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Changes in identification of possible pain coping strategies by people with osteoarthritis who complete web-based pain coping skills training

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Abstract

Background: We previously demonstrated that automated, web-based pain coping skills training (PCST) can reduce osteoarthritis pain. The present secondary analyses examined whether this program also changed coping strategies participants identified for use in hypothetical pain-related situations.

Methods: People with hip/knee osteoarthritis ($n=107$) were randomized to web-based PCST or standard care control. At baseline and post-intervention they reported their pain severity and impairment, then completed a task in which they described how they would cope with pain in four hypothetical pain-related situations, also reporting their perceived risk for pain and self-efficacy for managing it. We coded the generated coping strategies into counts of adaptive behavioral, maladaptive behavioral, adaptive cognitive, and discrete adaptive coping strategies (coping repertoire).

Results: Compared to the control arm, web-based PCST decreased the number of maladaptive behavioral strategies generated ($p=0.002$) while increasing the number of adaptive behavioral strategies generated ($p=0.006$), likelihood of generating at least one adaptive cognitive strategy ($p=0.01$), and the size of participants' coping repertoire ($p=0.009$). Several of these changes were associated with changes in pain outcomes ($ps=0.01$ to 0.65). Web-based PCST also reduced perceived risk for pain in the situations ($p=0.03$) and increased self-efficacy for avoiding pain in similar situations ($p<0.001$).

Conclusions: Salutary changes found in this study appear to reflect intervention-concordant learning.

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Keywords

pain coping skills; osteoarthritis; web-based; cognitive behavioral therapy; chronic pain; musculoskeletal pain

Osteoarthritis (OA) is one of the most common and disabling chronic conditions in the United States [1–3]. It most often affects hip and knee joints, where it causes a particularly high burden of pain and disability [3]. There is a pressing need for evidence-based pain interventions for people with hip or knee OA, including psychological pain interventions that help address the complex biopsychosocial causes of OA pain and impairment [4, 5]. Ideally, these interventions should be easy to access and cost-effective to disseminate so they can reach the largest possible proportion of the millions of affected people.

Pain coping skills training (PCST) can reduce pain and impairment related to OA and other conditions [6–9]. It seeks to increase people's use of adaptive cognitive and behavioral pain coping strategies and to reduce their use of maladaptive coping strategies known to increase pain and impairment. For instance, relaxation techniques can mitigate pain due to stressful situations, and cognitive coping skills help people identify and reduce pain catastrophizing—a tendency to focus on and ruminate about pain and to feel helpless in dealing with it [10]—by replacing maladaptive thoughts with more helpful coping thoughts. Education and training in these and other skills help people build and master a repertoire of adaptive coping strategies.

It is also likely that PCST will help people feel more confident in their ability to manage pain, both because using adaptive pain coping strategies reduces their pain and impairment and because they learn to consider all the skills available to them, to select the best skills for a given situation, and to try a different skill if initial efforts are unsuccessful. This confidence or “self-efficacy” [11, 12] for managing pain predicts beneficial physical and psychological outcomes of PCST and similar interventions, including better pain management, higher pain tolerance, and reduced perception of pain [13–16]. A meta-analysis of studies of people with chronic pain [17] found that greater self-efficacy was consistently associated with lower pain, pain-related impairment, and distress in a variety of pain conditions.

Consistent with growing evidence supporting the efficacy of web-based psychological pain interventions [18–20], we conducted a randomized controlled trial [21] to evaluate effects of PCST delivered in a web-based program that uses interactivity and tailoring to mimic critical therapeutic elements of in-person training while eliminating the involvement of trained therapists (i.e., the program is “automated” or “self-guided” [22, 23]). Compared with standard care, completing our 8-session program over 8 to 10 weeks reduced pain (Cohen's $d=.33$) in women (with no effect in men, most likely due to their low pain at study entry) and an increase in self-efficacy for managing pain in men and women. Acceptability was high: 91% of participants completed all of the program's eight training sessions.

