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## Treatment Expectations and Preferences as Predictors of Outcome of Acupuncture for Chronic Back Pain

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### Introduction

Belief that positive patient expectations could enhance treatment benefits has been widespread for many years and a major rationale for masking clinical trial participants to their assigned treatment.<sup>1–3</sup> However, the most clear and compelling evidence that patients' beliefs about treatment can enhance or attenuate the results of treatment comes from experimental studies of placebo analgesia wherein expectations are manipulated via visual and auditory cues.<sup>4,5</sup> In fact, relatively few clinical studies have explicitly evaluated the influence of patient expectations on treatment outcomes,<sup>6</sup> although some have included measures of pre-treatment patient expectations or preferences for medical treatment to explore this relationship (e.g., Crow, 1999<sup>7</sup>, Torgerson et al., 1996<sup>8</sup>, Myers, et al., 2008<sup>9</sup>, Greenberg 2006<sup>10</sup>).

Despite the paucity of evidence, some researchers assert that positive patient expectations for treatment efficacy are responsible for much of the success of some treatments, including many complementary and alternative medical (CAM) therapies.<sup>11–13</sup> If true, this would suggest that patients' expectations might help guide choice of effective therapy and that encouraging positive expectations of therapy might result in better outcomes.

Three studies of patients with chronic back pain have examined whether patient beliefs about the helpfulness of acupuncture were predictive of treatment outcomes.<sup>14–16</sup> These studies reported inconsistent results. As part of a large trial evaluating the efficacy of acupuncture for back pain among acupuncture naïve persons, we collected information that allowed us to explore the relationship between patients' pre-treatment preferences and expectations of improvement (in general and from acupuncture treatment) and actual treatment outcomes. Our pre-planned analyses hypothesized that greater improvement would be more likely among participants with:

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1. Higher baseline expectations that their back pain would improve.
2. Higher baseline expectations of the helpfulness of acupuncture.
3. A preference for acupuncture over other back pain treatments.
4. Both a preference for acupuncture and high expectations regarding acupuncture.

## Methods

Both the design<sup>17</sup> and main trial results<sup>18</sup> for this institutional review board-approved trial have been described elsewhere. The pertinent components of the trial design are briefly reviewed here.

638 participants 20 to 70 years of age with chronic non-specific low back pain were recruited from integrated health care systems in the Seattle and Oakland metropolitan areas. Participants were randomized to one of four treatment groups: individualized acupuncture, standardized acupuncture, simulated acupuncture (non-insertive stimulation of acupuncture points), and usual care. This report includes data only for the 477 participants randomized to one of the three treatment groups, who received 10 treatments over 7 weeks -- twice a week for 3 weeks followed by weekly treatments for 4 weeks. Participants were informed that the study was evaluating “different methods of stimulating acupuncture points”. In all three treatment groups, participants rated the skills and caring of the provider and their perceptions of the treatment almost identically. A Diagnostician acupuncturist, who was unaware of treatment assignment, saw each patient at the beginning of each visit and recommended an individualized treatment, which was only given to those randomized to that treatment group. The real or simulated acupuncture treatments were administered by a Therapist acupuncturist who interacted only minimally with the patient.

Telephone interviewers masked to type of acupuncture interviewed participants at baseline and at 8, 26 and 52 weeks post-randomization. In addition, participants completed short questionnaires immediately after their first and fifth treatments.

