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Perceived and functional disability in adults with chronic pain: what accounts for discrepancies?

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PERCEIVED AND FUNCTIONAL DISABILITY IN ADULTS WITH CHRONIC PAIN: WHAT ACCOUNTS FOR DISCREPANCIES?

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CHAPTER 1

Introduction

Background

Chronic pain conditions are a worldwide health concern, affecting up to 20 - 30% of adults (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006; Johannes, Le, Zhou, Johnston, & Dworkin, 2010). Chronic pain is associated with elevated medical utilization and costs, impaired physical functioning, and disability (Samwel, Kraaimaat, Evers, & Crul, 2007). In the workplace, common pain conditions are estimated to cost employers over 60 billion dollars annually (Stewart, Ricci, Chee, Morganstein, & Lipton, 2003). Pain-related disability is broadly defined as the inability to perform necessary tasks in any important life domain due to pain (Turk & Melzack, 2001), and can occur at a range of levels (e.g., inability to do heavy manual labor, inability to carry out basic personal hygiene tasks). Measurement of pain-related disability is important in guiding selection of appropriate interventions (e.g., rehabilitation, psychotherapy, medication, surgery), making safe and salubrious recommendations for work and activity, and facilitating equitable medicolegal judgments. Valid measurement of pain-related disability is also critical to scientific elucidation and elaboration of the constructs of pain and disability, and the development of interventions to prevent and treat these conditions. Interest in use of performance-based measures of chronic pain-related disability has increased over the past 15 years; however, little is known about the relationship of self-report to performance-based measures of chronic pain-related disability. Investigations into predictors that may account for discrepancies between them are essentially absent from the literature. This study aims to address this gap.

Self-Reported and Functional Disability

Traditionally, pain-related disability has been measured via self-report instruments reflecting the patient's perceptions about their ability to complete a variety of tasks such as house and yard work, occupational tasks, self-care, and leisure activities. Self-report measures of patient-perceived disability include the Arthritis Impact Measurement Scale, Quebec Back Pain Disability Scale, Pain Disability Index, Health Assessment Questionnaire, and others. Advantages of measuring disability via self-report include ease of administration, minimal cost, standardized format and administration, ability to establish baseline functioning, and often published normative and psychometric data. However, the validity of self-report disability assessment methods is limited by several factors. First, respondents must be able to understand and interpret the items as intended. Second, respondents must retrieve memories of disability, and then accurately judge their own level of function. Finally, they must select an answer and respond forthrightly. There are a multitude of factors that may bias the accuracy of respondents' self-assessment or introduce measurement error, including cognitive factors (e.g., confusion, memory inaccuracy, depression), lack of awareness of functioning, and self-presentation bias toward either socially desirable response sets or response patterns eliciting certain rewards (i.e., favorable medicolegal judgments, medications, relief from work or responsibilities, sympathy or care) (Gauthier, Sullivan, Adams, Stanish, & Thibault, 2006).

An alternative method for measuring pain-related disability among persons with chronic pain involves measurement of observable behavior; that is, functional disability. As pointed out by Wittink (2005), myriad terms for this construct have proliferated,

including: “physical functioning, functional ability, physical ability, physical activity, activity, capacity, performance, activity level, functional status, functional limitations, physical inability, activity restrictions, and physical functional status. The words capacity, performance and ability, but also functional and physical, are being used interchangeably, causing significant confusion” (p. 197). Functional disability can be measured in the clinic or laboratory via standardized functional performance tests (e.g., lifting strength, grip strength, walking speed, or other tests involving movement or activities), or in the community via measures such as work status, return to work, or ability to live independently.

Advantages of measuring disability via observation of functional performance tests include standardized, semi-objective assessment of observable behavior, which may be subject to fewer, or at least different types of bias, and different method variance, than self-report measures (Kop et al., 2005). Functional assessment of relevant activities may also facilitate assessment with high ecological validity (e.g., walking speed and endurance tests may have high ecological validity for mail carriers), limit patients’ ability to underreport their disability level, and allow for more direct comparisons among patients (Karagiozis, Gray, Sacco, Shapiro, & Kawas, 1998). Functional assessment tasks can and do vary in the extent to which they measure functional capacity and are influenced by psychosocial factors (Ruan, Haig, Geisser, Yamakawa, & Buchholz, 2001). Combining functional assessment tests with other types of disability measurement may provide a more complete picture of the individual’s abilities (Waddell, 1998).

Limitations of functional assessment include potentially high administration costs, time, practicality, and minor safety risks. Some authors have questioned the validity of functional assessment of disability because pain or anticipation of pain, rather than muscle endurance may be the limiting factor that determines performance among many chronic pain patients (Geisser, Robinson, Miller, & Bade, 2003). Misunderstanding the instructions and other cognitive factors (e.g., fear, anxiety, depression, low self-efficacy) may also lead to poor performance on functional tests. Like self-report measures, individuals who choose to do so may willfully inflate their functionally measured disability scores.

According to Gauthier et al. (2006), researchers commonly treat functional and self-report measures of pain-related disability as interchangeable methods of measuring the same construct. However, these authors argue that this practice has an adverse impact on what we think we know about risk factors for pain-related disability, because self-report and functional disability assessments measure dissimilar processes. This is consistent with the conclusion of Reneman, Jorritsma, Schellekens, and Göeken (2002), that "self-report of ability to perform certain activities cannot be interchanged with the actual ability to perform that same activity" (p. 127) because of their poor concurrent validity. In the next section, results of studies examining the relation of perceived disability and performance measures of disability are reviewed.

Relationship of Self-Reported Disability to Functional Disability

Gauthier et al. (2006) compared risk factors for self-reported disability to risk factors for non-return to work in a sample of employees with occupational back injuries who participated in a secondary-prevention program. Psychosocial variables predicted

change in functional disability (i.e., return to work) after program participation, but did not predict changes in self-reported disability. They concluded that self-reported disability measures reflect appraisals suffused with psychological variance, and have little validity as measures of actual disability.

In a recently published study of multidisciplinary pain rehabilitation patients with chronic low back (CLBP) or extremity pain who had been involved in workplace accidents, a functional disability measure (Functional Ability Percent Deficit) was essentially unrelated (all *r*s < .10, all *p*s > .10) to a self-report Index of Perceived Disability (or a visual analog pain scale) at intake (Carleton, Abrams, Kachur, & Asmundson, 2010). The authors reported that these findings are in line with previous research. Midway through, and at the end of the 6-week intervention, CLBP patients' perceived disability increased despite the fact that their functional disability had diminished and leveled off. Among extremity pain patients, both measurements decreased over time. The authors reported that there is a paradoxical disconnect between functional and perceived disability specific to CLBP, which warrants replication and further study. They speculated that CLPB is qualitatively distinct from extremity pain, and potentially shares features of somatic symptoms of anxiety disorders (Carleton et al., 2010).

Unlike Carleton et al. (2010) Alschuler, Theisen-Goodvich, Haig, and Geisser, (2008) reported moderate correlations (-.39 and -.47) between level of perceived disability (Quebec Back Pain Disability Scale) and performance on functional lifting tests (Progressive Isoinertial Lifting Evaluation- PILE) in a sample of 267 chronic spinal pain patients. Similar to Carleton et al. (2010), Alschuler et al. (2008) found that subjective

pain (McGill Pain Questionnaire) had no relationship to functional disability; pain did, however, have small, significant correlations with self-reported disability. Depression was also associated with self-reported disability (r = .31), and functional performance (r = -.25). Depression accounted for approximately 6-10% of the variance in disability. Female gender predicted poorer performance on the waist-to shoulder PILE task, but not the floor-to-waist task. Thus, gender specific differences in upper-body strength may account for discrepancies in perceived disability and certain functional performance tasks.

The relationships between several self-report measures of disability and a performance test (Isernhagen Work Systems Functional Capacity Evaluation) was examined in a sample of CLBP patients (Reneman et al., 2002). Mean level self-reported disability was found to be moderate to severe, but the performance test suggested that on average, these patients should be able to perform moderate to heavy physical labor. Correlations between self-report and physical performance were small to moderate in this study. No attempt was made to explain discrepancies in disability scores; instead, the authors simply recommend use of both types of measurement in disability assessment.

In studies of systematic lupus eryththematosus and multiple sclerosis, conditions involving chronic pain as well as neurocognitive problems, measures of self-reported disability (Health Assessment Questionnaire and Sickness Impact Profile, respectively) and functional disability (Assessment of Motor and Process Skills) were unrelated. Performance on the functional disability measure was positively associated with cognitive impairment, whereas the self-reported disability measures were not related to

cognitive impairment (Doble, Fisk, Fisher, & Murray, 1994; Poole, Atanasoff, Pelsor, & Sibbitt Jr, 2006). The authors pointed out that functional impairment in these populations may be at least partially driven by neurocognitive impairment rather than musculoskeletal impairment. Participants may have been unable or unwilling to report these impairments on the self-report measures of disability. The authors concluded that there was incremental utility for performance-based measurement of disability in these populations.

Obesity is a risk factor for onset of chronic pain conditions such as osteoarthritis and spinal pain. Obesity is also independently associated with functional limitations. In a sample of obese women, a self-report measure of obesity-related functional limitations and an analogous performance test correlated in the range of r = .14 to .61 at the analogous item level, and .56 at the scale level. No attempt to account for discrepancies was made in this study (Larsson & Mattsson, 2001).

Estimates of the prevalence of discrepancies between self-reported and performance-based measures of disability in chronic pain patients are not available in the extant literature. However, a study of heart transplant patients indicated that the prevalence of discrepancies in disability measurements (40-52%) is significantly higher among patients than controls, and this was not due to systematic under- or over-reporting (Putzke, Williams, Daniel, Bourge, & Boll, 2000).

In summary, published studies have identified a variety of discrepancies between self-reported and functional disability, including a number of non-associations and low associations. The literature suggests that self-reported disability may be more subject to

psychosocial influences leading to under or over reporting, than disability measured during functional tasks.

Predictors or Correlates of the Perceived / Functional Discrepancy

Variance attributable to specific data collection methods (e.g., self-report, behavioral ratings, performance tests), rather than the construct of interest, is estimated to account for one quarter of the variance in a measure (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Because of this, measures of a construct such as disability, collected via two very different methods (e.g., self-report and behavioral ratings of performance on functional tasks), are not expected to correlate as highly as measures collected via the same method. Research has shown that the association between two measures with common methods typically accounts for about 35% of the variance, but only 11% is accounted for, on average, when the measures use dissimilar methods (Podsakoff et al., 2003). Although cross-method discrepancies are to be expected, elucidating the reasons for these discrepancies facilitates the interpretation of the measures, both in research and clinical settings. Common sources of method variance include item characteristics such as social desirability, item demand characteristics, item format and anchors, positive and negative item wording, and item ambiguity. Other sources include characteristics of the respondent that interact with the format of the measure, including social desirability bias, yea-saying, naysaying, and positive/ negative affective states and traits. The context in which the items are presented may also influence responding regardless of item content. These factors include scale length, priming effects, item grouping patterns, and context-induced mood. The context in which the measurement occurs may also contribute variance (e.g., time of day, hot/cold room, pleasant/rude

examiner) (Podsakoff et al., 2003). Because many of these potential sources of method variance (e.g., item anchors, yea-saying/nay-saying, item grouping patterns) are more applicable to self-report measures of disability than standardized functional measures (e.g., walking speed test), it is possible that functional measures of disability are less susceptible to various biases.

