THE PRACTITIONER PROPOSES A TREATMENT CHANGE AND THE PATIENT DECLINES: WHAT TO DO NEXT?

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ABSTRACT

Objective

This study describes how pain practitioners can elicit the beliefs that are responsible for patients’ judgments against considering a treatment change and activate collaborative decision making.

Methods

Beliefs of 139 chronic pain patients who are in treatment but continue to experience significant pain were reduced to seven items about the significance of pain on the patient’s life. The items were aggregated into four decision models that predict which patients are actually considering a change in their current treatment.

Results

While only 36% of study participants were considering a treatment change overall, the percentage ranged from 20 to 70, depending on their ratings about current consequences of pain, emotional influence, and long-term impact. Generalized linear model analysis confirmed that a simple additive model of these three beliefs is the best predictor.

Conclusion

Initial opposition to a treatment change is a conditional judgment and subject to change as specific beliefs become incompatible with patients’ current conditions. These beliefs can be elicited through dialog by asking three questions.

Keywords: pain, pain management, chronic illness, patient perception of illness, patient-centered care, patient-centered communication, shared decision making, naturalistic decision making
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INTRODUCTION

Almost every provider has faced this situation: The patient’s current pain treatment is partially effective, but there is continuing disease activity and functioning limitations. A treatment change is likely to improve the patient’s condition, but when you raise this prospect the patient says, “thanks, but I’d rather not make a change.” What happens next is likely to impact the course of future treatment and significantly influence the healthcare relationship (1-3). Epstein and Peters (4) suggest three different ways to respond: persuading the patient to accept the provider’s recommendation, deferring to the patient’s wishes, or beginning a discussion that promotes patient-centered communication and leads to a collaborative decision. This paper joins them in favoring the latter. It describes how practitioners can facilitate patient-centered communication when there is initial disagreement over a prospective treatment change, and how this communication can move toward a collaborative decision.

The first response is paternalistic, insofar as it attempts to bring the patient into concurrence with the recommendation. Paternalism has subtle variations, and discussions between patients and providers frequently have a persuasive element. However, when the parties disagree and the provider is adamant, patients who are fearful, reluctant, or recessive tend to acquiesce, while assertive patients may dispute, defy, or simply walk out (5, 6). In either case, the relationship is undermined and quality of care diminished. The second response affirms the patient’s autonomy, promotes a sense of efficacy, and encourages self-determination (7, 8). Nonetheless, Epstein and Peters refer to it pejoratively as “naïve consumerism” (4, p. 197). Our concern is that it assumes that the patient has expressed a clear preference and further discussion would be invalidating or futile. This assumption was challenged in an epidemiological study by Wolfe and Michaud (9). They
found that rheumatoid arthritis patients and providers frequently disagree about prospective treatment changes and most of the patients surveyed would not be inclined to change their current treatment even if they are symptomatic. Yet, almost two-thirds said that they would consider a change if their arthritis got worse. Sometimes, patients make a firm decision that does not concur with their practitioner’s recommendation. More often, what patients initially express is not a preference or decision, but a conditional judgment that will be re-examined as circumstances change. Despite the beneficent intent, a deferential response can misconstrue what patients are saying and misinterpret their experience of pain and treatment.

Conditional judgments are commonplace in clinical practice. Treatment recommendations are conditioned on diagnostic impressions. Violence risk assessments are conditioned on predictions of future behavior (10). Frequently, interventions are conditioned on meeting a threshold. For instance, the Veterans Administration’s “pain as the 5th vital sign” initiative calls for a comprehensive assessment if the patient’s numeric rating scale pain score is at least 4 (11); rheumatology guidelines recommend a treatment change if disease activity meets a severity criterion. Patients also make conditional judgments in assessing health threats, gauging progress, evaluating quality of service, and reaching treatment preferences (12). As the epidemiological study illustrates, they use different criteria and apply different thresholds. Practitioners are likely to recommend an alternative if there is marked disease activity. Their patients tend to reject an entire class of alternatives—in effect, they dismiss the prospect of change altogether—until they are “getting worse.” Nonetheless, once the threshold is met, patients become open to the possibility of change.

