A Perspective-Taking Manipulation Leads to Greater Empathy and Less Pain During the Cold Pressor Task

Laura E. M. Leong, Annmarie Cano, Lee H. Wurm, Mark A. Lumley, and Angelia M. Corley
Department of Psychology, Wayne State University, Detroit, Michigan.

Abstract: The objectives of this study were to demonstrate that empathy and validation could be increased in an observing partner who received a brief perspective-taking manipulation, resulting in less pain severity and greater pain tolerance in their partner, who experienced experimental pain. In addition, we examined the correlations between perceived empathy/validation and behavioral ratings of validation and invalidation. In 126 pain-free romantic couples, 1 partner was randomly assigned to complete the cold pressor task while the other observed. The couples were randomly assigned to a) a perspective-taking group in which observing partners were privately instructed to take the perspective of the pain participant; or b) a control group in which observing partners received only a description of the task. Compared with the control group, pain participants in the perspective-taking group reported that observing partners had been more validating during the task and they also reported significantly lower pain severity. In addition, pain participants’ reports of their partners’ validation and observing partners’ self-reported empathic feelings were significantly related to lower pain severity over time. The results provide support that perspective taking may induce empathic feelings, in addition to perceptions of validation, which in turn promotes emotion regulation during pain.

Perspective: The experimental evidence in this study suggests that empathic feelings can be induced in significant others with simple instructions, and this manipulation leads to less pain in their partners undergoing a painful task. The results suggest that perspective taking, empathy, and validation should be further investigated as pain intervention targets.

Key words: Couples, pain, empathy, validation, perspective taking, cold pressor.
validate and addressed potential barriers. In a subsequent discussion with the person with pain, partners demonstrated significantly more validation and less invalidation than control couples who had a discussion. Empathic feelings and validation behaviors may also be enhanced by directing others to take the perspective of the person with pain. In social psychological research, a brief paragraph (eg, 50 words) that instructs participants to imagine how the other person feels has been shown to increase empathic feelings, other-oriented distress, and altruistic motivation and behaviors. This strategy has also been used in the context of empathy for physical pain. This is a promising method to promote empathy and validation in the context of pain.

The current multi-method experimental study was designed to test the extent to which a perspective-taking instruction compared with no instruction would result in both greater felt empathy among observing partners and greater perceived validation among participants undergoing a painful experience (ie, the cold pressor task). The manipulation was also expected to result in lower pain and greater pain tolerance in the person in pain, possibly due to the emotion regulation benefits of validation and empathy. In addition, greater empathy and validation were expected to be associated with less pain during the task. Thus, this study offers an opportunity to contrast the operant model with intimacy process models of pain. The correlations between perceived validation rated by the person in pain, felt empathy reported by observing partners, and external ratings of the observing partners’ validation and invalidation behaviors were also examined; these analyses were secondary given that this is the first time a behavioral coding system has been used to assess romantic partner validation in an acute pain study. Portions of this study were presented at the 2013 American Pain Society Annual Scientific Meeting.

Methods

Participants

The participants were 126 romantic couples, consisting of 126 undergraduate psychology students at a large Midwestern university and their romantic partners. Couples were eligible if they both denied chronic pain, blood circulation problems, and diabetes. The person who completed the cold pressor pain task is henceforth referred to as the “pain participant,” and the other participant is referred to as the “observing partner.” With respect to demographics, women comprised 52% (n = 65) of the pain participants and 50% (n = 63) of the observing partners. The pain participants self-reported their ethnicity as follows: approximately 42% (n = 53) White; 26% (n = 33) African American; 12% (n = 15) Arab; 6% (n = 8) Hispanic/Latino; 6% (n = 8) Asian; and 7% (n = 9) as Other. The distribution was generally similar for observing partners (White 39%, n = 49; African American 29%, n = 36; 13% Arab, n = 16; Asian 7%, n = 9; Hispanic/Latino 2%, n = 2; Other 11%, n = 14). The mean age of the pain participants was 22.19 years (SD = 5.51 years), similar to the mean age of the observing partners (mean = 22.06 years, SD = 5.70 years). On average, the pain participants and observing partners had completed some college (mean = 14.26 years, SD = 1.59 years; mean = 14.37 years, SD = 1.54 years, respectively). Relationship duration was highly variable, and ranged from 1 month to 14 years, with an average of 25.41 months (SD = 25.21 months) and a median of 21 months. Two of the couples (1.6%) were in same-sex relationships.