Secondary goals of our trial were to investigate whether web-based PCST helped participants learn to apply more adaptive, and fewer maladaptive, pain coping strategies

in situations likely to increase their OA pain, and whether it helped them build a larger repertoire of adaptive pain coping strategies. We also investigated whether these changes were associated with changes in pain and pain-related impairment. To address these goals, we adapted a novel research method that systematically assesses intervention-concordant changes in coping strategies people can generate and consider using in high-risk situations similar to those they may encounter in everyday life [24–26]. For example, before and after a behavioral weight control program [25], the investigators presented overweight people with Type II diabetes with hypothetical situations that could put them at risk for overeating and asked them to describe what they would think or do to keep from overeating in each situation. The intervention increased the number of behavioral coping strategies participants said they would use. Participants who generated coping responses for a greater number of the hypothetical situations lost more weight, suggesting that observed changes reflected real behavioral changes.

We adapted this method for a trial in which we randomly assigned people with hip or knee OA to complete web-based PCST or standard care [21]. At baseline and post-intervention, participants described coping strategies they would use in four hypothetical situations representing important or valued events likely to exacerbate OA pain. We investigated the pain coping strategies they generated across the situations and asked them report their perceived risk for pain in each situation, self-efficacy for enacting the coping strategies they generated in the situation, and self-efficacy for avoiding pain in similar situations. We hypothesized that participants who completed web-based PCST, compared to control group participants, would demonstrate a greater increase in the number of adaptive behavioral pain coping strategies generated; a greater decrease in the number of maladaptive behavioral pain coping strategies generated; a greater increase in the number of adaptive cognitive pain coping strategies generated; a greater increase in distinct types of adaptive pain coping strategies generated (i.e., a larger *coping repertoire*); a greater decrease in perceived risk for pain; and greater increases in the two types of self-efficacy.

We also examined whether participants' post-intervention scores for each pain coping category were associated with their post-intervention pain severity and impairment. We hypothesized that generating fewer maladaptive behavioral pain coping strategies, a greater number of adaptive behavioral and cognitive pain coping strategies, and a larger coping repertoire would be associated with lower post-intervention pain severity and impairment.

Method

Participants

Participants were enrolled in a randomized controlled trial comparing web-based PCST to a standard care control condition; all details of that trial are described in a prior publication [21]. We recruited participants from the University of North Carolina at Chapel Hill's (UNC) Johnston County Osteoarthritis Project [27] and from Duke University Medical Center (DUMC) using medical or research records or participant referrals. Participants had to be English-speaking adults (≥ 18 years old) with medically confirmed knee or hip OA (confirmed either radiographically using American College of Rheumatology clinical criteria [28, 29], with pain in the affected joint, or by their physician). They had to

have OA pain on most days for the prior three months. Exclusion criteria included significant cognitive impairment [30], <7th grade reading proficiency [31], a medical condition that precluded intervention completion (e.g., significant uncorrectable hearing or vision deficits), or a pain-related medical condition in addition to OA (e.g., fibromyalgia, rheumatoid arthritis). Of 113 participants, 107 completed the challenging situation task at both assessments and were included in the present sample. The remaining 6 participants could not be scheduled for a post-intervention appointment (n=3), were lost to follow-up during the study (n=2), or were withdrawn from the study due to serious illness (n=1). The flow diagram is shown in the paper describing the trial [21].

Procedures

Hypothetical challenging situation task.—The scenarios for this task were informed by studies using this research method and applied our study team’s substantial expertise in chronic pain in OA, events that commonly occur in people with osteoarthritis and that present a range of pain-related challenges, and optimal use of pain coping skills to overcome these common events. Our goals were to develop scenarios that people with OA could imagine themselves facing (i.e., the situations were relatable) and that would, taken together, elicit the full range of pain coping skills taught in our program. We used an iterative, expert consensus approach to achieve these goals.

Eligible individuals attended an in-person baseline visit at which they completed informed consent procedures and a baseline questionnaire before beginning this task. Using scripted procedures, the interviewer explained to participants that she would read descriptions of situations that could cause their arthritis pain to act up and then ask questions about how they thought they would react to each one. Participants were instructed to try to imagine what it would be like if the situation happened to them and how they would react to it. The task began with two practice situations, one involving heating up food in a pot and being burned by the hot pot and the other involving a friend calling with an invitation to go shopping; this scenario described substantial walking and a past experience in which shopping with this friend had exacerbated their arthritis pain and led to a day in bed. Next, the interviewer started the real task by presenting, in counterbalanced order, four situations designed to represent important or valued situations that are relatively common and that could exacerbate pain (see Table 1). For each situation, she read a description of it, prompted participant responses (“In two minutes, tell me as many things as you can that you would think or do to minimize the pain from this [situation]”), then started a timer. If participants verbally or non-verbally signaled they were done before two minutes were up, she asked, “is there anything else?” After two minutes, she stopped the timer and assessed perceived risk and self-efficacy. Participant responses were audio recorded.