It is known that, compared to younger people, older adults tend to underreport their level of disability on self-report measures relative to assessments involving direct observation of function. These findings may be due in part to the effects of aging on the brain (e.g., dementia, memory problems) that might impair a person's ability to provide accurate self-report (Karagiozis et al., 1998). These findings may also be due to environmental contingencies associated with increasing disability that older adults may wish to avoid (e.g., moving to a nursing home, loss of independence, use of assistive devices such as a cane or wheelchair). Albeit less often, these aversive contingencies may also be in effect among younger patients with chronic pain, and motivate them to downplay their disability as well (e.g., a young adult who has high fall risk wants to avoid using a walker, which he finds embarrassing.).

Other environmental contingencies that may differentially influence measurement of disability via self-report and functional behavior include litigation and compensation status. Some patients with chronic pain may feel compelled to over report their disability level on self-report in order to receive a favorable medicolegal outcome or other secondary gains. These same factors may also reduce effort on functional disability assessment tasks, regardless of actual difficulty level, and litigation status has been associated with lower performance on a functional lifting task (PILE). Though

assessment of malingering is fraught with threats to validity, current best-estimates of malingering prevalence range from 1 – 10 % of chronic pain patients (Bianchini, Greve, & Glynn, 2005; Fishbain, Cutler, Rosomoff, & Rosomoff, 2004; Fishbain, Cutler, Rosomoff, & Rosomoff, 1999; Geisser et al., 2003; Greve, Ord, Bianchini, & Curtis, 2009; Mittenberg, Patton, Canyock, & Condit, 2002).

Clinical depression, as well as symptoms of depression have been associated with increased disability among patients with chronic pain (Alschuler et al., 2008; Geisser et al., 2003). Symptoms of depression include both cognitive/affective experiences (e.g., sadness, thoughts of death), as well as somatic symptoms (e.g., fatigue, psychomotor retardation, hypersomnia); however, the expression of depression may be markedly more somatic or cognitive/affective in some patients. Consistent with cognitive theory of depression (Beck, Rush, Shaw, & Emery, 1979), cognitive/affective symptoms of depression, as well as general negative affect or neuroticism (e.g., fear, guilt, hostility), are related to pessimistic beliefs about the self and environment, lower self-reported health, and higher self-reported disability (Alschuler et al., 2008; Cohen & Pressman, 2006; Geisser, Roth, Theisen, Robinson, & Riley III, 2000). Frequent, dysregulated negative affective states also characterize borderline personality disorder, which is linked to systematic over-reporting on self-report psychological symptom checklists, relative to physician's symptom ratings. The private, but intensely chaotic negative emotional experiences of borderline patients have been offered as an explanation of this discrepancy (Edell, Joy, & Yehuda, 1990). It appears that negative affect and self-reported health are both expressions of the same underlying personality disposition toward somatopsychic distress; 34% of the variance in subjective illness

severity can be attributed to negative affect. Negative affect appears to be relatively independent of objective health markers (e.g., erythrocyte sedimentation rate) (Ondersma, Lumley, Corlis, Tojek, & Tolia, 1997).

Depression has also been shown to predict poorer functional performance among chronic pain patients, and this was mediated by lower physiologic effort. Somatic symptoms of depression may influence disability in a different way—by limiting a person's ability to complete physical tasks during functional disability measurement (Alschuler et al., 2008), perhaps via perceived weakness, fatigue, or pain.

Positive affect, (e.g., optimism, enthusiasm, happiness) on the other hand, is associated with more frequent exercise and social activity (Watson, 1988), as well as lower pain and symptom reports, and better self-reported health even after controlling for disease status (Cohen & Pressman, 2006). This may occur because what high positive affect individuals say about their symptoms and activities (including disability) is more subject to immediate affective influences than are objective measures of health status.

Although advanced age has, in general, been associated with underestimation of disability on self-report measures (Karagiozis et al., 1998), low perceptions of competence, mastery, and control predict overestimation of disability within this group (Kempen, Steverink, Ormel, & Deeg, 1996). These findings are consistent with self-efficacy theory indicating that an individual's beliefs about their ability to successfully execute a behavior are highly predictive of their objective task performance (Bandura, 2004).

Because physical disability is at odds with U.S. cultural values of independence and self-sufficiency, one might speculate that people who are highly motivated to respond in a socially desirable manner (e.g., those who seek social approval and acceptance via adherence to behaviors that are culturally acceptable and appropriate (Crowne & Marlowe, 1960) would tend to underreport their disability in an attempt to portray themselves in a favorable light. High social desirability (plus low reported neuroticism) is also characteristic of the repressive personality, who unlike neurotics, systematically deny symptoms and problems (Liberty, 1994). If chronic pain patients who are high in social desirability systematically underreport their disability symptoms, these people would be less able to underreport their disability on functional tests compared to self-report measures because their true physical limitations (whether muscle endurance or pain) would inhibit better performance. Systematic underreporting patterns in self-report have been identified in other socially stigmatized conditions such as depression and substance abuse (Goldfinger et al., 1996; Sayer et al., 1993).

Published studies have shown that socially desirable responding is not independently associated with self-reported disability among children or adults with chronic pain (Deshields, Tait, Gfeller, & Chibnall, 1995; Logan, Claar, & Scharff, 2008). Socially desirable responding was, however, positively associated with self-reported disability, after removing the influence of depression, but the amount of variance involved in this relationship was quite small (change in R^2 = .06), and adjusted R^2 was not reported (Deshields et al., 1995). Furthermore, it is unusual to follow-up on non-significant associations by controlling for another variable and re-testing the association. The fact that the authors did this via stepwise regression, suggests that this was

unexpected finding, which may be spurious due to over fitting of the data. If this is the case, these findings should not replicate. The authors suggest that an interaction between depression and social desirability underlies these findings, but this relationship was not tested. Conducting these tests and reporting the results would have done more to elucidate the true nature of these relationships. The extent to which socially desirable responding is associated with self-reported disability relative to functional disability in chronic pain has not been published, and the evidence that socially desirable responding is positively related to self-reported disability is not yet conclusive.

Coping with pain involves the thoughts and behaviors that are used to manage the demands of pain-related situations that are deemed stressful (Folkman & Moskowitz, 2004). Pain coping strategies have demonstrated relationships a variety of disability measures (Jensen, 2009; Turner, Jensen, & Romano, 2000). Three types of psychosocial and behavioral reactions to the chronic pain experience that have been studied extensively are: a) adaptive coping (low distress and pain, high perceived control and activity); b) interpersonally distressed (perceive significant others as punishing and unsupportive); and c) dysfunctional coping (high pain, disability and distress; low activity and perceived control) (Junghaenel, Keefe, & Broderick, 2010; Kerns, Turk, & Rudy, 1985; Turk & Rudy, 1988, 1990). Adaptive coping, as the name implies, is associated with lower levels of disability, whereas the other two types are associated with markers of poor health including higher disability (Ruan et al., 2001). At this time it is not clear whether these three pain subtypes have differential relationships to self-reported vs. observed disability.

Coping has also been defined broadly as active (e.g., remaining active, distracting from pain) vs. passive (e.g., rest, wishing, praying) strategies, and problem-focused vs. emotion-focused coping (Folkman & Lazarus, 1980). Efforts to improve the predictive ability of broad coping measures lead to the development of multidimensional coping measures (e.g., Vanderbilt Multidimensional Pain Coping Inventory), which tap specific coping strategies via multiple subscales (e.g., positive reappraisal, planful problem solving, wishful thinking, distraction, catastrophizing) (Smith, Wallston, Dwyer, & Dowdy, 1997; Stephens, Druley, & Zautra, 2002). Distracting from pain and positive reappraisal have been associated with lower levels of disability. Wishful thinking, prayer and catastrophizing have been associated with higher levels of physical disability (Cano, Mayo, & Ventimiglia, 2006). While patterns of pain-related coping have been linked to disability and health, little is known about the relations of these factors to self-reported disability in comparison to functional disability.

At this time, substantial evidence has accumulated supporting the validity of the fear-avoidance model in the development and maintenance of chronic pain and disability. It is known that pain-related fears of movement and re-injury predict avoidance of behaviors that might exacerbate pain (Vlaeyen, Kole-Snijders, Boeren, & Van Eek, 1995), self-reported and functional disability (Crombez, Vlaeyen, Heuts, & Lysens, 1999), and musculoskeletal abnormalities (Geisser, Haig, Wallbom, & Wiggert, 2004; Geisser et al., 2003). Fear of movement and re-injury is an important psychological variable in the realm of chronic pain and disability, and is associated with poorer health. However, the role it might play in accounting for discrepancies between perceived and functional disability is difficult to understand based on available research.

Rationale for the Proposed Research

Substantial evidence indicates that there often are discrepancies between self-reported disability and observed, functional disability among patients with chronic pain. The results of these two types of disability measurement do not rise and fall together in lockstep; instead they vary considerably among a sample of patients, and this variability is not yet predictable.

Both Wittink (2005) and Gauthier et al. (2006) have called for further scientific investigation into discrepancies between perceived disability and tests of functional performance among patients with chronic pain. Accounting for this disconnect has implications for both clinical rehabilitation of patients with chronic pain and disability, and research on this topic. As Geisser et al. (2003) pointed out, it is currently impossible to discern whether the results of studies based upon self-reported disability can be generalized to functional assessment disability. Understanding important predictors of discrepancies between self-reported disability and functional disability would facilitate an integration of this literature, and link important pain-related psychosocial variables to discrepancy patterns in disability measurement. To date, however, there is a dearth of published studies attempting to address these gaps in the literature.

This study examined discrepancies between measures of self-reported disability and functional disability in chronic pain patients. The goal of this study was to identify psychosocial predictors of both types of disability discrepancy including subjective pain, pain-related fears, mood/affect, disability compensation status, stress, coping, psychosocial functioning, and repressive coping style.

The proposed study involves the secondary analyses of two different existing data sets, each comprised of adult patients diagnosed with different chronic pain conditions. The first sample is comprised of adult patients with chronic spinal pain. The second sample consists of adult patients diagnosed with rheumatoid arthritis. Within each sample, self-reported and functional disability were assessed, as well as several potential predictors of discrepant disability. Both participant groups have been described elsewhere in published studies (Haig et al., 2006; Lumley et al., 2011).

CHAPTER 2

Method

Sample and Participant Selection

Each study protocol was reviewed and approved by the local Institutional Review Board.

