

**A comprehensive group-based cognitive behavioural treatment for
blood-injection-injury phobia**

Abstract

Objectives: A key feature of blood-injection-injury (BII) phobia is activation of disgust responses, in addition to fear. Yet standard treatments have largely neglected addressing disgust responses. The disorder is further complicated by fainting in 75% of sufferers. Moreover, treatments have been traditionally delivered in an individual format, which may not be as efficient as group treatment. The aim of this study was to develop a group-based program for BII phobia, with components targeting fear, disgust, and fainting, to determine feasibility and effectiveness of such an intervention.

Methods: Participants took part in an 8-session, group-based Cognitive Behavioural Therapy (CBT) program for BII phobia (N = 40). The key outcome measure was the Multidimensional Blood/Injury Phobia Inventory, which assesses a range of phobic stimuli and responses (including fear, disgust, and fainting).

Results: There were significant improvements, with large effect sizes, across symptoms over the course of treatment. Participants with higher disgust sensitivity reported higher pre-treatment symptom severity and greater life interference than those with lower disgust scores. Despite this, neither pre-treatment disgust sensitivity nor fainting history impacted on treatment response. For the first time, however, we showed that greater reductions in disgust to BII stimuli were associated with greater overall symptom reductions, highlighting the importance of disgust in the treatment of this disorder, and potentially others.

Conclusion: Despite the heterogeneous nature of BII phobia, this group-based, modified CBT intervention was effective in reducing a variety of phobic responses, including fear, disgust, and fainting.

Keywords: blood-injection-injury phobia; disgust; exposure therapy; applied tension; cognitive behavioural therapy; anxiety

Blood-injection-injury (BII) phobia is an excessive and persistent fear triggered by seeing blood, an injury, or by receiving an injection or other invasive medical procedure. The phobia can cause significant distress and impairment as affected individuals may avoid seeking necessary medical assessment and treatment. BII fears are very common, with an estimated prevalence between 3-13% in adults (Bienvenu & Eaton, 1998; Stinson et al., 2007). BII phobia also comes with an attendant morbidity risk due to the potential avoidance of important and timely medical procedures ranging from routine check-ups to surgical operations (Marks, 1988; Page, 1994).

A unique feature of BII phobia, when compared to other phobic disorders, is the presence of vasovagal syncope (fainting) in approximately three quarters of sufferers (Kleinknecht & Lenz, 1989). BII phobia is further complicated through activation of the disgust response system (Olatunji, Smits, Connolly, Willems, & Lohr, 2007b; Olatunji, Williams, Sawchuk, & Lohr, 2006; Sawchuk, Lohr, Tolin, Lee, & Kleinknecht, 2000; Tolin, Sawchuk, & Lee, 1999). Because disgust is commonly associated with contamination threat and serves to prevent contact with contaminants (Olatunji, Sawchuk, de Jong, & Lohr, 2006), the avoidance of phobic stimuli in BII fears may be related to both disgust (associated with the threat of contamination) as well as to fear (associated with the threat of injury). Not only is the experience of fear strongly correlated with disgust in BII phobia, but there is evidence suggesting that disgust may be the primary emotion in terms of greater intensity (Olatunji & Sawchuk, 2005).

Despite the key role of disgust in BII phobia, standard treatments for BII phobia have largely neglected addressing disgust responses. This is even more troubling when one considers that the activation of the disgust system may contribute to making treatment for BII phobia more difficult (Woody & Teachman, 2000). Moreover, evidence suggests that disgust may be more resistant to extinction during exposure therapy when compared to fear, therefore

reducing potential treatment effectiveness (Mason & Richardson, 2010; Olatunji, Forsyth, & Cherian, 2007a). For example, an analogue study by Olatunji et al. (2007b) found that disgust responses in individuals with a marked fear of BII stimuli did not decline to the same extent as fear responses, after exposure to phobic-relevant stimuli. This finding is consistent with research involving other anxiety disorders where disgust is a primary emotion, suggesting that disgust is unlikely to be reduced by traditional exposure therapy in an efficient manner (Mason & Richardson, 2012). Treatment for BII phobia may therefore be enhanced by finding ways to improve reductions in disgust to phobic stimuli (see Mason & Richardson, 2012 for a review).