Procedure

This study was approved by the university’s institutional review board. Participants were recruited via the Psychology Department’s online research participation system (SONA Systems), which described the study as investigating how couples cope with acute stress. Couples came into the laboratory for a 1-hour session. Each partner completed a consent form. At the start of the study, couples were randomized to either the perspective-taking group or the control group, and participants within couples were randomized to be either the pain participant or the observing partner using an online randomizing tool (www.randomizer.org), which simultaneously randomized couples and participants. The participants did not know that there were separate perspective-taking and control groups until they were debriefed at the end of the study.

Fig. 1 depicts the procedure followed by the pain participants and observing partners. Each person was given a private room to complete an assessment of demographic characteristics and baseline perspective taking and empathy. The last page of the survey packet had written instructions specific to each participant, including an explanation of who would be completing the cold pressor task and who would be the observing partner; this was the time at which participants were made aware of the within-couple randomization status.

Control Group Instructions and Perspective-Taking Manipulation

The instructions to the observing partners varied by experimental group. In the control group, the instructions to the observing partner simply described the task: “Soon, your partner will do the cold water task. You may interact with your partner as much or as little as you like. Your partner will put his or her hand into a bin of very cold water, 6°C, which is equivalent to 43°F. While this task may cause some pain, it is temporary and will end shortly after he or she removes his or her hand from the bin. Please wait for additional instructions from the experimenter.” In the perspective-taking group, the instructions to the observing partner included the instructions given to the control partners, with 1 additional paragraph, the perspective-taking manipulation (similar to instructions used by Batson et al with the addition of instructions used by Lamm et al in a pain empathy study, adapted for romantic partners): “During the task, please try to imagine how your partner feels about what is happening. Concentrate on how your partner feels while doing the painful cold water task and...”
how he or she is affected by it. Imagine your partner’s emotional response as he or she experiences the pain.”

All pain participants were given the following instructions: “Soon, you will do the cold water task. For this task you will put your hand into a bin of very cold water, 6°C, which is equivalent to 43°F. While this task might cause some pain, it is temporary and will end shortly after you remove your hand from the bin. You are allowed to remove your hand at any time during the task. Please wait for additional instructions from the experimenter.” The participants were not aware of any of the instructions that were given to their partners; and so the pain participants were unaware of any manipulation aimed at the observing partners until they were debriefed at the end of the study.

For all participants in all groups, the experimenter asked each person to repeat back the instructions to ensure that they had read the last page of the instructions. Participants who did not demonstrate a full understanding of the instructions were told to read them again and then describe them to the experimenter. All participants were able to adequately describe the instructions and were allowed to proceed to the next stage of the study.

**Cold Pressor Task**

The couple were then brought together into the observation room, where the pain participant engaged in the cold pressor task while their partner observed in the same room. The cold pressor machine was assembled using a Thermoelectric Circulator (model RU-200), thermoregulator (model TEC-10D), and stainless steel bath. Water from the bath flows through the flow cooler, which extracts the heat. The thermoregulator circulates the water and safely controls the temperature of the liquid in the bath within precise limits. The thermoregulator was set to 6°C (43°F).

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**Figure 1. Study procedures and methods.**
The Empathic Concern subscale had poor reliability in both pain participants (Cronbach’s $\alpha = .59$) and observing partners (Cronbach’s $\alpha = .46$). Deleting items did not increase the internal consistency to acceptable levels, and so the Empathic Concern subscale was not included in any subsequent analyses. The Perspective Taking subscale had better reliability, with Cronbach’s $\alpha = .79$ in both pain participants and observing partners.

Measures During the Cold Pressor Task

Pain Severity

During the task, pain participants rated their pain verbally on a scale from 0 (“No pain”) to 10 (“Extreme pain”) at regular intervals as described above, and the experimenter documented the ratings. The spacing of intervals was chosen based on prior conventions in cold pressor studies, as well as evidence suggesting that pain initially increases and then plateaus or decreases during the course of the cold pressor task.

