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The role of painful events and pain perception in blood-injection-injury fears

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Abstract

Background and objectives—Research suggests that blood, injection, and injury (BII) fears are related to painful experiences; however the role of frequency, intensity, and perceived ability to handle such events remains unknown. The aim of this study was to examine the relationship between BII fears and the frequency and intensity of prior painful experiences with blood, injuries, and injections. The relation of BII fears with self-reported tolerance and avoidance of physical discomfort and pain was also examined.

Methods—In the context of an undergraduate student survey, 392 participants completed questions about whether they were fearful of blood, injection, and injuries. They also completed questions about experiences with blood and injuries, as well as injections, including pain intensity, frequency of painful experiences, perceived ability to tolerate physical discomfort and pain (pain perception), and avoidance of physical discomfort.

Results—Findings indicated that only pain intensity, but not frequency of painful experiences with blood, injuries, and injections, was related to BII fears. Furthermore, there was a significant association between BII fears and pain perception, such that higher levels of discomfort intolerance were related to greater odds of endorsing BII fears.

Conclusions—These findings provide preliminary evidence that BII fears are associated with experiences with injections of high pain intensity. Individuals with a lower perceived ability to handle physical pain and discomfort are more likely to endorse BII fears. Clinical considerations and future directions are discussed.

Keywords

Pain; Blood; Injections; Injury; Fear

1. Introduction

The association between pain, such as the perceived ability to handle physical pain and the intensity and frequency of painful experiences, and blood-injection-injury (BII) fears remains poorly understood. According to retrospective accounts by individuals reporting aversive experiences with BII stimuli prior to their fear onset, one third of individuals with blood phobia and half of individuals with injection phobia reported that *painful* experiences preceded the onset of BII fears (Öst, 1991). The role of pain appears to be a critical factor in

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both the development and maintenance of fear. Rachman (1977) proposed that fear acquisition occurs when a neutral stimulus is paired with a fearful or pain-producing state, with repetitions of the pairing (*frequency*), as well as the *intensity* of fear or pain during these experiences contributing to the subsequent levels of fear. In such, the association between pain and BII stimuli may play an important role in BII fears (Öst & Hugdahl, 1985). Additionally, the pairing of pain and fear may contribute to the maintenance of such fears. For instance, Lethem, Slade, Troup, and Bentley (1983) outlined a fear-avoidance model of exaggerated pain perception such that fear is maintained by a tendency to exaggerate pain, which is associated with elevated pain intensity (Severeijns, Vlaeyen, van den Hout, & Weber, 2001). This exaggerated pain response and elevated pain intensity are further fueled by avoidance. As such, BII fears may be maintained by high pain intensity experiences involving BII stimuli.

The role of pain in relation to BII fears has garnered attention, particularly in the fainting response. Based on retrospective accounts of fear, feelings of faintness, pain, and disgust during blood draws, fearful individuals showed a greater tendency to feel pain during venipuncture as compared to those reporting less or no fear of needles (Deacon & Abramowitz, 2006). In first time blood donors, higher levels of pain sensitivity and BII fears predicted the fainting response more strongly than trait anxiety, anxiety sensitivity, and fainting history (Meade, France, & Peterson, 1996), suggesting the importance of pain perception in BII fears and its accompanying symptomatology.

Further support for the role of painful experiences and pain perception comes from studies on dental phobia and pain. In a sample of undergraduate students, pain perception and the number of painful dental experiences related significantly to dental fears, such that higher levels of perceived pain were associated with greater levels of fear (De Jongh, Muris, Ter Horst, & Duyx, 1995). Individuals seeking treatment for dental fears also endorsed greater and longer-lasting pain during previous dental procedures in comparison to their non-anxious counterparts (van Wijk & Hoogstraten, 2009). The expectation of pain may also contribute to fear and anxiety. For example, in a sample undergoing two extensive dental procedures, anxious individuals reported inaccurate expectations of pain and anxiety (Arntz, van Eck, & Heijmans, 1990). Before both dental treatments, the anxious group overestimated their predicted pain, despite reporting pain levels similar to the low anxiety group during the procedure. These findings highlight the importance of pain perception and fear, particularly for fearful individuals. With the considerable overlap of individuals meeting diagnostic criteria for dental phobia and BII phobia (De Jongh et al., 1998), BII fears may have a similar relation to pain-related factors.