Most current CBT approaches utilise a combination of psychoeducation, cognitive restructuring, and graded exposure to feared stimuli, along with applied muscle tension techniques for those who also experience vasovagal (fainting) symptoms (e.g., Antony & Watling, 2006; Chapman & DeLapp, 2014; Craske, Antony, & Barlow, 2006; Mednick & Claar, 2012). While the treatment literature recommends that the effectiveness of Cognitive Behavioural Therapy (CBT) for BII phobia may be enhanced by adding applied muscle tension strategies to address fainting and by improving reductions in disgust sensitivity, there is little evidence to date as to how best to optimise the combination of these strategies. For example, the most recent review in the field identified only five randomised control trials (RCTs) comparing various therapeutic techniques used to treat BII phobia (Ayala, Meuret, & Ritz, 2009). Not only were these trials conducted by the same research group (Ost and colleagues), none included strategies to address maladaptive disgust responses, highlighting the need for further research in the field.

BII phobia is arguably the most heterogeneous phobia both in terms of the variety of stimuli to which sufferers are phobic and the variety of responses to phobic stimuli, namely, fear, disgust, and fainting (or a combination of these). This is likely the reason why

treatments for this disorder have been traditionally delivered in an individual format. There are, however, a number of benefits of group treatment. These include normalising of experiences, positive reinforcement, encouragement, vicarious learning, as well as assistance by other group members with cognitive challenging and the provision of additional exposure opportunities (Whitfield, 2010). Given these as well as the time-limited and potentially cost-effective nature of group treatment, the aim of this study was to develop and evaluate a comprehensive 8-session group treatment protocol to address BII phobia to determine the feasibility and effectiveness of such an intervention. As an extension to existing protocols/traditional CBT techniques used to treat BII, including exposure therapy and applied tension, we added treatment components designed specifically to address maladaptive disgust responses (details below). Despite the key role of disgust in several anxiety disorders, to the best of the authors' knowledge, no study has investigated whether changes in disgust impact treatment response in BII phobia. However, related to this question, Olatunji and colleagues showed that changes in disgust and fear mediated changes in symptoms in a treatment seeking, though not formally clinical, sample of individuals with spider phobia undergoing exposure therapy (Olatunji, Huijding, de Jong, & Smits, 2011). In addition, Mathes et al. (2020) recently showed that changes in both disgust and fear predicted treatment outcomes in individuals with contamination-based OCD who were treated with exposure and response prevention. Therefore, the second aim of this study was to determine whether changes in disgust to BII phobic stimuli impact treatment response for BII phobia.

Method

Participants

Forty adults (29 females, 11 males, $M_{age}=28.5$ years, age range: 20-54 years) were recruited via university and community notices. The majority of participants were born in

Australia (73%) and employed either full-time or part time (65%), with the remaining 35% being full-time students. All were diagnosed at initial assessment with a Specific Phobia (DSM-IV code 300.29 or ICD-10 code F40.2).

Description of BII phobia group program

The BII phobia group program consisted of eight sessions of 2-hour duration. The first seven sessions were delivered weekly. There was a break of 4 weeks between the seventh and eighth session to allow participants to do further exposure tasks and to consolidate treatment gains. A description of the content of each session can be found in Table 1. In addition to the homework tasks listed, clients were encouraged to read the relevant chapter(s) from *Overcoming Medical Phobias* (Antony & Watling, 2006) each week. As outlined in Table 1, the structure of the group program began with psychoeducation followed by the delivery of cognitive and behavioural skills to manage fear, disgust, and fainting. Additional strategies (relative to traditional protocols) to target disgust included: psychoeducation regarding the role of disgust in BII phobia; “symptom surfing” (including labelling and accepting disgust responses, akin to “panic surfing”); cognitive restructuring targeting secondary disgust appraisals (e.g., “I can’t cope with feeling disgusted”); symptom/disgust exposure; as well as conceptual reorientation and deconstruction – this involved psychoeducation about BII phobic stimuli, and encouraged participants to view BII stimuli in a slightly different manner. For example, participants were encouraged to view blood as simply a substance composed of mostly red and white blood cells, platelets, and plasma. In addition, they were prompted to consider the positive functional aspects of blood, such as its life-sustaining properties. They were also encouraged to view BII phobic stimuli and situations from a clinical, detached perspective, as there is some limited evidence that this may be effective in reducing disgust responses to BII-related stimuli (Gross, 1998). For