General intervention procedures.—After the task, the interviewer randomized participants and provided instructions appropriate to their assigned study arm. Participants completing web-based PCST were loaned a tablet computer and the interviewer showed them how to access the program, which they completed at home over 8–10 weeks. The program is detailed elsewhere [21, 23]. Briefly, it includes eight 35–45 minute sessions providing interactive, experiential training in cognitive and behavioral pain coping skills

(progressive muscle relaxation, brief relaxation skills, activity-rest cycling, pleasant activity scheduling, coping thoughts, pleasant imagery), problem solving, and maintenance of skill use. The importance of skill practice is emphasized and reinforced. Control group participants completed study visits and questionnaires on the same schedule as participants in the web-based PCST arm. After the intervention period, participants attended an in-person visit with an interviewer who was blind to their study arm. They completed a post-intervention questionnaire and repeated the hypothetical challenging situation task. The institutional review boards at UNC and DUMC approved all procedures.

Measures

Sociodemographics: Sociodemographics were self-reported at baseline and included participant age, sex, race, ethnicity, marital/partner status, employment status, education, and income.

Measures collected in the hypothetical challenging situation task

Pain coping strategies.: Co-authors AK and AN conducted a content analysis on transcribed participant responses to the task. They double-coded 10% of the transcripts, resolving disagreements with the lead author (CR), and then finalized the codebook. The remaining transcripts were then randomly assigned to AK or AN for independent coding. The coders were able to consult each other if issues arose, and CR resolved disagreements. They first coded generated pain coping strategies as behavioral (overt actions undertaken to manage, prevent, or avoid pain or its effects) or cognitive (unobservable mental processes intended to change perceptions, perspectives, or thoughts about pain or its effects) [24, 25, 32, 33]. To enable creation of variables for analyses, they further categorized behavioral strategies as attempts to relax, activity pacing, scheduling and/or engaging in pleasant activities, using pain medications, or refusing to do activities to avoid pain. Similarly, they further categorized cognitive strategies as use of distraction and use of positive thoughts. No strategy was coded as both behavioral and cognitive, and elaborations or repetitions of a coping strategy were not counted.

Because we were interested in pain coping strategies generated across situations rather than in any one situation, we summed the number of times a participant identified a strategy in four categories of interest (see Table 2) across the four situations. Adaptive strategies were those taught in PCST. They included *adaptive behavioral pain coping strategies* (relaxation, pacing physical activities to avoid overexertion, and scheduling/engaging in pleasant activities) and *adaptive cognitive pain coping strategies* (distraction techniques and identifying catastrophizing thoughts and changing them using positive “coping thoughts”). Emotional or cognitive *responses* to pain were not coded. *Maladaptive behavioral pain coping strategies* included two that are common and, when overused, can cause physical or psychosocial problems: increasing use of pain medications or avoiding pain by refusing to do activities. We did not code *maladaptive cognitive pain coping strategies* (e.g., catastrophizing) because participants are unlikely to generate them as coping strategies. Scores ranged from zero (no strategy in the category generated in any of the four situations) to an unspecified high score (the number of times a strategy in the category was generated, summed across the four situations). To characterize the size of participants’ *coping*

repertoire, we counted how many of the five adaptive pain coping strategies (relaxation, activity pacing, pleasant activity, distraction, coping thoughts) they generated across the four situations (0=*none mentioned* to 5=*all five mentioned*).

Perceived risk for pain: Perceived risk for pain was assessed with one item developed for this study, asked after each hypothetical challenging situation: “How likely is it that this situation would cause you to experience a lot of arthritis pain?” Responses (1=*slightly likely* to 4=*extremely likely*) were averaged across the four situations to create a perceived risk score (Cronbach’s $\alpha_{\text{baseline}}=0.82$, Cronbach’s $\alpha_{\text{post-intervention}}=0.88$).