## Outcome variable(s)

Primary trial outcomes were the modified Roland Morris Disability Scale score (Roland score) and symptom bothersomeness score at 8 weeks. The modified Roland is a 23-item questionnaire that measures back-specific functional status.<sup>19</sup> Participants were also asked to rate how bothersome their back pain was during the past week on a 0 to 10 scale where 0 indicated not at all bothersome and 10 extremely bothersome. This measure was highly correlated with pain intensity ( $r=0.8$ ,  $p<0.0001$ ). We also looked at the proportion of “treatment responders”, defined as having improved by at least 3 points on the Roland Scale or two points on the symptom bothersomeness scale.<sup>20</sup>

## Potential Predictor Variables

At the baseline interview conducted immediately prior to randomization, prospective participants were asked several questions about their perceptions and expectations:

1. General expectations for improvement: participants were asked if, in one year, they expected their back pain to be: completely gone, much better, moderately better, a little better, about the same, a little worse or much worse.<sup>14</sup> We dichotomized these responses as completely gone or much better versus all others.
2. Expectations of Acupuncture, participants rated how helpful they believed acupuncture would be for their current back pain on a 0 to 10 scale.<sup>14</sup> Responses were trichotomized into tertiles: low (0 to 5), medium (6 and 7), and high (8 to 10).

3. Treatment preference: participants were asked which treatment they would select if they could have any treatment or training for their back pain. We coded the responses into acupuncture, other CAM treatment (e.g., chiropractic, massage, yoga), or medical treatments (e.g., narcotics, physical therapy).

Participants were also asked to rate their knowledge of acupuncture on a 5-point scale, to list their sources of information about acupuncture, to tell us whether or not they had heard about others' experiences with acupuncture treatment, and if so, what they heard about the effectiveness of the treatment (dichotomized as very effective and any other response) and to tell us their current impression of acupuncture (trichotomized as very positive, moderately positive, and slightly positive or neutral or negative).<sup>21</sup> At the baseline interview, we also collected information on demographic and clinical characteristics of the study participants.

Finally, at the end of the first and the fifth acupuncturist visits, participants were asked to indicate their current expectation of the success of acupuncture for relieving low back pain (trichotomized as very successful, moderately successful, and slightly or not at all successful).

## Analysis

This analysis is restricted to the 477 participants receiving individualized, standardized, or simulated acupuncture. We pooled data across all three groups since there were no significant effects of treatment on the outcomes examined. We then assessed baseline variables as prognostic indicators of later outcomes using regression models<sup>22</sup>. We also assessed the association among baseline variables.

Overall means and frequencies of baseline patient characteristics were computed. We performed logistic regression to identify demographic, clinical, and other characteristics that were associated with high baseline expectations for acupuncture. This gives an indication of what variables at baseline may be related to a preference for acupuncture measured prior to randomization. These general expectations and specific expectations and desire for acupuncture were then assessed as predictors of back pain outcomes at 8 and 52 weeks after initiation of treatment.

To assess the ability of the baseline measures of general and acupuncture expectations, preferred treatment, acupuncture effectiveness and acupuncture impressions to influence treatment outcomes, we used both linear regression and logistic regression. In these models, the outcome was either the follow-up Roland score or the bothersomeness score (linear regression) or whether or not the study participant was a responder to treatment at follow-up (logistic regression). Separate models were constructed for each predictor variable with each primary outcome measured at 8 and 52 weeks. Finally, we used both linear and logistic regression models to explore whether expectations of success of acupuncture collected after the first and fifth treatments were related to subsequent changes on the Roland and bothersomeness scores at 8 and 52 weeks.

All models included continuous variables for age and baseline Roland or bothersomeness scores and dichotomous variables for gender, site and pain duration as covariates. Study participants who were missing information for a certain predictor variable or covariate were excluded from that particular model. Because results from the linear and logistic regression models were consistent, we present only the results from the linear regression models. We also found comparable results in models that included missing predictor variables in the model as a separate category. Adjustment for treatment group allocation did not change the results of the analyses. All data were analyzed using SAS/STAT version 9.1<sup>23</sup> and all tests for statistical significance were two-tailed.

## Results

The typical study participant was 47 years old, female, white, college educated, currently experiencing moderately severe back pain and had had back pain for at least a year (Table 1). Most reported the lowest level of knowledge of acupuncture. About two-thirds had heard others describe their experiences with acupuncture. Only a fifth of participants reported a “very positive” impression of acupuncture.

### Baseline Correlates of High Expectations of Acupuncture

Table 2 presents the results of the logistic regression model with an outcome of high expectations of acupuncture. Higher expectations of acupuncture was associated with older age, higher baseline symptom bothersomeness, higher general expectations, preference for acupuncture over other treatments, having heard that acupuncture was a “very effective” treatment,” and moderately or very positive impressions of acupuncture. Having a very positive impression of acupuncture was most strongly associated with high expectations of acupuncture.

### Relationship Between Baseline Predisposition and Preferences for Acupuncture and Treatment Outcome

**General Expectations of Improvement**—Of the 422 (88% of 477) participants who rated their general expectations of the status of their back pain in one year, 118 (28% of 422) expected their back pain to be much better or completely gone (Table 3). General expectations of improvement was not predictive of outcomes after 8 or 52 weeks after adjustment for age, baseline Roland (or bothersomeness) score, gender, site and duration of chronic pain (Table 4). Findings from logistic regression models were similar (data not shown).

**Expectations of Helpfulness of Acupuncture**—Almost one in five participants could not provide a numerical rating of how helpful they believed acupuncture would be for their current back pain. Of those who could, roughly equal numbers reported high (8 to 10), medium (6 or 7) and low (0 to 5) expectations (123, 130, and 133, respectively; Table 3). Participants reporting higher expectations of acupuncture had worse baseline Roland and bothersomeness scores but more favorable outcomes measured by both mean change in scores, and percentages responding to treatment. However, after adjusting for age, baseline Roland (or bothersomeness) score, gender, site and duration of chronic pain, these differences were not significant (Table 4). Logistic regression models confirmed these results.

**Preferred Treatment**—When asked about their preferred treatment for their back pain at the baseline interview, about a third wanted acupuncture (167 of 477; Table 3). Participants who preferred acupuncture had more dysfunction (higher Roland scores) at baseline but significantly greater improvement following treatment. However, after adjustment for baseline variables, individuals who preferred acupuncture had outcomes similar to those in the other groups (Table 4). Moreover, models including both expectations of helpfulness of acupuncture and preferred treatment did not confirm our hypotheses that participants with high baseline expectations of helpfulness and who preferred acupuncture would improve most.

**Acupuncture Effectiveness and Impressions of Acupuncture**—After adjustment, neither having heard that acupuncture was very effective nor having a very or moderately positive impression of acupuncture were associated with either Roland Score or symptom bothersomeness score at 8 or 52 weeks (Table 4). Logistic regression analyses gave similar results (data not shown).

**Acupuncture Expectations During Treatment**—After the first visit, participants rating their expectation of acupuncture treatment as very or moderately successful were significantly

more likely to have improvements in their 8 week symptom bothersomeness scores, with Roland scale scores showing a similar, but non-significant trend (Table 5). These differences diminished by 52 weeks and were no longer significant.

Participants' expectations of the helpfulness of acupuncture measured at the fifth visit were more consistently predictive of both outcomes at 8 and 52 weeks. However, this finding is not surprising. By the time of the fifth visit, many participants would have already reached a clear conclusion about the value of acupuncture for their back pain based on their symptom improvement.

## Discussion

Among acupuncture-naïve persons with chronic low back pain, we found that having higher pre-treatment expectations for the success of acupuncture was associated with higher general expectations for improvement, preference for acupuncture over other back pain treatments, having heard acupuncture was a very effective treatment, and having a positive impression of acupuncture. However, none of these variables was a significant predictor of short or long-term improvement in back-related symptoms or function.

After one treatment, participants' revised expectations were predictive of only modest improvements in back symptoms at the end of treatment. After five treatments, a stronger association was found between expectation of treatment success for both outcomes at 8 and 52 weeks, likely reflecting participants' revisions of their expectations to reflect their actual experience. Thus, in our study population, having a highly positive predisposition toward acupuncture did not predict superior outcomes. Although based on a pre-planned analysis of secondary data, this study has notable strengths including a large sample size, high follow-up rates, successful treatment blinding, and inclusion of multiple measures of participants' beliefs regarding acupuncture's effectiveness as a therapy for back pain. Furthermore, the consistent results among these measures lend credence to our results.

The inconsistent findings of the three previous studies of acupuncture for persistent musculoskeletal pain that included measures of pre-treatment expectations<sup>14-16</sup> could reflect differences in recruitment sources (primary care patients<sup>14, 15</sup> versus respondents to advertisements<sup>16</sup>) or in how expectations and outcomes were measured.

Kalauokalani et al's<sup>14</sup> study of patients randomized to massage or acupuncture found those with higher positive pre-treatment expectations of the treatment they received were more likely to have clinically important improvements in function at the end of treatment. Her study included a small fraction of participants who had previously had these treatments (4% of those randomized to acupuncture and 14% of those randomized to massage).

Linde et al's<sup>16</sup> analysis of data combined from 4 large trials of acupuncture for different musculoskeletal conditions found expectations of improvement asked before treatment and after the third treatment to be predictive of improvement (defined as 50% improvement in pain, the primary outcome) at the end of treatment and 4 months later. Of the 75% of persons expressing positive expectations of acupuncture, (the remainder failed to provide an expectation), 89% expected at least "clear improvement" in their pain. Thus, the patients in Linde's report appeared substantially more optimistic than those in our study about the benefits of acupuncture for their pain condition. Moreover, about 30% of participants in his study versus none in our study had previously had acupuncture treatments a year or more prior to the study.

In the third study, Thomas et al.<sup>15</sup> found that persons randomized to acupuncture who thought acupuncture might help their back problem did little better than those randomized to usual care after 24 months on their primary outcome measure, the Bodily Pain Scale of the SF-36. By

contrast, those who did not know whether acupuncture would be helpful were somewhat more likely to benefit if randomized to acupuncture.

Studies of many other treatments for back pain have also failed to provide consistent evidence that optimism about<sup>24, 25</sup> or preference<sup>26, 27</sup> for a treatment leads to better outcomes. The disparate results of these studies suggest that the relationship between expectations and preferences for treatment and outcomes is more complex than has been previously thought.<sup>7, 28</sup> Participants' previous experience with the treatment under study might be expected to influence the observed relationship between treatment expectations and outcomes. Specifically, we suspect that studies including high proportions of participants who have tried the treatment previously (and who therefore probably had positive experiences with the treatment) will be more likely to find a positive correlation between expectation and outcomes than studies including individuals who have had no experience with the treatment. We think that future progress in elucidating the nature of these relationships will require greater consistency in measurement of preferences and expectations as well as more sophisticated models of the interrelationship among patient expectations, treatment outcomes, and the patient-provider relationship. Such models should include potential mediators and moderators of treatment outcome, including prior experience with the therapy, both in general and for the specific condition studied. New questionnaires should be designed to explicitly facilitate the testing of conceptual models linking expectations and preferences to treatment outcomes.

At this early stage of research on patient expectations, we recommend that such instruments include several questions that explore conceptually distinct dimensions of patients' expectations-related experience. Such pre-treatment measures might include general expectations for improvement in condition, preferred treatment, expectations about the value of the specific treatment, and the possible antecedents for these expectations (e.g., prior experience with therapy, experience of family or friends). If there is interest in how treatment expectations change over time, similar measures could be asked during the course of treatment.

Further work in this area could ultimately have important practical value by helping clinicians better understand the potential clinical benefits of promoting reasonable treatment options that their patients believe will be most helpful. There is limited, but growing evidence that clinicians can either enhance or attenuate their patient's pre-treatment expectations by the way they interact with them.<sup>28</sup> A recent trial of patients with irritable bowel syndrome clearly demonstrated that a supportive patient-provider relationship amplifies treatment benefits for persons receiving a placebo CAM treatment.<sup>29</sup> Conceivably, such benefits could be even greater in persons with greater initial optimism about the treatment.

Our study demonstrates that positive pre-treatment beliefs about medical therapies do not always lead to enhanced outcomes, even for CAM therapies. The relationship between patient expectations and treatment outcomes appears to be complex. Advances in this burgeoning area of research will require development of more sophisticated conceptual models and measures of expectation.

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**Table 1**

Baseline characteristics of study population

<b>Baseline characteristic</b>	<b>Total</b>
Age (y), mean(s.d.)	47.4 (13.2)
Roland disability (0–23 scale), mean (s.d.)	10.5 (5.3)
Bothersomeness (0–10 scale), mean (s.d.)	5.0 (2.4)
Living in Seattle area, %	55
Female, %	61
White, %	69
Hispanic, %	8
College graduate, %	54
Married, %	59
Annual income >= \$45,000, %	70
Employed, %	79
Chronic pain for 1+ years, %	68
Reduced activity 7+ days in last 3 months, %	25
Pain below knee, %	22
Medication use, %	62
General expectation, %	
- High	25
- Low, %	64
- Missing, %	12
Acupuncture expectation, %	
- High	26
- Medium	27
- Low	28
- Missing	19
Treatment preference, %	
- Acupuncture	35
- Other CAM	39
- Conventional	16
- Missing	10

Baseline characteristic	Total
Lowest level of acupuncture knowledge, %	62
Personally know acupuncturist, %	10
Heard about acupuncture treatment, %	67
Heard acupuncture very effective, %	34
Heard acupuncture not painful, %	40
Source of acupuncture info, %	
- Family/Friends	61
- Media	46
- Research	16
- Other acquaintance	16
- Health professional, %	14
- Other, %	0.2
Impression of acupuncture	
% Very positive, %	18
% Moderately positive, %	40
% <Moderately positive, %	42
Aware needles very thin, %	82
Worried about needles, %	30
Aware of (lack of) pain, %	76

**Table 2**  
**Acupuncture expectations : multiple logistic regression model**

Association with High (8–10) vs. Not high (0–7) Acupuncture Expectation

Parameter	Category	Odds ratio	95% CI	p-value
Age	Years (Continuous)	1.03	1.01–1.06	0.01
Gender	Male vs. Female	0.91	0.48–1.71	0.77
Site	Oakland vs. Seattle	1.28	0.69–2.40	0.44
Baseline Roland	0–23 scale (Continuous)	1.01	0.95–1.08	0.81
Baseline bothersomeness	0–10 scale (Continuous)	1.24	1.07–1.43	0.004
Duration of chronic pain	<1 year vs. at least 1 year	1.20	0.64–2.25	0.57
General expectation	High vs. Low	3.39	1.80–6.40	0.0002
Treatment preference	Other CAM vs. Acupuncture	0.59	0.31–1.13	
	Conventional vs. Acupuncture	0.30	0.13–0.72	0.02
Acupuncture effectiveness	Very effective vs. <Very effective	2.60	1.43–4.73	0.002
Acupuncture impression	Mod positive vs. <Mod positive	3.27	1.59–6.73	
	Very positive vs. <Mod positive	11.14	4.99–24.9	<.0001