further information regarding these additional strategies proposed to target disgust responses, please see Mason and Richardson (2012).

Measures

The pre- and post-treatment measures administered were:

Multidimensional Blood/Injury Phobia Inventory (MBPI; Wenzel & Holt, 2003). The MBPI is a valid and reliable tool to evaluate the subdimensions of BII phobia (Ak, Birgul Ak, & Kilic, 2014; van Overveld, de Jong, Peters, & Schouten, 2011). Indeed the MBPI is the only scale that assesses both anxiety and disgust in relation to blood phobia stimuli (van Overveld et al., 2011). The MBPI assesses four types of phobic stimuli (injections, injury, hospitals, blood), five types of responses (fear, avoidance, worry, disgust, fainting), and a “self” versus “other” focus. There are 40 items and participants rated the degree to which each item is typical of them on a 5-point scale (ranging from 0 = very slightly or not at all; 4 = extremely). Ratings from each item are summed for a total blood/injury phobia score (possible range: 0–160). The disgust subscale measures feelings of disgust to the aforementioned types of phobic stimuli.

Medical Fear Survey (MFS; Kleinknecht, Kleinknecht, Sawchuk, Lee, & Lohr, 1999). The MFS contains 50 items assessing medically related fears across five domains: Injections and Blood Draws, Sharp Objects, Blood, Mutilation, and Examinations and Symptoms. This measure has very good reliability (Cronbach’s alpha ranging from 0.84 to 0.94 for the five subscales), as well as convergent and discriminant validity (Kleinknecht et al., 1999). MFS items also discriminate between “fainters” and “non-fainters” (Kleinknecht, Thorndike, & Walls, 1996). Participants are asked to rate their degree of fear or tension if they were to be exposed to each item, using a 5-point Likert scale, ranging from 0 = No fear or tension to 4 = Terror.

State-Blood-Injection Symptom Scale (State-BISS). This measure is an extension of the Blood-Injection Symptom Scale (Page, Bennett, Carter, Smith, & Woodmore, 1997) as it is more sensitive to changes in symptoms. It measures symptoms elicited by blood, injury or injection stimuli, and contains 28 items. Respondents are prompted to answer how they would “feel right now” if currently exposed to a blood, injury, or injection situation; and to rate how strongly they are feeling the sensation, on a 5-point Likert scale (0 = not at all, 1 = mildly, 2 = moderately, 3 = strongly, 4 = severely).

Disgust Scale–Revised (DS-R); Haidt, McCauley, & Rozin, 1994; Olatunji et al., 2007c). The DS-R is a 27-item measure that assesses the degree to which the respondent experiences disgust to a variety of stimuli. The DS-R has sound reliability and validity, with three distinct factors: core disgust, animal-reminder, and contamination disgust (Olatunji et al., 2007c). Core disgust includes items related to rotten food, small animals, and bodily products. Animal-reminder disgust includes items related to body envelope violations and death. Contamination disgust includes items related to hygiene and perceived threat of transmission of contagion (Olatunji et al., 2007c). Following the removal of two catch items and the reverse scoring of relevant items, scores are averaged across all items.

Mutilation Questionnaire (MQ); Klorman, Weerts, Hastings, Melamed, & Lang, 1974). The MQ is a 30-item true/false questionnaire which measures the verbal and cognitive features of mutilation and blood/injury fear. It has established validity and reliability with demonstrated treatment sensitivity (Hood & Antony, 2012).