Chronic spinal pain sample. The chronic spine pain sample participants (*N* = 389) were consecutive patients evaluated once as part of a Spine Team Assessment (STA) at a major Midwestern research university's multidisciplinary spine treatment center. De-identified data was retrospectively extracted from 510 patient clinical records. These patients were initially referred to the spine program by their primary care provider, spine surgeon, spine specialist physiatrist, or case manager. In this healthcare setting, referral to STA was recommended for all patients experiencing work and/or life disability due to spinal pain beyond 3-month duration. After exhausting other individual treatment methods and being medically approved for aggressive rehabilitation testing, each patient was referred by his or her staff physiatrist for the STA. Persons who were not cleared medically, and most individuals over the age of 60, were offered a different program, and were not included in this study; the number of patients who were triaged to a different program was not recorded, and thus is not reported here. Of the 510 participants included in the parent study, 389 had complete data available for both functional and perceived disability measures, and were included in analyses for the current study.

The chronic spinal pain sample was nearly equally composed of men (52.70%) and women (47.3%), ranging in age from 18 to 78 years (*M* = 41.22, *SD* = 8.74).

Average reported pain duration was 53.54 months (*SD* = 76.69). The sample was predominantly white (88.9%), with a significant minority of African American patients (9.8%). The most common pain diagnoses were low back pain (74.2%) and neck pain (13.6%). Onset, when attributable to a specific event, was most often reported as subsequent to a work-related injury (38.4%), motor vehicle accident (23.8%), fall (7.1%), or lift (3.8%). Idiopathic onset was reported by 16.5% of the sample. Less than a high school education was reported by 18.1% of this sample. Nearly one-third (30.9%) completed high school, 36.6% reported some college or vocational training, and 14.1% of the sample had a college degree or higher. The parent study sample has been described previously by Haig et al., (2006).

Rheumatoid arthritis sample. The sample of participants with rheumatoid arthritis (RA) (*N* = 174) was recruited from urban and suburban rheumatology clinics in the metropolitan area surrounding an urban research university in the Midwest where the study was conducted. Each participant volunteered to participate in a randomized, controlled study of emotional disclosure, and completed informed consent prior to enrollment. In order to participate in the study, participants had to meet American College of Rheumatology diagnostic criteria for nonjuvenile RA and report experiencing pain and/or disability due to RA disease over the past 7 days. Potential participants were excluded from this study if they had physician-suspected or diagnosed cognitive impairment; an inability to read, write, and/or understand the English language; or a major medical, rheumatic, or autoimmune comorbidity. Due to the nature of the study, participation in another clinical trial, intent to move out of the area in the next 6 months, and physical inability to write or walk were also exclusionary criteria. Initially, 425

participants were invited to participate in the study; 173 (40.7%) participants declined the invitation, and another 71 participants (16.7%) failed to meet inclusion/exclusion criteria. The remaining 181 participants completed baseline assessment. Of those 181, 174 participants completed at least one measure of functional disability, and a measure of perceived disability, and are included in analyses for this study. This sample was composed predominantly of women (84%) and was ethnically varied (44% African American, 55% White, 1% Hispanic). The average participant was 54.6 years old (range, 20 - 74 years) and had completed some education beyond high school (*M* = 13.5 years of education). The average length of time since RA diagnosis was 11.2 years. The parent study sample has been described more fully by Lumley et al. (2011).

Procedure

The procedure for each of the two samples are described separately in the following two sections. Procedures that occurred after baseline data collection was conducted are not described here (e.g., post-baseline procedures such as interventions or longitudinal follow-up assessments) because they are not relevant to this cross-sectional study. Interested readers are directed to the published parent studies for more information on these procedures (Haig et al., 2006; Lumley et al., 2011).

Chronic spinal pain sample procedure. Chronic spinal pain patients were referred to the spine program for STA participated in a half-day multidisciplinary assessment. The assessment included completion of standardized self-report psychometric instruments, questionnaires, a diagnostic interview, and hour-long evaluations with pain psychologist, physical therapist, occupational therapist, and exercise physiologist. Physical examinations by a spine specialist physiatrist occurred

prior to referral for STA. The assessment instruments used in the STA are described in detail in the measures section. The STA was designed for assessment of individuals who have high levels of disability in work and/or activities of daily living, subsequent to chronic spinal pain. The STA culminated in a multi-disciplinary team meeting, and an assessment report including treatment recommendations (Haig et al., 2006). Participants were not compensated for their time because data was collected as part of routine clinical procedures, and extracted retrospectively for research purposes.

Rheumatoid arthritis sample procedure. Participating rheumatology clinics identified appropriate patients as potential study participants and mailed each one a study recruitment letter that detailed the study goals and procedures, and invited them to enroll. Similar recruitment telephone calls were also made by research assistants to patients who had not expressly declined participation. The research assistant arranged to meet with potentially interested patients at the rheumatology clinic prior to their next office visit. At these appointments the participants provided informed consent to participate in the study. Next, demographic and medical history data were collected by interview, and the remaining assessment procedures were completed. Assessment instruments and procedures are described in detail in the measures section below. Each participant was compensated financially for completing the baseline assessment. Details of study procedures beyond baseline data collection, as well as study results were published by (Lumley et al., 2011).

Assessments and Measures

Because the data collection methods of the two parent studies were not identical, the measures available for reporting and analysis necessarily vary between the chronic

spinal pain and rheumatoid arthritis samples. In the following section, measures used in the chronic spinal pain sample arereported first, followed by the RA sample.

Chronic spinal pain sample measures

Self-reported disability

Quebec Back Pain Disability Scale. This is a 20-item instrument that asks patients to rate the level of difficulty they have performing several activities (e.g., making a bed, getting out of bed, walking several miles). Ratings range from 0 (not difficult at all) to 5 (unable to do). A total score is calculated by summing all items. Total scores range from 20 – 100, and higher scores reflect greater disability. Test-retest reliability for the English version is reported to be .93, and internal consistency for the scale is .95. This instrument has demonstrated sensitivity to changes in pain (Kopec et al., 1995).

Behavioral disability

Progressive Isoinertial Lifting Evaluation (PILE). This assessment requires the participant to perform a low lift and a high lift task, and performance is assessed in terms of a percentage of maximum weight lifted. The low lift involves lifting a weight from floor to waist, and then returning it to the floor. The high lift involves lifting the weight from waist to above shoulder height, and returning it to waist level. Both low and high lifts are repeated 4 times over 20 seconds. The weight is then increased and the task repeated until the patient requests to stop, physical safety parameters are exceeded (i.e., heart rate, blood pressure), or a norm-based expected weight limit is achieved. Haig et al. (2006) published formulas calculating the appropriate weights for use in the PILE based on gender, weight and height. The PILE is reported to be a

measure of strength, endurance, and psychophysical effort. During the PILE, an examiner records the maximum weight lifted during testing. After testing, the proportion of expected weight actually lifted is calculated. At the spine program, participants who achieved less than 70% of their maximum heart rate during the PILE are charted as exerting submaximal physiologic effort (Haig et al., 2006; Mayer et al., 1988).

Functional Assessment Screening Test (FAST). The FAST is comprised of five short and simple physical functional assessment tests that screen for functional disability. These low-exertion tasks are considered quite easy to complete by able-bodied persons (88% completion rate among healthy controls). The FAST was designed to require movements that were face-valid measures of back performance. The time requirements were set in order to allow participants to choose whether to continue or cease participation in the task prior to reaching the time limit. However, these tasks were selected because they also posed minimal biomechanical challenge, compared with typical activities of daily living. Despite the low physical demands of this task, only about 1 in 5 chronic spinal pain patients (19.7%) successfully complete all 5 tasks (Haig et al., 2006; Ruan et al., 2001), and non-completion was associated with poorer performance on more physically demanding tests of physical functioning (e.g., PILE), and lower physiological effort (i.e., heart rate), but not less perceived exertion. Cervical or thoracic pain locations were associated with significantly higher rates of completion than lumbar pain. The internal consistency reliability estimate of the FAST is .82 (Ruan et al., 2001). The five tests are as follows:

1. Repetitive stooping 5-minute test (stoop5). This task involves picking up small bolts from a floor-level container, and placement of the bolts into a different overhead container. Overhead reach is set to a comfortable level for the individual.

2. Repetitive twisting 5-minute test (twist5).This task requires the participant to use his or her left hand to take a bolt from a waist height container located on the right-hand side, and place the bolt in a different container located directly in front. Then the motion is reversed and the participant reaches to the left with the right hand, and performs the same action. This pattern is repeated over the duration of the test.

3. Kneeling 2-minute test (kneel2). The participant is asked to kneel on one or both knees, while screwing and unscrewing bolts from a wooden box facing the participant.

4. Squatting 2-minute test (squat2). This test mirrors the kneel2 test, except the participant is asked to complete the task in a squatting position.

5. Stooping 2-minute test (stoop2). This test mirrors the kneel2 test, except the participant is asked to complete the task while bending at the waist (knees may be bent) rather than kneeling.

For each test, a stopwatch is used to measure seconds of effort, beginning when the participant assumes the correct position, and continuing as long as he or she continues the task at his or her own pace. Timing ends when the patient ceases to participate in the task, asks to stop, or the time limit is reached (i.e., two or five minutes), whichever comes first. Each test is scored as completed/noncompleted, and the number of completed tasks can be summed for an overall score. A test score of

zero or nonconmpleted is scored if the participant is unable to perform the correct test position.

Correlates

Demographics and pain characteristics. Data collected from the chronic spinal pain sample includes gender, age, education, race/ethnicity, pain diagnosis, pain location, pain cause, and injury date.

West Haven-Yale Multidimensional Pain Inventory- Version II (MPI). The MPI is a 61-item self-report questionnaire that is composed of three parts, each with its own subscales. The first section inquires about pain experience and includes the following five subscales: perceived interference of pain in various areas of patients' functioning, support and concern of significant others, pain severity, self-control, and negative affect. The second section assesses responses of significant others to pain communication, and includes three subscales assessing the frequency of punishing, solicitous, and distracting responses. The third part queries frequency of participation in four types of daily activities: household chores, outdoor work, activities away from home and social activities (Kerns et al., 1985). Sample items include: "Rate the level of your pain at the present moment", how often do you "Play cards or other games", and, when you are in pain how often does your significant other "Ask what he/she can do to help." Items are scored on a 0 – 6 scale with anchors at 0 (e.g., none, never) and 6 (e.g., extreme, very often). Subscale reliability estimates ranged from .70 – .90, and stability estimates ranged from .62 – .91(Bernstein, Jaremko, & Hinkley, 1995).