Pain Tolerance

Pain tolerance with the cold pressor task is often measured as the length of time for which a person is willing to keep his or her hand submerged in the water. Because there was a fairly even split between pain participants who completed the full 4 minutes of the cold pressor task (43%, n = 54) and those who did not (57%, n = 72), the pain participants were categorized into whether or not they completed the 4-minute task. However, within the group of people who did not reach the end of the task, the duration was highly variable, from 9 to 225 seconds.

Surveys Administered After the Cold Pressor Task

Perceived Validation

Pain participants then completed 7 items taken from 2 scales that assess perceived validation. These items were used because they measure perceived validation following a specific interaction. Three of the items were taken from Mitchell et al’s adaptation of the Interaction Record Form–Intimacy; the items reflect speaker and listener perceptions of empathy separately after a couple interaction. Pain participants rated how well each of the statements, “My partner understood me”; “My partner was critical of me” (reverse coded), and “My partner was supportive and caring during the interaction” described the interaction. The other 4 items were identified as a valid measure of partner responsiveness, which can also be conceptualized as validation: “I felt [validated, accepted, cared for, understood] by my partner during this interaction.” The same response scale was used for all 7 items (1 = “Not at all true” to 4 = “Very true”). Cronbach’s $\alpha$ for the 7 perceived validation items was .81 in the control group and .87 in the perspective-taking group.

Empathic Feelings

Observing partners were given a list of 6 adjectives that were rated on a scale of 1 (“Not at all”) to 7 (“Extremely”) that assesses empathic feelings (ie, sympathetic, soft-hearted, warm, compassionate, tender, and moved). These items were taken from the same Batson et al study from which our perspective-taking instructions originated. The item ratings were averaged to result in 1 overall score for empathic feelings. Cronbach’s $\alpha$ was excellent at .91 for both the control and perspective-taking groups.

Externally Rated Validation and Invalidation Behaviors

Coding Manual and Description

A manual was developed to code validation and invalidation behaviors exhibited by the observing partners during the cold pressor task so that the correlation between perceived and externally rated validation could be explored. The manual was based on existing coding systems of validation and invalidation and (A. Fruzzetti’s unpublished Validation and Invalidation Behavior Coding System, 2001) and adapted to the cold pressor task and for interval coding. The revised manual is available upon request from the second author.

Validation and invalidation were coded as present or absent (ie, code of 1 or 0) within each interval of the task (ie, the time between tones/pain ratings). It was possible for an interval to contain both validation and invalidation. Word choice, tone of voice, facial expressions, and gestures were incorporated into the coding definitions of validation and invalidation. Validation included behaviors that conveyed an attempt to understand, acknowledge, and accept the other person’s pain experience. Examples of validation include statements such as, “Does it hurt?” and “It makes sense that you would feel that way,” as well as non-verbal behaviors such as rubbing one’s partner’s shoulders, concerned facial expressions, meaningful eye contact (ie, engaging the participant’s gaze), and nodding understandingly in response to pain behaviors. In contrast, invalidation included behaviors that conveyed negative judgment and rejection of the other person or his or her pain experience. Examples include ignoring the pain participant’s statements, saying “It’s only cold water, you’re exaggerating how much it hurts,” sarcastic or angry tone of voice, laughing at the partner’s pain behaviors, and non-verbal behaviors such as scowling or rolling one’s eyes at the other’s pain expressions.