Depression Anxiety and Stress Scale (DASS-21); Lovibond & Lovibond, 1995). This measure is a 21-item self-report scale that screens for psychological distress across three domains - depression, anxiety and stress. Each domain has seven items with four possible responses ranging from 0 (*did not apply to me at all*) to 3 (*applied to me much, or most of the time*), indicating the degree to which each statement applied to them over the previous week.

A score for each domain was calculated by summing responses for each of the seven relevant items to determine the level of psychological distress (from “normal” to “extremely severe”). The DASS-21 total scale score has been found to have good consistency and construct validity (Henry & Crawford, 2005; Page, Hooke, & Morrison, 2007).

Life Interference Scale (LIS) is adapted from the Child Anxiety Life Interference Scale [CALIS] (Lyneham et al., 2013). This measure assesses the degree to which the blood-injection-injury phobia currently interferes with the life of the respondent, in four main domains related to work/school/career, leisure activities, social life, and home/family life; as well as daily life in general. Respondents are prompted to answer the extent to which the phobia interferes with their life on an 8-point Likert scale, ranging from 0 = not at all to 8 = extremely.

Procedure

In total, five groups were treated between 2011 and 2015. Groups were facilitated by two graduate clinical psychology trainees. Data were collected with written consent at admission and discharge for each participant as part of the treatment program.

All potential participants completed a preliminary individual screening assessment, which involved the administration of a semi-structured interview as well as the measures outlined above. The interview included questions related to the nature of the current problem, history of problem, motivation to seek treatment, psychosocial functioning, medical history, current medications, as well as comorbid mood and anxiety disorders. Participants were included if they met DSM-IV diagnostic criteria for a Specific Phobia (Blood-injection-injury type, 300.29).

Therapists followed a detailed treatment manual and received weekly supervision by an experienced clinical psychologist. Treatment integrity was also monitored by the supervisor via reviewing video recordings of the sessions and progress notes.

Results

Sample characteristics

The mean age of participants was 28.53 years ($SD = 9.30$), range 20-54 years. Whilst there was some overlap between categories, 31 were predominantly fearful of injections, seven fearful of blood and associated medical care, and two fearful of injuries only. Other demographic characteristics can be found in Table 2. Across all participants, the mean score on the MBPI at baseline was 59.64 ($SD = 26.99$).

Fainting history

Thirty participants (75%) reported a history of fainting. There were no differences at pre-treatment in overall symptom severity between participants with a history of fainting and those without a history of fainting [largest $t(38) = 1.47, p = 0.15$, on the MBPI]. However, on the BISS, while there were no differences in terms of the Anxiety [$t(38) = 0.29, p = 0.78$] and Tension [$t(38) = 0.81, p = 0.42$] subscales, as would be expected, those with a history of fainting did report greater symptoms associated with fainting [$t(38) = -2.05, p = .047$].

Disgust sensitivity

The mean disgust score at baseline was 1.62 ($SD = 0.61$), which is similar to what was found in a large online study of more than 30000 participants from the general community ($M = 1.67$; unpublished data reported on the DS-R homepage -

<http://people.stern.nyu.edu/jhaidt/disgustscale.html>). Participants with higher disgust

sensitivity (based on a median split on the DS-R) reported higher pre-treatment symptom severity (on the MBPI, MFS, and MQ; $ps < 0.01$) and greater life interference than those with lower disgust scores [$t(38) = 6.85, p = 0.005$].

Treatment completion

Thirty-one participants (77.5%) attended all eight sessions and completed the treatment/post-treatment questionnaires. Mean pre-treatment symptom scores for completers

and non-completers are shown in Table 3. There were no differences in pre-treatment symptom severity between treatment completers and non-completers [largest $t(38) = 1.20$, $p = 0.24$, on the DASS-21). Of the nine participants who did not complete treatment, one participant completed six sessions, three participants completed five sessions, three participants completed four sessions and one participant did not complete any sessions. Reasons for non-completion were known for six of these participants and included conflicting commitments as well as illness.