The beliefs and thresholds that predicate patients’ conditional judgments are subject-matter for patient-centered communication. Practical tools have been developed to assist providers in eliciting patients’ beliefs and values and facilitate the discussion. These tools include the health belief model (13), the implicit model of illness (14), the transtheoretical model (15), and the
common sense model or CSM (16, 17). In particular, the CSM was developed to assist in providers in understanding how patients perceive and manage chronic illnesses (18, 19). Researchers have measured a broad domain of beliefs regarding the course, significance, and timeline of an illness, and the role of treatment (20, 21). They have examined how these beliefs influence coping, self-regulation, emotion, and treatment adherence both immediately and over the life span (22-28). CSM studies have made it possible to perform a comprehensive assessment of patient experience, but comprehensive instruments are cumbersome and have limited value for clinical practice (29). The CSM is intended as a treatment tool that focuses on domains that are most relevant to specific illnesses, patients, and circumstances. We believe that for chronic pain, these domains include the current consequences of pain, its emotional influence, beliefs about controllability and the effectiveness of treatment, and the long-term impact of pain on the patient’s life.

The CSM is well suited to understanding how patients’ beliefs influence their conditional judgments. Patient-centered communication can make these beliefs explicit (30). But it can do more by facilitating the patient’s involvement in treatment and activating their decision making processes (31). According to Politi and Street (32), collaborative decision making has both communicative and cognitive aspects. The communicative aspects focus on the patient-provider relationship and shared understanding. The cognitive aspects reveal how each party contributes to this shared understanding. For the patient, beliefs and values are aggregated into a schema and form a decision strategy. Traditional behavioral decision making models can shed light on how decision strategies influence patient preferences, but naturalistic models are better suited to describing how the strategy is formed and decision making begins (33). Image theory (34) and its successor, narrative behavioral decision theory (NBDT) (35), are especially appropriate because they portray conditional judgment and preference as distinct but contiguous phases of decision making.
In the epidemiological study reported above (9), most patients judged their current state as compatible with their CSM. They might say that “things are about as expected” and their treatment “is working about as well as it can.” In NBDT, a comparison between what is and what ought to be is called a “discrepancy test.” The study identified a threshold, or point at which the current state becomes incompatible with their beliefs. Most patients believe that they should not be getting worse. According to NBDT, incompatibility loosens the hold of the current schema and brings it into question. At this moment, patients project alternatives, then proceed to winnow unacceptable choices and reach a preference. In patient-centered communication, the stepping stones from conditional judgment to preference are experienced and expressed interactively, but each party makes a distinct contribution to the ultimate preference. The following section identifies the beliefs that are pertinent to this process and uses NBDT’s discrepancy test to describe how patients’ beliefs are aggregated into a decision strategy.

**METHOD**

**STUDY PARTICIPANTS AND RECRUITMENT**

Patients were recruited from the primary care and women's clinics of the Connecticut Department of Veterans Affairs medical center’s West Haven and Newington campuses. A Human Subjects Committee-approved protocol included HIPAA and informed consent waivers to perform a limited chart review that identified patients who met three inclusion criteria: 1) non-cancerous musculoskeletal pain in the same location on most days of the month over the past three months; 2) living independently or in assisted living facilities; 3) age 20-35, 40-55, or 70-89. The latter criterion permitted age-related analyses that are not contained in this report. Patients with an active substance use disorder, a psychotic disorder, or a dementia were excluded. Candidates were contacted by letter and notified of an impending telephone contact by a research assistant. The letter described an opt-out procedure. A questionnaire was administered to candidates who agreed
to be contacted, were reached by telephone, agreed to participate, and signed informed consents. They received $25.00 for participating in a single interview.

DATA COLLECTION

Participants provided demographic information and answered questions about the severity and duration of their pain. Their responses are reported in the results section. Information about co-morbid conditions, obtained from a subsequent chart review, was aggregated into a single measure, using the Charlson comorbidity index (36). Age category and Charleson scores were treated as covariates in the statistical analyses. An 18-item questionnaire elicited participants’ common sense models (CSM) of illness and treatment. The items were reduced using empirical procedures described below to produce a small number of items that can be readily incorporated into discussions between patient and provider. The study’s dependent variable was obtained by asking a single yes/no question: “Are you thinking about actually making a change in your current pain treatment?”

