de ontwikkeling van een instrument om probleem-oplossings- en acceptatie strategieën te meten die worden aangewend wanneer men geconfronteerd wordt met de situatie waarin chronische pijn het bereiken van belangrijke doelen in de weg staat. Dit instrument, i.e. Means-End Probleem-oplossingstaak voor Pijn (*MepsforPain*), bestond uit drie vignettes waarin zich problemen stelden waarbij chronische pijn het verwezenlijken van belangrijke doelen in de weg stond, en waarop individuen met chronische pijn dienden aan te geven hoe ze dit zouden oplossen. Antwoorden werden voornamelijk gecodeerd op basis van het onderscheid tussen assimilatieve coping of oplossen van de pijn enerzijds, en accommodatieve coping of acceptatie anderzijds. Terwijl het oplossen van de pijn gericht is op het controleren of wegwerken van pijn, betekent acceptatie het loskomen van pijncontrole en/of het aanpassen van doelen aan de situatie met pijn. Resultaten toonden aan dat individuen die meer antwoorden gaven gericht op het oplossen van pijn dan accepterende antwoorden het noodzakelijker achtten dat pijn werd opgelost voor een goede afloop van de verhalen, in vergelijking met individuen die meer accepterende antwoorden gaven. Ook was het zo dat hun antwoorden als minder effectief werden beoordeeld door experts, i.e. beoordeling van de consistentie en werkzaamheid van het voorgestelde antwoord. De verschillen in antwoordpatronen vertoonden echter geen verband met adaptatie aan chronische pijn, i.e., catastroferen, fysieke belemmering, en emotioneel welbevinden. Ook was het zo dat enkel het aantal accepterende antwoorden die verband hielden met een aanpassing van activiteiten en de effectiviteitsscore overheen vignettes een negatief verband vertoonden met een attitude die gericht was op het oplossen van de pijn, zoals gemeten met de PaSol. De *MepsforPain* liet ook toe om diverse andere manieren in het omgaan met pijn te identificeren. Zo werden antwoorden genoemd die betrekking hadden op het verderzetten van of persisteren in activiteiten, ongeacht de

pijn. Persistentie was geassocieerd met een hogere noodzaak om pijn op te lossen overheen verhalen, een attitude gericht op het oplossen van pijn en een lagere effectiviteitsscore overheen antwoorden. Deze bevindingen kunnen verdere aanzet geven tot het onderzoeken hoe een dergelijk taakgericht persisteren zich verhoudt tot pogingen om pijn op te lossen of te controleren, en tot adaptatie aan chronische pijn. Het instrument kon op een afdoende wijze antwoorden genereren gericht op het oplossen van pijn en acceptatie van pijn. Ook bood het een methode om diverse andere manieren te meten waarop individuen omgaan met problemen veroorzaakt door chronische pijn. Desalniettemin stelden zich een aantal methodologische bezwaren, voornamelijk dan de lage betrouwbaarheid in het coderen van de antwoorden. Aanpassingen aan het instrument dringen zich op om toepasbaar te kunnen zijn in het valide meten van coping met chronische pijn.

In **Hoofdstuk VI**, ten slotte, werden bevindingen besproken van een studie naar de achterliggende redenen van pogingen om pijn op te lossen of te controleren. Observatie leert dat mensen vaak pogingen blijven ondernemen om het probleem van chronische pijn weg te werken of te controleren, ondanks nadelige effecten op lange termijn (e.g., Crombez et al., 2008). Het rigide vasthouden aan de zoektocht naar een oplossing voor of controle over pijn zou echter ten koste kunnen gaan van het bereiken van andere doelen (e.g., Eccleston & Crombez, 2007; Van Damme et al., 2008). De studie binnen het laatste hoofdstuk richtte zich op het onderzoeken van doelen die individuen met chronische pijn stellen. Vanuit een idiografisch-nomothetische aanpak werd antwoord gezocht op vragen rond welke doelen individuen vooropstellen, hoe ze deze vormgeven, en wat de relatie is tussen het doel om pijn te controleren en andere levensdoelen. Resultaten toonden aan dat het doel om pijn te controleren in het algemeen als zeer belangrijk en waardevol werd geacht, ondanks het feit dat nog niet de helft van de individuen dit doel spontaan vermeldde. De tevredenheid in het bereiken van dit doel en het streven ernaar toe werden echter ook consequent als negatiever ingeschat in vergelijking met de inschatting van niet-pijn doelen. Verder wezen de bevindingen ook op individuele verschillen in hoe doelen worden gepercipieerd. Zij die meer gericht waren op het oplossen van de pijn,