Turk and Rudy used the MPI items to evaluate the psychosocial and cognitive behavioral responses to chronic pain (1987, 1988, 1990). Cluster analysis of MPI

responses revealed three subtypes of chronic pain patients: dysfunctional, interpersonally distressed, and adaptive copers. Participants are assigned a subtype corresponding to their pattern of responses using computer software developed by Rudy and Turk (1989). External validity studies using multivariate and univariate analyses of variance with over 10 reliable, external scales (e.g., Beck Depression Inventory, McGill Pain Questionnaire) demonstrated that each of the three clusters of patients were distinct. Only 3.3% of cases (*N* = 122) were misclassified using a multivariate procedure controlling for the intercorrelation of the MPI subscales. These findings were successfully replicated in a different sample of 79 pain patients (Turk & Rudy, 1987). The three profile patterns have been reliably identified within chronic back pain patients using alternate forms of the MPI, leading Turk and Melzack (2001) to conclude that the profiles are quite robust. Participants in the chronic spinal pain sample completed the MPI were classified according to the three chronic pain subtypes.

Center for Epidemiological Studies-Depression (CES-D). The CES-D is a 20-item self-report measure of depressive symptoms that asks patients to rate the frequency of their depressed symptoms over the past week on a 0–3 scale (Radloff, 1977). The total score is equal to the sum of all items (4 items are reverse scored). The internal consistency reliability estimate for in a general sample was .85, and it was .95 in a psychiatric sample (Radloff, 1977). The CES-D had demonstrated good sensitivity and specificity in identifying chronic pain patients with and without depression, and concurrent validity with DSM-III-R and DSM-IV diagnoses of depression among chronic pain patients (Geisser, Roth, & Robinson, 1997; Haig et al., 2006; Turk & Okifuji, 1994).

Tampa Scale of Kinesiophobia (TSK). Fear of movement/(re)injury was assessed via patient ratings of 13 items querying beliefs about pain and activities (e.g., I am afraid that I might injure myself accidentally). This version of the TSK excludes four of the original items that were identified as having low item-total correlations. Each item was rated on a scale ranging from 1 = strongly disagree, to 4 = strongly agree. Factor analysis revealed that the scale measures two constructs, pathological somatic focus, and activity avoidance; the items loading on each factor can be summed to form two subscales. A total score can also be calculated from the sum of the item scores (higher scores reflect more fear of movement/(re)injury). Internal consistency for the total score is quite good (alpha = .86) (French, France, Vigneau, French, & Evans, 2007; Goubert et al., 2004; Vlaeyen et al., 1995).

Medical Outcomes Study 36-Item Short Form Health Survey (MOS-SF-36). Participants completed this 36-item multi-format self-report measure assessing generic health related quality of life over the past month via several different health concepts. The Bodily Pain, Social Functioning, and Role Function- Emotional Aspects scales were examined in this study. Several different question and response formats are used. For example, the question “Compared to one year ago, how would you rate your health in general now?” is rated on a five-item scale ranging from 1 = Much better now than one year ago, to 5 = Much worse now than one year ago, and the statement “I am as healthy as anybody I know” is rated on a five-item scale ranging from 1 = definitely true, to 5 = definitely false. After specific items are reversed, item ratings within each concept are summed and standardized on a 0 – 100 scale (higher scores represent better health and/or freedom from health problems). Published internal consistency and test-retest

reliability estimates in more than 25 studies have exceeded the minimum standard of .70 for use in group comparisons, with only rare exceptions (Tsai, Bayliss, & Ware, 1997); most reported reliability estimates have exceeded 0.80 (McHorney, Ware Jr, Rachel Lu, & Sherbourne, 1994; Ware, Snow, Kosinski, & Gandek, 1993).The SF-36 meets both Kline and Nunnally's (Kline, 1986; Nunnally, 1978) criteria for internal consistency (Garratt, Ruta, Abdalla, Buckingham, & Russell, 1993).

Rheumatoid arthritis sample measures

Self-reported disability

Arthritis Impact Measurement Scales-2 (AIMS-2). The AIMS-2 Is an arthritis specific self-report instrument that measures a range of physical dysfunction with the following six subscales: mobility level, walking and bending, hand and finger function, arm function, self-care, and household tasks. Questions are scored on a 5-point scale ranging from either "all days" to "no days", or "always" to "never", in reference to experiences during the past month (e.g., "How often did someone have to assist you to get around outside your home?"). Each subscale is made up of four or five items; responses are summed and then standardized on a 0-10 scale. Scores from the six subscales listed above can be summed to form composite physical dysfunction scale with a maximum possible score of 60. The AIMS-2 scales have been widely used and validated, internal consistencies for the six physical functioning scales range from .81 – .90 in RA samples. Stability over two to three weeks ranges from .81 – .94. The American College of Rheumatology recommends the AIMS-2 for use in clinical trials (Lumley et al., 2011; Meenan, Mason, Anderson, Guccione, & Kazis, 1992).

Behavioral disability

Walking Speed. Walking speed was conceptualized as an objective measure of functional pain-related disability. Participants were instructed to walk ‘‘as quickly as possible, but safely’’ down a 50-foot corridor. The number of seconds it took each participant to perform this task was recorded in seconds. Higher values indicate slower walking and greater disability (Lumley et al., 2011).

Grip Strength. Grip strength was conceptualized as an objective measure of functional pain-related disability. Grip strength was assessed by asking each participant to squeeze a sphygmomanometer bulb as firmly as possible. Each participant was asked to complete two trials with each hand and the pressure generated was recorded in millimeters of mercury (mm HG). The mean of all four trials was calculated. Higher scores reflect greater grip strength and less disability (Lumley et al., 2011).

Predictors

Demographics and Pain Characteristics. Data collected from the RA sample include gender, age, education, race/ethnicity, marital status, occupation, work/disability status, age of RA symptom onset, and age at RA diagnosis.

Arthritis Impact Measurement Scales-2 (AIMS-2): depressed mood and arthritis pain scales. This arthritis specific self-report instrument contains a five-item subscale measuring depressed mood, and a five-item subscale measuring arthritis pain. Questions are scored on a five-point scale ranging from “always” to “never”, in reference to experiences during the past month (e.g., “How often did you feel so down in the dumps that nothing would cheer you up?”). Item responses are summed and then standardized on a 0-10 scale where higher scores reflect higher levels of the construct measured. The AIMS-2 scales have been widely used and validated. Internal

consistency for the depressed mood scale was reported as .85 in an RA sample, while stability over 2 - 3 weeks was .80. Internal consistency for the arthritis pain scale in an RA sample, and stability over 2 - 3 weeks were both .89. The American College of Rheumatology recommends the AIMS-2 for use in clinical trials (Lumley et al., 2011; Meenan et al., 1992).

Positive and Negative Affect Schedule-Expanded Version (PANAS-X). This 60 item measure asked participants to rate their current experience of fear, guilt, hostility, shyness, fatigue, surprise, joviality, self-assurance, attentiveness, serenity, and sadness on a scale ranging from 1 = very slightly, or not at all, to 5 = extremely. The corresponding item scores may also be summed to create a positive affect composite (joviality, self-assurance, attentiveness), and a negative affect composite (fear, guilt, hostility, sadness) (Watson & Clark, 1999).

Vanderbilt Multidimensional Pain Coping Inventory (VMPCI). This 41-item self-report measure of pain-related and general coping taps 11 distinct strategies: planful problem solving, positive reappraisal, confrontative coping, distraction, distancing/denial, stoicism, use of religion, self-blame, self-isolation, wishful thinking, and disengagement. Each item begins with the stem “When my pain is at a moderate level of intensity or greater, I…” followed by a coping behavior (e.g., “pray more than usual”, “criticize or blame myself”). Participants rate how often they engaged in each coping effort to manage their pain, using a scale ranging from 1 = never to 5 = very frequently (Stephens et al., 2002). Subscale items are summed and a mean score is calculated. Higher scores reflect more use of that coping strategy. The VMPCI demonstrated incremental validity over broad, two-dimensional coping measures in

predicting positive and negative psychological adjustment. Internal consistency reliabilities of 8/11 subscales range from .70 – .93; two subscales stoicism (.56) and self blame (.67) are lower. The self blame subscale consists of a single item, thus the internal consistency reliability cannot be reported. Stability of the subscales at 18-month retest is acceptable. This measure has been validated with RA patients (Smith et al., 1997).

Marlowe-Crowne Social Desirability Scale. This widely used 33-item true/false instrument assesses the extent to which people endorse behaviors that are socially admirable, yet rarely true for most people (e.g., before voting I thoroughly investigate the qualifications of all the candidates). Items are scored on a scale of 1 = strongly disagree, to 4 = strongly agree. The frequency of 4 = strongly agree ratings is calculated (other responses are not scored), and this score is standardized on a 0 – 100 scale to form the total score. Higher scores reflect more socially desirable responding. Internal consistency appears to be adequate (approaching .80), and temporal stability is high (Crino, Svoboda, Rubenfeld, & White, 1983).The SDS has demonstrated discriminant validity with measures of depression, anxiety, and psychopathology. (Crowne & Marlowe, 1960; Tanaka-Matsumi & Kameoka, 1986).

Repressive personality type. Each participant was classified into one of two groups, repressors or non-repressors, using previously established methods (Liberty, 1994). Median splits on the Marlowe-Crowne Social Desirability Scale, and the PANAS negative affect composite were used to identify participants that are high on social desirability and low on negative affect, who were then categorized as repressors. All others were categorized as non-repressors.

Data Analytic Plan

IBM SPSS Statistics 19 software package was used for data management and analysis. Prior to data analysis, the data sets were first screened for outliers and missing data. Appropriate strategies for managing these issues were identified and implemented.

Within the chronic spinal pain sample, the PILE and FAST measures of functional disability were standardized within the sample (i.e. z-scores were calculated for each measure), and then the sign was reversed so that positive scores reflect higher functional disability, and negative scores reflect lower functional disability. Then the mean of the two scores was calculated and this composite score was transformed into a z-score. The Quebec Back Pain Disability Scale was transformed into a z-score as well, where positive scores reflect higher self-reported disability within the chronic spinal pain sample. Only participants who had complete data available for the PILE, FAST, and The Quebec Back Pain Disability Scale were included in this study sample.

Within the RA sample, following the same procedure described above, walking speed and grip strength total scores were transformed into z-scores where positive scores reflect greater functional disability. Then the mean of the two scores was calculated, and this composite score was transformed into a z-score. If either walking speed or grip strength data was missing, then the measure that was available was transformed into a z-score and used as the functional disability measure on its own. In this sample, 17 participants were missing walking speed data, thus grip strength alone represented their functional disability level. The AIMS physical dysfunction composite

score was also transformed into a z-score where positive scores reflect higher self-reported disability within the RA sample.

Next, disability discrepancy scores were computed using the formula: Disability discrepancy = (functional disability z-score) – (perceived disability z-score). Disability discrepancy scores that approach zero indicate non-discrepant disability measures for that individual. Disability discrepancy scores that are positive indicate disability discrepancies where functional disability exceeds perceived disability. Disability discrepancy scores that are negative indicate disability discrepancies where perceived disability exceeds functional disability. One discrepancy score was calculated for each sample.