CSM ITEM SELECTION PROCEDURE

CSM items were drawn from four domains of the patient’s CSM that we believe are most relevant to chronic pain patients: 1) the current consequences of pain, 2) the emotional influence of pain, 3) controllability of the pain and the effectiveness of treatment, and 4) the long-term impact of pain on the patient’s life. Sixteen items were drawn from the Revised Illness Perception Questionnaire (IPQ-R) (20) and a concurrent longitudinal study conducted by the a co-author who is the principal developer of the CSM (HLL). Two new items were used to assess the long-term impact domain. The 18 items have a 4- or 5-point rating scales.

A principal axis factor analysis was performed to verify that the items assessed the four CSM domains and had at least moderate Varimax-rotated factor loadings (> .50). Four factors had eigenvalues greater than 1 and accounted for 66% of the total variance. The items, eigenvalues, and
percent of variance for each factor are contained in Table 1. (The original item order was changed
to clarify the results.) Table 1 also reports the highest loading for each item. Loadings for items 11
and 16 were under .5 and they were eliminated from further consideration.

Insert Table 1 about here

Jensen and associates (29) recommend that in clinical practice, assessments of patient
beliefs be performed as efficiently as possible, preferably by asking one or two questions. The 16
remaining items were reduced by comparing item scores against the study’s dependent variable.
34% of participants were thinking about actually making a change in their current pain treatment.
By cross-tabulating, we obtained the percent of “yes” responses for every rating scale score on all
16 items. The items exhibit a threshold by meeting two conditions:

1. They have a break-point, a score in which the percent of “yes” answers is higher than the
   overall 34% percent.
2. For all scores below the break point, the percent of “yes” answers is under 34%.
   • If the question has negative wording, the percent of “yes” answers must be under 34%
     for all values that are above the break point.
   • If the break point is at the middle of the scale, the percent of “yes” answers for scores
     above the break point must be higher than 34% percent. (For negatively-worded
     questions, percentages for all scores below the break point must be higher than 34%
     percent.)

Seven of the 16 items did not exhibit a threshold. For six of these items, the “yes”
percentages for every value were under 34%. For item 15, a negative-worded controllability item
had a break point at 2, but the “yes” percent at the score of 1 was substantially lower and below
34%. The remaining nine items were collapsed into two categories and their scores were recoded.
Ratings at the break point were coded as 1 and ratings below the break point were coded as 0. (For the three negative-word items from the controllability and long-term impact domains, scores above the break point were recoded as 0.)

The recoded scores of the nine items were tested for association with the dependent variable. As reported in Table 1, this 2 x 2 chi square test was significant for the six items indicated in bold face. Items 1, 2, and 3 represent the current consequences domain; items 7 and 8 represent emotional influence, and item 17 represents long-term impact. None of the controllability items survived the selection procedure: Item 16 had a low factor loading, items 14 and 15 did not exhibit a threshold, and items 12 and 13 had non-significant associations.

**DISCREPANCY TESTING, HYPOTHESES, AND DATA ANALYSIS**

Discrepancy testing examines how the six beliefs, or a subset, are aggregated into a strategy that activates decision making. The discrepancy test was developed from image theory studies of the “simple counting rule.” The rule proposes that the likelihood of rejecting an alternative increases with the number of incompatible beliefs (37). Regardless of disease activity and clinical indicators, patients who do not experience an incompatibility between their beliefs and the current situation are likely to decline a recommendation to change their current treatment. The likelihood of considering a treatment change increases as the situation becomes less compatible.

The counting rule has been examined in studies of behavioral decision making (37-42) and clinical decision making (43-45). The rule is efficient, additive, and non-compensatory. Because it does not involve a head-to-head comparison between viable alternatives, the counting rule is simpler than the mathematical models that are prominent in the decision making literature. Image theory suggests that expected value maximization and mathematical tradeoff strategies apply to a later stage, after a decision process has begun. The compatibility test occurs earlier and determines whether this process is activated.
Discrepancy testing becomes more complicated if beliefs are weighted differentially (46). For instance, the emotional influence of pain may be more important than its long-term impact. Differential weighting can be represented by a multiplier (like a regression weight) or by unbalancing the belief domains by adding representative items. This study uses the latter approach and compares the simple counting rule to several weighted alternatives.