Self-efficacy: Self-efficacy was assessed with two items based on Lorig’s self-efficacy measure [34, 35]: “How confident are you that you could think or do the things you mentioned to control your arthritis pain in this situation?” and “How confident are you that you can avoid having a lot of arthritis pain in situations like this?” Responses (0=*cannot do at all* to 100=*highly certain can do*) were averaged across the four situations to create one score indicating self-efficacy for enacting coping strategies in the task’s situations (Cronbach’s $\alpha_{\text{baseline}}=0.75$, Cronbach’s $\alpha_{\text{post-intervention}}=0.86$) and another indicating self-efficacy for avoiding pain in similar situations (Cronbach’s $\alpha_{\text{baseline}}=0.76$, Cronbach’s $\alpha_{\text{post-intervention}}=0.85$).

Pain outcomes assessed in the randomized controlled trial

Pain outcomes: Pain outcomes in the randomized controlled trial were assessed with the Arthritis Impact Measurement Scale 2 (AIMS2) [36]. *Pain severity* in the past month used the 5-item arthritis pain subscale. Respondents report the severity of their usual arthritis pain (1=*severe* to 5=*none*) and the frequency of severe pain, pain in two or more joints at the same time, morning stiffness lasting more than one hour after waking, and difficulty sleeping due to pain (1=*no days* to 5=*all days*). Using standard scoring, we reverse coded the usual pain rating then summed and normalized the responses. Scores range from 0–10, with higher scores indicating more severe pain (Cronbach’s $\alpha_{\text{baseline}}=0.73$ and $\alpha_{\text{post-intervention}}=0.77$). *Pain-related impairment* in the past month used four AIMS2 subscales: mobility level (5 items), walking and bending (5 items), self-care (4 items), and household tasks (4 items). Responses (1=*no days/never* to 5=*all days/always*) were reverse coded, when necessary, then summed and normalized. Scores range from 0–10, with higher scores indicating greater impairment (Cronbach’s $\alpha_{\text{baseline}}=0.84$ and $\alpha_{\text{post-intervention}}=0.86$).

Analytic strategy

We tested hypotheses by regressing each post-intervention pain coping strategy variable on its corresponding baseline variable and a dummy-coded variable indicating participants’ assigned group (1=*Web-based PCST*, 0=*Control*). We used Poisson regression to analyze changes in counts of adaptive and maladaptive behavioral pain coping strategies and coping repertoire size. Because most participants (81% at Baseline, 72% at Post-Intervention) did not generate any adaptive cognitive coping strategies, we dichotomized this variable (1=*generated at least one*, 0=*none generated*) and evaluated change with a logistic regression model. For hypotheses concerning perceived risk and self-efficacy, we conducted linear

regression analyses using an analogous approach. Finally, we computed change scores for pain outcome and coping strategy category variables by subtracting baseline scores from post-intervention scores, so that positive scores indicated an increase in a given variable. We then conducted two sets of two multiple regression analyses, each controlling for participants' assigned group. First, we regressed change scores for pain intensity on change scores for the three variables representing change in specific types of coping responses (adaptive behavioral, adaptive cognitive, and maladaptive behavioral). Second, we regressed change scores for pain intensity on change scores for coping repertoire (using a separate model to reduce potential for multicollinearity, because this variable encompassed change in the three other coping strategy variables). We conducted an analogous set of analyses to predict change in pain-related impairment.

Results

Descriptive analyses

Participants were 42–90 years old ($M=67.86$; $SD=8.90$). Most were women (81%; $n=87$), married/partnered (64%; $n=68$), had less than a 4-year college education (63%; $n=67$), and were not working for pay (79%; $n=85$). Sixty-nine percent ($n=74$) identified as Non-Hispanic White. The median income was \$30,000–\$44,999. Fifty-six participants (52%) were randomized to web-based PCST (comparable to 51% in the parent trial [21]) and 51 (48%) were randomized to the control group. These groups did not differ at baseline on sociodemographic or medical characteristics, pain severity, impairment, scores for the four categories of pain coping strategies (see Table 3), perceived risk, or the two types of self-efficacy (all $ps>.10$).