Hypotheses

In order to test which psychosocial variables account for discrepancies between self-reported and functional disability, I correlated each of the discrepancy scores with the psychosocial and demographic variables of interest within the appropriate sample. In general, indicators of better psychosocial health and adjustment were expected to correlate with discrepancies where functional disability exceeds perceived disability. Conversely, indicators of poorer psychosocial health and adjustment were expected to correlate with discrepancies where perceived disability exceeds functional disability.

Thus, higher scores on the following constructs were expected to predict discrepancies where functional disability exceeds perceived disability: positive affect, planful problem solving coping, positive reappraisal coping. The adaptive coping response to pain was also expected to be associated with relatively higher functional disability. Whereas, higher scores on the following constructs were expected to predict

discrepancies where perceived disability exceeds functional disability: depression, negative affect, fear of movement/(re)injury, self-blame coping, self-isolation coping, wishful thinking coping, confrontive coping, religious coping, and disengagement coping. The categories of interpersonally distressed, and dysfunctional response to pain were also expected to be associated with higher perceived disability.

Another expected relationship did not pertain to the positive vs. negative health and psychosocial adjustment markers detailed above. Repressive personality type (i.e., high social desirability and low negative affect) was expected to be associated with higher relative functional disability, because these individuals do not admit to problems on self-report.

For some other constructs of interest, it was more difficult to determine whether they necessarily fit best within the positive markers of health and adjustment, or the negative health markers group, or to make hypotheses about how they might otherwise be associated with relatively higher self reported or functional disability (or non-discrepancy) in chronic pain samples. These variables were examined in an exploratory manner: demographic variables and pain characteristics, litigation status, distraction coping, distancing/denial coping, and stoicism coping.

CHAPTER 3

Results

Chronic Spinal Pain Sample

Chronic spinal pain sample data screening and cleaning

Only those participants with data available on measures necessary to calculate a disability discrepancy score were included in the study sample (*N* = 389). Demographic and pain characteristics of participants included in the study were not significantly different from characteristics of participants who were excluded due to missing data. All variables were screened for outliers prior to analysis. A small number of out-of-range values were assumed to be data entry errors and replaced with the closest in-range value because it was not possible to access the original paper measures. Data was found to be missing for up to 18% of participants (i.e., MOS Bodily Pain variable), due to variability in clinical procedure and patient non-completion of measures. Missing data values were not replaced.

Chronic spinal pain sample descriptive statistics

Descriptive statistics for continuous outcome variables in the chronic spinal pain sample are reported in Table 1, and the intercorrelations among these variable are reported in Table 2.

Table 1.

Descriptive Statistics for Key Continuous Outcome Variables in the Chronic Spinal Pain Sample (N = 389)

Variable	*n*	Mean	*SD*
Quebec Back Pain Disability Scale	389	58.83	18.32
PILE (1 - mean % lifted)	389	59.71	22.63
FAST (5 - # of tasks completed)	389	2.67	1.76
CSP Discrepancy Score	389	0.00	1.00
CES-D	368	25.06	13.38
TSK- Pathological Somatic Focus	354	14.71	3.63
TSK- Activity Avoidance	352	21.73	5.30
MOS- Bodily Pain	319	24.43	15.94
MOS- Social Functioning	327	41.25	24.16
MOS- Role Emotional	323	46.46	42.60

Note. Higher scores reflect better functioning in MOS variables. The reverse is true for all other variables (except the CSP Discrepancy Score). Positive discrepancy scores indicate that self-reported disability < functional disability. Negative discrepancy scores indicate that self reported disability > functional disability.

Chronic spinal pain sample zero order correlations

Table 2.
Zero-Order Correlations of Continuous Variables in the Chronic Spinal Pain Sample

	Quebec	PILE	FAST	Compen-sation.	CES-D	Pathological Somatic Focus	Activity Avoidance	MOS-Pain	MOS-Social Functioning
PILE	.51**								
n	389								
FAST	.49**	.61**							
n	389	389							
Comp.	.17**	.17**	.13*						
n	314	314	314						
CES-D	.37**	.26**	.31**	.11					
n	368	368	368	309					
Path. S. F.	.26**	.23**	.17**	.16**	.38**				
n	354	354	354	291	345				
Activ. Avoid.	.29**	.26**	.20**	.09	.43**	.58**			
n	352	352	352	289	343	352			
MOS-Pain	-.58**	-.37**	-.36**	-.16*	-.37**	-.29**	-.24**		
n	319	319	319	259	312	319	318		
MOS-Social	-.43**	-.28**	-.30**	-.19**	-.55**	-.30**	-.30**	.51**	
n	327	327	327	267	320	327	326	319	
MOS-Emo.	-.24**	-.21**	-.22**	-.14**	-.60**	-.34**	-.39**	.24**	.41**
n	323	323	323	265	316	323	321	310	312

Note. * = p < .05, ** = p < .01. Correlations are two-tailed. Participants not receiving medical disability compensation were coded as 0, and those receiving medical disability compensation were coded as 1. Higher scores reflect better functioning for the MOS variables. The reverse is true for all other variables.

Chronic spinal pain sample analysis of continuous variables

The Chronic Spinal Pain Discrepancy Score was not significantly associated with any measured demographic variables or pain characteristics (i.e., age, race, education, cause of pain, pain diagnosis, or pain duration), so it was not necessary to control for any variables in the following analyses. Table 3 displays the correlations of discrepancy scores with continuous variables in the chronic spinal pain sample. It shows that lower levels of pain and better social functioning are significantly associated with lower perceived disability relative to functional disability. Compensation status, depression, kinesiophobia (i.e., pathological somatic focus and activity avoidance), and emotional role functioning were not significantly associated with the disability discrepancy score.

Table 3.

Correlations of Discrepancy Scores with Continuous Variables in the Chronic Spinal Pain Sample

Measure	*r*	*p*
Compensation (*n* = 314)	.01	.92
Depression (*n* = 368)	-.06	.29
Pathological Somatic Focus (*n* = 354)	-.04	.46
Activity Avoidance (*n* = 352)	-.04	.50
MOS-Pain (*n* = 319)	.19	.001
MOS- Social Functioning (*n* = 327)	.12	.036
MOS- Role Emotional (*n* = 323)	.00	.97

NOTE: Correlations are two-tailed. Participants not receiving medical disability compensation were coded as 0, and those receiving medical disability compensation were coded as 1. Higher scores reflect better functioning for the MOS variables. The reverse is true for all other variables. Positive correlations reflect an association with discrepancies where self-reported disability < functional disability. Negative correlations reflect an association with discrepancies where self reported disability > functional disability.

Chronic spinal pain sample analysis of categorical variables

Of the 389 participants who completed the MPI, 270 of them were able to be classified into the adaptive coper, dysfunctional coper, or interpersonally distressed category. One-Way Analysis of Variance was used to test whether the disability discrepancy scores significantly varied by MPI categories, which they did ($F(3, 385) = 3.44$, $p = .017$). After the omnibus F-test was identified as statistically significant, Tukey's HSD post-hoc test was used to determine that adaptive copers' disability

discrepancy scores (n = 77, M = 0.17, SD = 0.84) were significantly higher than dysfunctional copers' disability discrepancy scores (n = 123, M = - 0.20, SD = 0.93; p = .029; Cohen's d = 0.41). This means that adaptive copers tended to have lower levels of perceived disability levels relative to their higher level of functional disability, while dysfunctional copers tended to have higher levels of perceived disability in relation to lower levels of functional disability. The interpersonally distressed participants' discrepancy scores (n = 70, M = - 0.10, SD = 1.00) were not significantly different from the other two MPI categories.

Rheumatoid Arthritis Sample Results

Rheumatoid arthritis sample data screening and cleaning

Only those participants with data available on measures necessary to calculate a disability discrepancy score were included in the study sample (N = 174). Demographic and pain characteristics of participants included in these analyses had on average more years of education (M = 13.59, SD = 2.47) than participants who were excluded (M = 11.44, SD = 4.45) due to missing data (t (181) = 2.42, p = .02). They did not significantly differ on any other demographic or pain variables. All variables were screened for outliers prior to analysis. Outliers were not identified in this data set, likely due to previous data screening and cleaning conducted as part of the parent study. Missing data was limited in the rheumatoid arthritis sample (no greater than 8.05% for any variable). Missing data values were not replaced.

Rheumatoid arthritis sample data reduction

In order to reduce the total number of variables analyzed and identify superordinate constructs, an exploratory factor analysis was conducted on the 16

VMPCI subscales using principal components extraction. A varimax rotation was used to create orthogonal factors. The final four factor solution converged in eight iterations (see Table 4).

Consistent with the varimax rotation approach, each subscale was assigned to the factor on which it had the greatest loading; each subscale was assigned to only one factor. The new factor variables were created by averaging the subscale scores assigned to each factor.

The four factors were named: Passive Dysfunctional Coping, Cognitive Adaptation, Active Behavioral Adaptation, and Religion. The Passive Dysfunctional Coping factor was comprised of the following VMPCI subscales: Confrontive Coping, Self-Blame, Self-Isolation, Wishful Thinking, Disengagement, Passive Coping, and Venting. The Cognitive Adaptation factor was composed of the following VMPCI subscales: Positive Reappraisal, Distancing-Denial, Distraction, Stoicism, and Acceptance. The Active Behavioral Adaptation factor included the following VMPCI subscales: Planful Problem Solving, Active Coping, and Seeking Social Support. Only the VMPCI Religion scale loaded on the Religion factor. These four factor variables were used in subsequent analyses.

Table 4.

Summary of Exploratory Factor Analysis Results for VMPCI Subscales Using Principal Components Analysis and a Varimax Rotation (n = 160)

	Factor Loadings			
VMPCI Subscale	Passive Dysfunctional Coping	Cognitive Adaptation	Active Behavioral Adaptation	Religion
Planful Prob. Solving	-.17	.22	**.65**	.11
Positive Reappraisal	-.25	**.55**	.44	.39
Confrontive Coping	**.72**	-.05	.21	-.27
Distraction	.19	**.58**	.37	.16
Distancing-Denial	-.07	**.84**	.14	-.10
Stoicism	.18	**.79**	-.28	.06
Religion	.13	.16	.16	**.82**
Self-Blame	**.66**	.10	-.08	-.05
Self-Isolation	**.75**	.04	-.26	.21
Wishful Thinking	**.62**	.17	.08	.44
Disengagement	**.88**	.05	-.23	.01
Active Coping	-.24	.58	**.59**	.00
Passive Coping	**.78**	-.18	.00	.33
Acceptance	.02	**.57**	.01	.16
Seeking Soc. Support	.35	-.23	**.76**	.09
Venting	**.78**	-.05	.33	.06
Eigenvalues	4.24	2.83	2.08	1.35
% of variance	26.52	17.69	13.02	8.41

Note: The highest factor loading for each subscale appears in bold.