**Table 3**

Baseline and 8-week outcomes

	General expectation				p-value for difference
	High (n=118)	Low (n=304)	Missing (n=55)		
<b>Roland dysfunction*</b>					
Mean baseline score (s.d.)	11.2 (5.3)	10.0 (5.2)	11.7 (5.6)		
Mean 8-week score (s.d.)	6.6 (6.1)	5.7 (4.9)	6.8 (5.6)		
Mean change from baseline (s.d.)	-4.7 (5.6)	-4.3 (5.5)	-5.0 (4.4)		p=0.63
% Improved by 3+ scale points	65	56	66		p=0.18
<b>Symptom bothersomeness<sup>†</sup></b>					
Mean baseline score (s.d.)	5.6 (2.5)	4.7 (2.3)	5.1 (2.5)		
Mean 8-week score (s.d.)	3.6 (2.8)	3.1 (2.4)	3.3 (2.7)		
Mean change from baseline (s.d.)	-2.1 (3.4)	-1.6 (2.8)	-1.8 (2.6)		p=0.40
% Improved by 2+ scale points	54	48	53		p=0.50
	Acupuncture expectation				p-value for difference
	High (8-10) (n=123)	Medium (6-7) (n=130)	Low (0-5) (n=133)	Missing (n=91)	
<b>Roland dysfunction*</b>					
Mean baseline score (s.d.)	11.8 (5.4)	10.5 (5.5)	8.9 (4.5)	11.0 (5.5)	
Mean 8-week score (s.d.)	6.0 (5.7)	6.1 (5.1)	5.8 (5.0)	6.4 (5.6)	
Mean change from baseline (s.d.)	-5.9 (5.4)	-4.5 (5.5)	-3.1 (4.5)	-4.6 (6.1)	p=0.001
% Improved by 3+ scale points	68	59	51	62	p=0.049
<b>Symptom bothersomeness<sup>†</sup></b>					
Mean baseline score (s.d.)	5.9 (2.4)	4.8 (2.4)	4.6 (2.2)	4.5 (2.4)	
Mean 8-week score (s.d.)	3.1 (2.7)	3.3 (2.4)	3.3 (2.5)	3.3 (2.6)	
Mean change from baseline (s.d.)	-2.7 (3.1)	-1.7 (2.8)	-1.3 (2.9)	-1.3 (2.9)	p=0.001
% Improved by 2+ scale points	60	49	45	45	p=0.06

	Treatment preference				p-value for difference
	Acupuncture (n= 167)	Other CAM (n=186)	Conventional Medical Care (n=76)	Missing (n=48)	
<b>Roland dysfunction</b> *					
Mean baseline score (s.d.)	12.2 (5.5)	9.2 (5.0)	9.9 (5.1)	10.2 (4.4)	
Mean 8-week score (s.d.)	6.6 (5.6)	5.6 (5.3)	5.5 (5.0)	5.7 (4.2)	
Mean change from baseline (s.d.)	-5.6 (5.6)	-3.5 (5.4)	-4.4 (5.1)	-4.8 (4.9)	p=0.006
% Improved by 3+ scale points	68	51	63	67	p=0.01
<b>Symptom bothersomeness</b> †					
Mean baseline score (s.d.)	5.5 (2.5)	4.7 (2.2)	4.7 (2.3)	4.6 (2.7)	
Mean 8-week score (s.d.)	3.6 (2.6)	3.0 (2.5)	3.0 (2.5)	3.5 (2.7)	
Mean change from baseline (s.d.)	-1.9 (3.0)	-1.7 (2.8)	-1.8 (3.1)	-1.4 (3.1)	p=0.86
% Improved by 2+ scale points	51	47	51	52	p=0.84

\* a lower score on the Roland Scale indicates less dysfunction

† a lower score on the Symptom bothersomeness scale indicates less bothersomeness