The simple counting rule is represented by a three-item subset: Item 17 in Table 1 is the only candidate from the long-term impact domain; item 1 has the highest factor loading of the three candidates in the current consequences domain; item 7 has a higher factor loading than the other candidate in the emotional influence domain. A single categorical variable is computed by summing these three recoded items and obtaining a discrepancy count for each patient. The count has four possible values and ranges from 0 to 3. Three differentially weighted rules are computed by supplementing the simple counting rule:

1. Adding item 8, the other emotional influence item, enhances emotional influence domain.
2. Adding item 2, the next highest loading current consequences item, enhances the current consequences domain. For the two enhanced models, the discrepancy count ranges from 0 to 4.
3. Adding both item 8 and 2 diminishes the long-term impact domain. For this model, the discrepancy count ranges from 0 to 5.

The four counting rules are examined by separate generalized linear models (GLZ). Age group and the Charleson co-morbidity index are treated as covariates. With a logit link function, GLZ is equivalent to binomial logistic regression analysis. It is suitable for analyzing the incremental influence of the discrepancy count on the study’s binomial dependent variable. The significance of each rule is determined by two Wald chi square statistics. One statistic reports the incremental association with the dependent variable; the other reports the linearity of the estimated likelihoods at each value of the discrepancy count. The latter examines whether the likelihood of considering a
treatment change increases with the number of discrepant beliefs. Significant rules are compared using Aikaike’s AIC (47), a lower-is-better goodness of fit index. In keeping with the recommendation to assess patient beliefs as efficiently as possible, it is hypothesized that the simple counting rule is significantly associated with the dependent variable and provides the best fit of the four counting rules.

**RESULTS**

Of 209 candidates who met the record review criteria, did not opt out, were able to be contacted, and met the inclusion criteria, 139 (66%) were interviewed and 70 refused. The demographic and pain-related characteristics of the participants, including their scores on the covariates and dependent variable, are broken down by age group and reported in Table 2. Participants’ ages ranged from 22 to 89 and included both genders, but the sample consisted mainly of younger and older males. The percentage who were actually thinking about making a treatment change was similar across the age groups. The mean pain numeric rating scale of about 6 exceeds the threshold of 4 for conducting a comprehensive pain assessment at VA facilities (48). Despite their NRS and a mean duration of more than 13 years, most patients in all three age groups were not actually thinking about making a treatment change. As expected, mean duration and co-morbidity increase with age, and most participants regard their pain as long-standing. Even among the younger group, over 75% believe it will last either “for a long time” or for the remainder of their lives.

The results of the GLZ analyses are reported in Table 3. The discrepancy count and the linear effect are significant in all four models. Given this finding, the principal issue concerns goodness of fit. The AIC indices confirm the hypothesis that the simple counting rule provides the
best fit to the data. The AIC is 8% higher for the emotion-weighted rule, 12% higher for the consequences-weighted rule, and 13% higher for the rule that diminishes long-term effects.

Because the AIC index exacts a penalty as the number of parameters increases, the analyses were repeated with the discrepancy count treated as a continuous variable with one degree of freedom. Except for the diminished rule, AIC indices are lower and differences between the simple counting rule and the two weighted rules are smaller. However, the AIC index is lowest in the simple counting rule and the hypothesis is supported.

Insert Table 3 about here

________________________

DISCUSSION

Work is underway to identify the essential features of patient centered communication, enrich its theoretical framework, and measure its impact on treatment effectiveness and outcome (8, 49-53). This work has not addressed a situation that most practitioners face in working with chronic pain patients: Treatment has been partially effective, but a change is likely to improve the patient’s condition; when this prospect is raised, the patient declines. The current study challenged an assumption shared by paternalistic and consumer-oriented practitioners: that patients who say “thank you, but no” have concluded a decisional process and expressed a preference. Guided by the common-sense model of illness (16), image theory (34), and narrative behavioral decision theory (35), the study proposed that declining an offer to change treatment is a conditional judgment and subject to change. The study identified the beliefs that influence this judgment, the conditions of change, and the strategy that activates patients’ decision processes.

