Why safety behaviour may not be that bad in the treatment of anxiety disorders: The commitment to future exposures

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Abstract
Traditionally, safety behaviours carried out by anxious patients are held to maintain the disorder and impede in vivo exposure treatment. This view has recently been challenged by Rachman, Radomsky, Shafran and Zysk (2011). Feelings of contamination, fear, danger and disgust decreased substantially over trials and the effects were not impeded by safety behaviour. This finding was critically replicated by Van den Hout, Engelhard, Toffolo and Van Uijen (2011), who obtained the same results. Safety behaviours in those studies may not have had negative effects because participants were committed to engage in exposure trials (to re-contaminate) after safety behaviours. In this paper the role of commitment to future exposure in safety behaviour has been critically tested. Safety behaviour promoted feelings of control over emotions. Safety behaviours may not be categorically harmful and may even have beneficial effects.

Keywords: Obsessive-Compulsive Disorder, Safety behaviour, Exposure therapy.

Riassunto
Perché i comportamenti protettivi possono risultare non del tutto dannosi nel trattamento dei disturbi d’ansia: l’impegno a esporarsi di nuovo
Tradizionalmente si ritiene che i comportamenti protettivi messi in atto dai pazienti ansiosi mantengano il disturbo e ostacolino la terapia di esposizione in vivo. Di recente questa prospettiva è stata messa in discussione da Rachman, Radomsky, Shafran e Zysk (2011). Le sensazioni di contaminazione, paura, pericolo e disgusto tendevano a decrescere in modo sostanziale e i comportamenti protettivi non ostacolavano questo processo. Van den Hout, