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## Placebo use in pain management: the role of medical context, treatment efficacy, and deception in determining placebo acceptability

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### Abstract

Placebo effects can act as powerful pain relievers. While the ethics of therapeutic placebo use is highly controversial, recent evidence suggests that medical providers frequently utilize placebo treatments, and patients may be open to these interventions under certain contexts. This investigation used a patient-centered approach to answer essential questions about placebo treatment acceptability. People with chronic musculoskeletal pain completed a placebo survey where they: 1) rated their knowledge of placebo and its efficacy for alleviating pain; 2) evaluated the acceptability of a placebo analgesic interventions across several unique medical contexts; and 3) responded to six different patient-physician treatment scenarios to assess the role of deception and placebo effectiveness on mood and provider trust. Results showed that participants had limited knowledge of placebo and its efficacy for alleviating pain. Placebo acceptability was highly dependent on the context of the intervention, as placebo treatments were considered acceptable when used as complementary/adjunct treatments and when no other established treatments were available. Also, an analgesic placebo response mitigated the negative consequences of deception by improving provider trust and decreasing negative mood. These findings suggest that patients may be rather pragmatic in their appraisals of placebo treatment acceptability and may consider a variety of treatments/contextes as permissible for managing their pain. This is the first study of its kind to quantify perceptions of placebo analgesia knowledge and efficacy among individuals with chronic pain, and to assess the role of different medical contexts in treatment acceptability.

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#### Author contributions:

N.K. designed the study, collected, analyzed and interpreted the data, and wrote the paper. M.R. supervised every stage of the study, assisted with study design, and provided paper edits. R.H. and R.S. assisted with participant recruitment and paper edits/comments. All authors have approved the final paper.

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## 1. INTRODUCTION

The effectiveness of most medical interventions is derived partially from contextual or “non-specific” factors – commonly referred to as placebo effects [12]. These effects have demonstrated remarkable potency for the alleviation of pain, and under certain circumstances, placebos have produced effect sizes indistinguishable from established medications [24,42], surgeries [30], and other analgesic treatments [25,40,43]. With clearly defined neurobiological [2,31] and psychological underpinnings [7,32,37], the placebo analgesic response is one of the most well-understood models of placebo [8,17,34].

Despite considerable advances in understanding placebo mechanisms and effects, debate persists regarding the acceptability of therapeutic placebo use [28]. Whereas the ethics of placebo-controlled/randomized-controlled trials (RCTs) has been well established [11,22,27,44], the placebo treatment debate continues to incite disagreement among healthcare providers, bioethicist, and researchers [4]. Interventional placebo use opponents tout a variety of arguments, including that placebo use would damage the provider-patient relationship and/or cause psychological distress [10]. These arguments are primarily driven by placebos association with deceptive means and presumed negative consequences of deceiving patients [29]. Medical associations rarely adopt policies/guidelines regarding clinical placebo use, although some organizations prohibit covert use [3]. However, healthcare providers frequently use placebo interventions, often unbeknownst to patients [13,14,18,26,39].

Recent research has challenged the claims of placebo use opponents. A survey among primary care patients revealed that most were amenable to placebos despite the use of deception [5]. Furthermore, amongst both a non-clinical sample and irritable bowel syndrome (IBS) patients, placebo use had no adverse effects on mood nor the strength of subsequent placebo responding, even after the use of placebo was disclosed to participants [6]. Additionally, an explicit, open-label placebo RCT for IBS patients produced large and clinically meaningful reductions in IBS symptom severity [19].

Our research group has extended this line of inquiry by examining attitudes towards placebo use in non-clinical populations. In one study, participants responded to various scenarios of patients receiving placebo treatments to alleviate pain [21]. These scenarios systematically varied the severity of the patient’s pain, the deceptiveness of the provider’s description of the treatment, and the intervention’s effectiveness. Results illustrated that, while participants viewed placebo interventions as deceptive, their perceptions of placebo acceptability were mitigated by beneficial treatment outcomes. These findings were supported in a subsequent survey exploring placebo analgesia knowledge and acceptability [20]. Finding illustrated that lay individuals were uncertain about placebo analgesia efficacy and harbored rudimentary conceptualizations of placebos.

The present investigation seeks to further the understanding of placebo analgesia acceptability through utilization of an established patient-centered survey methodology [20,21] in a chronic musculoskeletal pain syndrome sample. The aims of this study were: 1) to examine patients’ knowledge of placebo; 2) to explore the role of medical contextual

factors in appraisals placebo acceptability; 3) and to understand the role of deception and treatment effectiveness in attitudes towards a placebo analgesic use. We hypothesize that, despite having limited knowledge of placebo, placebos will be deemed acceptable by chronic pain patients under certain circumstances. Additionally, we hypothesize that improved pain outcomes would mitigate the negative consequences of deceptive placebo use.

## 2. METHODS

### 2.1. Subjects

Subjects were directed recruited from two university outpatient medical clinics as well as through flyers posted in the surrounding community. Participants comprised 57 adults with chronic musculoskeletal pain (females = 40 and 17 males;  $M$  age = 45.12,  $SD$  = 19.16). Study inclusion criteria were as follows: adults age 18 years or older; the ability to read English fluently; the presence of musculoskeletal chronic pain that has lasted at least three months; and internet access to complete the web-based study. Exclusion criteria included the diagnosis of cancer or any other non-musculoskeletal chronic pain etiology (e.g., neuropathic pain).

### 2.2. Procedure

The present study was reviewed and approved by the University of Florida Institutional Review Board. Informed consent was obtained electronically. Prior to commencing the study, participants were informed that study participation would involve assessing their attitudes towards and knowledge of novel treatments for pain, such as placebo, and would involve completing questionnaires about their pain and their thoughts about pain treatments. The stated goals of this line of research were to help develop better ways to manage chronic pain in the future. The online questionnaire took approximately 30 minutes to complete and responses were anonymous. Participants were provided the URL/web address for the study in addition to a unique login username and password. The web-based survey was comprised to three sections: 1) Placebo Knowledge; 2) Placebo Acceptability; and 3) Treatment Scenarios.

### 2.3. Measures

**2.3.1. Placebo Knowledge, Conceptualization, and Efficacy**—All survey outcome measures were rated using Visual Analogue Scale (VAS) ratings producing numerical values between 0 and 100. Anchors for individual VAS questions can be found in Tables 2 and Table 3. VAS ratings have demonstrated considerable reliability and validity for the measurement of pain and other subjective phenomenon [23,35].

The Placebo Knowledge section is a modified version of a previously published web-based survey [20]. Participants were asked to VAS ratings of the following: 1) perceived knowledge of placebo analgesia, 2) conceptualization of placebo, and 3) perceived effectiveness of placebo for reducing pain, and 4) placebo analgesia treatment acceptability.

Placebo knowledge was assessed using a VAS scale from “no knowledge” to “the most knowledge imaginable”; participants were asked to conceptualize placebo along a VAS

continuum from something “completely inert” to “completely active.” The perceived effectiveness of placebo treatments for pain was rated from “completely ineffective” to “completely effective.”

**2.3.2. Placebo Acceptability**—Placebo analgesia treatment acceptability was assessed through VAS ratings of six questions: how acceptable would it be if a physician 1) overtly or 2) covertly administered a placebo treatment for pain; 3) how acceptable would it be if a physician used a placebo as a treatment enhancer or an adjunct treatment; is it acceptable for a medical provider to treat pain with placebo for a condition for which there are 4) other established treatments or 5) for a condition in which there are no other established treatments; and 6) is it acceptable for a medical provider to use a placebo to determine if a patient’s pain complaints are “real.” VAS anchors were “completely unacceptable” and “completely acceptable.”

**2.3.3. Deception, Trust, and Negative Mood**—The Treatment Scenarios represented a modified version of a previously published placebo survey [21]. The survey was comprised of six different hypothetical scenarios, each portraying a clinical encounter in which a patient sees a physician for pain management and subsequently receives a placebo. Our sample of chronic pain individuals was asked to review each hypothetical scenario and to respond as if they were the individual receiving the placebo intervention. After viewing each scenario, our participants responded through VAS ratings of the following: 1) deceptiveness of the hypothetical clinical encounter/placebo intervention, 2) their level of trust in the prescribing physician, and 3) the amount of negative mood they would experience if they had received the placebo treatment for their pain.

Two factors varied per scenario: 1) the healthcare provider’s description of the placebo intervention and 2) the outcome/effectiveness of the treatment. Two distinct treatment descriptions were intended to be experimental manipulations of deceptiveness: for the “high deception/enhanced placebo” scenarios, the hypothetical patient in the scenario was informed that they will receive “a treatment that has been shown to be a powerful analgesic in some people”; for the “low deception/random assignment” instructions, the patient in the scenario was informed that they will receive either a “standard drug treatment or a placebo treatment” to manage their pain. Although the “enhanced placebo” description was once proposed to be an ethically acceptable description of a placebo treatment, more recent evidence has shown that it is perceived as highly deceptive [21]. There were three levels for treatment effectiveness/outcome: upon completion of the treatment, our sample of chronic pain individuals read that the placebo intervention either worsened, had no effect, or improved the pain of the patient depicted in the scenario.

## 2.4. Statistical Analyses

**2.4.1. Sample Size**—Power analyses were performed to determine the number of subjects needed to detect sizable effects for deception, healthcare provider trust, negative mood, and placebo acceptability as primary outcomes [16]. Due to the various analyses conducted for the original publications of these surveys, several methods were used to estimate the necessary sample size. Based upon repeated measures analyses of variance (ANOVA)

partial eta squared main effect sizes for deception (.69 and .09) trust in physician (.50 and .46), and negative mood (.43 and .60), and a negative mood interaction effect size (.08) [21], it was estimated that a sample size of 42 patients would be sufficient to detect effects at alpha level 0.05 and power 0.80. Based upon repeated measures ANOVA effects sizes for placebo acceptability contexts (.22, .09, .35 and .28) and one-way ANOVA acceptability subgroups Cohen's *d* effect sizes (.74, .74 and .68) [20], it was estimated that a sample size of 21 patients would be sufficient to detect effects at alpha level 0.05 and power 0.80. The final sample size is based on the most conservative value needed to optimally power the study, plus 20 percent more patients to buffer for potential participant drop out. Thus, based upon previously published placebo acceptability studies, recruitment of 50 pain patients was deemed sufficient to adequately power the study. Seven additional participants completed the study after recruitment ended and were thus included in the final sample.

**2.4.2. Survey Analyses**—Analyses were performed using IBM SPSS version 20 (IBM Inc, Armonk New York). Means and standard deviations were calculated for all VAS outcomes and frequencies were calculated for all categorical outcomes. A one-factor repeated measures ANOVA was conducted for the six placebo acceptability treatment contexts. Three  $2 \times 3$  (treatment instructions  $\times$  treatment outcome) repeated measures ANOVAs were conducted on deception, trust, and negative mood outcomes. Significant omnibus *F* tests were followed by simple contrasts or post hoc comparisons for all ANOVA analyses.

### 3. RESULTS

#### 3.1. Sample Demographics

Sample demographic statistics can be found in Table 1. The ethnic/racial composition of the sample was as follows: 75.4% Caucasian; 7% African American/black; 7% Asian or Pacific Islander; 3.5% Indian; 3.5% Hispanic; and 3.5% "Other". Average annual income for participants was \$31,121 ( $SD = \$41,081$ ), with income ranging from \$0 to \$220,000. Over half the sample had either "some college education" (35.1%) or a college degree (21.1%). Most participants reported their relationship status as married (42.1%) or single (45.6%).

Participants reported having chronic pain for an average of 6.34 years ( $SD = 7.34$ ). The mean VAS rating of current pain intensity was 41.89 ( $SD = 25.84$ ). Several pain diagnoses were endorsed, with many reporting multiple diagnoses: 63.2% endorsed low back pain (LBP), 22.8% endorsed Fibromyalgia, 19.3% endorsed osteoarthritis, and 15.8% endorsed IBS. Many individuals (40.4%) also endorsed additional diagnoses, such as "scoliosis," "herniated disk," "Temporomandibular Joint Disorder (TMJ)," and "unknown."

#### 3.2. Placebo Knowledge, Conceptualization, and Efficacy

All descriptive statistics for survey outcomes are presented in Tables 2 – 4. Descriptive statistics suggest that our sample of chronic pain patients primarily conceptualized placebos as "inert" ( $M = 19.93$ ), endorsed low to moderate knowledge of placebos ( $M = 37.19$ ), and perceived placebos as fairly ineffective for reducing pain ( $M = 18.33$ ) (Table 2).

### 3.3. Placebo Acceptability

Significant differences were found between the six placebo acceptability outcomes, with these contextual factors accounting for 17.5% for the variance in acceptability (Table 4). Ordered from lowest to highest acceptability, they were: 1) deceptive placebo use; 2) use when other established treatments were available; 3) explicit placebo use (i.e., informing patient prior to use); 4) diagnostic use for pain; 5) use as a treatment enhancer; and 6) acceptability when no other treatments were available. Placebo use when no other established treatments were available was significantly more acceptable than deceptive placebo ( $p < .001$ ,  $\eta^2 = .388$ ), explicit placebo ( $p < .001$ ,  $\eta^2 = .185$ ), and placebo when other established treatments were available ( $p < .001$ ,  $\eta^2 = .407$ ). Similarly, placebo as an adjunct treatment/treatment enhancer was more acceptable than deceptive placebo ( $p < .001$ ,  $\eta^2 = .264$ ), explicit placebo ( $p < .001$ ,  $\eta^2 = .174$ ), and placebo used when other established treatments were available ( $p < .001$ ,  $\eta^2 = .276$ ).

### 3.4. Deception, Trust, and Negative Mood

Deceptive/enhanced placebo instructions were rated as highly deceptive ( $p < .001$ ,  $\eta^2 = .544$ ) (Table 5; Figure 1), with participants endorsing the most negative mood ( $p < .001$ ,  $\eta^2 = .421$ ) (Table 5; Figure 3) and least trust in their health care provider ( $p < .001$ ,  $\eta^2 = .378$ ) (Table 5; Figure 2) when responding to these treatment scenarios.

While treatment effectiveness/outcome (i.e., whether pain improves, remains the same, or worsens) had no impact on perceptions of placebo deceptiveness ( $p = .072$ ), treatment outcome had a significant effect on provider attributions (Table 5) as an analgesic treatment response improved trust in the provider ( $p < .001$ ,  $\eta^2 = .123$ ) and greatly reduced negative mood ( $p < .001$ ,  $\eta^2 = .396$ ).