Hypothesis tests

Adaptive behavioral coping strategies.—Findings revealed a significant omnibus model ($p<.001$) and an effect of group ($B=0.34$; 95% CI=0.10, 0.58; SE of $B=0.12$, $p=0.006$); the web-based PCST group demonstrated a greater increase in the number of adaptive behavioral pain coping strategies generated at post-intervention (estimated marginal $M=2.86$, SE=0.23, 95% CI=2.45, 3.34) than the control group (estimated marginal $M=2.04$, SE=0.20, 95% CI=1.68, 2.46).

Maladaptive behavioral coping strategies.—Findings revealed a significant omnibus model ($p<.001$) and an effect of group ($B=-0.38$; 95% CI=-0.62, -0.14; SE of $B=0.12$, $p=0.002$); the web-based PCST group demonstrated a decrease in the number of maladaptive behavioral pain coping strategies generated at post-intervention (estimated marginal $M=1.98$, SE=0.19, 95% CI=1.64, 2.38) than the control group (estimated marginal $M=2.89$, SE=0.24, 95% CI=2.46, 3.40).

Adaptive cognitive coping strategies.—Findings revealed a significant omnibus model ($p=.002$) and an effect of group ($OR=3.43$, 95% CI=1.32, 8.85; $p=0.01$); participants who completed web-based PCST were more likely than those in the control condition to identify at least one adaptive cognitive coping strategy at post-intervention, controlling for whether they identified at least one at baseline.

Coping repertoire.—Findings revealed a significant omnibus model ($p<.001$) and an effect of group ($B=0.45$; 95% CI=0.11, 0.78; SE of $B=0.17$, $p=0.009$); the web-based PCST group demonstrated greater growth in their coping repertoire at post-intervention (estimated marginal $M=1.67$, SE=0.17, 95% CI=1.36, 2.05) than the control group (estimated marginal $M=1.07$, SE=0.15, 95% CI=0.82, 1.40).

Perceived risk for pain in the hypothetical challenging situations.—This linear regression model was significant, $F(2,104)=31.67$, $p<.001$, and revealed greater reduction in perceived risk in the web-based PCST group ($B=-0.30$, SE=0.13, 95% CI -0.56 , -0.04 , $p=0.03$) than in the control group.

Self-efficacy.—The linear regression predicting participants' post-intervention self-efficacy for enacting their coping strategies in the hypothetical challenging situations was significant, $F(2,104)=13.63$, $p<.001$, but the effect of group was not ($B=0.45$, SE=2.74.13, 95% CI -4.99 , 5.88, $p=0.87$). The linear regression predicting self-efficacy for avoiding pain in similar situations was significant, $F(2,104)=11.76$, $p<.001$. An effect of group indicated a greater increase in the web-based PCST group than the control group ($B=0.41$, SE=0.09, 95% CI 0.23, 0.59, $p<.001$).

Post-intervention pain outcomes.—Regression analyses revealed that reductions in pain severity were associated with increased likelihood of generating at least one adaptive cognitive coping strategy ($\beta=-0.22$; $t=-2.31$; 95% CI -1.26 , -0.10 ; $p=0.02$), but not change in adaptive behavioral coping strategies ($\beta=-0.17$; $t=-1.72$; 95% CI -0.35 , 0.03; $p=0.09$) or maladaptive behavioral coping strategies ($\beta=0.09$; $t=0.45$; 95% CI -0.14 , 0.22; $p=0.65$). Decreases in pain severity were also associated with an increase in participants' repertoire of adaptive coping strategies ($\beta=-0.22$; $t=-2.22$; 95% CI -0.74 , -0.04 ; $p=0.03$). Reductions in post-intervention pain-related impairment were not associated with changes in adaptive cognitive coping strategies ($\beta=-0.11$; $t=-1.11$; 95% CI -0.50 , 0.14; $p=0.27$), adaptive behavioral coping strategies ($\beta=-0.10$; $t=-0.96$; 95% CI -0.16 , 0.05; $p=0.34$) or maladaptive behavioral coping strategies ($\beta=-0.12$; $t=-1.17$; 95% CI -0.16 , 0.04; $p=0.25$). However, reductions in post-intervention pain-related impairment were associated with an increase in participants' repertoire of adaptive coping strategies ($\beta=-0.26$; $t=-2.64$; 95% CI -0.43 , -0.06 ; $p=0.01$).

