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Cognitive and Behavioral Factors in Fibromyalgia: Mood, Goals, and Task Performance

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DUTCH FIBROMYALGIA ASSOCIATION 20TH ANNIVERSARY MANUSCRIPTS

Cognitive and Behavioral Factors in Fibromyalgia: Mood, Goals, and Task Performance

Johan W.S. Vlaeyen, PhD
Stephen Morley, PhD

ABSTRACT. Objectives: This paper reviews the existing theoretical models explaining task persistence in chronic pain, pointing at its strengths and weaknesses.

Findings: For chronic musculoskeletal pain, purely biomedical models appear insufficient. The prevailing Fear-Avoidance model postulates that catastrophic misinterpretations of pain give rise to fear of pain, subsequently leading to a cycle of avoidance of activity, disuse, and disability. For pain disability associated with task persistence and overuse often seen in patients with fibromyalgia syndrome, cognitive behavioral mechanisms have been a neglected area in pain research and are just beginning to be scrutinized. One promising theoretical model is the so-called Mood-as-Input model, which predicts that task performance results from the interaction between current mood and certain stop-rules. The novel feature of the Mood-as-Input model is that the effects of mood on task performance are dependent on motivational context variables [As-Many-As-Can [AMAC] and Feel-Like-Discontinuing [FLDC] contexts]. In the AMAC context, negative mood signals the individual that not enough progress on the task has been made, leading to continuation with the task. In the FLDC context, the opposite pattern is found. A negative mood here signals that continuing with the task is no longer appropriate, thereby disengaging from the task. Thus, with different stop-rules, the same mood can have different motivational effects.

Conclusions: The literature suggests that the Mood-as-Input model may provide a framework to enhance our understanding of disability both due to avoidance behavior and activity overuse. Suggestions for further research in this novel area are made.

KEYWORDS. Chronic pain, task persistence, overuse, cognitive behavioral mechanisms

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INTRODUCTION

Due to its high impact and associated disability, chronic idiopathic widespread pain comprises an important problem in healthcare and society. Biomedical models appear insufficient to explain these health problems, and research has moved toward a biopsychosocial approach including the role of central nervous system mechanisms. One of the prevailing theoretical models is the Fear-Avoidance [FA] model which postulates that catastrophic misinterpretations of pain give rise to fear of pain, subsequently leading to a cycle of avoidance of activity, disuse, and disability. Although the FA model has been successfully tested in back and neck pain patients, a limited number of studies have shown that its assumptions also apply to patients with fibromyalgia syndrome [FMS]. Moreover, the FA model also has its limitations, as it may be less applicable where pain related disability is associated with task persistence and overuse as often seen in patients with FMS. The cognitive behavioral mechanisms associated with task persistence have been a neglected area in pain research and are just beginning to be scrutinized. In this article, we briefly review the existing theoretical models that seek to explain task persistence in chronic pain, and highlight the novel Mood-as-Input model as a potentially productive model for further investigation.

Disability in Chronic Musculoskeletal Pain: Task Avoidance versus Task Persistence

In patients with chronic pain, the reduced ability to accomplish tasks of daily living [pain disability] has long been conceptualized as merely the consequence of pain severity: individuals with more pain tend to show greater impairment in task performance than those with less pain. In the last decade, however, the intuitively appealing idea of congruency between pain severity and disability has been refuted, and negative appraisals and emotions related to pain appeared more important than pain itself in explaining disability (1). The FA model has become influential as a valid explanation for the transition from acute to chronic pain disability, and low back pain disability in particular (2, 3). Although there is accumulating research evidence supporting the FA model in FMS (4), there are also

unresolved issues that merit further scientific attention. First, it is difficult to apply the model to musculoskeletal pain syndromes associated with task persistence and overuse rather than to avoidance and disuse. Second, there are several anomalous findings in the current literature that cannot be explained by the FA model. For example, in a study investigating the influence of attentional demands on FMS patients with high and low pain-related fear, De Gier et al. (5) failed to observe the relationship between pain-related fear and task performance that had been previously observed in patients with chronic low back pain. In this study, task performance was unexpectedly predicted by the baseline level of pain. A similar observation of increased physical performance [weight lifting] in FMS patients with experimentally induced low mood, given the instructions to lift for as long as possible, was made by Vlaeyen et al. (6). Conversely, when given the instruction to lift until they felt like discontinuing, patients with a positively induced mood performed better. These intriguing findings suggest that pathways to disability other than that described in the FA may exist.

Task Persistence as an Adaptive Strategy?