Coder Training and Agreement

Training sessions consisted of 5 weeks of instruction on basic couples observational issues, review of the coding manual, in-session and practice coding from a previous study, and demonstrating agreement with other coders. After training, weekly coding meetings were held to discuss ambiguous situations and any discrepancies in coding. Coders viewed each interaction at least 2 times. During the first viewing, coders were instructed to
attend to baseline facial expressions and personal styles of interactions to limit bias. During the subsequent viewing(s), coders focused on rating the observer’s validation and invalidation behaviors. Coders were allowed to watch the videos as many times as necessary to make confident coding decisions. The fifth author was chosen to be the primary coder, who coded all of the video-recorded interactions. She did not participate in any of the initial data collection. The first author was the secondary coder, who coded a randomly selected subset of 25% of the videos to calculate inter-rater agreement. Neither coder was aware of participants’ group membership or survey responses. On average, in this sample, validation of pain was present in approximately 40% of the intervals and invalidation of pain was present in approximately 22% of the intervals. In addition, the presence of each behavior was similar for the 10- and 20-second intervals (presence of validation: 10-second intervals = 40%; 20-second intervals = 39%; presence of invalidation: 10-second intervals = 21%; 20-second intervals = 23%). Because Cohen’s kappa is adversely affected by base rates of the target behavior that are less than 50%, the prevalence-adjusted bias-adjusted kappa (PABAK) was used. The mean PABAK was .83 for validation and .77 for invalidation, indicating excellent inter-rater agreement.

The duration of the intervals appears to be appropriate for capturing validation and invalidation behaviors in this task because validation and invalidation occurred infrequently; 60% and 70% of the intervals did not have validation or invalidation, respectively. Thus, coding intervals of shorter duration is unlikely to have resulted in greater precision. For all analyses, the primary coder’s ratings were used.

Results

Data Management

Before conducting the analyses, the data were screened for accuracy of input, non-random missing data, outliers, and parametric assumptions. Baseline measures were screened as ungrouped data, then all data collected after the manipulation were grouped (control and perspective-taking groups). Very few (under 3%) data were missing, and the pattern occurred infrequently; 60% and 70% of the intervals did not have validation or invalidation, respectively. Thus, coding intervals of shorter duration is unlikely to have resulted in greater precision. For all analyses, the primary coder’s ratings were used.

Group Differences

Self-reported Empathy and Perceived Validation

It was expected that the perspective-taking manipulation would increase both the observing partners’ and the pain participants’ feelings and perceptions of empathy. At the start of the study, the perspective-taking and control groups were equivalent for both pain participant and observing partner perspective taking (pain participants: mean (control) = 16.53, SD = 4.13; mean (perspective-taking) = 16.39, SD = 4.88; F1,124 = .03, P > .05; observing partners: mean (control) = 15.92, SD = 4.09; mean (perspective-taking) = 16.48, SD = 4.40; F1,124 = .54, P > .05). After the pain task, however, observing partners in the perspective-taking group reported significantly higher empathic feeling scores (mean = 5.37, SD = 1.27) than those in the control group (mean = 4.83, SD = 1.44), F1,124 = 5.06, P = .03, a small-to-medium effect (Cohen’s d = .40). More importantly, pain participants in the perspective-taking group reported that they felt more validated during the task (mean = 22.65, SD = 4.43) than those in the control group (mean = 21.11, SD = 4.27), F1,124 = 3.93, P = .05, another small-to-medium effect (Cohen’s d = .35). Thus, empathic feelings in the observer appear to have been manipulated via a perspective-taking instruction, as were perceptions of validation in the pain participant.

Pain Severity

It was expected that pain participants in the perspective-taking group would report lower pain than those in the control group. The number of couples included in these analyses was only 123, because 3 couples discontinued the pain task before providing any pain ratings. Rather than collapsing ratings across the task, which would have obscured changes in pain over time, multilevel analyses were conducted to examine trajectories of pain during the task. Data were analyzed using version 3.0.2 of the R statistical language and version 2.0-6 of the ImerTest package, which computes P values based on the Satterthwaite approximation for degrees of freedom. Main effects included group (perspective-taking vs control) and time in seconds. Time was also entered as a quadratic effect because previous evidence suggests that pain increases and then plateaus or decreases during the course of the cold pressor task. Finally, interactive effects were included between group, time, and quadratic time.

A significant group by quadratic time interaction (technically, a 3-way interaction) emerged in which participants in the perspective-taking group reported significantly lower pain ratings over time, compared with those in the control group (t = 3.09, P = .002), with the expected curvilinear relationship for both groups (Fig 2).