Discussion

We investigated whether PCST, completed in an automated web-based program, produced beneficial changes in pain coping strategies that people with hip or knee OA identified for use in hypothetical challenging situations likely to exacerbate their OA pain. As hypothesized, completing web-based PCST increased the number of adaptive behavioral pain coping strategies they generated in the task, increased their likelihood of identifying at least one adaptive cognitive pain coping strategy, and enabled them to generate a larger set of distinct types of adaptive pain coping strategies. The intervention did not change the number of maladaptive behavioral pain coping skills participants generated at post-intervention, compared to an increase observed in the control group. The potential clinical relevance of these changes is underscored by several notable associations with

changes in participants' pain outcomes: Increases in participants' repertoire of possible adapting pain coping strategies were associated with reductions in their pain severity and pain-related impairment, and increases in their likelihood of generating at least one adaptive cognitive coping strategy were associated with a reduction in pain severity. Participants who completed web-based PCST were also less likely than controls to perceive that the hypothetical situations would increase their pain, and they were more confident they could avoid pain in similar situations. The changes we observed should be considered as a whole; taken together, they indicate that web-based PCST resulted in positive, intervention-concordant changes in the way people think about coping with OA pain and their expectations regarding risks and ability to overcome challenging situations.

It is encouraging that web-based PCST increased participants' ability to generate at least one adaptive cognitive pain coping strategy. These strategies can be difficult to change [25], yet reducing pain catastrophizing is reliably associated with pain and impairment in people with chronic musculoskeletal pain [37]. However, most participants did not mention any adaptive cognitive coping strategies, even after completing web-based PCST. This observation could be related to the fact that web-based PCST teaches one adaptive cognitive coping strategy (identifying catastrophizing thoughts and changing them using positive "coping thoughts") compared to a larger number of adaptive behavioral pain coping strategies. This difference may have contributed to participants' focus on behavioral strategies. If so, we could refine the program to increase emphasis on the importance of mastering our cognitive pain coping strategy, especially in light of the important effects of catastrophizing on people's experience of pain. Our finding may also reflect a methodological issue. Specifically, our scenarios may have been more likely to elicit behavioral pain coping strategies. Future research should include pilot testing to ensure scenarios are capable of eliciting cognitive pain coping strategies in addition to behavioral strategies.

Of course, we cannot be certain that observed changes will translate to real-world situations. Yet, our randomized controlled trial of web-based PCST [21] found a post-intervention reduction in pain, suggesting that it succeeded in changing participants' way of coping with pain in everyday life. Those findings are consistent with findings in the present study, which revealed that the same participants also demonstrated positive changes in pain coping strategies they generated in response to hypothetical challenging situations. The most likely explanation is that the task did, indeed, reveal changes that reflected changes in pain coping in participants' everyday life.

Contrary to expectations, completing web-based PCST did not increase participants' self-efficacy for enacting the specific coping strategies they generated in each situation in our task; participants in the two groups were equally confident that they could think or do the things they identified to control their OA pain in those situations. In retrospect, this finding makes sense—people are likely to generate coping strategies they think they can enact, perhaps because they have used them before. Learning new strategies or learning to use familiar strategies in a different, more effective way would not necessarily change that fact.

One limitation of this study was its use of hypothetical situations. Although there is concern that findings from studies using hypothetical situations may not translate to real life, this

approach was well suited to investigating whether participants who completed web-based PCST improved in their ability to identify new and more adaptive pain coping skills. Additional research is needed to evaluate the conditions under which this improvement allows them to cope more flexibly and adaptively in real situations likely to exacerbate OA pain. In addition, our parent trial [21] could not adequately evaluate men's pain outcomes because they had significantly lower pain at Baseline compared with women, especially if they were in the control group. This problem with screening and randomization may have limited the present study's ability to find associations with pain outcomes. Another limitation is our use unvalidated single-item measures. Our findings concerning perceived risk and self-efficacy should be verified with research using measures with well-established validity and sound psychometric properties.

Despite these limitations, our findings advance knowledge of learning that occurs in web-based PCST. This is especially notable in light of the improved accessibility and cost-effectiveness offered by a web-based intervention approach. People with OA have limited access to PCST and similar non-pharmacologic pain interventions [38]. Thus, our findings have implications for health in a large and growing population.