Cognitive behavioral models of chronic pain emphasize the importance of an individual's attempts to cope with pain and pain-related issues or problems. Coping responses can be considered adaptive or maladaptive, depending on the usual outcome of the coping behavior, cognition, or emotion. Certain coping responses, such as task persistence, have been associated with better physical and psychological functioning among individuals with chronic pain, whereas others, such as pain-contingent resting and guarding, have been correlated with impaired function. However, the recent literature seems inconsistent as to the validity of task persistence as an adaptive coping strategy. For example, the task persistence subscale of the Chronic Pain Coping Inventory was found to be positively associated with general activity level and negatively associated with depression, functional disability, and interference of pain in situations of daily life (7, 8). One subscale of the Work Style Questionnaire that conceptually shows great overlap with task persistence is "working through pain" (9). Interestingly,

another pattern of correlations emerges. Working through pain appears to be positively associated with pain severity and functional limitations and negatively associated with a measure of physical and mental health. A closer look at the items of both measures may lead to a possible explanation. Items of the Chronic Pain Coping Inventory task persistence scale imply "despite pain, I continue my activity," which reflects active approach behavior. Items of the Work Style Questionnaire's working through pain scale are worded differently: they take the form of "I continue to prevent problems," reflecting active avoidance behavior such that continuing to work avoids the consequences of aversive behavior. A typical item is "I continue to work with pain and discomfort so that the quality of my work won't suffer." One might speculate why a person might be motivated to maintain the quality of work while pain? Plausible reasons are that the reduction in work quality might be associated with punishing consequences that are either extrinsic [job loss] or intrinsic [self critical appraisals] (10). Under these conditions task persistence can be construed as active avoidance of an undesired goal. In the absence of clear signals of success, avoidance is associated with negative mood and physiological arousal (11). As we will argue later, negative mood may, under certain circumstances, facilitate task persistence, which in these circumstances suggests the presence of a subtle mood-based feedback system that may contribute to persistence despite the presence of pain. These intriguing data reflect the controversy about the validity of the coping concept (12), and force us to critically rethink our theoretical models of task persistence in chronic pain.

Psychology of Overuse: A Neglected Area in Pain Research

Although the research is scarce, researchers and clinicians have observed that some patients with chronic pain conditions [e.g., work-related upper extremity pain] tend to persist rather than escape or avoid physical activity (13, 14). Two models have been described: the Ergomania model (15) and the Avoidance-Endurance model (16). The Ergomania model stems from the psychodynamic tradition that views hyperactivity in chronic pain an expres-

sion of overcompensated dependency needs, excessive bodily narcissism, masochism, and perfectionism (17). The problem with the Ergomania model is that the constructs are difficult to operationalize for the purposes of experimental investigation.

The Avoidance-Endurance model assumes that there are at least three different maladaptive types of attentional coping with pain that lead to chronicity: (1) *catastrophizing* thoughts are associated with fear and avoidance, a reduction in behavioral activity, and depression; (2) *suppressive* thoughts [in which the person attempts to eliminate pain related thoughts and repeatedly switches attention between pain and ongoing activities] are associated with irritability and depressed mood, and behavioral avoidance; and (3) *minimizing* thoughts, characterized by ignoring the pain, are however associated with positive mood and physical overexertion leading to "muscular hyperactivity" and chronicity (18). The novel idea put forward by the Avoidance-Endurance model is that positive mood is considered a risk factor for overuse and subsequent disability.

Although this model is appealing, it is essentially descriptive and still lacks empirical support, especially as the prevailing view is that positive mood is generally related to beneficial outcomes in the context of pain. For example, there is evidence from both experimental and diary studies that, as compared to neutral mood conditions and negative mood, positive mood is associated with higher pain tolerance (19). Positive mood also has been found to positively influence activity performance. For example, increases in positive mood were associated with decreases in pain, less healthcare use, and more activity participation in adolescents with sickle cell disease (20). Similar findings have been reported in juvenile rheumatic disease (21). These findings are compatible with earlier work suggesting a different organizational process and greater efficiency in decision making among people in whom positive affect had been induced, and with recent work suggesting that positive affect facilitates flexibility and integration in problem solving (22). The challenge implied by these findings is to explain the apparently paradoxical observations and relationship between mood, task persistence and avoidance, and their possible contribution to the development of chronic pain.