**Table 4**

Association of Expectations/Preferences and Outcomes

	Roland dysfunction			Symptom bothersomeness		
	8 week	52 week		8 week	52 week	
(1) General expectation	High	Adjusted* Mean (s.e.) 6.3 (0.5)	Adjusted* Mean (s.e.) 5.8 (0.5)	Adjusted† Mean (s.e.) 3.4 (0.2)	Adjusted† Mean (s.e.) 3.3 (0.3)	
	Low	Adjusted* Mean (s.e.) 5.8 (0.3)	Adjusted* Mean (s.e.) 6.1 (0.3)	Adjusted† Mean (s.e.) 3.1 (0.1)	Adjusted† Mean (s.e.) 3.6 (0.2)	
(2) Acupuncture expectation	High	<i>p</i> = 0.43	<i>p</i> = 0.52	<i>p</i> = 0.34	<i>p</i> = 0.33	
	Medium	Adjusted* Mean (s.e.) 5.3 (0.4)	Adjusted* Mean (s.e.) 5.6 (0.5)	Adjusted† Mean (s.e.) 3.0 (0.2)	Adjusted† Mean (s.e.) 3.2 (0.2)	
	Low	Adjusted* Mean (s.e.) 6.1 (0.4)	Adjusted* Mean (s.e.) 6.2 (0.4)	Adjusted† Mean (s.e.) 3.3 (0.2)	Adjusted† Mean (s.e.) 3.6 (0.2)	
(3) Treatment preference	Acupuncture	Adjusted* Mean (s.e.) 6.5 (0.4)	Adjusted* Mean (s.e.) 5.8 (0.4)	Adjusted† Mean (s.e.) 3.4 (0.2)	Adjusted† Mean (s.e.) 3.5 (0.2)	
	Other CAM	<i>p</i> = 0.10	<i>p</i> = 0.66	<i>p</i> = 0.35	<i>p</i> = 0.49	
	Conventional	Adjusted* Mean (s.e.) 5.8 (0.4)	Adjusted* Mean (s.e.) 5.9 (0.4)	Adjusted† Mean (s.e.) 3.4 (0.2)	Adjusted† Mean (s.e.) 3.7 (0.2)	
(4) Acupuncture expectation/Treatment preference	High/NotAcu	Adjusted* Mean (s.e.) 6.3 (0.4)	Adjusted* Mean (s.e.) 5.9 (0.4)	Adjusted† Mean (s.e.) 3.1 (0.2)	Adjusted† Mean (s.e.) 3.4 (0.2)	
	NotHigh/Acu	Adjusted* Mean (s.e.) 5.7 (0.6)	Adjusted* Mean (s.e.) 6.6 (0.6)	Adjusted† Mean (s.e.) 3.0 (0.3)	Adjusted† Mean (s.e.) 3.1 (0.3)	
	NotHigh/NotAcu	<i>p</i> = 0.55	<i>p</i> = 0.51	<i>p</i> = 0.46	<i>p</i> = 0.33	
(5) Heard about acupuncture effectiveness	High/Acu	Adjusted* Mean (s.e.) 5.6 (0.6)	Adjusted* Mean (s.e.) 5.9 (0.6)	Adjusted† Mean (s.e.) 3.1 (0.3)	Adjusted† Mean (s.e.) 3.5 (0.3)	
	Very effective	Adjusted* Mean (s.e.) 4.9 (0.7)	Adjusted* Mean (s.e.) 5.3 (0.7)	Adjusted† Mean (s.e.) 2.5 (0.4)	Adjusted† Mean (s.e.) 2.9 (0.4)	
	<Very effective	Adjusted* Mean (s.e.) 6.0 (0.5)	Adjusted* Mean (s.e.) 5.3 (0.5)	Adjusted† Mean (s.e.) 3.5 (0.3)	Adjusted† Mean (s.e.) 3.7 (0.3)	
(6) Acupuncture impression	Very positive	Adjusted* Mean (s.e.) 6.3 (0.4)	Adjusted* Mean (s.e.) 6.2 (0.4)	Adjusted† Mean (s.e.) 3.2 (0.2)	Adjusted† Mean (s.e.) 3.3 (0.2)	
	Moderately positive	<i>p</i> = 0.30	<i>p</i> = 0.54	<i>p</i> = 0.20	<i>p</i> = 0.36	
	<Mod positive	Adjusted* Mean (s.e.) 6.1 (0.4)	Adjusted* Mean (s.e.) 5.7 (0.4)	Adjusted† Mean (s.e.) 3.4 (0.2)	Adjusted† Mean (s.e.) 3.4 (0.2)	
		Adjusted* Mean (s.e.) 6.0 (0.3)	Adjusted* Mean (s.e.) 6.3 (0.3)	Adjusted† Mean (s.e.) 3.2 (0.1)	Adjusted† Mean (s.e.) 3.6 (0.1)	
		<i>p</i> = 0.92	<i>p</i> = 0.21	<i>p</i> = 0.32	<i>p</i> = 0.49	
		Adjusted* Mean (s.e.) 5.8 (0.4)	Adjusted* Mean (s.e.) 5.9 (0.5)	Adjusted† Mean (s.e.) 3.4 (0.3)	Adjusted† Mean (s.e.) 3.5 (0.3)	
		Adjusted* Mean (s.e.) 5.9 (0.5)	Adjusted* Mean (s.e.) 5.8 (0.4)	Adjusted† Mean (s.e.) 3.0 (0.2)	Adjusted† Mean (s.e.) 3.3 (0.2)	
		Adjusted* Mean (s.e.) 6.4 (0.3)	Adjusted* Mean (s.e.) 6.4 (0.3)	Adjusted† Mean (s.e.) 3.4 (0.2)	Adjusted† Mean (s.e.) 3.8 (0.2)	
		<i>p</i> = 0.38	<i>p</i> = 0.49	<i>p</i> = 0.36	<i>p</i> = 0.19	