The aim of this study was to further illuminate the role of painful experiences and pain perception in BII fears. To replicate and extend previous findings, we assessed BII fears, frequency and intensity of painful experiences with blood, injury, and injections, and the perceived ability to handle general physical pain and discomfort. In line with extant literature on painful experiences and fears, we hypothesized that the number and intensity of previous painful experiences with blood, injuries and injections would be associated with BII fears. That is, individuals with a greater number of higher intensity painful experiences with blood, injuries, and injections would be more likely to endorse BII fears. Additionally, we assessed the relation of pain perception and BII fears, hypothesizing that a lower perceived ability to handle general physical discomfort and pain would be related to a greater likelihood of endorsing BII fears.

2. Method

2.1. Participants

The sample included 392 undergraduate students. Seventy-seven percent of the sample was female and the mean age was 19.79 years (SD = 2.70; Range = 18–52). Seventy-three percent of the sample identified as Caucasian, 5.6% as African American, 8.7% as Hispanic, 7.4% as Asian, 2% as mixed race, and 3.1% as other.

2.2. Procedures and measures

Undergraduate students enrolled in psychology classes were invited to participate in an online screening containing various questions including the ones below. The study was approved by the university ethics committee and informed consent was obtained from all participants. Questions were completed using a secure online website. To assess current BII fears, participants were asked to respond "yes" or "no" to the following question "*Are you fearful or anxious of blood, injections, or injuries?*" Frequency and intensity of previous painful experiences with BII stimuli were assessed using four questions. Frequency was assessed with two questions: one asking about experiences with blood/injuries and a separate question referring to experiences with injections. Individuals indicated the *number of painful experiences* experienced for both blood/injuries and injections. Additionally, participants rated the *worst level of pain*, using a 0–100 scale, experienced with blood/injuries stimuli, as well as injections.

Participants also completed the *Discomfort Intolerance Scale* (DIS; Schmidt, Richey, & Fitzpatrick, 2006), a brief self-report questionnaire measuring the ability to tolerate physical pain and discomfort. The scale uses a seven point Likert-type scale ranging from *not at all like me* (0) to *extremely like me* (6). The scale has two factors: ability to tolerate discomfort and pain (Factor 1: $\alpha = .91$), and a factor that appears to measure avoidance of physical discomfort (Factor 2: $\alpha = .72$; Schmidt et al., 2006), with similar internal consistency in the current sample for Factor 1 ($\alpha = .94$) and Factor 2 ($\alpha = .65$).

The *Anxiety Sensitivity Index* (ASI; Reiss, Peterson, Gursky, & McNally, 1986) is a 16-item scale intended to capture fear of anxiety-related symptoms. The items are rated on a 5-point Likert-type scale (0 = *very little* to 4 = *very much*) with total scores ranging from 0 to 64. The scale has good internal consistency ($\alpha = .80–.90$; Peterson & Reiss, 1992) and good construct validity (McNally & Lorenz, 1987), with similar internal consistency found in the current sample ($\alpha = .85$).

2.3. Statistical analysis

Prior to all analyses, descriptive statistics were run to identify means and standard deviations for the study variables. BII fear was coded as no fear (0) and fear (1), and gender was coded 0 and 1 for males and females, respectively. To test for group differences between BII fearful and non-fearful groups, *t*-tests were used for continuous variables, and a χ^2 test was used to examine group differences on gender. Correlations between the study variables were run to identify relationships between the constructs of interest. To test the hypothesis that the frequency and intensity of painful BII experiences as well as discomfort intolerance would be related to BII fears, a logistic regression was used. Continuous predictor variables were standardized for better comparison between the odds ratios. Assumptions of logistic regression were met: normal distribution of the residuals, a non-significant Hosmer and Lemeshow test indicating goodness of fit, and values for Cook's influence less than 1 indicating the absence of outliers (Tabachnick & Fidell, 2007).

3. Results

3.1. Descriptive statistics

Thirty-five percent (n = 138) of the sample endorsed blood, injection, and injury fears. Of the individuals endorsing BII fears, the majority was female (n = 118). There were group differences for gender, such that the BII fearful group was significantly more likely to be female (83%) than those in the non-fearful group (60.4%). Mean scores and standard deviations for each of the variables are provided in Table 1.

3.2. Correlations between individual variables

BII fears were significantly correlated with gender as well as injection pain intensity and discomfort intolerance (Table 2). Gender was also significantly correlated with pain intensity during injections, discomfort intolerance, and avoidance of physical pain. Pain intensity variables were significantly correlated, as were the variables assessing the number of painful experiences.