Rheumatoid arthritis sample descriptive statistics

Descriptive statistics for continuous outcome variables in the Rheumatoid Arthritis sample are reported in Table 5, and the intercorrelations among these variable are reported in Table 6. A repressive coping style was identified in 25.90% of the sample (45 out of 174 participants). The proportion of participants receiving medical disability compensation was 31.6% (*n* = 55).

Table 5.

Descriptive Statistics for Key Continuous Outcome Variables in the Rheumatoid Arthritis Sample (N = 174)

Variable	*n*	*Mean*	*SD*
Physical Dysfunction (AIMS-2)	*174*	*2.16*	*0.72*
Walk Time (seconds)	157	*15.70*	*7.03*
Grip Strength (mm Hg)	*174*	*242.79*	*124.91*
RA Disability Discrepancy Score	*174*	*0.00*	*1.00*
Depression (AIMS-2)	174	1.98	0.78
Negative Affect	173	1.91	0.74
Positive Affect	173	2.95	0.77
Pain (AIMS-2)	174	3.22	1.00
Passive/Dysfunctional Coping	158	1.49	0.69
Cognitive Adaptation	158	2.51	0.56
Active Behavioral Coping	158	2.25	0.56
Religion	158	2.83	1.10

Note: For those participants that did not have a Walk Time score available (n = 17), the discrepancy score was calculated using Grip Strength as a single functional disability measure.

Rheumatoid arthritis sample zero-order correlations

Table 6.
Zero-Order Correlations of Continuous Variables in the Rheumatoid Arthritis Sample

	AIMS-2 Phys. Dysfx.	Walk	Grip (rev.)	Compensation	Depression	NA	PA	Repressive Coping	AIMS-2 Pain	Passive Dysfx Coping	Cog. Adapt. Coping	Active Beh. Coping
Walk	.57**											
n	157											
Grip (r)	.44**	.46**										
n	174	157										
Comp.	.40**	.17*	.25**									
n	171	154	171									
Depress	.39**	.24**	.15*	.16*								
n	174	157	174	171								
NA	.35**	.27**	.11	.12	.74**							
n	173	156	173	170	173							
PA	-.23**	-.10	-.18*	-.18*	-.55**	-.45**						
n	173	156	173	170	173	173						
Repres	.01	.00	.00	-.09	-.29**	-.44**	.19*					
n	174	157	174	171	174	173	173					
Pain	.60**	.36**	.26**	.24**	.32**	.34**	-.21**	-.05				
n	174	157	174	171	174	173	173	174				
Passive	.40**	.21*	.15	.05	.56**	.60**	-.42**	-.32**	.40**			
n	158	142	158	155	158	157	157	158	158			
Cog. A.	.02	-.06	.20*	.11	-.15	-.09	.16*	.13	.14	.07		
n	158	142	158	155	158	157	157	158	158	158		
Active	-.03	-.07	-.02	.04	-.21**	-.19*	.31**	.14	.00	.01	.32**	
n	158	142	158	155	158	157	157	158	158	158	158	
Religion	.39**	.35**	.28**	.13	.15	.09	.01	.02	.26**	.22**	.31**	.20*
n	158	142	158	155	158	157	157	158	158	158	158	158

Note. * = $p < .05$, ** = $p < .01$ Correlations are two-tailed. Grip strength was reversed so that higher scores reflect greater disability, consistent with other measures of impairment. Participants receiving medical disability compensation were coded as 1, and those not receiving medical disability compensation were coded as 0. Presence of a repressive coping style was coded as 1, and its absence was coded as 0.

Rheumatoid arthritis sample analysis of continuous variables

The rheumatoid arthritis sample disability discrepancy score correlated positively and significantly with rheumatoid arthritis duration and female gender, so duration and gender were controlled for in subsequent analyses. Table 7 displays the results of partial correlations of discrepancy scores with continuous variables in the rheumatoid arthritis sample (controlling for gender and rheumatoid arthritis duration). The results indicate that receiving medical disability compensation, higher levels of depression and negative affect, more pain, and a passive dysfunctional coping style are significantly associated with a pattern of higher perceived disability relative to disability measured during functional tests. Disability discrepancies were not significantly associated with level of positive affect, or other coping styles.

Table 7.

Partial Correlations of Discrepancy Scores with Continuous Variables in the Rheumatoid Arthritis Sample, Controlling for Gender and Rheumatoid Arthritis Duration

Measure	*r*	*p*
Compensation (*df* = 167)	-.23	.003
Depression (*df* = 170)	-.20	.008
Negative Affect (*df* = 169)	-.15	.046
Positive Affect (*df* = 169)	.08	.30
Repressive Coping (*df* = 170)	-.04	.67
Pain (*df* = 170)	-.25	.001
Passive Dysfunctional (*df* = 154)	-.17	.033
Cognitive Adaptation (*df* = 154)	.08	.30
Active Behavioral (*df* = 154)	-.01	.92
Religion (*df* = 154)	-.08	.34

NOTE: Positive correlations reflect an association with discrepancies where self-reported disability < functional disability. Negative correlations reflect an association with discrepancies where self reported disability > functional disability. Participants receiving medical disability compensation were coded as 1, and those not receiving medical disability compensation were coded as 0. Presence of a repressive coping style was coded as 1, and its absence was coded as 0.

Negative affect became significantly associated with the rheumatoid arthritis sample disability discrepancy score only after controlling for rheumatoid arthritis duration and gender (see Table 7). In order to determine the extent to which the results

reported in Table 7 may be influenced by participants' level of negative affect, the data was analyzed again, adding negative affect to the original set of covariates (i.e., gender and rheumatoid arthritis duration). Table 8 displays the partial correlations of discrepancy scores with continuous variables in the rheumatoid arthritis sample, controlling for negative affect, gender, and rheumatoid arthritis duration. Repressive coping style was not included in these analyses because it is, by definition, inherently confounded with negative affect. The results show that after adding negative affect to the set of variables held constant, only receiving medical disability compensation and higher levels of pain remain significantly associated with the discrepancy score pattern where perceived disability level exceeds functional disability level. Unlike the previous analyses reported in Table 7, depression and passive dysfunctional coping style are not significantly related to discrepancy scores after controlling for negative affect.

Table 8.

Partial Correlations of Discrepancy Scores with Continuous Variables in the Rheumatoid Arthritis Sample- Controlling for Negative Affect, Gender, and Rheumatoid Arthritis Duration

Measure	*r*	*p*
Compensation (*df* = 165)	-.21	.006
Depression (*df* = 168)	-.13	.08
Positive Affect (*df* = 168)	.01	.88
Pain (*df* = 168)	-.22	.005
Passive Dysfunctional (*df* = 152)	-.10	.22
Cognitive Adaptation (*df* = 152)	.07	.39
Active Behavioral (*df* = 152)	-.04	.62
Religion (*df* = 152)	-.06	.43

NOTE: Positive correlations reflect an association with discrepancies where self-reported disability < functional disability. Negative correlations reflect an association with discrepancies where self reported disability > functional disability. Participants receiving medical disability compensation were coded as 1, and those not receiving medical disability compensation were coded as 0. Repressive coping was not included in this set of analyses because it is confounded with negative affect.

Because female gender was positively associated with the rheumatoid arthritis disability discrepancy score, and the number of male participants was too low to conduct a moderation analysis, the female participants were analyzed separately to determine if the results from the female sample would differ from results for the entire sample. The differences were minimal.

CHAPTER 4

Discussion

Background and Purpose

Chronic pain is one of the most highly prevalent health conditions among adults worldwide, and pain-related disability is widespread and costly. Measurement of pain-related disability is necessary for myriad medical, legal, and scientific endeavors. Existing research shows that when pain-related disability is measured using dissimilar methods, including self-report instruments (e.g., Pain Disability Index), functional tasks that are objectively scored (e.g., Assessment of Motor and Process Skills), or other naturalistic behaviors (e.g., return to work), the measures are often correlated at low or non-significant levels (Carleton et al., 2010; Poole et al., 2006). Some researchers have suggested, at least in the case of chronic low back pain populations, that there is a paradoxical disconnect between functional and self-report measures of disability (Carleton et al., 2010). Although discrepancies in pain-related disability measurement are not uncommon in the scientific literature, little is known about predictors of these discrepancies.

Given the pattern of reported findings in the literature, this study aimed to identify correlates of discrepant patterns in pain related disability measurement. This study measured discrepancies between self-reported and functional disability in two samples of patients with chronic pain conditions; one sample of patients with chronic spinal pain, and the other with rheumatoid arthritis. We examined the association of discrepancies to psychosocial adjustment in order to facilitate understanding of the implications of

discrepant results between self-reported and functional measures of pain-related disability.

Results

Overall, a modest association between disability discrepancy patterns and certain psychosocial adjustment variables was identified. In general, the disability discrepancy pattern where functional disability exceeds self-reported disability—or self-reported disability underestimates functional disability—was modestly associated with salubrious patterns of psychosocial adjustment, including better mood and coping, less pain, and less medical disability compensation. The other, equally important way of conceptualizing our results is that the disability discrepancy pattern where self-reported disability exceeds functional disability was modestly associated with patterns of poor psychosocial adjustment including more negative mood, maladaptive coping, more pain, and more disability compensation. Thus, our results clearly indicate that the pain-related disability discrepancy, where self-reported disability scores are lower than functional disability scores, is a marker of better adjustment than the inverse pattern. This pattern of relatively lower self-reported disability will be referred to as a salubrious discrepancy pattern, and results will be discussed in terms of the salubrious pattern. One should keep in mind, however, that the inverse interpretation- a non-salubrious discrepancy pattern (i.e., self-reported disability exceeds functional disability) with maladaptive correlates, is a relevant alternative way of conceptualizing the findings for each discussion point.

Results of analysis of the chronic spinal pain sample revealed small, but significant associations of less pain and better social functioning with the disability

discrepancy pattern where self-reported disability underestimates functional disability. This discrepancy pattern was also seen significantly more often among participants with an adaptive coping style, whereas participants with a dysfunctional coping style more often displayed the opposite discrepancy pattern (medium effect size). Discrepancy scores in the chronic spinal pain sample were not significantly associated with compensation, depression, kinesiopbobia scales, emotional role functioning, or interpersonal distress.

Within the rheumatoid arthritis sample, female gender and longer disease duration were associated with the salubrious discrepancy pattern described above. Thus, these two variables were controlled in subsequent analyses. The analyses revealed small, but significant associations of less pain, less depression, less negative affect, and less passive/dysfunctional coping with the salubrious disability discrepancy pattern (i.e., relatively lower self-reported disability). Positive affect, repressive coping style, cognitively adaptive coping, active behavioral coping, and religious coping were not significantly associated with the disability discrepancy index in the rheumatoid arthritis sample.