We found that the conditional judgment turns on beliefs about the current consequences of pain, its emotional influence, and its long-term impact on their lives. Symptoms and clinical indicators are crucial to assessment, treatment, and outcome, but as Wolfe and Michaud (9)
reported, they do not significantly influence patients’ willingness to change. A finding that seems to conflict with their study concerns the “control” factor. It was not significant in the current study, but in the epidemiological study it was the best single predictor of unwillingness (p. 2137). Item 14 in Table 1 was similar to the question that Wolfe and Michaud used to assess patients’ control over their illness. Item 14 item did not exhibit a threshold, which suggests that most participants in the current study, as with theirs, believed that their pain is reasonably under control. Of the 21 participants (8.6%) who rated this 1 (lowest control), six had 3 simple counting rule discrepancies and ten had 2 discrepancies. A belief that pain is out of control may be represented by discrepancies in beliefs that are directly associated with considering a treatment change: current consequences, emotional influence, and long-term impact.

The study supported the simple counting rule, which gives equal weight to the three beliefs. The mean likelihood estimates for the simple counting rule are shown in Figure 1. With 0 discrepancies, the likelihood considering a treatment change is only 22%. With 1 or 2 discrepancies, the likelihood is still relatively low at 35%, but it jumps to 70% when all three beliefs are discrepant. The results indicate that patients’ beliefs about the prospect of changing their treatment can be assessed efficiently by asking three questions, but one or two questions is not adequate. To illustrate, item 17 is the most sensitive belief, with 59% of participants who rating this item actually considering a treatment change. Depending on the other two discrepancies, this percentage ranges between 40 and 70. Consequently, focusing on one belief or even two is likely to give an incomplete and unbalanced account of when and why patients are actually considering a treatment change.

Insert Figure 1 about here
Thresholds are commonly used in clinical practice, but it is unusual to identify thresholds of individual items, then recode them and obtain a count. More commonly, raw scores are summed and the results are put into categories, for instance, as “mild” or “moderate.” An example is the Rapid-4 disease activity assessment (54). To investigate whether a “sum-and-classify” procedure can be used instead of the simple counting rule, we summed items 1, 7, and 17 after collapsing item 1 into a 4-point scale and reversing the scores of item 17. The sum was significant (Wald $X^2=20.154$, df=9, $p=.017$) and the linear contrast was significant when the sum is treated as a continuous variable (Wald $X^2=11.71$, df=1, $p<.001$). Mean likelihood estimates are displayed in Figure 2. The scores fall roughly into three groups. The estimate is 12% for scores between 3 and 6, 35% for scores between 7 and 11, and 70% for the score of 12. In Figure 1, the likelihood estimate at 0 discrepancies is 20%; otherwise, the percentages are almost identical. Sum-and-classify is useful for tallying questionnaire data, but the simple discrepancy count allows beliefs to be elicited through dialog and is especially useful as a patient-centered communication tool.

STUDY LIMITATIONS AND CONCLUSION

The findings presented here should be moderated by the study’s limitations. These include the nature of the sample, which was confined to veterans with chronic pain who, for the most part, are male, Caucasian, and not impoverished. Diagnostic data were limited to disease co-morbidities. The study’s sample size was sufficient to identify the beliefs that influence patients’ conditional judgments and determine how decision making is activated. But unlike the Wolfe and Michaud study, the prevalence of the beliefs was not assessed. Illness perception studies have found that beliefs change across the lifespan (55, 56), and older patients are more inclined to accept less than
perfect health states than younger patients (57). No studies to date have examined how age affects compatibility testing and the current study lacked sufficient power to investigate this relationship.