3.3. Pain perception and experiences in BII fears

Logistic regression was performed to assess the association of a number of pain-related factors with the likelihood that individuals would report fear of blood, injections, and injuries. Table 3 includes the nine independent variables in the model and the statistics for each variable (age, gender, anxiety sensitivity, number of painful blood and injuries, number of painful injections, pain intensity during blood and injuries, pain intensity during injections, discomfort intolerance and avoidance of physical discomfort). The overall model containing all predictors was statistically significant, χ^2 (9, N = 392) = 53.08, p < .001, indicating that the model was able to distinguish between individuals with and without BII fears. The whole model explained 17.4% (Nagelkerke R^2) of the variance in BII fears and correctly classified 69.9% of the cases.

There were two variables that made a statistically significant contribution to the model over and above other variables in the model: pain intensity during injections and Factor 1 of the Discomfort Intolerance Scale. Higher levels of pain during experiences with injections were positively related to BII fears (B = .52; p < .001; OR = 1.67). The number of painful experiences with injections was not significantly related to BII fears, suggesting that intensity regardless of frequency plays a greater role. Neither pain intensity nor the number of painful experiences with blood and injuries was associated with BII fears. Higher levels of discomfort intolerance, meaning a lower perceived ability to tolerate physical pain as indicated by DIS Factor 1 scores, were significantly related to BII fears (B = .51; p < .001; OR = 1.67). Avoidance of physical discomfort was not related to BII fears (B = −.03; p > .05). Anxiety sensitivity was not related to BII fears over and above the other variables in the equation (B = −.05; p > .05).

4. Discussion

The aim of the study was to examine the relation between BII fears and pain, specifically painful experiences with BII stimuli and discomfort intolerance. We found support for a role of painful experiences and pain perception in BII fears. Related to painful experiences, only high intensity pain experiences with injections were associated with BII fears. However, the frequency and intensity of painful experiences with blood and injuries, as well as the frequency of painful experiences involving injection stimuli, did not significantly predict BII fears. According to the fear-avoidance model of pain, confrontation (e.g., approach behaviors) with the painful experience is associated with decreases in fear (Lethem et al., 1983). This suggests that the frequency of these experiences may not be closely related to

BII fears. With respect to pain intensity, higher pain intensity ratings were associated with greater odds of reporting BII fears. This parallels the findings on the relationship between fears and elevated perceived pain during exposure to feared stimuli in patients with dental phobia (De Jongh et al., 1995; Hakeberg & Cunha, 2008; van Wijk & Hoogstraten, 2009).

Endorsing BII fears may depend less on repeated painful experiences and more on the pain intensity of these experiences. Along these lines, Arntz, van den Hout, van den Berg, and Meijboom (1991) suggested that fear may be affected by expectations of pain intensity. Underpredicted pain intensity to a painful stimulation was followed by an increased physiological fear response, as well as a greater increase in subjective fear and pain expectancy of future painful experiences (Arntz et al., 1991). As such, BII fearful individuals may have experienced a situation in which they received an injection, expecting little or no pain, which could have affected subsequent fear responses.

Following a painful injection, individuals may have exaggerated the pain and recalled disproportionately elevated pain intensity. The pain intensity variable may be capturing this altered perception of pain. For example, in a study with highly anxious dental patients, individuals rated their pain intensity preceding, during, and following dental procedures (Arntz et al., 1990). Results showed that these individuals retrospectively reported significantly more pain following the procedure than they actually reported experiencing during the procedure. This was despite a lack of differences from non-anxious dental patients in pain they reported experiencing during the procedure (Arntz et al., 1990).

Our results further indicated that the perceived ability to handle physical pain and discomfort was also significantly related BII fears. Individuals with a lower perceived pain tolerance, as indicated by higher discomfort intolerance, were more likely to endorse BII fears. Avoidance of physical discomfort was not associated with BII fears, possibly suggesting a dispositional characteristic of lower pain tolerances or thresholds in individuals with BII fears. The temporal relationship between pain tolerance and BII fears is unknown and was not tested in the current study.

Clinical levels of BII fears are associated with avoidance of medical procedures and can have serious health consequences (Kleinknecht & Lenz, 1989). Considering the findings of the current study and previous research, targeting pain perception may be therapeutically valuable. For instance, Acceptance and Commitment Therapy (ACT) has shown promise in targeting the element of pain (for a review see Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Specifically, undergraduate students receiving brief sessions in ACT techniques were able to better tolerate pain for a longer duration in a laboratory task designed to induce pain, and outperformed those receiving a cognitive behavioral pain management intervention (Gutiérrez, Luciano, Rodríguez, & Fink, 2004) and the attention placebo (Hayes et al., 1999). Individuals were also more willing to continue with the pain task, even after reporting high levels of pain. Thus, altering pain perception and willingness to tolerate pain may be a worthwhile area to explore.