Mood, Stop-Rules, and Task Performance

The Fear-Avoidance, Ergomania and Avoidance-Endurance models all share a basic assumption that task performance is basically determined by main effects. In contrast, there are more complex models from the area of social psychology that assume that behavioral performance should be approached in the context of affect regulation processes, in which interactions rather than main effects are more accurate predictors of performance. The "Mood-as-Input" model (23) is one of these emerging paradigms. Mood-as-Input assumes that the informational value of the mood in a certain context, rather than the mood itself, determines whether participants persist at a certain task. It also assumes that individuals implicitly or explicitly use so-called "stop-rules" or "goals" which guide them in persisting or terminating a given task. The "As-Many-As-Can [AMAC]" stop-rule is used when the individual persists until satisfaction is reached about dealing with the task. In contrast, when adopting the "Feel-Like-Discontinuing [FLDC]" stop-rule, activities are terminated because the individual is not enjoying the task anymore. The basic tenet of the Mood-as-Input model is that task performance is a function of the *interaction* between mood and stop-rule used. When individuals use an AMAC stop-rule, negative mood will facilitate task persistence, while positive mood will inhibit task persistence. The negative mood signals the individual that not enough progress on the task has been made and facilitates continuation with the task. Using the FLDC stop-rule, the opposite pattern is found. A negative mood here signals that continuing with the task is no longer appropriate, leading to disengagement from the task. Thus, with different stop-rules, the same mood can have different motivational effects.

In the area of chronic pain, the Mood-as-Input paradigm may provide a new theoretical model that is likely to produce new assessment and treatment approaches. A particular strength of the Mood-as-Input model is that it provides predictions including those based on the existing models. Indeed, back pain patients who are convinced that certain movements are harmful, will use the FLDC stop-rule when dealing with a task that consists of these movements. Consistent with the fear-avoidance model, such patients

will terminate the task soon when in a negative mood. However, if they are instructed to perform as much as possible [AMAC stop-rule], they will tend to persist longer with the task. The Mood-as-Input model further predicts that there are four cognitive behavioral pathways to linking mood, stop-rules, and task performance. When in a negative mood [possibly fueled by pain, or failure in achieving goals], the FLDC-rule [e.g., patient considers the task as threatening, and has a negative outcome expectancy] will lead to task avoidance resulting in disuse, which is in accordance with the FA model. In the same negative mood, the AMAC stop-rule will result in task persistence [e.g., patient considers task as meaningful and goal-directed, and has positive outcome expectancy], with overuse possibly causing tissue damage (24) as a potential risk. Although positive mood generally is considered to be much more beneficial (25), the process may be reversed. For example, the use of FLDC stop-rule in a positive mood may risk overuse as well. As such, the model also may explain fluctuations in activity levels typical of pain patients. In individuals habitually adopting a certain stop-rule, fluctuating moods concur with changes in the level of task performance, or when in a certain mood, fluctuations in task performance occur as a function of changing stop-rules. While the Mood-as-Input paradigm may help to identify mechanisms of risks of overuse or disuse, there is complementary and compelling evidence that an accommodating style of "flexible goal pursuit" may protect against disability (26, 27).

Goals and Personal Strivings

Current research on the Mood-as-Input model has been mostly conducted on healthy young people in settings where mood and task instructions have been experimentally controlled and manipulated. Moreover, the tasks used in these studies have been selected for use within a laboratory setting within a defined time scale. In contrast, chronic pain occurs in the context of a developing life that can be understood in terms of a person's implicit and explicit goals and motivation. Indeed, a manifest feature of humans is their explicit or implicit goal-directed behavior, and the ability to think of self in another [un]desired context or state. Goals are likely to be represented in a variety of ways and at

several levels with a certain degree of interdependence between the levels. Additionally, individuals continuously monitor the state of progress to or away from the goal, in order to take corrective action. In this vein, a distinction is made between approach and avoidance goals. Approach goals require the person to increase the discrepancy between the goal and the current state, while avoidance goals direct the person to decrease that discrepancy. In other words, individuals have “promotion” and “prevention” foci. Threats to these goals will elicit different emotional responses. Threats to avoidance/prevention goals/foci will be associated with fear and anxiety, while threats to promotion/approach goals/foci will be associated with sadness and depression (28). As most people have multiple goals, possibly a mixture of approach and avoidance goals, we would expect that people with chronic pain experience the full gamut of affect as pain interferes with these goal-related activities. From this perspective, we might consider whether important tasks become associated with particular stop-rule depending on the person’s dominant motivational state; as it is probable that for person whose major motivation is to avoid harm, physical tasks will be associated with the FLDC stop-rule. In contrast, for another person whose motivational state being dominated by strong affiliation needs any task which meets these needs will be associated with the AMAC stop-rule.