There was a significant outcome x instruction interaction (Table 4; Figure 3). In scenarios depicting random assignment to placebo treatment, participants reported no difference in negative mood between pain improved and no change outcomes. However, when viewing scenarios where deceptive instructions were given, participants reported greater negative mood when pain status was unchanged than when it improved. Additionally, in scenarios where patients received a beneficial treatment response, mood ratings were the same whether they received a deceptive or non-deceptive treatment description.

## 4. DISCUSSION

Substantial evidence highlights the utility of placebo analgesic effects - real, potentially potent events mediated by psychological and neurobiological factors - for reducing pain [12]. Although the mechanisms underlying these effects are acknowledged among those who study placebo factors, it is unlikely that this knowledge has disseminated to the lay public [20]. To date, relatively few studies have addressed the patients' perspectives regarding interventional placebo use. The overarching goal of this line of scientific inquiry was to use an empirical, patient-centered approach to answer essential questions about placebo treatment acceptability. The aims of the present study were to investigate chronic pain patients' knowledge of and attitudes towards the clinical use of placebos using a validated survey methodology. Specifically, we sought to explore the role of deception and



treatment efficacy on placebo treatment attributions, as well as examine the role of contextual factors in determining placebo acceptability. Our results illustrated that knowledge of placebos and their efficacy for reducing pain was relatively low among those suffering from chronic musculoskeletal pain. However, individuals with chronic pain were rather pragmatic in their appraisals of placebo acceptability, as receiving a placebo analgesic response attenuated negative mood and improved trust in the prescribing provider. Additionally, the context within which the placebo was used played an important role in influencing the acceptability of a placebo intervention for pain. These findings mirror the results of previous investigations of placebo acceptability in pain-free individuals.

#### 4.1. Deception

It was hypothesized that placebo interventions that were non-deceptive and effective for relieving pain would be perceived as less deceptive, and individuals with chronic pain would endorse decreased negative mood and greater trust in the prescribing clinician. Comparable to findings observed in studies with non-clinical samples [21], the deceptiveness of a placebo treatment was exclusively determined by the overtness of the treatment instructions, accounting for over half the variance in treatment deceptiveness ( $\eta^2 = .544$ ). The enhanced placebo instructions, once proposed as an ethically acceptable description of a placebo treatment [33,41,42], were rated as highly deceptive, a finding coinciding with recent evidence [21]. Conversely, “random assignment” descriptions – where there was an explicit possibility of receiving a placebo intervention – were rated as relatively non-deceptive. Although in our previous survey research there was a marginal effect of treatment outcome on deception, in this study a beneficial treatment response had no impact on perceptions of treatment deception ( $p = .072$ ,  $\eta^2 = .046$ ). These findings suggest that the description of the placebo intervention is important to patients, and unless it is explicitly stated, they may feel misled, even if the treatment works.

#### 4.2. Trust and Negative Mood

Patient negative mood and trust in the prescribing clinician were both influenced by treatment deception/description and treatment outcome, supporting our hypotheses, with trust more influenced by the treatment deception/description ( $\eta^2 = .378$ ) than its efficacy ( $\eta^2 = .123$ ). Specifically, trust ratings were predominantly determined by the non-deceptive description and pain worsening status; there were no differences between no change and pain improved treatment outcomes. On the other hand, negative mood was strongly and approximately equally influenced by treatment instructions ( $\eta^2 = .421$ ) and outcome ( $\eta^2 = .429$ ), with graded increases in negative mood observed when participants received the “enhanced placebo” instructions and as intervention outcomes worsened. The interaction of these two factors suggest that patients would be much more upset if their pain remained unchanged following a deceptive placebo treatment, as opposed to when randomly assigned to treatment. Overall, these findings suggest that patients are rather practical when making appraisals of placebo treatments – put simply, as long as it alleviates pain, then the intervention is tolerable, even if the treatment description is misleading.

### 4.3. Placebo Acceptability

Consistent with findings from previous studies, the acceptability of a placebo treatment for pain was highly dependent on the context in which it is delivered [20], with contextual factors accounted for nearly 18% of the variability in placebo acceptability. Deceptive placebo administration and placebo use when other established treatments were available were viewed as most unacceptable treatment scenarios. In contrast, placebos were most acceptable when there were no other well-established treatments available and when placebo was used as a treatment enhancer/adjunct. It was unexpected that placebo use to “determine if a patients’ pain is real” was considered as relatively acceptable, as diagnostic placebo use is one area in which informed researchers and clinicians can reasonably agree constitutes an unethical and unacceptable practice [38]. Another unexpected finding was that overt, yet non-deceptive use of placebo was perceived as relatively unacceptable by our sample. We believe these finding serve as corroborative evidence that, although placebo use may be relatively acceptable under certain circumstances, lay knowledge of placebo mechanisms is likely rudimentary and largely uninformed by extant empirical evidence.