Our study has a number of limitations that require mentioning. Generalizability of the results is limited due to the nature of the sample (i.e., undergraduate students). Further, the cross-sectional design limits the interpretations of the findings regarding temporal sequence. Fear was assessed dichotomously and not divided by type of fear (i.e., blood, injections, or injuries), precluding an analysis of fear severity and specificity. Additionally, the retrospective reporting of pain may be biased as studies have shown that memories of pain can be significantly influenced by both predicted and experienced pain (Arntz et al., 1990). Future studies should assess how the fear of pain, expectations of pain, and pain catastrophizing are related to the development and maintenance of BII fears.

Taken together, our findings provide preliminary evidence that individuals with a lower perceived ability to handle physical pain and discomfort, and a history of intense painful experiences with injections are more likely to report fears of blood, injections, and injuries. This suggests a relation between pain-related factors and BII fears, inviting further investigation into the role of pain perception in BII fears.

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Table 1

Means (and standard deviations) for of sample characteristics.

	BII fearful *n* = 138	BII non-fearful *n* = 254	Group differences *t*(390)
%Female	83.1	60.4	9.56 *[a]
Age	19.66 (2.29)	19.85 (2.90)	.68
Anxiety sensitivity	20.01 (8.97)	19.52 (9.18)	−.50
Number painful experiences blood/injury	4.46 (8.04)	4.87 (11.08)	.38
Number painful experiences injection	2.64 (4.44)	3.80 (20.20)	.67
Blood/injury pain intensity	47.71 (30.60)	44.1 (30.49)	−1.03
Injection pain intensity	31.21 (26.11)	19.2 (20.01)	−5.15 **
Discomfort intolerance (DIS factor 1)[b]	6.79 (3.43)	4.3 (3.29)	−5.38 **
Pain avoidance (DIS factor 2)[b]	9.07 (3.48)	8.20 (3.18)	−2.50

Note:

* $p < .01$,

** $p \leq .001$; $N = 392$.

[a] $\chi^2(1, N = 392)$.

[b] Discomfort Intolerance Scale.

Table 2

Correlation matrix of main study constructs.

Variable	1	2	3	4	5	6	7	8	9
1. Fear									
2. Gender	.16*[a]								
3. Age	−.03	−.06							
4. Anxiety sensitivity	.02	.11	.04						
5. Number painful experiences blood/injury	−.02	−.07	−.02	.06					
6. Number painful experiences injection	−.03	.03	−.01	.01	.13*				
7. Blood/injury pain intensity	.05	−.04	−.02	.05	.32**	.10			
8. Injection pain intensity	.25**	.14*	−.02	.07	.12	.16*	.39**		
9. Discomfort intolerance (DIS factor 1)[b]	.26**	.22**	.07	.15*	−.13*	.03	−.10	.16*	
10. Pain avoidance (DIS factor 2)[b]	.13	.16**	.15*	.23**	−.03	.06	.03	.20**	.44**

Note:

* $p \leq .01$,

** $p \leq .001$; $N = 392$.

[a] Phi coefficient.

[b] Discomfort Intolerance Scale.

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Table 3

Logistic regression predicting BII fears with demographic and pain perception variables.

Variable	*B*	S.E.	Wald	*p*	Exp (*B*)
Gender	.47	.30	2.53	.11	1.61
Age	−.09	.12	.59	.44	.91
Anxiety sensitivity	−.05	.12	.20	.66	.95
Number painful experiences blood/injury	.03	.14	.04	.85	1.03
Number painful experiences injection	−.40	.38	1.11	.29	.67
Blood/injury pain intensity	−.01	.13	.01	.93	.99
Injection pain intensity	**.52**	**.13**	**15.55**	**.001**	**1.67**
Discomfort intolerance (DIS factor 1)[a]	**.51**	**.13**	**15.27**	**.001**	**1.67**
Pain avoidance (DIS factor 2)[a]	−.03	.13	.06	.81	.97
Constant	−1.07	.27	16.08	.00	.35

Note: Continuous variables were standardized.

The *p* values are provided in the table with bold values representing significance at $p < .001$.

[a]Discomfort Intolerance Scale.