\* Adjusted for a) baseline age and Roland disability score as continuous variables and 2) gender, site, and duration of chronic pain as categorical variables.

† Adjusted for a) baseline age and symptom bothersomeness score as continuous variables and 2) gender, site, and duration of chronic pain as categorical variables.

**Table 5**  
Relationship between Acupuncture Expectation during Visits 1 and 5 and Outcomes of Treatment

	Roland dysfunction			Symptom bothersomeness		
	8 week	52 week	8 week	52 week	8 week	52 week
(1) <i>Acupuncture expectation from Visit 1 Treatment Credibility</i>	Adjusted* Mean (s.e.)	Adjusted* Mean (s.e.)	Adjusted† Mean (s.e.)	Adjusted† Mean (s.e.)	Adjusted† Mean (s.e.)	Adjusted† Mean (s.e.)
Very successful	5.3 (0.5)	5.3 (0.6)	3.0 (0.3)	3.0 (0.3)	3.0 (0.3)	3.0 (0.3)
Moderately	5.9 (0.3)	6.1 (0.3)	3.0 (0.2)	3.0 (0.2)	3.5 (0.2)	3.5 (0.2)
Slightly or Not	6.7 (0.4)	6.4 (0.4)	3.7 (0.2)	3.7 (0.2)	3.8 (0.2)	3.8 (0.2)
	<i>p</i> = 0.10	<i>p</i> = 0.33	<i>p</i> = 0.03	<i>p</i> = 0.10	<i>p</i> = 0.10	<i>p</i> = 0.10
(2) <i>Acupuncture expectation from Visit 5 Treatment Credibility</i>	Adjusted* Mean (s.e.)	Adjusted* Mean (s.e.)	Adjusted† Mean (s.e.)	Adjusted† Mean (s.e.)	Adjusted† Mean (s.e.)	Adjusted† Mean (s.e.)
Very successful	4.4 (0.4)	5.1 (0.4)	2.4 (0.2)	2.4 (0.2)	3.0 (0.2)	3.0 (0.2)
Moderately	5.4 (0.3)	6.0 (0.4)	2.8 (0.2)	2.8 (0.2)	3.5 (0.2)	3.5 (0.2)
Slightly or Not	7.9 (0.4)	6.9 (0.4)	4.4 (0.2)	4.4 (0.2)	3.8 (0.2)	3.8 (0.2)
	<i>p</i> < 0.0001	<i>p</i> = 0.01	<i>p</i> < 0.0001	<i>p</i> < 0.0001	<i>p</i> = 0.03	<i>p</i> = 0.03

\* Adjusted for 1) baseline age and Roland disability score as continuous variables and 2) gender, site, and duration of chronic pain as categorical variables.

† Adjusted for 1) baseline age and symptom bothersomeness score as continuous variables and 2) gender, site, and duration of chronic pain as categorical variables.