beoordeelden het doel om pijn te controleren als meer waardevol en belangrijk, en gaven aan er meer tijd aan te besteden. Hoge scores op catastroferen over pijn hielden verband met het rapporteren van meer stress en moeite in het bereiken van niet-pijndoelen, alsook met minder tevredenheid in het bereiken van die doelen. Meer acceptatie was dan weer gerelateerd aan minder stress en moeite in het bereiken van niet-pijn doelen, alsook met meer tevredenheid in het maken van progressie naar die doelen. Diegene die catastrofeerden over de pijn, meer emotioneel onwelbevinden en minder acceptatie rapporteerden, gaven aan dat het bereiken van pijncontrole zelfs een noodzakelijke voorwaarde was in het bereiken van hun niet-pijn doelen. In het nagaan van bovenstaande verbanden werd telkens gecontroleerd voor de effecten van de intensiteit van pijn die individuen ervaarden tijdens de week voorafgaand aan bevraging. Deze bevindingen kunnen nieuw licht werpen op de redenen achterliggend aan pogingen om pijn op te lossen of te controleren bij individuen met chronische pijn. Een aantal individuen, vooral deze die sterk catastroferen over pijn, lijken het bereiken van waardevolle niet-pijndoelen in sterke mate te laten afhangen van het bereiken van pijncontrole. Het voorwaardelijk stellen van doelen afhankelijk van het bereiken van pijncontrole lijkt ook samen te gaan met minder acceptatie van chronische pijn en een hogere mate van emotioneel onwelbevinden.

Naast een samenvatting van bovenstaande onderzoeksresultaten per studie, bevat **Hoofdstuk VII** een discussie van de resultaten in het licht van bestaand onderzoek, theoretische en praktische implicaties, beperkingen van het werk en een toelichting van aanbevolen richtingen voor vervolgonderzoek. Uit de resultaten in dit proefschrift blijkt dat het aanhouden van een *verengd probleemkader rond chronische pijn*, dat gericht is op het vinden van een externe of medische oplossing voor het probleem van pijn, samen te gaan met meer negatieve gevolgen. Het trachten op te lossen van het onoplosbaar probleem van chronische pijn, of het vasthouden aan oplossingspogingen die het lijden kunnen verhogen op langere termijn, kunnen in die zin stellig *misgericht* genoemd worden. Een andere aanpak lijkt het *accepteren* van het probleem van chronische pijn te zijn. Dit kan gezien worden als het loskomen van het doel om het pijnprobleem op te lossen of te controleren, en het zich richten op

andere waardevolle doelen ondanks de pijn (Eccleston & Crombez, 2007; Van Damme et al., 2008). Dergelijke bevindingen kunnen belangrijke *praktische implicaties* hebben. Niet in het minst zal het belangrijk zijn om, als mensen komen vast te zitten in ineffectieve pogingen om het pijnprobleem te beheersen, hen te proberen bewegen naar het aannemen van een meer flexibel probleemkader. Een aantal technieken uit de traditionele cognitieve gedragstherapie (e.g., Morley, Eccleston, & Williams, 1999), alsook de aanpak van de nieuwe stroom therapieën gericht op een verhogen van acceptatie, zoals 'Acceptance en Commitment Therapie' (ACT; Hayes et al., 1999) of Mindfulness-gebaseerde stressreductie-programma's (MBSR; Kabat-Zinn, Lipworth, & Burney, 1985) lijken hiervoor uitermate geschikt.