Changes in symptoms across treatment

Mean pre- and post-treatment symptom scores can be found in Table 3. As can be seen in Table 3, there were significant improvements across all outcome measures over treatment, except disgust sensitivity (DS-R). These analyses were repeated using multilevel modelling, in which participants were nested within treatment group (there were five groups treated over 2011 to 2015), but there was no significant effect of group and hence the patterns of results were unchanged. The effect sizes were very large in the symptom indices that focused on blood-injection fears and large in those that addressed symptoms more generally. There were no interaction effects across measures [largest $F(4,26) = 2.11$, $p = 1.11$, DS-R]. There was, however, a main effect of group on the MBPI [$F(4,26) = 7.81$, $p < 0.001$], the MFS [$F(4,26) = 4.70$, $p = 0.005$], and the MPBI disgust subscale [$F(4,26) = 4.38$, $p = 0.008$], suggesting some differences between groups in symptom levels. There was no main effect of group across other measures (largest [$F(4,26) = 2.61$, $p < 0.06$, MQ]).

Predictors of treatment change

Baseline disgust sensitivity

Linear regression was used to determine whether disgust sensitivity at baseline predicted the degree to which BII phobia symptoms decreased over treatment. We first calculated a change score (pre-treatment symptom score minus post-treatment symptom

score) for each outcome measure. We entered pre-treatment DS-R scores as the independent variable (IV) and the change in symptom score as the dependent variable (DV). For symptom measures where we previously found a main effect of group (the MBPI, MFS, and MBPI disgust subscale), group was also entered as an IV. Controlling for group, pre-treatment disgust sensitivity impacted on the magnitude of symptom reduction as measured by the MBPI ($\beta = 22.52$, $SE = 5.65$, $t = 3.99$, $p < 0.001$) and the MFS ($\beta = 15.59$, $SE = 6.35$, $t = 2.46$, $p = 0.02$), with those with higher pre-treatment disgust sensitivity showing greater BII phobia reductions over treatment. Note that this is due to a higher starting point on the MBPI and MFS, rather than a lower score at post-treatment – see Figure 1 for illustration. Pre-treatment disgust sensitivity did not impact on the magnitude of symptom reduction as measured by the BISS ($\beta = 4.45$, $SE = 2.62$, $t = 1.70$, $p = 0.01$).

History of fainting

Linear regression was also used to determine whether a history of fainting impacted on treatment response. Fainting history was coded as binary variable (fainter vs. no history of fainting). Controlling for group, fainting history did not impact on the magnitude of symptom reduction as measured by the MBPI ($\beta = -2.87$, $SE = 10.50$, $t = -0.27$, $p = 0.79$) or the MFS ($\beta = -0.35$, $SE = 10.39$, $t = -0.03$, $p = 0.97$). Fainting history also did not impact on the magnitude of symptom reduction as measured by the BISS ($\beta = 1.17$, $SE = 3.93$, $t = 0.30$, $p = 0.77$).

Did changes in disgust over treatment relate to treatment response?

Linear regression was used to determine whether changes in disgust to BII stimuli over treatment was associated with overall changes in BII symptoms, as measured by pre- to post-treatment change scores on the MBPI scale, excluding the disgust items. Changes in disgust to BII stimuli were measured by subtracting scores on the disgust scale of the MBPI at post-treatment from scores on that subscale at pre-treatment. Change in disgust to BII

stimuli was entered as the IV. To control for any differences between groups, group was also entered as an IV. Change in MBPI (excluding disgust items) was entered as the DV. Given the possibility that a decrease in general negative affect could account for any possible relationship between change in disgust to BII and overall symptom changes, DASS change scores were also entered as an IV. Group and change in DASS scores were entered in step 1 and change in disgust to BII was entered in step 2. Controlling for group and changes in DASS scores, changes in BII disgust over treatment correlated with the magnitude of symptom reduction ($\beta = 1.5$, $SE = 0.45$, $t = 3.34$, $p = 0.002$). $R^2 = 0.37$.