### 4.4. Implications

More research is greatly needed to determine how to best use our understanding of placebo mechanisms to augment existing pain management practices. While the focus of the present investigation was the application of placebos in pain management, it is important to note that there are other ways to utilize the benefits of placebo mechanisms without actual placebos through enhancing provider-patient communication [9]. However, we feel that these results have important implications for our understanding of placebo acceptability, particularly in light of how frequently placebos treatments are used by healthcare providers today [15]. The findings suggest that, independent of effect sizes, individuals suffering from pain conditions bereft of well-established treatments may find placebo as a satisfactory alternative treatment. Also, placebo interventions were most acceptable when used to complement established pain treatments to improve overall therapeutic efficacy. This is a promising finding, as it implies that “dose extender” placebo use may be an acceptable application for treating pain. Although dose extending models have not been demonstrated for the treatment of pain, placebos have been used in this manner to treat both psoriasis [1] and attention deficit disorder [36]. It is also very important to consider the findings within the context that our sample’s understanding of placebo. Subjects endorsed relatively low knowledge of placebo effects and found them to have marginal efficacy for reducing pain. Research is greatly needed to determine what role education may play in placebo treatment acceptability. Specifically, we would hypothesize that an education intervention addressing the neurobiological mechanisms (e.g., activation in pain reducing areas of the brain, release of endogenous opioids and cannabinoids) and psychological mechanisms (e.g., expectancy, classical conditioning, reduced negative emotions, observational learning) underlying placebos would greatly enhance perceptions of placebo acceptably.

### 4.5. Limitations

Several limitations to this study should be considered when interpreting the findings. These findings are from a chronic musculoskeletal pain population and may not generalize to



individuals suffering from acute pain or chronic pain from a different etiology. Additionally, individuals without knowledge of or access to the Internet (e.g. some elderly adults, those with limited financial resources) could not participate in this study, perhaps limiting the generalizability of the findings. While deception was successfully manipulated through two distinct treatment instructions, the “random assignment” instructions may not be representative of typical clinical encounter. Although random treatment assignment is common in the clinical trial setting, this is largely non-existent in typical medical encounters. Future iterations studies should substitute random assignment instructions with instructions that are equally non-deceptive and clinically applicable. More research is necessary to elucidate the magnitude and duration of placebo analgesic effects before they can be systemically applied in clinical practice. Finally, the authors acknowledge that it may be difficult to interpret the responses of participants who reported having absolutely no knowledge of placebo (i.e. zero on a 0–100 VAS). However, this only occurred for three participants, and since all participants were informed in study advertisements, during screening, and through informed consent that they would have to answer questions regarding placebo, it is assumed that they had some base knowledge. We elected to keep these participants in the final analyses since their exclusion still produced identical results.

#### 4.6. Conclusions

The present investigation represents a meaningful addition to the placebo acceptability literature. Using an established survey methodology, we were able to assess the important role of medical treatment context in determining placebo acceptability, as well as examine the importance of treatment effectiveness and deception on mood and relationship with healthcare providers. Patients’ knowledge of placebo effects was limited, and more research is needed to investigate the role of education in placebo acceptability. We believe that this line of research will contribute to a fruitful discussion of placebo ethics, and will extend knowledge of placebo benefits to chronic pain patients and clinicians with the goal of improving existing pain management practices.

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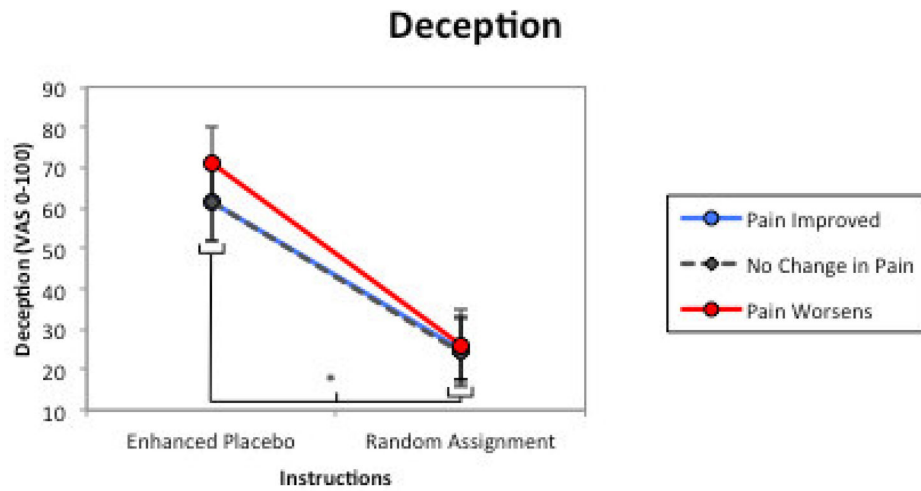
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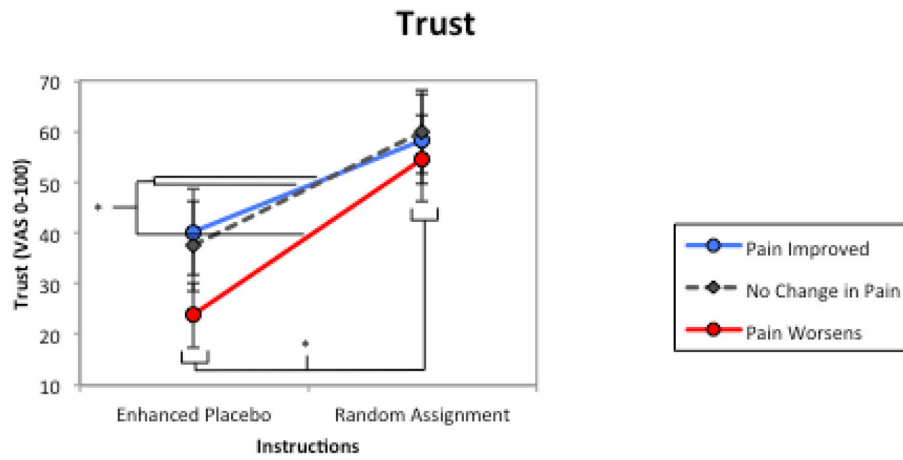
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### Summary