According to Politi and Street (32), collaborative decision making has both communicative and cognitive aspects. This study focused solely on the cognitive aspects and did not describe how the three beliefs are incorporated into patient-provider dialog. Nor did it discuss the importance of communicative aspects such as trust, supportiveness, and interpersonal style (58, 59, 60). We alluded to a movement from conditional judgment to preference and depicted decision making as a two-stage process. We did not describe the crucial role of communication in turning discontinuous phases into a contiguous and integral event. Patient-centered communication is an uncertain process. There is no assurance that eliciting relevant beliefs will activate patients’ decision making or lead to their expressing a preference. Patients who examine alternatives may decide not to change their current treatment. A change may not be congruent with the provider's recommendation.

Even when a patient-centered response does not result in a treatment change, it can identify barriers to collaboration, assist patients in coping with their pain, and enhance their ability to recognize health threats. Belief compatibility can militate against the provision of effective treatment, especially when a patient's condition is stable. Those who are relatively satisfied, suffer fewer or lesser consequences, and have minimal worries may be better able to endure unnecessary pain and accommodate functioning limitations. In some instances, the ability to accommodate and adapt exacerbates their condition and causes irrevocable damage.

When discrepancy is low in the presence of a serious clinical picture, a worst-of-both response is to persuade the patient to conform the provider's recommendation, abandon the effort when it proves futile or counterproductive, then send the patient away “to make a decision.” Sandman (61) describes an alternative that he calls a “professionally driven best interest compromise” (p. 62). It attempts to balance the patient's beliefs and desires against the provider's
knowledge of effective interventions. A compromise is achieved when the provider’s discrepancy threshold is lowered and the patient’s is raised. Some practitioners may be reluctant to increase the patients’ dissatisfaction or to raise their expectations. Others may be hesitant about lowering their standard of practice, even provisionally. These complications arise only when there is a prospect that patient and provider can concur about the next step in treatment.
REFERENCES