Discussion

In this open trial of a comprehensive group treatment program for blood-injection-injury phobia, participants experienced significant reductions in symptoms, including fear, fainting, and disgust to phobic stimuli. Pre-treatment fainting history did not impact treatment outcomes. Although participants with higher baseline disgust sensitivity had more severe BII phobia symptoms prior to treatment, their post-treatment BII symptom scores were similar to those with low baseline disgust sensitivity. While baseline general disgust did not impact on overall treatment outcomes, we showed for the first time in BII phobia, that changes in disgust responses to phobic stimuli were associated with overall reductions in symptoms.

Disgust is known to be a key component of BII phobia and disgust has been shown to be resistant to exposure type interventions, yet there are no published protocols which include components to specifically target maladaptive disgust responses. We sought to rectify this by including components such as cognitive restructuring targeting secondary disgust appraisals, an emphasis on disgust ratings during exposure, as well as conceptual reorientation and deconstruction, which have been suggested to target disgust, drawing on experimental research or theoretical arguments (see Mason & Richardson, 2012). Although others have addressed disgust by including “disgust-eliciting exposure tasks” (e.g., Hirai et al., 2008; Oar,

Farrell, & Ollendick, 2015), one might argue that specific disgust eliciting tasks are not required as it is already clear that “standard” phobic stimuli elicit disgust in this population. In contrast, we included novel therapeutic techniques specifically aimed at reducing maladaptive disgust responses. We found significant reductions in disgust responses to BII stimuli. Moreover, changes in BII-disgust were associated with changes in overall symptoms. Indeed, changes in BII disgust accounted for one-third of the variance in overall symptom reductions. It should be noted, however, that because symptoms of disgust were measured at the same time as other symptoms, a causal relationship cannot be established. That is, while it is possible that changes in disgust played a role in changes in overall symptoms, it is also possible that reductions of other symptoms predict changes in disgust or that a third variable is responsible for changes in both disgust and other symptoms. In addition, without a control group, it is unclear whether these additional treatment components played a role in reducing maladaptive disgust responses. Future studies should include controls to determine effectiveness of these additions versus standard CBT. Experimental studies which examine each of these additional treatment components may be able to provide useful insights also.

Despite the absence of a control group, this study represents a significant contribution to the literature. In particular, although the key role of disgust in certain anxiety disorders is well established, there is a glaring absence of therapeutic strategies to target maladaptive disgust responses in the existing literature. This paper adds to the literature by translating experimental work and theories related to ways in which disgust may be addressed in anxiety disorders directly to a clinical sample. This study is an important initial step to highlight that the inclusion of strategies to target disgust is feasible and acceptable, and that with this approach, fear and disgust do decrease.

Given the highly heterogeneous nature of BII phobia, one might hypothesise that a group treatment program was not suitable for this disorder. Nevertheless, the large observed

symptom improvements suggest that it is feasible to apply treatment for BII phobia within a group program. While a high proportion of participants in this study reported that their primary BII fear was of injections, the treatment protocol itself covered all categories of BII phobia stimuli. For example, the deconstruction task involved worksheets/psychoeducation on blood as well as needles. In addition, the exposure tasks were individualised to each specific participant, relevant to their specific concerns (avoided stimuli and situations). All participants received the same program content, with the only variation being in session two in which participants with a fainting history were taught applied tension and those without a fainting history were taught symptom surfing. Fainters and non-fainters responded similarly to treatment, consistent with what has been found in previous treatment studies of BII phobia (see Ayala et al., 2009 for review). This finding that group treatment was effective for a heterogeneous sample suggests that this program could be adapted to the online space to further increase the dissemination of evidence-based interventions for this disorder. To the best of our knowledge, only two other papers have examined a *group* treatment of BII phobia (Lilliecreutz, Josefsson, & Sydsjo, 2010; Wannemueller et al., 2018). Lilliecreutz et al. (2010) examined a two-session, primarily exposure-based group treatment in pregnant women and found significant reductions in symptoms of BII phobia. As the authors of that study point out, their sample was highly motivated (on account of their upcoming birth in the near future) and homogeneous, in that they were all pregnant women and had similar fears (presumably related to stimuli and situations that would be encountered during their pregnancy/birth). Wannemueller et al. (2018) examined a large-group one-session treatment and found significant reductions in BII phobia, though with smaller effect sizes than the present results. The current study builds upon those studies by examining group treatment for BII phobia in a more heterogeneous sample than Lilliecreutz et al. (2010) and by examining a

more comprehensive treatment protocol which included therapeutic approaches to target disgust.