The Relationship Between Pain Severity and Perceptions of Empathy and Validation

Additional analyses were conducted to examine the extent to which perceived empathy and validation related to pain during the cold pressor task. Pain participants’ reports of their partners’ validation were added to the multilevel model that included main effects of group and time, as well as all of the higher order interactions among these 3 variables (group, time, perceived validation). The interaction between group, perceived
validation, and quadratic time was not significant ($t = -1.82, P > .05$). Two significant interactions emerged, one of which was the group by quadratic time interaction ($t = 3.48, P = .0005$), already reported. The other significant interaction was between perceived validation and quadratic time ($t = -3.54, P = .0004$) such that greater perceptions of being validated by one's partner also correlates with lower pain over the course of the cold pressor task (Fig 3, top). The effects of perceived validation did not differ by group, and there were no other significant higher order interactions.

The same pattern of findings emerged when participants' perceived validation was replaced with observing partners' empathic feelings. Again, the group by quadratic time interaction was significant ($t = 3.60, P = .0003$) as well as the empathic feelings by quadratic time interaction ($t = -2.33, P = .02$; see Fig 3, bottom), meaning that greater observing partner feelings of empathy were correlated with lower pain ratings by the pain participants over the course of the task. The highest order interaction term that included group, empathic feelings, and quadratic time was not significant ($t = - .92, P > .05$).

**Pain Tolerance**

It was expected that pain participants in the perspective-taking group would be more likely to complete the pain task than those in the control group. Contrary to our hypothesis, the proportion of people who completed the task did not vary by group ($\chi^2 [N = 126] = .02, P > .05$). Thus, the perspective-taking manipulation did not affect whether or not pain participants were willing or able to complete the task.

In summary, these analyses indicate that the perspective-taking manipulation positively affected felt empathy in observers and perceived validation as reported by pain participants, and resulted in less pain severity in the cold pressor task. In contrast, pain tolerance (as measured by task completion) did not appear to be affected by the perspective-taking manipulation.

**Perceived and Externally Rated Validation**

Correlation analyses were conducted to examine the associations of validation and invalidation behaviors with self-reports and pain participant-reports of observing partner validation and empathic feelings in the sample as a whole. The percentage of intervals with validation or invalidation behaviors was calculated for each couple by dividing the number of intervals in which the behavior was present by the total number of intervals for which the participant continued to do the cold pressor task. The calculation controls for the variance in cold pressor intervals completed across the sample (ie, recall that approximately half of the participants completed the cold pressor task). The percentages of intervals with validation and invalidation behaviors were inversely correlated ($r = - .38, P < .001$). Higher percentages of validation behaviors were significantly and positively correlated with observing partners' empathic feelings ($r = .22, P < .05$) and pain participants' reports of perceptions of their partners' validation ($r = .23, P < .01$). In contrast, higher percentages of invalidation behaviors were inversely correlated with both observing partners' empathic feelings ($r = -.35, P < .01$) and pain participants' perceptions of their partners' validation ($r = -.26, P < .01$). There were no significant group differences in the magnitude of these correlations. Thus, we
discuss the implications of these findings for pain management.

**Discussion**

One purpose of the study was to demonstrate that a simple perspective-taking manipulation directed solely to observing partners could result in greater empathy, which would also be perceived by their participant partners who completed a painful task. Another purpose was to test the extent to which the manipulation resulted in less pain and greater pain tolerance. In addition, the relationship between perceived and observed validation was examined. The perspective-taking manipulation did result in greater felt empathy in observing partners and greater perceived validation as well as less pain over the course of the task in pain participants. These results provide support for the notion that empathy and validation can result in improved emotion regulation during pain, as indicated by reduced pain. This is in direct contrast to operant models that might predict that empathy would reinforce pain behavior, including intervention development. For instance, it is possible that the manipulation used in the current study could be tested in cases of clinical acute pain (e.g., medical and dental procedures, injury), as well as chronic pain. Likewise, this manipulation could be administered to health care professionals to test whether it can mitigate pain in their patients. Furthermore, variations in the intensity and wording of the manipulation could be explored to investigate the mechanisms and scope of the perspective-taking effect.