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<table>
<thead>
<tr>
<th>CSM Domain</th>
<th>Item No.</th>
<th>Item</th>
<th>Rotated factor loading</th>
<th>Threshold value</th>
<th>“Yes” percent below the threshold</th>
<th>“Yes” percent at the threshold</th>
<th>Chi square test of association</th>
<th>Summary</th>
</tr>
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<tbody>
<tr>
<td><strong>Current consequences of pain (Eigenvalue=7.48, 41.6% of the variance)</strong></td>
<td>1</td>
<td>My illness has major consequences on my life (5+)</td>
<td>.876</td>
<td>5: strongly agree</td>
<td>27</td>
<td>46</td>
<td>5.182, p=.023</td>
<td>Selected for discrepancy testing</td>
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<tr>
<td></td>
<td>2</td>
<td>My illness is a serious condition (5+)</td>
<td>.780</td>
<td>5: strongly agree</td>
<td>27</td>
<td>50</td>
<td>3.839, p=.05</td>
<td>Selected for discrepancy testing</td>
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<td></td>
<td>3</td>
<td>My body reminds me every day that I have pain (5+)</td>
<td>.524</td>
<td>5: strongly agree</td>
<td>24</td>
<td>42</td>
<td>4.628, p=.031</td>
<td>Selected for discrepancy testing</td>
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<tr>
<td></td>
<td>4</td>
<td>How much does your pain affect the quality of your life? (4+)</td>
<td>.616</td>
<td>5: strongly agree</td>
<td>30</td>
<td>47</td>
<td>2.824, p=.093</td>
<td>Rejected, non-significant association</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>My illness causes difficulties for those who are close to me (5+)</td>
<td>.616</td>
<td>No threshold</td>
<td>30</td>
<td>47</td>
<td>2.824, p=.093</td>
<td>Rejected, no threshold</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>How much has your illness disrupted your life? (4+)</td>
<td>.570</td>
<td>No threshold</td>
<td>30</td>
<td>47</td>
<td>2.824, p=.093</td>
<td>Rejected, no threshold</td>
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<tr>
<td><strong>Emotional influence (Eigenvalue=1.89, 10.5% of the variance)</strong></td>
<td>7</td>
<td>How worried are you about the effect your pain has on your life now? (4+)</td>
<td>.787</td>
<td>4: a lot</td>
<td>27</td>
<td>43</td>
<td>3.839(1), p=.05</td>
<td>Selected for discrepancy testing</td>
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<tr>
<td></td>
<td>8</td>
<td>How worried are you that your pain will disrupt your life in the future? (4+)</td>
<td>.649</td>
<td>4: a lot</td>
<td>23</td>
<td>42</td>
<td>5.731 (1), p=.017</td>
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<td>9</td>
<td>How worried are you about your pain? (4+)</td>
<td>.660</td>
<td>No threshold</td>
<td>30</td>
<td>47</td>
<td>2.824, p=.093</td>
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<td></td>
<td>10</td>
<td>How much does your pain affect you emotionally? (4+)</td>
<td>.590</td>
<td>No threshold</td>
<td>30</td>
<td>47</td>
<td>2.824, p=.093</td>
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<td></td>
<td>11</td>
<td>How worried are you about any of the medications you are taking for your pain? (5+)</td>
<td>.314</td>
<td>No threshold</td>
<td>30</td>
<td>47</td>
<td>2.824, p=.093</td>
<td>Rejected, low factor loading</td>
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<tr>
<td><strong>Controllability and effectiveness of treatment (Eigenvalue=1.39, 7.7% of the variance)</strong></td>
<td>12</td>
<td>How much do your treatments actually help your pain? (4-)</td>
<td>.619</td>
<td>1: Not at all</td>
<td>32</td>
<td>50</td>
<td>1.305, p=.253</td>
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<td></td>
<td>13</td>
<td>How much control do you feel you have over your pain? (4-)</td>
<td>.573</td>
<td>1: Not at all</td>
<td>30</td>
<td>48</td>
<td>3.077, p=.079</td>
<td>Rejected, non-significant association</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>My pain is under control most of the time (5-)</td>
<td>.769</td>
<td>No threshold</td>
<td>30</td>
<td>48</td>
<td>3.077, p=.079</td>
<td>Rejected, no threshold</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Overall, my efforts to keep my pain under control are working very well (5-)</td>
<td>.769</td>
<td>No threshold</td>
<td>30</td>
<td>48</td>
<td>3.077, p=.079</td>
<td>Rejected, no threshold</td>
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<tr>
<td></td>
<td>16</td>
<td>How much do you think any treatment can help your pain? (4-)</td>
<td>.454</td>
<td>No threshold</td>
<td>30</td>
<td>48</td>
<td>3.077, p=.079</td>
<td>Rejected, low factor loading</td>
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<tr>
<td><strong>Long-term impact of pain (Eigenvalue=1.08, 5.98% of the variance)</strong></td>
<td>17</td>
<td>How satisfied are you with where your life is heading? (4-)</td>
<td>.673</td>
<td>1: Not at all</td>
<td>28</td>
<td>59</td>
<td>9.695(1), p=.002</td>
<td>Selected for discrepancy testing</td>
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<td></td>
<td>18</td>
<td>How hopeful are you that you will be able to live a good life? (4-)</td>
<td>.620</td>
<td>No threshold</td>
<td>28</td>
<td>59</td>
<td>9.695(1), p=.002</td>
<td>Selected for discrepancy testing</td>
</tr>
</tbody>
</table>

---

1 The number in parentheses indicates a 5 point Likert-type scale (strongly disagree to strongly agree) or a 4-point “how much” scale (not at all to a lot). A plus indicates positive-wording, a minus indicates negative wording.