Limitations

Although the aim of the present study was to examine the effectiveness of group program and identify correlates of outcomes, the lack of a control group means that we cannot entirely rule out the role of other factors in the reduction of symptoms. Further, we were unable to partial out the effects of individual treatment components. For example, the inclusion of a control group that did not include additional strategies to target disgust would allow for clearer inference regarding the effectiveness of these strategies. Finally, the lack of follow up data mean that we cannot comment on the stability of treatment effects over time. Future studies should include longer follow up periods and larger samples. In addition, other work has highlighted the potential role of respiratory abnormalities in vasovagal syncope associated with BII phobia (Ayala, Meuret, & Ritz, 2010; Harrison et al., 2017). Recent research targeting these abnormalities showed promising results (Meuret, Simon, Bhaskara, & Ritz, 2017) and there may be a role for the inclusion of treatment components that address this in future studies of comprehensive treatment programs for BII phobia. In addition, virtual reality exposure therapy (VRET) has recently been examined in BII phobia and related, dental phobia. While Gujjar and colleagues (2019) found VRET was efficacious for the treatment of dental phobia, Jiang and colleagues (2020) found only partial effects on BII symptoms, suggesting further work is required to refine the use of virtual reality in the treatment of BII phobia.

Conclusion

Blood-injection-injury phobia is prevalent and disabling. This time-limited, enhanced group CBT program was feasibly delivered by psychology graduate trainees to a heterogeneous sample and led to significant and large improvements in symptoms. Moreover,

changes in disgust were associated with overall treatment response. This highlights the importance of disgust in this disorder and the need to further develop and evaluate treatment techniques to address maladaptive disgust responses, particularly given the known limitations of conventional approaches (i.e., exposure) in adequately reducing disgust.

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Table 1: *Session content of the blood-injection-injury phobia group treatment program.*

Session	Content	Homework tasks
1	Psychoeducation about BIIP; The fight-or-flight response; Model of BIIP; Motivational interviewing.	Review handouts from session; Goal setting for treatment.
2	Psychoeducation about fainting and early warning signs; Symptom coping: Applied tension for those with a history of fainting; Symptom surfing for non-fainters.	Fainters: Practice applied tension. Non-fainters: Practice symptom surfing.
3	Introduction to the cognitive model; Cognitive restructuring (probability, cost, helpfulness & looking for evidence); Thinking errors.	Cognitive restructuring.
4	Rationale for exposure; Developing an exposure hierarchy; Information on how to do exposure effectively including planning and debriefing.	Exposure: for each task, complete related handout which treats each exposure task as a behavioural experiment.
5	Debrief of homework exposure exercise; Problem solving related to exposure; Psychoeducation about safety behaviours; In-session, guided exposure (including symptom exposure for disgust).	Exposure/behavioural experiments.
6	Debrief of homework exposure exercise; Problem solving; Deconstruction and psycho-education about BIIP stimuli; In-session guided exposure.	Exposure/behavioural experiments. Optional homework: corrective information regarding phobic stimuli.
7	Debrief of homework exposure exercise; Conceptual reorientation (targeting disgust); Coping statements; In-session guided exposure.	Exposure/behavioural experiments.
8	Skills review and relapse prevention.	Review materials.

Note: BIIP = Blood-injection-injury phobia.

Table 2. *Sample demographics.*

Characteristic	(N = 40)	
	n	%
Female	29	72.5
Country of origin		
Australia	30	75
England	3	7.5
Other	7	17.5
Marital Status		
Single	22	55
Married/Partnered (de facto)	17	42.5
Separated	1	2.5
Employment Status		
Full or part time employment	27	67.5
Student	12	30
At home parent	1	2.5
Education (highest qualification)		
High school certificate	30	75
Bachelor degree or higher	6	33.1
Trade certificate	2	6.0
Other	2	25.9

Table 3. Mean symptom scores at pre and post-treatment for treatment completers and non-completers.

