Pain Quality and Endurance in the Context of Sacrifice: An Empirical Investigation

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\textbf{ABSTRACT}

How is the experience of pain altered by perceptions of its meaning? Does endurance or quality change with context? Work done by Melzack and Wall (1965) suggests that pain is as much a “top-down” process as it is “bottom-up”. One of the many ways in which pain is shaped “top-down” is through an understanding of the meaning or purpose of the pain endured. Throughout this experiment, 51 participants engaged in the Cold Pressor Task (CPT). The participants were randomly assigned to either an imagined sacrifice condition or the control condition without any pre-experiment instruction. For each participant, pain perception was represented by two measures of time and three independent scores from the McGill Pain Questionnaire Short Form (MPQ-SF) for a total of five measures. A condition by gender interaction was found on one of five pain measures (physiological pain). Main effects of gender were found on three of five pain measures (two time measures and one MPQ-SF measure). These results suggest that men and women perceive pain differently and that a sacrifice context—that is enduring pain so an imagined other will not have to—serves as a poor tool for pain reduction. The effectiveness of the context manipulation is explored, and further consideration is given to the validity of examining existential concerns (i.e. sacrifice, questions of meaning) in laboratory situations.

\textbf{INTRODUCTION}

Friedrich Nietzsche said: “he who has a why to live for can endure any how” (Quoted in Frankl, 1959). The underlying reality of this pithy remark has been demonstrated in psychological research linking pain acceptance and pain control (Hayes, et al.1997; Sellinger, 2007). However, little empirical work has been done linking pain and existential meaning. Some have argued (Noble, 2009) that existential meaning (or significance) has a transformative power to induce a metamorphosis of pain into an entirely new quality of experience—while still others have argued that it is hope that eases pain without changing its underlying nature (Snyder, Berg, Woodward, Gum, Rand, Wroblewski, 2005).

Seminal work done by Melzack and Wall (1965) has shown that pain is a sensory experience that is affected by both bottom-up and top-down processes. Bottom-up process refer to process that shape themselves without the help of expectations or categories. It is essentially the raw sensory data of experience. An example of a bottom-up experience might be eating jalapeño peppers for the first time. Top-down process, on the other hand, are largely shaped by our expectations and social meanings. Therefore, eating jalapeño peppers with a group of people who are exchange stories of how hot jalapeño peppers are creates an expectation that builds a model for the experience to fall into. The sensation of pain is in part determined by the nerve impulses being sent from the area of the noxious stimulus and by higher cognitive processes such as attention, context and distraction. One potential shaping top-down influence is the sacrificial-existential meaning of pain. An example of a sacrificial-existential meaning might be: “How does this experience of pain animate and give significance to my life and self?” To demonstrate such a reality empirically is a challenge for any researcher because
fabricating an existentially significant event is in some ways antithetical to existential significance – that is, there is no artificial fabrication of individual meaning. Yet, while acknowledging the limitations of a lab setting, this study endeavoured to ask in what ways a sacrificial context (albeit artificial) will change both pain endurance and pain perception. In many ways, the artificial context of the lab mirrors the artificial context of pain-treatment clinics and hospitals where this pain-reduction technique of meaning making through sacrifice would be employed if it were to show itself to be promising. 

In exploring pain relief techniques, particularly within narrative medicine and meaning-making, work on sacrifice – strangely – has largely been ignored. Sacrifice, and the implicit phenomenological experience of innocent suffering that comes with it, may serve to relieve or intensify pain. This study probes the question, “is pain relieved or intensified by understanding one’s own actions as serving the betterment of another?” If understanding pain as the result of sacrifice – a willing choice that helps another – relieves pain, there may be applications for the use of meaning-making through sacrifice in the medical world. 

The Cold Pressor Task (CPT) is a common tool in pain research. The CPT has been used in a number of pain research contexts, including research with women at different points in the menstrual cycle (Hellstrom, & Lundberg, 2000), patients with cancer (Kwekkeboom, 2003) and participants with a clinically induced depressed mood (Willoughby, Hailey, Mulkana, & Rowe, 2002). 