Patients with chronic musculoskeletal pain have a limited understanding of placebo mechanisms, but may consider placebos an acceptable treatment for pain under certain medical contexts.

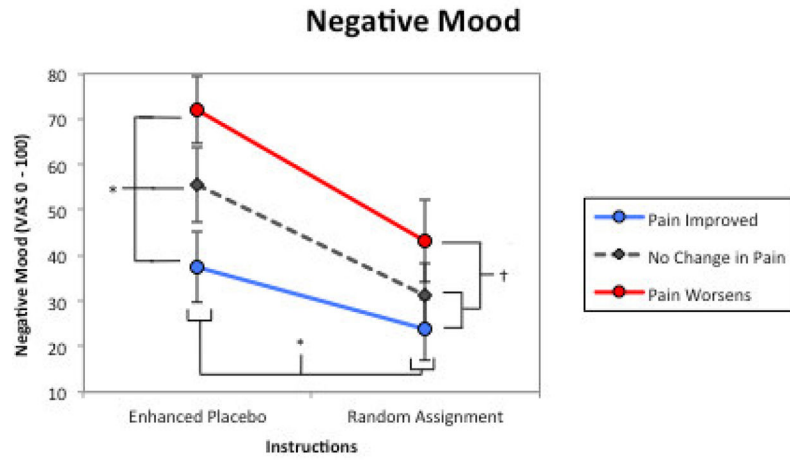


**Figure 1.** Deception. The influence of treatment descriptions/instructions and treatment outcomes on appraisal of treatment deceptiveness in six hypothetical placebo intervention scenarios. There was a significant main effect of treatment outcome but not treatment instructions. \* = significant main effect ( $p < .05$ ); error bars are 95% confidence intervals.



**Figure 2.** Trust. The influence of treatment descriptions/instructions and treatment outcomes on participants' trust in their healthcare provider in six hypothetical placebo intervention scenarios. There was significant main effect for treatment instructions and treatment outcomes. \* = significant main effect ( $p < .05$ ); error bars are 95% confidence intervals.





**Figure 3.** Negative Mood. The influence of treatment descriptions/instructions and treatment outcomes on participants' negative mood in six hypothetical placebo intervention scenarios. There was significant main effect for treatment instructions and treatment outcomes, and a significant instructions x outcome interaction. \* = significant main effect ( $p < .05$ ); † = significant main interaction ( $p < .05$ ) error bars are 95% confidence intervals.

**Table 1**Participant demographics and chronic pain characteristics ( $n = 57$ )

Demographics/Characteristic	<i>M(SD)</i>	Percentage
Age (years)	45.12 (19.16)	-
Income (\$ thousands)	31 (41)	-
Sex		
Female	-	70%
Male	-	30%
Ethnicity		
Caucasian	-	75.4%
African American/black	-	7%
Indian	-	3.5%
Hispanic	-	3.5%
Asian or Pacific Islander	-	7%
Other	-	3.5%
Education		
No high School Education	-	1.8%
High School Diploma/GED	-	12.3%
Some College Education	-	35.1%
College Degree	-	21.1%
Some Graduate Education	-	7.0%
Graduate School Degree	-	22.8%
Marital Status		
Single	-	45.6%
Living With Partner	-	7%
Married	-	42.1%
Divorced	-	3.5%
Separated	-	1.8%
Current Pain Intensity (VAS 0 = “no pain”; 100 = “worst pain imaginable”)	41.89 (25.84)	-
Usual Pain Intensity (VAS 0 = “no pain”; 100 = “worst pain imaginable”)	51.18 (23.85)	-
Years experiencing chronic pain	6.34 (7.34)	-
Participants who uses OTC meds for pain	-	66.7%
Participants who use prescription meds for pain	-	35.1%
Participants who use “commentary and alternative” treatments for pain	-	36.8%
Current Pain Intensity (VAS 0 = “no pain”; 100 = “worst pain imaginable”)	41.89 (25.84)	-
Diagnoses endorsed by participants		
Low back pain	-	63.2%
Fibromyalgia	-	28.1%
Osteoarthritis	-	19.3%
Irritable Bowel Disease	-	15.8%
Other	-	40.4%

