

# The Influence of Social Threat on Pain, Aggression, and Empathy in Women



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**Abstract:** Only one published study has investigated the effect of a threatening social context on the perception and expression of pain, showing that social threat leads to increased pain reports but reduced nonverbal pain expression. The current study aimed to replicate and extend these findings to further explore the effects of a threatening social context. Healthy, female participants (N = 71) received 10 electrocutaneous stimuli delivered by a confederate. They were led to believe that the confederate was requested to administer 10 painful stimuli (control group) or that the confederate deliberately chose to deliver 10 painful stimuli when given the choice to deliver between 1 to 10 painful stimuli (social threat group). Self-reported pain intensity, unpleasantness, threat value of pain, and painful facial expression were assessed. Additionally, empathy and aggression toward the confederate were investigated. Social threat did not affect painful facial expression or self-reported pain intensity, but led to increased aggression toward the confederate. Moreover, perceived social threat predicted the threat value of pain and reduced empathy toward the confederate. We were not able to replicate the previously reported dissociation between pain reports and pain expression as a result of social threat. However, social threat was associated with an increased threat value of pain, increased aggression, and reduced empathy.

**Perspective:** A threatening social context affects how threatening pain is perceived and has interpersonal consequences such as increased aggression and reduced empathy, thereby creating a double burden on the individual suffering from pain.

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**Key words:** Social threat, pain expression, self-report, aggression, communication, retribution, empathy.

Recently, it has been proposed to acknowledge social components alongside sensory, emotional, and cognitive components in an updated definition of pain.<sup>52</sup> This proposal follows a growing body of re-

search showing that the social context in which pain occurs modulates the perception and communication of pain itself.<sup>4,25</sup> The most common way to communicate pain to others is through facial expressions.<sup>32</sup> The social communication model of pain<sup>4,18</sup> outlines how internal (eg, genetics or cognitive biases) as well as external factors (eg, ethnicity or clinical context), including the social context, can affect the encoding and decoding of pain signals. For example, the nonverbal expression of pain is modulated by gender<sup>24</sup> or the mere presence of others.<sup>45,46</sup>

According to evolutionary theory, emotions in general and pain in particular are expressed when it is advantageous to do so (eg, to elicit help from others).<sup>51</sup> However, expressing pain might not always be advantageous because it also signals vulnerability, which could be exploited by competitors or adversaries. Consequently, pain expression might be suppressed when in a threatening social situation (eg, in the presence of someone else who is intentionally trying to cause harm). This

Received September 14, 2017; Revised October 30, 2017; Accepted November 6, 2017.

This study was supported by the Odysseus Grant "The Psychology of Pain and Disability Research Program" funded by the Research Foundation Flanders, Belgium (FWO Vlaanderen) granted to Johan W.S. Vlaeyen. Johan W.S. Vlaeyen is also supported by the "Asthenes" long-term structural funding—Methusalem grant (METH/15/011) by the Flemish Government, Belgium. Ann Meulders is a postdoctoral researcher of the Research Foundation, Flanders, Belgium (FWO Vlaanderen; grant 2E3717). Kai Karos is a doctoral researcher supported by the Research Foundation, Flanders, Belgium (grant 1111015N).

The authors have no conflicts of interest to declare.

Supplementary data accompanying this article are available online at [www.jpain.org](http://www.jpain.org) and [www.sciencedirect.com](http://www.sciencedirect.com).

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1526-5900/\$36.00

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<https://doi.org/10.1016/j.jpain.2017.11.003>

hypothesis has been supported in a recent study using agent-based modeling, a computer simulation in which the effects of selection pressures on behaviors over generations are modeled. In this study pain expression was reduced almost completely in a context of exploitation.<sup>53</sup> Although possibly adaptive in a threatening situation, suppression of pain expression might also have adverse side effects such as underestimation of pain by others, a bias that is common in lay observers<sup>17,34</sup> as well as in health care professionals.<sup>21,35</sup> This is especially relevant in a clinical context because there is mounting evidence that chronic pain patients are frequently confronted with threatening social interactions such as stigmatization,<sup>6,7,50</sup> invalidation,<sup>8,9</sup> and perceptions of injustice.<sup>38,41,42</sup>