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Table 1.**Four Hypothetical Challenging Situations Used in Study Task**

Imagine that you are in this situation: You're starting a long road trip. You'll be spending hours sitting in an uncomfortable car. After you get started you realize the person you're driving with doesn't like to stop for breaks. You're already starting to feel your hips and knees get stiff and you know it's going to get worse if you can't take a break. It's not turning out to be a pleasant trip
Imagine that you are in this situation: You volunteered to help out at a local community event that's important to you. You'll be working with them for about a month, and they really need your help. Unfortunately, you just found out that you'll have to take on someone else's responsibilities in addition to your own. It will be physically difficult. You'll be working long hours and doing a lot of standing, walking, and climbing stairs. You start worrying about how demanding it will be and how it might stir up your arthritis pain
Imagine that you are in this situation: Someone important to you is recovering from surgery. You've offered to help him as he recovers. You'll be running around picking up groceries and medications at the drug store, cooking some meals for him, and taking his dog for a walk a few times a day. Unfortunately, his apartment building's elevator is being repaired, and it's not working. So you'll have to walk up and down stairs a lot, too.
Imagine that you are in this situation: You're getting ready for a holiday get together with your family. Decorations need to be put up before your family arrives, and no one is home to help you. You get boxes of decorations down from a high shelf, and then you spend a lot of time standing, bending and lifting as you put up the decorations. It takes hours to get all of this done, and it turns out to be very hard work.

Table 2.

Coding of Participants' Open-Ended Responses to Hypothetical Challenging Situations into Categories of Pain Coping Strategies

Category	Strategies	Code	Definition
Adaptive behavioral	Relaxation	Relaxation/mini-practice	May also be referred to as a brief relaxation in response to an internal or external cue of some sort. Another term may be progressive relaxation. Basically, a description of some action taken to relax muscles or release tension. Does not include taking a mental "time out" or taking a break (e.g., <i>I relaxed by watching my favorite TV show</i>).
Adaptive behavioral	Activity Pacing	Activity/rest cycle/breaks/pacing	With respect to activities that tend to cause them pain or effortful activities, they take a break after some amount of time or completion of some part of the activity. "Pacing" themselves.
Adaptive behavioral	Pleasant Activity	Adding pleasant activity	Scheduling or doing an activity they find pleasant, purposefully building it into their day or as a break in another (not pleasant) activity simply because they enjoy it. Can be large or small (take a trip, have a cup of coffee or tea, call a friend).
Adaptive Cognitive	Distraction	Pleasant imagery/distraction/focus attention	Focusing attention on a pleasant scene or activity, or on an object or a sound or music. Trying to enjoy something or focus on the part of it that is enjoyable. Doing something to take mind off of pain.
Adaptive Cognitive	Coping Thoughts	Identify and/or change unhelpful thoughts	Realizing or noticing they are having thoughts that "work against them" or that are catastrophizing (e.g., blowing things out of proportion or being hopeless). Purposeful attempt to change their perspective. They may also talk in terms of changing attitudes, not feeling guilty, trying to enjoy something. May mention using a "coping thought."
Maladaptive behavioral	Medication	Taking/using pain medications	Person says he/she will take or use a medication (prescribed or over the counter, such as Tylenol, Advil, or aspirin) to prevent or manage pain. This is not coded if he/she says they will have the medications with them just in case he/she needs to use/take them. Mention of using several medications (e.g., topical cream and ingested medication) would be counted as one behavioral action.
Maladaptive behavioral	Refuse	Refuse/limit activities to avoid pain	Saying "no" to an invitation or activity, or ceasing to do it, in order to avoid pain
	Not Codable	A response that acts as a verbal "place-holder" without specifying a recognizable coping response (e.g., "I'd do my best" or "take it as it comes"). Vague answers (e.g., I'd ignore it" if it is unclear what they are ignoring) would also be uncodable.	
	General Rules	Coders were instructed to code two behaviors together as one if one behavior is enabling another behavior (e.g., sliding a carseat back so you can change positions more easily is one behavior). Coders were also instructed to code lists of responses as one thing (e.g., I would tell him I would need to take a break or not lift any heavy things" or "I would make myself comfortable by wearing comfortable clothes and shoes" are each one coding response).	