Note: VAS, Visual Analogue Scale; *M*, mean; *SD*, Standard Deviation, *n*, sample size; %, percentage; GED, General Educational Development Certificate of High School Equivalency.

Table 2

## Placebo analgesia knowledge, effectiveness, and acceptability

Survey Questions	VAS Anchors (0 – 100)	Abbreviation	M (SD)
Placebo Conceptualization/Knowledge			
Overall, is a placebo something “inert/incapable of producing an effect” or something “active/capable of producing an effect?”	Completely inert; Completely active	Placebo Conceptualization	19.93 (24.73)
How much knowledge do you have about placebo for pain relief?	No knowledge of placebo for pain relief; Most knowledge of placebo for pain relief imaginable	Placebo Knowledge	37.19 (33.17)
Placebo Effectiveness			
How effective would placebo be for your pain?	Completely ineffective; Completely effective	Placebo Effectiveness	18.33 (18.82)
Placebo Acceptability			
How acceptable would it be if your physician used a placebo treatment to reduce your pain without telling you?	Completely unacceptable; Completely acceptable	Deceptive Placebo Acceptability	18.05 (23.79)
How acceptable would it be if your physician told you that he/she was going to use a placebo treatment to reduce your pain?	Completely unacceptable; Completely acceptable	Explicit Placebo Acceptability	29.46 (33.01)
How acceptable would it be if your physician told you that he/she was going to use a placebo treatment that may enhance the effectiveness of your usual pain treatments?	Completely unacceptable; Completely acceptable	Treatment Enhancer Placebo Acceptability	41.93 (34.36)
How acceptable would it be if your physician treated your pain with placebo when other established treatments were available?	Completely unacceptable; Completely acceptable	Placebo Acceptability when other EBTs are available	20.28 (23.76)
How acceptable would it be if your physician treated pain with placebo when NO other established treatments were available?	Completely unacceptable; Completely acceptable	Placebo Acceptability when NO other EBTs are available	48.21 (39.41)
How acceptable would it be if your physician used a placebo to see if your pain is “real”?	Completely unacceptable; Completely acceptable	Diagnostic Placebo Acceptability	36.26 (36.81)

Note: *M*, mean; *SD*, standard deviation.

Table 3

Treatment scenarios dependent variables: deception, trust, and negative mood (VAS 0 – 100)

Survey Treatment Scenarios	<i>M (SD)</i>			Rate the level of negative mood you would experience
	How deceptive would this be?	Rate your level of trust in this physician	Rate the level of negative mood you would experience	
Imagine that you are seeing a physician to manage your pain. The doctor provides you with a prescription for your pain, and states that what you have been given has been shown to be a powerful pain reliever in some people. Two weeks after the treatment, you report that your condition has improved. You received a placebo.	61.70 (32.83)	40.25 (32.13)	37.53 (29.39)	
Enhanced placebo instructions used and pain improves				
Imagine that you are seeing a physician to manage your pain. The doctor provides you with a prescription for your pain, and states that what you have been given has been shown to be a powerful pain reliever in some people. Two weeks after the treatment, you report that there is no change in your condition. You received a placebo.	61.42 (36.91)	37.42 (33.54)	55.56 (30.99)	
Enhanced placebo instructions used and pain is unchanged				
Imagine that you are seeing a physician to manage your pain. The doctor provides you with a prescription for your pain, and states that what you have been given has been shown to be a powerful pain reliever in some people. Two weeks after the treatment, you report that your condition has gotten worse. You received a placebo.	71.09 (33.31)	23.84 (24.25)	72.14 (28.16)	
Enhanced placebo instructions used and pain worsens				
Imagine that you are seeing a physician to manage your pain. The doctor tells you that you will randomly receive either a standard drug treatment or a placebo treatment for your pain. Two weeks after the treatment, you report that your condition has improved. You received a placebo.	24.98 (31.96)	58.44 (32.44)	23.79 (25.70)	
Randomly assigned and pain improved				
Imagine that you are seeing a physician to manage your pain. The doctor tells you that you are going to randomly receive either a standard drug treatment or a placebo treatment for your pain. Two weeks after the treatment, you report that there is no change in your condition. You received a placebo.	24.30 (31.96)	59.86 (30.69)	31.25 (26.94)	
Randomly assigned and pain is unchanged				
Imagine that you are seeing a physician to manage your pain. The doctor tells you that you will randomly receive either a standard drug treatment or a placebo treatment for your pain. Two weeks after the treatment, you report that your condition has gotten worse. You received a placebo.	26.19 (26.19)	54.70 (54.70)	43.16 (33.76)	
Randomly assigned and pain worsens				

Note: *M*, Mean; *SD*, Standard Deviation; Deception VAS anchors = “Not at all deceptive” – “Completely deceptive”; Trust VAS anchors = “No trust” – “Most trust imaginable”; Negative mood VAS anchors = “No negative mood” – “Most negative mood imaginable.”