There is only limited experimental research investigating the effects of threatening social contexts on the perception and communication of pain.<sup>22,23</sup> One study showed that pain that is inflicted intentionally by someone else led to higher verbal pain reports than pain that is inflicted nonintentionally but unfortunately, facial pain expression was not investigated in this study.<sup>16</sup> To our knowledge, there is only 1 single experimental study that investigated verbal self-report as well as facial expression of pain in a threatening social context. This study showed that social threat in the form of intentionally administered electrocutaneous stimuli concurrently led to increased self-reported pain for high pain catastrophizers and decreased facial pain expression in high as well as low catastrophizing participants.<sup>31</sup>

In addition to impacting pain-related outcomes, social threat might have interpersonal consequences as well. For instance, an individual who is exposed to threat, might react with aggression and reduced empathy towards threatening others themselves, leading to further social isolation.<sup>13,49</sup> Social isolation itself also has been implicated in the development of psychosomatic symptoms in general,<sup>11,13</sup> and chronic pain in particular.<sup>47</sup>

Taking into account the clinical relevance and the lack of experimental research in this area, we aimed to replicate and extend the study by Peeters and Vlaeyen<sup>31</sup> investigating the effect of a threatening social context on pain. To this end, we compared a threatening social context with a nonthreatening social context using the same manipulation as in Peeters and Vlaeyen. In addition to self-reported pain intensity, unpleasantness, threat, and facial pain expression we also assessed aggression and empathy. We also investigated whether pain catastrophizing moderated the effects of social context. We hypothesized that a threatening social context 1) increases self-reported pain intensity, unpleasantness, threat, and aggression, but 2) decreases facial expression of pain and self-reported empathy compared with a nonthreatening social context.

## Methods

### Participants

We recruited 71 female participants between the age of 18 and 38 years (mean = 21.51 years, SD = 3.50) by

spreading flyers at the Faculty of Psychology and Educational Sciences of the KU Leuven as well as through the departmental Experiment Management System (Sona Systems). The study was advertised as a study investigating the effect of personality traits on the administration and the receiving of painful stimuli, explaining that the participant will come to the laboratory alongside another participant and that there is a possibility that she will experience and/or administer painful/unpleasant stimuli. Sample estimates were on the basis of the earlier study by Peeters and Vlaeyen.<sup>31</sup> Of the 71 participants, 67 were students (94%). The exclusion criteria for this study were presence/diagnosis of (acute or chronic) pain, the use of anxiolytics or antidepressants, the need to avoid stressful situations on medical advice, a neurological or psychiatric disorder, electronic implants (eg, pacemakers), pregnancy, impaired uncorrected vision, heart disease or other severe medical conditions, and nonfluency in Dutch. One participant fulfilled 1 of the exclusion criteria and therefore had to be excluded, bringing the total number of participants eligible for analysis to 70. Participants were recruited and compensated in 2 ways: first-year psychology students participated in return for course credit (n = 22; 31%); volunteers recruited by means of flyers were paid €8 for their participation (n = 49; 69%).

### Ethical Approval

The experimental protocol was approved by the Social and Societal Ethics Committee of the KU Leuven (Belgium; registration number: G-2015 04 220). All participants provided informed consent before participation. It was emphasized that participation was completely voluntary and that participants were allowed to stop the experiment at any time without any negative consequences.

### Experimental Design and Social Threat Manipulation

A between-subject design was used, with participants being randomized either into the social threat group (n = 36) or the control group (n = 34). The manipulation of social threat was borrowed from Peeters and Vlaeyen<sup>31</sup>: Participants came to the lab with a female confederate (Caucasian female, age 23 years) whom they believed to be another participant. On the basis of a bogus randomization procedure, the participant was allocated to receive painful electrocutaneous stimuli, whereas the confederate was allocated to administer them to the participant. The confederate was then asked to choose how many electrocutaneous stimuli she wanted to administer to the participant. In the social threat group, the confederate could choose from 1 to 10 stimuli and chose to administer the maximum of 10 painful stimuli. In the control group, the confederate did not have a choice and was requested by the experimenter to administer 10 painful stimuli. So although the number of painful stimuli in both groups was identical (10 stimuli), the participant was led to believe that the confederate intentionally chose to deliver the maximum of painful

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