Correlates (and Non-Correlates) of Disability Discrepancies

In the current study, it appears that the perception of disability, rather than observable difficulty completing functional tasks, is more strongly associated with undesirable psychosocial adjustment in patients with chronic pain. Our empirical findings may be conceptually linked with research on self-efficacy and positive illusions. Self-efficacy is defined as one's belief that one can succeed in certain situations (Bandura, 1977, 2004). Self-efficacy is relevant to living with chronic pain, and several

general and disease specific measures of pain-related self-efficacy have been developed (e.g., The Arthritis Self-Efficacy Scale, The Chronic Pain Self-Efficacy Scale) (Arnstein, 2000; Arnstein, Caudill, Mandle, Norris, & Beasley, 1999; Dolce, 1987; Levin, Lofland, Cassisi, Poreh, & Blonsky, 1996; Miles, Pincus, Carnes, Taylor, & Underwood, 2011). Although we did not use a dedicated self-efficacy measure, it is possible that our measure of self-reported disability at least partially taps participants' beliefs about whether they can or cannot succeed in daily life activities. Based on our results one might speculate that strong pain-related self-efficacy beliefs are likely to be predictive of the disability discrepancy pattern where self-reported disability is lower than functional disability. For example, imagine a man, Walter, with chronic spinal pain. Walter has very strong pain-related self-efficacy for yard work, and when he filled out a self-report questionnaire, he indicated that pain never holds him back from mowing the lawn. However, about once a month Walter actually does put off mowing the lawn when his back is troubling him, and once or twice each summer he flares up his back when mowing the lawn so he stops mowing, and takes some medication, ices his back, and rests. He finishes the job a couple of days later when he is feeling better. In contrast, another person, Clayton has low self-efficacy for mowing the lawn, and reports on a questionnaire that he is unable to mow the lawn due to spinal pain. He gladly hires a lawn service, and never touches a mower. Interestingly, when asked to complete a functional measure of disability, both men perform similarly on the PILE. But Walter's self-reported disability underestimated his functional disability, whereas Clayton's self-report overestimated his functional disability.

A somewhat different way of conceptualizing the discrepancy pattern embodied by Walter is that it could reflect an unrealistically optimistic view of his ability to engage in daily activities (i.e., mowing the lawn). This pattern may be interpreted as reflecting unrealistic optimism because performance on tests of functional disability do not appear to be commensurate with what Walter and others like him say about what they are able to do; they say that they can do more than they are able to demonstrate in functional tasks. Similarly, unrealistically optimistic views were explored in the research on positive illusions (Taylor & Brown, 1988). They found that among patients with chronic health conditions, unrealistically sanguine beliefs about symptom control and ability to complete life tasks were associated with better adjustment, despite lower levels of objective control and functioning (Taylor & Brown, 1994). The findings of the current study demonstrating that perceptions of disability which underestimate functional disability are modestly associated with better adjustment are consistent with Taylor and other's line of research on the benefits of positive illusions.

Negative Affect

Careful interpretation of the results of this study must take into consideration the important role of neuroticism or negative affectivity, which is a personality trait defined by the tendency to experience emotional distress and negative mood states (McCrae & Costa, 1987). Within our rheumatoid arthritis sample, negative affect was identified as a superordinate factor that was significantly related to the disability discrepancy score, after controlling for gender and rheumatoid arthritis duration. High negative affect was found to be associated with the discrepancy pattern of over reporting subjective pain-related disability in relation to functional disability, whereas low negative affect was

associated with the discrepancy pattern marked by underreporting on subjective pain-related disability measures in relation to functional disability measures (i.e., salubrious pattern). Negative affect correlated at r = .39 with self-reported disability, .27 with walking speed, and .11 with grip strength; thus the self-reported disability score was more strongly associated with the propensity to experience emotional distress and somatic symptoms than the functional disability composite.

Moreover, negative affect accounted for a considerable amount of variance in the association between the disability discrepancy score, depression, and passive dysfunctional coping. After adding negative affect to the set of covariates, the discrepancy score was no longer significantly associated with either depression or passive dysfunctional coping. This finding is not surprising; Watson and Pennebaker's seminal 1989 manuscript makes it clear that negative affectivity is a general nuisance factor that suffuses physical symptom report measures, which are closely related to pain-related disability measures. The most compelling explanation for this relationship is that negative affectivity increases ones awareness of, and sensitivity to a broad spectrum of somatopsychic distress. However, according to Watson and Pennebaker (1989), despite being associated with elevated reporting of somatic symptoms, trait negative affectivity is unlikely to cause, nor result from medical illness. Similarly, negative affectivity is not a risk factor for mortality or disease (Costa & McCrae, 1987; Watson & Pennebaker, 1989).

Although negative affectivity per se was not measured in the chronic spinal pain sample, based on the results of the rheumatoid arthritis sample analyses, and other published studies (Watson & Pennebaker, 1989), one could speculate that the same

pattern exists in populations with chronic spinal pain. In general, medical and non-medical populations are equally subject to the diffuse effects of negative affectivity on subjective distress and physical symptom reports. However, the lack of a significant relationship between depression (a variable that tends to correlate highly with negative affect), and the disability discrepancy score in the chronic spinal pain sample indicates that this is not a foregone conclusion. Nonetheless, without actually measuring negative affect in this sample and ruling out alternative explanations for the expected non-association with disability discrepancy score (e.g., low variance in negative affectivity), it is not possible to be certain of the reasons for this finding.

This discussion leads one to ponder then, whether negative affect is a primary driving force behind discrepancies in pain-related disability, and if that is the case, whether it is useful or appropriate to control for negative affectivity in this study and others like it. I would argue against controlling for negative affect, and propose that the set of correlations which do not control for negative affect are of the most interest, but should be interpreted in light of the research on negative affect. That is, the findings that negative affectivity is neither the cause nor effect of ill health, but negative affectivity is associated with elevated reporting of distressing symptoms.

Positive Affect

Given the discussion above, it is worth briefly considering the role of positive affect in the current study. The hypothesis that positive affect would be significantly associated with the salubrious disability discrepancy pattern (i.e., self-reported disability underestimates functional disability) was not supported, although the trend was in the predicted direction. This finding would be consistent with Watson and Pennebaker's

(1989) assertion that positive affect is not significantly related to somatic complaints; they argue that one's ability to enjoy a vibrant, active, interesting existence is not contingent upon the number and type of physiological symptom complaints one has.

However, positive affect was inversely associated with all measures of disability, and this relationship reached significance with self-reported disability (r = -.23) and grip strength (r = -.18), but not walking speed (r = -.10). Positive affect also had inverse associations with disability compensation, depression, negative affect, pain, and passive coping. Positive affect was positively associated with repression, and both active coping styles. These results fit better with Zautra's Dynamic Model of Affect, which explains that in healthy populations, negative and positive affect are orthogonal. However, in clinical populations (e.g., stressed populations, or people in pain), negative and positive affect have an inverse association that approaches a bipolar dimension (Davis, Zautra, & Smith, 2004). (Zautra, Smith, Affleck, & Tennen, 2001). Given the stress of chronic pain conditions, and our findings of a significant, inverse association of medium size between positive and negative affect in our study, our results appear to be congruent with Zautra's model.

Association of Functional and Self-Reported Disability Measures

Interestingly, unlike the findings of Carleton et al. (2010) and Poole et al. (2006), this study found that self-reported and functional disability measurements were moderately correlated (r = .44 - .57 range). However, even these moderate correlations are only representative of about 25% shared variance among self-reported and functional pain related disability in this study; thus, there remains a considerable amount of unaccounted variance or discrepancy in our study.

Our study (as well as some prior research) identified moderate correlations between self-reported and functional measures of pain-related disability (Alschuler et al., 2008; Larsson & Mattsson, 2001; Reneman et al., 2002). However, other studies reported low or non-associations, and even proposed that there may be paradoxical relationships between self-reported disability and functional disability in certain chronic pain populations. I propose that the aforementioned findings of non-association may be a byproduct of methodological issues in those studies. For example, it is possible that low validity and/or reliability of the measures or other methodological problems in those studies could have placed a ceiling on the observed correlations.

An example of a methodological issue that might underlie non-association of functional and self-reported disability is the use of The Functional Ability Percent Deficit measure used by (Carleton et al., 2010). This methodology is peculiar because it calculates functional disability as a ratio of floor to waist lifting performance and rating of job demands. Other measures of functional disability are corrected for gender differences and age (e.g., FAST), or simple uncorrected scores are used (e.g., PILE, walking speed, return to work). The idiosyncratic correction for job demands may result in overcorrection, leading to highly idiographic scores that are difficult to interpret in isolation. The scores appear to be sensitive to interventions and decrease in response to treatment; however, they do not correlate with other relevant variables. No studies examining the psychometric properties of the Functional Ability Percent Deficit have been published, and at this time the construct it taps appears to be poorly defined.

Furthermore, job demands in patients with chronic pain are hard to standardize because some patients are intolerant of lifting, whereas others experience pain while

sitting, and still others have pain triggered by using a computer, standing, or walking. The possible combinations of comfortable and pain-inducing activities are myriad when it comes to individuals with chronic pain. What may be a low-demand job for one person with chronic pain may be very demanding for another to the degree that the required behaviors are triggers for pain. Thus, the validity of the standardized job demand rating in the Functional Ability Percent Deficit is in question.

Finally, it is unclear whether the measure of perceived disability used by Carleton, et al. (2010) was as circumscribed as their measure of functional disability. If patients rated their perceived disability globally, by evaluating their daily functioning in a holistic manner, but then functional disability was rated only in relation to work activities, this could explain the non-association of the measures.

For a second example of studies wherein methodology might underlie findings of non-association of self-reported disability and functional disability, we can examine Doble et al. (1994), and Poole et al. (2006). These studies reported non-association of perceived and functional disability in patients with multiple sclerosis and systemic lupus erythematosus. I propose that these findings may be due to sample-specific neurocognitive deficits in patients with multiple sclerosis and lupus that are not relevant to patients with musculoskeletal pain.

Cross-Sample Comparisons

Within the chronic spinal pain sample, less pain and better social functioning were modestly associated with relatively higher levels of functional disability in relation to self-reported disability. Adaptive copers were more likely to display this pattern of

disability discrepancy as well, and this effect size was moderate. These findings are consistent with the findings from the rheumatoid arthritis sample.

Despite the general pattern of similar results across the chronic spinal pain and rheumatoid arthritis samples, some results did differ. First, unlike the rheumatoid arthritis sample, compensation status and level of depression were not significantly associated with higher self-reported disability relative to functional disability in the chronic spinal pain sample. This might be due to the fact that the chronic spinal pain sample was likely experiencing more severe or complex illness refractory to treatment in primary care settings, which is why they were in treatment in a tertiary care setting. Unfortunately, because depression was measured with different instruments in each sample, we cannot directly compare the level of depression between groups. Rates of receiving medical disability compensation were comparable between groups (33.2 % - 31.62%), but the chronic spinal pain sample was markedly younger (mean age = 41.22 years) than the rheumatoid arthritis sample (mean age = 54.60 years). This supports the notion that the chronic spinal pain sample was suffering from more severe or refractory illness because one would expect to see higher prevalence of medical disability compensation in the rheumatoid arthritis sample because they were older, but this was not the case.