The correspondence between perceived and externally rated validation behaviors was also explored in the current study. The correlations among these variables were significant and in the small-to-medium ranges, which is noteworthy given the multi-method assessment approach. The results are consistent with the conceptualization of empathic/non-empathic feelings as expressed via validation and invalidation behaviors, and provide preliminary support for the behavioral coding system and for the construct validity of validation and invalidation in an experimental context. The absence of significant effects of the perspective-taking induction on validation and invalidation behaviors, and the lack of significant effects of observed validation on pain, suggest that more work is needed to develop validation coding systems in the context of experimental pain. However, this study is not the first to demonstrate that perceptions of supportive behaviors are better predictors of outcomes, compared with actual support behaviors. Researchers must address the extent to which this discrepancy has implications for theoretical, methodological, and clinical work in pain.

Although partner behaviors that were neither validation nor invalidation (e.g., humor, distraction, or coaching) may also promote pain coping, they were not examined in the current study. Nevertheless, the vast majority of observing partners expressed validation toward the pain participants at least once, and more than one-third never showed any invalidation during the task. This is consistent with previous work that examined rates of affect, validation, and invalidation in each speaker’s turn among chronic pain couples, many of whom were middle-aged and in long-term relationships. Extending that work, Cano et al found that when a person with pain specifically expressed pain-related distress, spousal validation was more common than invalidation. Pain research has often focused on negative communication strategies, and with good reason, given that negative behaviors such as criticism are associated with poor pain adjustment. However, evidence is accumulating to suggest that interactions between people with pain and their loved ones are generally more positive than negative.

The hypotheses regarding pain tolerance were not supported; greater pain tolerance (i.e., task completion) did not appear to be affected by the perspective-taking manipulation, perceived empathy by either partner, or validation behaviors. Other studies of experimental pain have also failed to find significant associations between empathy or other interpersonal variables (e.g., attachment) and pain tolerance, even when pain severity ratings
were affected. There is evidence that variables such as gender, catastrophizing, and cognitive distraction are relevant in predicting pain tolerance, which may be better conceptualized as participants’ willingness to endure pain. Socially based motivations to persist (e.g., to demonstrate bravery) or terminate a pain task (e.g., to “prove” how severe the pain was; to receive sympathy/support from a partner) may also predict willingness. Thus, pain intensity and pain willingness may have different predictors as indicated in studies that rely on psychological flexibility models of pain. More work is needed to understand how social influences can be harnessed to also promote pain willingness.

Despite the strengths of the study, which include the experimental manipulation of perspective taking, a dyadic approach, multi-method design, and the use of multi-level modeling to assess pain ratings over time, several limitations must be addressed. The current study involved an experimental pain procedure in a laboratory setting, with a convenience sample of pain-free participants. Future research in clinical settings must be conducted to determine whether the findings persist during acutely painful medical procedures such as dental work, lumbar punctures, or vaccinations. In addition, research manipulating perspective taking, empathy, and validation in samples of couples in long-term relationships and with chronic pain is needed. Although partners in the perspective-taking group engaged in more validating and less invalidating behaviors than partners in the control group, these differences failed to reach significance. It is possible that couples attended to other behaviors that were a function of the couples’ relationship histories but not accessible to coders (e.g., previous shared experiences and “inside jokes”). In an unpublished pilot feasibility study of the current experimental paradigm, participants reported that helpful partner behaviors included encouragement to continue to express one’s pain and increasing his or her feelings of validation. This result is consistent with an intimacy process model framework, which states that certain pain expressions can be conceptualized as emotional self-disclosures. It is possible that empathic responses serve to increase intimacy, closeness, and healthy emotion regulation during pain by lessening the threat value of the situation, by increasing acceptance, and perhaps affecting emotions, for example, by transforming an unpleasant situation into a relationship-enhancing one. Thus, perspective taking and validation appear to promote acute pain coping. This finding is in contrast to the predictions made in the operant model that attending to pain may reinforce pain. A key question, as some point out, is whether empathic responses can be delivered without also reinforcing dysfunctional pain behaviors. Additional work is needed to disentangle pain-reinforcing behaviors from empathy and validation for pain and to examine the settings in which validation might be considered reinforcing of pain, relationship intimacy, or both.

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