Using the Cold Pressor Task (CPT) the current study compared two groups. One was a control group. Individuals in the control group were simply asked to place their arm in an ice bath for as long as they were able. Individuals in the other condition, the sacrifice condition, were asked to imagine that the pain of the ice bath simulated giving blood in order to provide a blood transfusion to a loved one. Thus, both groups performed the same outward task (submerging an arm in an ice bath) but with different ‘frames’.

The two research questions were: 1) Does sacrifice increase the amount of suffering one can endure? 2) Does sacrifice evoke a qualitatively difference experience of pain? The researchers hypothesized that sacrificial meaning would increase the amount of time participants would endure the noxious stimulus, and that the qualitative experience of the pain would also be altered.

METHODS

Design

In a between-participants 2 (condition) x 2 (gender) factorial design, a convenience sample of 51 undergraduate students were alternatively assigned to one of the conditions (control, sacrifice).

Participants

After receiving the approval of the Ethics in Research Committee at The King’s University College, a volunteer sample of 34 females (17 Control, 17 Sacrifice) and 17 males (9 Control, 8 Sacrifice), primarily recruited through verbal requests in introductory psychology classes, who were promised a one percent bonus mark in the course for participation, and through personal contact. The difference between men and women reflects the proportional numbers in these introductory classes. Though special efforts were made to recruit more men, the numbers remained uneven. However, the equal numbers in the control and sacrifice allow for the integrity of the statistical analysis. Participants read and signed an informed consent form prior to participating that outlined the experiment and highlighted that they were free to withdraw at any time without penalty. The informed consent form did not explain that the purpose of the research was to investigate sacrifice and meaning-making, however, students were debriefed as to the
purpose of the research after the experiment had concluded.

**Materials and Measurement Indices**

One five-gallon pail filled with warm water (28-32 degrees Celsius) was used to standardize participants’ arm temperature before undergoing the CPT. A large cooler filled with ice and ice water (2-5 degrees Celsius) was used for the CPT. Temperatures of these two baths were checked between participants with a thermometer. Additionally, a Water Resistant Stopwatch was used to measure participants’ performance on the trial with regard to time.

Pain experience was measured in terms of time and responses to the McGill Pain Questionnaire Short Form (MPQ-SF). The three time measures were time (in seconds) of initial pain, total time in the ice bath, and time pain subsided after CPT. The MPQ-SF yielded three dependent measures of pain: physiological experience of pain (the purely physical descriptors of pain, i.e. stabbing, throbbing), affective experience of pain (the physical/emotional descriptors of pain i.e. crushing, punishing), and pain intensity index on a visual analogue scale. In addition to these six measures, a series of open-ended post-test questions probed participants’ experience of the CPT.

**Procedure**

All trials were carried out in the athletic department’s first aid/training room at The King’s University College. Prior to participants arriving, the ice bath and the warm water bath were checked for temperature. Participants who had ingested pain medications, had medical conditions or trauma and had participated in CPT previously were excluded. Participants were asked to remove watches or jewellery on their dominant arm and not look at any timepieces during the CPT.

Participants were then given an informed consent form to read and sign. Before beginning the trial, participants were asked to repeat back the method of the research to ensure the researcher and participant had the same expectations. The participants were then asked not to converse or make eye contact with the researcher during the CPT. Participants were asked to put their arm in the warm water bucket for two minutes. After two minutes the experimenter would ask the participants to make the switch directly from the warm water bucket to the ice water bucket. Participants were asked to raise their non-dominant arm (which was not in the ice bath) when they first felt pain, and to leave their dominant arm in the ice bath as long as they were able to tolerate the CPT (despite the pain). Special attention was paid to ensuring that the participants knew that they could remove their arm at any time without any consequences. The participants were not told that there was a three minute (180 second) cap time. If participants had not removed their arm by that point, the researcher would then ask them to remove it. After removing their arm from the ice bath, the participants were invited to dry their arm off and indicate when they no longer felt any pain in their arm. This time interval – from removing the arm from the ice bath to indicating feeling no pain – was recorded. Once the participant indicated that they no longer felt pain, the MPQ-SF was administered.

The MPQ-SF consisted of three scales of pain which served as dependent variables for comparing the various experiences of pain. After the participants had finished the MPQ-SF, they were asked to describe their experience of the CPT. Notes were taken from these interchanges to explore and record the qualitative experiences of pain. Finally, the participants were asked not to discuss the CPT with their peers until data collection was complete.