A recent study examined individual differences in symptom-specific goals for persons diagnosed with FMS to determine whether those differences are related to adjustment outcomes (29). The participants rank ordered 12 FMS-specific goals and completed a packet of psychosocial outcome measures. Cluster analysis suggested that there were three relatively homogeneous subgroups defined. Cluster 1 ranked goals related to seeking professional care higher than all other groups [e.g., “to get a better and more accurate diagnosis of my problems than I now possess”]. Cluster 2 ranked self-sufficiency goals higher than the other two groups [e.g., “to learn how to get on with life, despite my FMS”] and Cluster 3 ranked social-validation goals higher than the other two clusters [e.g., “to convince people that I really have a genuine medical problem”]. The results indicated that there were significant cluster differences in negative affect and in worst pain. Specifically,

women with a self-sufficient goal profile and women with a treatment-seeking goal profile reported less negative affect than did women with a social-validation goal profile. Women with a self-sufficient profile reported less pain than women with a symptom-focused to treatment seeking profile. In contrast with women with a self-sufficient profile, women with a social-validation goal profile reported significantly more interference with pursuit of the goal to feel less pain [first ranked goal], reported less social support in general, and more interpersonal negative life events as compared to the two other groups. The study also suggests that in patients with FMS, the goal of being accepted by the social network appears as important as the goal of seeking treatment and symptom reduction. This is in line with the results of an electronic diary study showing that FMS patients who reported more progress toward social-interpersonal goals on a given day were more likely to give evidence of improvements in positive mood across the day, regardless of any changes in pain or fatigue that day (30). It is likely that such a goal may stem from the perception of being socially excluded because of the symptoms or other reasons. In addition, some researchers have found evidence for the idea that social exclusion is experienced as painful because reactions to social rejection are mediated by the same mechanisms that belong to the physical pain system (31). This leads to the conjecture that task persistence may also be associated with the goal of belonging to the social network, or with the goal of avoiding social rejection.

Implications for Further Research

Although never systematically used in chronic pain research, the Mood-as-Input paradigm is enticing because it elucidates the interplay among pain, mood, and individual action goals; it accounts for predictions based on the FA model, and provides explanations for inconsistencies found in the FA research. It also may help understand the cognitive and behavioral mechanisms underlying overuse syndromes of which the etiology still is unknown. However, as the Mood-as-Input model has been introduced quite recently, a number of issues remain to be answered concerning the transfer and generalization

of the model to the real-world setting of chronic pain.

A first sphere for consideration is suggested by the literature indicating that individuals differ in the extent to which they are hampered by factors that distract from their goals. Some individuals are known to be easily immobilized by feelings of depression, anxiety, and self-doubt. When these so-called "state oriented" people focus on their internal state, they will encounter subsequent performance deficits because of the inability to disengage from the perceived failures. In contrast, "action oriented" individuals are capable of self-regulating aversive affect in a more efficient manner, which enables them to pursue their goals in a more ardently manner (32). In a study among hospitalized patients who received groin rupture surgery, action-oriented patients reported less pain, lower use of analgesics, and reduced fear as compared to state-oriented patients (33).

The second area to be considered is the role of pain severity. The Mood-as-Input model specifies that mood moderates the interaction between task and instruction. What role does pain severity play in determining the predicted stop-rule X mood interaction, and how can it be incorporated into the model in a theoretically principled manner? In a study noted above (6), the predicted relationships between stop-rule and mood were observed only in the patients with relatively low current levels of pain; but elevated levels of pain may overrule the stop-rule/mood interactions. Research should clarify whether this observation is robust.

Third, from where do stop-rules originate? Stop-rules may be linked to a number of factors such as the individual's tendency to be action or state oriented (32), the expectancy that the goal can easily be attained (34), perfectionism (35), or increased sense of responsibility (36).

Fourth, based on the existing literature on nonconscious motivation, there is evidence that individuals are often not aware of their own mental processes that are guiding daily behaviors, and that there are automatic links between goals and behavioral responses (37). These findings are based on preconscious activation through subliminal priming, which can be considered a proxy for features of the daily environment.

Fifth, outside the laboratory, pain severity, mood, tasks, and goals are not fixed; they change dynamically. It will be a considerable challenge

to understand how dynamic changes interact with stop-rules, and diary studies might shed light onto these dynamics (30).

A final question is whether stop-rules are modifiable. Perhaps the Mood-as-Input model may provide a single framework for helping chronic pain patients adopt stop-rules in a flexible way, including both exposure to feared activities [encouraging AMAC stop-rules] (38) and pacing techniques [encouraging FLDC stop-rules] (39). More insight in the interplay between mood, stop-rules, and physical performance is likely to enhance our understanding of disability in chronic musculoskeletal pain for which novel, successful interventions are badly needed.

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