Another possible explanation for our finding that the disability discrepancy scores were related to compensation status in the rheumatoid arthritis sample, but not the chronic spinal pain sample, is that 19% of the participants in the chronic spinal pain sample were missing data for the disability compensation variable, whereas only 1.7% of the rheumatoid arthritis sample were missing compensation data. It may be that the

missing compensation data in the chronic spinal pain sample obscures a stronger relationship to disability discrepancy than we were able to identify.

Although we anticipated a relationship between a repressive coping style and lower self-reported disability in relation to functional disability in the rheumatoid arthritis sample, this pattern was not identified in our data. In fact, repressive coping style was non-associated with any of the disability (or pain) measures used in this study. Repressive coping was, however, positively associated with positive affect, and inversely associated with depression, and passive coping. This would suggest that a repressive coping style in patients with chronic pain conditions is not expressed through perceptions or expressions of their pain, or pain-related disability. Instead, expression of a repressive coping style appears to be limited to denial of depression, denial of passive coping behaviors, and affirmation of positive affective states.

Gender and Disease Duration

Within the rheumatoid arthritis sample, being female and having a longer disease duration (a proxy for age, which was also significantly associated with the discrepancy score, but at a slightly lower magnitude, so we chose to control for disease duration rather than age) was associated with higher disability discrepancy scores (i.e., salubrious pattern). Therefore, compared with men, women tended to self-report lower levels of disability in relation to functional disability.

Although it is tempting to attribute this finding to gender-specific higher resiliency among women for a variety of reasons, an alternative explanation is proposed. Given that the grip strength and walking speed tests of functional disability were not normed by age (which covaries with disease duration) or gender, it is likely that expected

physiological differences that occur between the genders (i.e., men are on average faster and stronger than women) and changes in strength and speed as a part of the aging process (i.e., age-related slowing and loss of strength) underlie these findings. I propose that the reason that these findings were not identified in the chronic spinal pain sample was due to the fact that the PILE was normed by gender, and the FAST was not physically demanding. Nonetheless, we did control for gender and disease duration in analyses of the rheumatoid arthritis sample, so the lack correction for age and gender in the original measure was corrected statistically and does not pose a confound or threat to the validity of this study.

Strengths and Limitations

This study had several noteworthy strengths. For example, it examined correlates of pain-related disability discrepancies in two different clinical chronic pain samples of ample size, using well-validated psychometric measures. Testing hypotheses in two separate samples allows for cross-validation of our findings, and given the similarity of results across samples, supports a degree of generalizability of the findings.

Despite its strengths, as with any study, limitations exist. One primary limitation is this study's cross-sectional nature, which prohibits causal interpretations of the identified relationships between disability discrepancies and psychosocial adjustment. Without longitudinal examination of these associations, it is not possible to determine if discrepancies are triggered by psychosocial adjustment, or vice versa. It may also be the case that an unmeasured third variable predicts both adjustment and disability discrepancy.

Next, the retrospective analysis of existing data sets also limited our analyses to available variables; thus, it was not possible to examine other theoretically relevant and attention-worthy variables. Other types of disability measures such as collateral ratings of disability, missed work days, or actigraph scores, might have provided additional information. Other markers of health, adjustment, and personality that could warrant consideration include biomarkers such as telomere length (an objective health marker), MMPI-2 conversion V pattern, big five personality facets, Personal Growth Initiative Scale, Subjective Happiness Scale, or the Valued Living Scale. Finally, the results of this study should be interpreted cautiously because effect sizes were modest (small to medium effect size), and multiple tests could have resulted type-one errors; however, the results were generally consistent across samples, which may mitigate these concerns.

Limitations specific to the chronic spinal pain sample include the fact that negative affect per se was not measured, so unlike the rheumatoid arthritis sample, it was impossible to determine if negative affect was responsible for the relationship of disability discrepancy scores to coping and other variables, and to control for negative affect if necessary. Missing data was also moderately prevalent in the chronic spinal pain sample, and this issue may have compromised the validity of the results for some variables (i.e., kinesiophobia, MOS variables, and compensation status).

Limitations specific to the rheumatoid arthritis sample include use of the single item walking speed variable as one of the two components of the functional disability composite. The validity of single-single item measures is frequently questioned in the literature; however these concerns are likely mitigated by the fact that the walking speed

variable was composited with a four item grip strength measure, and these two variables demonstrated acceptable convergent validity. However, it should be noted that walking speed correlated more highly with the AIMS-2 Physical Dysfunction scale than it did with grip strength, whereas psychometrically we would prefer to see walking speed and grip strength correlating more strongly with each other than with the self-report disability measure.

Future Directions

Looking forward, we have identified some potentially interesting avenues for clinical research on disability discrepancies among chronic pain patients. First, because this appears to be the first study with the primary aim of examining discrepancies in multimethod measures of pain-related disability, and the results were modest, the results need to be replicated in order to determine how robust the findings are. It would also be interesting to extend this study by examining whether other types of chronic pain populations, such as patients with irritable bowel syndrome, diabetic neuropathy, or fibromyalgia, also demonstrate a pattern where relatively higher perceived disability is associated with markers of poorer psychosocial functioning, in contrast to relatively higher functional disability's association with markers of better psychosocial adjustment. This would allow us to determine if the results in this study can be generalized to non-musculoskeletal chronic pain populations.

Ideally, future researchers would implement longitudinal designs that would facilitate nuanced temporal understanding of the relationship between patterns of disability discrepancy and psychosocial functioning over time. For example, this type of research could examine whether pre-existing patterns of disability discrepancy predict

applications for medical disability compensation, and/or if approved/denied applications predict changes in disability discrepancy patterns. Such longitudinal studies could also examine whether relatively lower perceived disability in relation to functional disability predicts better adjustment over the course of a chronic illness, and whether patterns of disability discrepancy are stable (i.e., trait-like), or fluctuating (i.e., state-like).

Naturalistic or randomized studies of disability discrepancy patterns in chronic pain patients participating in psychotherapy, physical therapy, or multidisciplinary rehabilitation might inform development of decision trees for stepped care or treatment matching approaches to chronic pain management. For example, it might be found that patients who have relatively higher perceived disability would benefit from initial treatment with psychotherapy that enhances self-efficacy for daily activities, adaptive forms of coping, and addresses comorbid depression. In contrast, perhaps patients with relatively higher functional disability would benefit most from initial treatment with physical therapy and a graduated home exercise program. These might be implemented independently, or as part of a multidisciplinary rehabilitation program that adds other components after the initial intervention has been provided.

Examining the response of discrepancies to interventions aimed at improving coping, decreasing depression, reducing pain, or returning disabled persons with chronic pain conditions to the workforce would also increase our understanding of the disability discrepancy score construct by contributing information about the uni-, or bi-directionality of the relationships identified in this study.

Summary

Chronic pain is a highly prevalent, costly, and frequently disabling health condition. Research on pain-related disability has shown that self-reported disability and functional disability are often poorly correlated; discrepant measures of pain related disability have been reported in several different chronic pain populations. This study identified correlates of discrepant patterns in pain related disability measurement in a sample of patients with chronic spinal pain, and a sample of patients with rheumatoid arthritis. This study measured discrepancies between self-reported and functional disability and tested their association with measures of psychosocial adjustment. The results clearly indicate that a pain-related disability discrepancy where self-reported disability scores are lower than functional disability scores is a marker of better adjustment than the inverse pattern. These findings appear to be driven at least partially by the influence of negative affectivity on self-report ratings of perceived disability, as well as self-report ratings of psychosocial adjustment. The findings are also congruent with research on the benefits of positive illusions. More research is needed to determine whether discrepancy patterns in pain-related disability may usefully inform treatment matching or stepped care treatment approaches, and also whether these discrepancies have state-like or trait-like properties.

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ABSTRACT

PERCEIVED AND FUNCTIONAL DISABILITY IN ADULTS WITH CHRONIC PAIN: WHAT ACCOUNTS FOR DISCREPANCIES?

by

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Disability among patients with chronic pain can be assessed functionally (behaviorally) or subjectively (self-report). However, discrepancies—including low or zero correlations—between these methods are commonly reported. Research suggests that subjective disability may be more influenced by psychosocial factors than disability measured during functional tasks, leading to under/over reporting, but further investigation is needed. This study sought to identify correlates of discrepancies between subjective and functional disability in two samples of patients with chronic pain.

Retrospective data was compiled from clinical records of 389 patients evaluated at a university multidisciplinary chronic spinal pain treatment program (52.7% men; 88.9% White, 9.8% Black; spinal pain duration *M* = 53.54 months; 74.2% reported low back pain; 18.1% did not complete high school, 30.9% completed high school, 36.6% attended some college or vocational training, and 14.1% had a college degree or higher).

A sample of 174 adults with rheumatoid arthritis (RA) was recruited from

rheumatology clinics (84% women; 55% White, 44% Black, 1% Hispanic; age *M* = 54.6 years; education *M* = 13.5 yrs; RA duration *M* = 11.2 yrs).

In each sample, markers of psychosocial adjustment (e.g., depression, pain, coping, disability status), subjective disability, and functional disability were assessed. Subjective and functional disability measures were standardized, and a discrepancy score calculated (functional - subjective).

Results identified a salubrious pattern of disability discrepancy (subjective < functional), which was associated with less pain, better social functioning, more adaptive coping, and less dysfunctional coping in the chronic spinal pain sample (small to medium effect size, $p < .05$). The salubrious discrepancy pattern was inversely associated with disability compensation, depression, negative affect, pain, and dysfunctional coping in the RA sample (small effect size, $p < .05$). Kinesiophobia, religion, and positive affect were not associated with the discrepancy score. The discrepancy pattern where subjective > functional was not associated with any markers of healthy adjustment.

Overall, markers of better psychosocial adjustment were modestly associated with the salubrious pattern of functional > subjective disability, whereas poor adjustment was associated with the reverse discrepancy pattern. Theoretical and clinical implications of these findings are discussed.

AUTOBIOGRAPHICAL STATEMENT

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Dana Nevedal graduated from Wayne State University's clinical psychology Ph.D. program in August 2012, shortly after completing her pre-doctoral internship at West Virginia University- Charleston Division. Post-graduation she will begin a one-year post-doctoral fellowship in clinical health psychology at the Veterans' Affairs Connecticut Health Care System in West Haven. Her career goals include integrating research, practice, and clinical teaching of health psychology at an academic medical center.

Prior to studying clinical psychology, she earned a master's of education in art therapy in 2007, and a bachelor's of fine arts in painting in 2002, also at Wayne State University. Dana grew up in Saint Clair Shores, Michigan.

She married Georges Potworowski, also a psychologist, in 2009. She has a pointer-mix dog named Moxie. She volunteers with several dog rescue groups, and has fostered many dogs while they await adoption. She enjoys hiking, cycling cross country skiing, horseback riding, running, and visiting galleries and museums in her free time.