Though the basic method was the same for both the control and sacrifice groups, in the sacrifice condition, directly after confirming that the participants understood the method, the experimenter
would ask the participants to think of a vulnerable loved one that they felt they had some responsibility for. The participants were then asked to imagine that the ice bath represented donating blood in order to provide a blood transfusion for the loved one they had in mind. Additionally, the participants in the sacrifice condition were asked afterwards to rate, on a scale of 1-10, how real they were able to make the imagined situation. After this the method continued in the same manner as the control group.

RESULTS

A two-way gender by condition Analysis of Variance (ANOVA) revealed no significant effect of condition on most measures of pain perception.

<table>
<thead>
<tr>
<th>Table 1: A comparison of effects of condition on five dependent measures of pain perception. Note: Means with an asterisk (*) have a p &lt; .05 by ANOVA.</th>
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<tbody>
<tr>
<td><strong>Time until initial pain (sec.)</strong></td>
</tr>
<tr>
<td>Mean Standard Deviation</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Control</td>
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<tr>
<td>Sacrifice</td>
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However, there was a significant effect of gender on three measures of pain perception (Table 2). These measures include time until initial pain (F (1, 49) = 1.760, p = .044), MPQ-SF physiological pain score (F (1, 49) = 10.830, p = .002), and the MPQ-SF visual analogue scale (F (1, 49) = 11.512, p = .002). The MPQ-SF affective pain score was omitted from the analysis because very few participants reported pain on this measure. As demonstrated in Table 2, when compared to females, males took longer to feel initial pain and rated their overall experience as less painful.

<table>
<thead>
<tr>
<th>Table 2. A comparison of effects of gender on five dependent measures of pain perception. Note: Means with an asterisk (*) have a p &lt; .05 by ANOVA.</th>
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<td>Males</td>
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<td>Females</td>
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There was condition by gender interaction on the physiological pain measure (F (1,47) = 7.586, p = .008) and movement toward a trend on pain continuum (F (1, 47) = 2.775, p = .010). The physiological pain measure effect is demonstrated in Figure 1. Males reported more physiological pain in the sacrifice compared to the control condition, while females reported less pain in the sacrifice than the control conditions. In the control group, no significant differences were found from men to women.

The scores for the realism of the imagined sacrifice (on a scale of 1-10) were coded and analyzed against one another on the time scales and MPQ-SF scales. There were no statistically significant results for any of the analyses. Furthermore, a 2 (gender) x 3 (condition) x 2 (handedness) ANOVA was run, with handedness as the independent variable, with no statistically significant results.

Figure 1. A comparison of physiological pain experienced by men and women in the control and sacrifice conditions.
DISCUSSION

There were no statistically significant effects between the control and the sacrifice condition. This suggests that an imaginative context of sacrifice does not offer pain relief in a laboratory setting. However, partially these results are a result of the challenges of pain research (though this is not a “write off” of empirical pain research. See suggestions below). The results did reveal that overall men tend to report less pain and endure the noxious stimulus longer than women. Further, the research offers an important opportunity for reflection on the value of empirical research when studying topics that do not lend themselves well to the laboratory. And, lastly, the research suggests some areas where sacrifice does begin to alter one’s experience of pain.

Limitations and improvements to be made in future research

This study provided an initial exploration into the possibility that contexts for pain and suffering can be meaningfully manipulated in a laboratory setting. The experience and results obtained suggest both modifications for doing so in future studies, and limitations in our ability to explore this question in a controlled setting. We address four major issues: number of participants, setting up the CPT, the nature of pain research, and the nature of existential research.

First, though the sample size for women was strong (34) there were only 17 men involved in this experiment. Boosting the total number of male participants would have enabled more confident conclusions about the gender differences observed. Second, the decision to put a 180 second cap time on the CPT may have caused a ‘roof-out’ effect because of the tendency in all conditions for participants to reach the maximum limit of time in the ice bath. Future research may be benefited by the use of a 240 to 300 second cap time. Also, future research might administer some questions or a questionnaire while participants are still in the ice bath so as not to merely have the scale reflect remembered pain.