	Treatment non-completers n=9	Treatment completers n=31			
	Mean (SEM)	Mean (SEM)		<i>F</i> (1,26)	
Measure	Pre-treatment	Pre-treatment	Post-treatment	<i>Comparison across treatment</i>	Effect Size (d)
MBPI	60.78 (11.25)	59.30 (4.55)	28.29 (3.16)	41.60, $p < 0.001$	1.44
MFS	61.70 (12.55)	64.39 (4.91)	35.74 (4.82)	43.05, $p < 0.001$	1.06
S-BISS total	42.67 (4.85)	46.48 (3.50)	21.03 (3.86)	37.47, $p < 0.001$	1.24
MQ	14.15 (2.24)	14.55 (0.95)	10.39 (0.97)	26.00, $p < 0.001$	0.78
LIS	11.89 (2.37)	11.74 (1.50)	5.94 (1.26)	17.26, $p < 0.001$	0.75
DASS-21	37.56 (7.32)	28.76 (3.34)	18.32 (2.60)	17.26, $p = 0.001$	0.63
DS-R	1.69 (0.25)	1.60 (0.58)	1.48 (0.44)	3.69, $p = 0.066$	0.22
MBPI-disgust	12.22 (2.97)	10.10 (1.27)	5.74 (0.74)	8.56, $p = 0.007$	0.78

Note. MBPI = Multidimensional Blood/Injury Phobia Inventory; MFS = Medical Fears Survey; S-BISS = State Blood-Injection Symptom Scale; MQ = Mutilation Questionnaire; LIS = Life Interference Scale; DASS-21 = Depression Anxiety and Stress Scale; DS-R = Disgust Sensitivity-Revised; MBPI-disgust = Disgust subscale of the Multidimensional Blood/Injury Phobia Inventory.

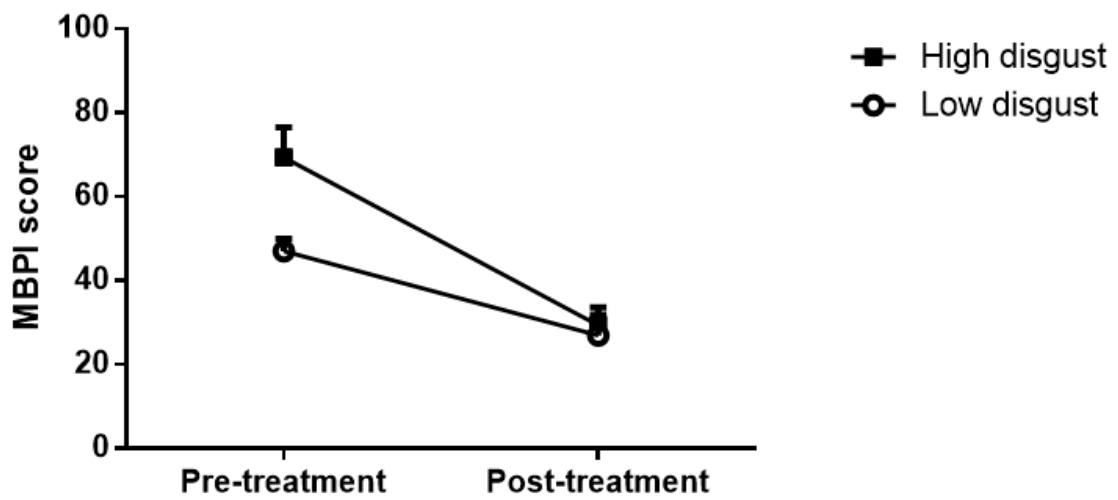


Figure 1: Changes in blood-injection-injury phobia symptom severity across treatment for participants with high and low disgust sensitivity at pre-treatment.

Note: MBPI = Multidimensional Blood/Injury Phobia Inventory (MBPI).