2 2x2 chi square tests have 1 degree of freedom

3 A break point at 2 but fewer than 34% “yes” scores at 1.
TABLE 2
CHARACTERISTICS OF THE STUDY PARTICIPANTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Younger (20-35)</th>
<th>Middle (40-55)</th>
<th>Older (70-90)</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>62 (45%)(^1)</td>
<td>28 (20%)</td>
<td>49 (35%)</td>
<td>139</td>
</tr>
<tr>
<td>Number of males</td>
<td>46 (74%)</td>
<td>21 (75%)</td>
<td>48 (98%)</td>
<td>115 (83%)</td>
</tr>
<tr>
<td>Considering a treatment change</td>
<td>22 (36%)</td>
<td>10 (36%)</td>
<td>15 (31%)</td>
<td>47 (34%)</td>
</tr>
<tr>
<td>Mean NRS illness severity</td>
<td>5.95 (2.092)</td>
<td>6.61 (2.2)</td>
<td>6.22 (2.143)</td>
<td>6.18 (2.131)</td>
</tr>
<tr>
<td>Mean Charleson co-morbidity score</td>
<td>.516 (.621)</td>
<td>1.57 (1.5)</td>
<td>2.67 (1.16)</td>
<td>1.489 (1.416)</td>
</tr>
<tr>
<td>Mean duration of pain in years</td>
<td>7.40 (3.766)</td>
<td>13.11 (11.48)</td>
<td>21.06 (20.113)</td>
<td>13.37 (14.483)</td>
</tr>
<tr>
<td>Course of the pain:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Will clear up and go away</td>
<td>0 (0%)</td>
<td>2 (7.1%)</td>
<td>4 (8.2%)</td>
<td>6 (4.3%)</td>
</tr>
<tr>
<td>Will get better then come back</td>
<td>4 (6.5%)</td>
<td>2 (7.1%)</td>
<td>2 (4.1%)</td>
<td>8 (5.7%)</td>
</tr>
<tr>
<td>Will last for a long time</td>
<td>12 (1.94%)</td>
<td>1 (3.6%)</td>
<td>3 (6.1%)</td>
<td>16 (11.5%)</td>
</tr>
<tr>
<td>Will last for the rest of my life</td>
<td>46 (74.2%)</td>
<td>23 (82.1%)</td>
<td>40 (81.6%)</td>
<td>109 (78.4%)</td>
</tr>
</tbody>
</table>

\(^1\)Standard deviations or percentages are in parentheses
# TABLE 3

**GENERALIZED LINEAR MODEL ANALYSIS OF FOUR DISCREPANCY-BASED DECISION B MODELS**

<table>
<thead>
<tr>
<th>GLZ analysis</th>
<th>Simple counting model</th>
<th>Emotion-weighted model</th>
<th>Consequences-weighted model</th>
<th>Long-term effects diminished model</th>
<th>Sum model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discrepancy count variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wald chi square</td>
<td>10.626</td>
<td>13.149</td>
<td>12.495</td>
<td>18.577</td>
<td>20.154</td>
</tr>
<tr>
<td>df</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>p</td>
<td>.014</td>
<td>.011</td>
<td>.014</td>
<td>.002</td>
<td>.017</td>
</tr>
<tr>
<td><strong>Discrepancy count linearity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wald chi square</td>
<td>12.134</td>
<td>12.888</td>
<td>11.886</td>
<td>15.088</td>
<td>7.483</td>
</tr>
<tr>
<td>df</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>p</td>
<td>.001</td>
<td>.001</td>
<td>.002</td>
<td>.001</td>
<td>.056</td>
</tr>
<tr>
<td><strong>Goodness of fit</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Categorical AIC</td>
<td>93.591</td>
<td>101.135</td>
<td>104.932</td>
<td>105.788</td>
<td>128.743</td>
</tr>
<tr>
<td>% increase</td>
<td>8.06%</td>
<td>12.12%</td>
<td>13.03%</td>
<td>37.56%</td>
<td></td>
</tr>
<tr>
<td>Continuous AIC</td>
<td>91.203</td>
<td>97.367</td>
<td>100.624</td>
<td>104.326</td>
<td>124.17</td>
</tr>
<tr>
<td>% increase</td>
<td>6.76%</td>
<td>10.33%</td>
<td>14.39%</td>
<td>36.15%</td>
<td></td>
</tr>
<tr>
<td><strong>IV as linear</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X2</td>
<td>9.588</td>
<td>10.071</td>
<td>10.01</td>
<td>11.023</td>
<td>11.711</td>
</tr>
<tr>
<td>df</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>p</td>
<td>0.002</td>
<td>0.002</td>
<td>0.002</td>
<td>0.001</td>
<td>0.001</td>
</tr>
</tbody>
</table>
FIGURE 1
MEAN LIKELIHOOD ESTIMATES FOR THE SIMPLE COUNTING RULE
FIGURE 2
MEAN LIKELIHOOD ESTIMATES FOR THE SUM-AND-CLASSIFY PROCEDURE