Verder bleek uit onze resultaten dat individuen kunnen blijven vasthouden aan pogingen om het probleem van pijn op te lossen of te controleren, ondanks duidelijke negatieve gevolgen die hiermee gepaard gaan. Dit lijkt een paradox te zijn. Andere onderzoekstradities maken ook gewag van een dergelijk contradictorisch gedragspatroon en beschrijven dit eerder vanuit een inflexibiliteit in het ervaren van ongewilde sensaties (McCracken, 1998; McCracken et al., 1999). Belangrijke vragen stellen zich hierbij naar hoe en waarom een dergelijk patroon zich ontwikkelt. Vanuit dit proefschrift werd gesuggereerd dergelijk patroon te begrijpen vanuit een *dynamische visie* op adaptatie aan chronische pijn (zie ook Karoly, 1993). Het blijven vasthouden aan pogingen om pijn weg te werken of te controleren lijkt vanuit deze optiek ingegeven te zijn vanuit een *wil om te blijven functioneren*. Binnen dit proefschrift werd verder sterke nadruk gelegd op het belang van het begrijpen van coping met chronische pijn binnen een *context van meerdere doelen*. Interessant was de bevinding dat zij die catastroferen over pijn, pijn in lage mate accepteren, en een hoge mate van emotioneel onwelbevinden ervaren, een hogere noodzaak aangaven om pijn te controleren of op te lossen alvorens andere waardevolle doelen te kunnen bereiken. Vanuit deze optiek kan catastroferen dus best begrepen worden als een excessief rumineren om het probleem van pijn op te lossen. De klemtoon verschuift hierbij van het bestuderen van hoe mensen de pijnsensatie op zich kaderen, naar hoe mensen omgaan met het pijnprobleem in de context van andere doelen die ze willen

bereiken. Toekomstig onderzoek zal er moeten op gericht zijn om meer inzicht te verwerven in hoe personen met chronische pijn hun doelen vormgeven, en hoe ze specifiek balanceren tussen het nastreven van het doel om pijn te verlichten of te controleren en het bereiken van waardevolle niet-pijn doelen in het leven.

Bovenal behelsde het proefschrift ook een zoektocht naar het afstemmen van het theoretische kader op de gebruikte meetmethoden. De nadruk lag op het meten van probleem oplossen en acceptatie, specifiek binnen de context van chronische pijn. Algemeen pleiten we binnen dit proefschrift voor het gebruik van *ziekte-specifieke* in plaats van generische lijsten. Om gedrag van individuen binnen context te meten, hechten wij belang aan het gebruik van *nomothetisch-idiografische* meetmethodes. Deze laten toe om uitspraken te doen, zowel op niveau van de groep, als op niveau van het individu. Een haalbare methode in dit opzicht bleek uit de bevindingen van dit proefschrift een meting van doelconstructies te zijn, zoals bijvoorbeeld aan de hand van de Personal Project Analysis (Little, 1983). Verder wezen bevindingen in dit proefschrift op verschillen in *de conceptualisatie en het meten van acceptatie*. Nadruk in toekomstig onderzoek zal met name moeten liggen op het ontwikkelen van zelf-rapportage instrumenten die op een niet-ambigue wijze acceptatie-processen reflecteren. Verder lijkt het ook sterk aangewezen om meetmethodes uit te breiden met instrumenten die in staat zijn om de dynamiek in concepten in rekening te brengen, zoals dagboekmethodes of 'ecological momentary assessment' methodes (e.g., Csikszentmihalyi & Larsen, 1987; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004).

Tot slot kan benadrukt worden dat het huidige proefschrift een van de eerste pogingen behelsde om coping met chronische pijn te bestuderen vanuit een actie-georiënteerd, doelgericht theoretisch kader. De bevindingen kunnen een belangrijke aanzet vormen tot het verder bestuderen van de dynamiek achterliggend aan coping met chronische pijn. Verder onderzoek naar adaptatie aan chronische pijn kan zich best richten op het exploreren van het samenspel tussen doelconstructies, cognities en coping.

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