Third, pain research has a number of difficulties inherent in the phenomenon being explored. Pain is a qualitative experience that does not correspond neatly with any physical stimulus. Because of this, pain must be studied through self-report. However, language is troublesome because of the idiosyncratic way that individuals use it. Furthermore, there is nothing ‘objective’ that the words correspond to. “Discomfort”, “pain”, “suffering”, etc. may refer to a great many qualities of experience. Nonetheless, this will always be a challenge in pain research, and thus, it is important that scholars continue to work on updating and reinventing pain language as the social meanings of pain evolve.

The final reason why this research may have failed to yield significant results is that the research intends to do something it may be incapable of – empirically testing existential questions in the laboratory. Many of the participants reported that the imagined sacrifice condition was not compelling in their mind (less than a 5 on a ten point scale). So called, ‘questions of ultimate concern’ are lived out in meaningful contexts. The laboratory offers a sterile, safe, artificial environment in which to probe these questions; however, it may be the case that the nature of the environment makes it impossible to probe these questions meaningfully. That is to say, the research may be inherently flawed because participants cannot fully feel the weight of the existential concerns being considered in a safe, controlled laboratory setting. The attempt to empirically measure the existential problems may ultimately be an unwise decision born of a headstrong, unreflective epistemological commitment. Serious dialogue should be had in the discipline about the value and limits of studying existential questions in the laboratory.

The lack of effect of context on the experience of pain suggests that, in this experiment, simply imagining that the pain
being endured is a sacrifice for a loved one was not enough to change the quality of experience. This finding may reflect that sacrifice was not a compelling pain relief technique. However, it is also possible that this finding reflects that the technique for eliciting the sacrifice response to the noxious stimulus (that is, imagining the CPT to be a blood transfusion) was simply not compelling, whereas another scenario may have produced significant results. This conclusion is supported by the low to moderate scores for the realism of the sacrifice manipulation. One way that this might be to do the same research, but with people who have actually given bone marrow or an organ for a loved one. Though this research would require a quite unique pool of volunteers, working with people who actually understand the phenomenon of sacrifice might garner significant results.

CONCLUSIONS

There was a large gender effect on three of the five pain measures (see Table 2). These results are consistent with previous research (Keogh, Barlow, Mounce & Bond, 2006 and McClelland, & McCubbin, 2008) which showed that men tend to report less pain than women when doing the CPT. Particularly, the number of men who reached the peak time of three minutes as compared to the number of women who reached the peak time suggests that this gendered trend has found expression in this research study. It is difficult to say why men and women report pain differently. One possibility is that men are more unwilling to report pain than women. It is certainly possible that men are feeling a similar degree of pain, but not ‘letting it show’ on the outside. Also, it may also be the case that social pressure on men to report less pain actually translates to a different quality of experience where there actually is less pain. However, these remarks are only speculation, or perhaps an interesting question to an ambitious researcher.

Psychology, in its rush to be recognized as a Science, has adopted the Natural Sciences model of empirical investigation. Though this is a great strength of the discipline – that all knowledge must be verified through an agreed method – it also remains a weakness as well. Unlike the Natural Sciences, Psychology is a reflexive study. The ‘subjects’ that are being studied – it is largely agreed – have the same claim to personhood as the researcher. Thus, the ‘subjects’ can comment on their own being, rather than have their being defined externally as would be done for a rock. The attempt to standardize the human experience – especially in the most meaningful experiences such as pain – must always be approached with the utmost of delicacy. Further, it must be approached with a keen appreciation for the nature of the subjects and the way that their experience – their very way of being – is shaped by the researcher. That is to say, the role of the empirical researcher in Psychology can never be entirely neutral or standardized. In turn, the empirical research can never be completely standardized, as becomes abundantly apparent in research on existentially valuable experiences.

The significant gender by condition interaction on physiological pain score does indicate that, on this particular measure, both men and women reacted differently to the sacrifice condition. Men tended to report more physiological pain in the sacrifice condition and women tended to report slightly less pain in the sacrifice condition, compared to the controls. This indicates that there are the seeds of an alteration of the quality of experience when the participants put themselves in the imagined sacrifice situation. For the researcher who endeavors to follow in this vein of research, physiological, not emotional, pain in sacrifice may be a promising place to continue digging.
WORKS CITED