Table 3:

Number of Coping Strategies Generated by Participants by Category, Time of Assessment, and Study Group

	Web-based PCST ^a (n=56)		Control (n=51)		Total (n=107)	
Coping Strategy Categories	Baseline M (SD)	Post-intervention M (SD)	Baseline M (SD)	Post-intervention M (SD)	Baseline M (SD)	Post-intervention M (SD)
Adaptive behavioral	1.77 (1.29)	2.93 (1.74)	1.86 (1.27)	2.12 (1.49)	1.81 (1.27)	2.54 (1.67)
Maladaptive behavioral	2.55 (1.44)	2.04 (1.64)	2.61 (1.64)	3.04 (1.66)	2.58 (1.53)	2.51 (1.72)
Adaptive Cognitive	0.38 (0.91)	1.00 (1.50)	0.22 (0.58)	0.39 (1.04)	0.30 (0.77)	0.71 (1.33)
Coping repertoire	1.18 (0.79)	1.77 (1.03)	0.98 (0.65)	1.06 (0.65)	1.08 (0.73)	1.43 (0.93)

^aPCST=Pain Coping Skills Training.

Table 4:

Correlations between Study Measures (N = 107)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Mean (SD)	Range
Baseline Variables																				
1. Adaptive Behavioral Pain Coping Strategies	--	.13	-.02	.53***	-.08	-.02	0.12	-.04	-.07	.39***	.26***	.08	.19 [†]	-.09	.06	-.11	.07	-.15	1.81 (1.27)	0-6
2. Maladaptive Behavioral Pain Coping Strategies		--	.01	.18 [†]	.02	-.08	-.14	-.14	-.19 [†]	.08	.43***	.06	.15	.00	.04	-.03	-.09	.004	2.58 (1.53)	0-6
3. Adaptive Cognitive Pain Coping Strategies			--	.31***	.002	.04	.10	.18 [†]	-.13	.18 [†]	-.03	.23*	.22*	-.15	-.11	-.06	-.18 [†]	-.16	0.19 (0.39)	0-1
4. Coping Repertoire				--	-.04	-.02	.01	-.13	-.16	.33***	.09	.30***	.43***	-.10	.08	-.07	-.07	-.07	1.08 (0.73)	0-4
5. Perceived Risk for Pain					--	-.16 [†]	-.21*	.37***	.32***	.11	.10	-.05	-.02	.59***	.05	-.13	.24*	.31**	2.87 (0.76)	1-4
6. Self-efficacy for Enacting Coping Strategies						--	.51***	-.08	-.19*	.04	-.03	.01	.04	-.07	.46***	.38***	-.10	-.22*	83.39 (14.34)	48.75-100
7. Self-efficacy for Avoiding Pain							--	-.14	-.27***	.06	-.13	.01	.12	-.15	.20*	.40***	-.22*	-.32***	77.63 (16.66)	25-100
8. Pain Severity								--	.47***	-.04	-.07	-.02	-.08	.29**	.01	-.05	.62***	.45***	4.96 (1.74)	1-9
9. Pain-Related Impairment									--	-.11	-.06	-.12	-.19 [†]	.28**	-.16 [†]	-.16 [†]	.42***	.71***	2.43 (1.14)	33-7.33
10. Adaptive Behavioral Pain Coping Strategies										--	.02	.25*	.58***	-.03	.12	.08	-.10	-.24*	2.54 (1.67)	0-7
11. Maladaptive Behavioral											--	-.15	-.16 [†]	.07	-.004	-.16	.06	.05	2.51 (1.72)	0-7
Post-Intervention Variables																				

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	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Mean (SD)	Range
	Pain Coping Strategies																				
	12. Adaptive Cognitive Pain Coping Strategies												--	.74***	-.10	-.01	.15	-.25***	-.23*	0.28 (0.45)	0-1
	13. Coping Repertoire													--	-.16	.11	.25**	-.22*	-.31**	1.43 (0.93)	0-4
	14. Perceived Risk for Pain														--	.06	-.11	.31**	.31***	2.75 (0.85)	1-4
	15. Self-efficacy for Enacting Coping Strategies															--	.71***	.02	-.10	83.80 (15.77)	35-100
	16. Self-efficacy for Avoiding Pain																--	-.13	-.22*	79.70 (17.40)	25-100
	17. Pain Severity																	--	.55***	4.29 (1.90)	0-9
	18. Pain-Related Impairment																		--	2.28 (1.09)	.33-6.00

† $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.