**Table 4**

## Placebo acceptability one-factor ANOVA

Main effect x Contrasts	<i>P</i>	ES ( $\eta p^2$ )
Acceptability Contexts	<.001**	.175
Deceptive Placebo - Explicit Placebo	.039*	.074
Deceptive Placebo < Treatment Enhancer	<.001**	.264
Deceptive Placebo – When other EBTs are available	.514	.008
Deceptive Placebo < when NO other EBTs are available	<.001**	.388
Deceptive Placebo < Diagnostic Placebo	<.001**	.223
Explicit Placebo < Treatment Enhancer	.001*	.174
Explicit Placebo – when other EBTs are available	.026*	.085
Explicit Placebo < when NO other EBTs are available	.001*	.185
Explicit Placebo – Diagnostic Placebo	.273	.021
Treatment Enhancer > When other EBTs are available	<.001**	.276
Treatment Enhancer – when NO other EBTs are available	.182	.032
Treatment Enhancer – Diagnostic Placebo	.332	.017
When other EBTs are available < when NO other EBTs are available	<.001**	.407
When other EBTs are available - Diagnostic Placebo	.002*	.160
When NO other EBTs are available – Diagnostic Placebo	.036*	.076

Note: *P*, p-value; ES ( $\eta p^2$ ), partial eta squared effect size;

\* Indicates significant difference ( $p < .05$ );

\*\* Indicates significant difference ( $p < .001$ ).

**Table 5**

Deception, trust, and negative mood repeated measures (2 × 3) ANOVAs

Factors/Contrast	<i>F</i>	<i>P</i>	ES
Deception			
Instructions	F(1, 56) = 66.85	<.001 **	$\eta^2 = .544$
Enhanced placebo > RA	-	<.001 **	$\eta^2 = .544$
Tx Outcome	F(2, 112) = 2.69	.072	$\eta^2 = .046$
Instruction x Tx Outcome	F(2, 122) = 1.36	.260	$\eta^2 = .024$
Trust in Healthcare Provider			
Instructions	F(1, 56) = 33.97	<.001 **	$\eta^2 = .378$
RA > Enhanced placebo	-	<.001 **	$\eta^2 = .378$
Tx Outcome	F(2, 112) = 7.86	.001 *	$\eta^2 = .123$
Improves > Worsens	-	.001 *	$\eta^2 = .180$
No Change > Worsens	-	<.001 **	$\eta^2 = .204$
Improves – No Change	-	.823	$\eta^2 = .001$
Instructions x Tx Outcome	F(1.71, 95.81) = 2.93	.066	$\eta^2 = .050$
Negative Mood			
Instructions	F(1, 56) = 40.80	<.001 **	$\eta^2 = .421$
Enhanced placebo > RA	-	<.001 **	$\eta^2 = .421$
Tx Outcome	F(2, 112) = 42.08	<.001 **	$\eta^2 = .429$
Worsens > Improves	-	<.001 **	$\eta^2 = .546$
Worsens > No Change	-	<.001 **	$\eta^2 = .324$
No Change > Improves	-	<.001 **	$\eta^2 = .275$
Instructions x Tx Outcome	F(2, 112) = 3.27	.042	$\eta^2 = .055$
Enhanced Placebo			
Improves < No Change	-	<.001 **	<i>d</i> = .602
Improves < Worsens	-	<.001 **	<i>d</i> = 1.213
No Change < Worsens	-	.001 *	<i>d</i> = .564
Random Assignment			
Improves – No Change	-	.190	<i>d</i> = .286
Improves < Worsens	-	<.001 **	<i>d</i> = .651
No Change < Worsens	-	.014 *	<i>d</i> = .393
Pain Improves			
Enhanced Placebo > RA	-	.006 *	<i>d</i> = .502
No Change in Pain			
Enhanced Placebo > RA	-	<.001 **	<i>d</i> = .845
Pain Worsens			
Enhanced Placebo > RA	-	<.001 **	<i>d</i> = .629



Note: RA, Random assignment instructions;  $F$ ,  $F$  statistics;  $P$ ,  $p$  value;  $\eta^2$ , partial eta squared effects size;  $d$  = Cohen's  $d$  effect size;

\* Indicates significant deviation ( $p < .05$ );

\*\* Indicates significant deviation ( $p < .001$ ).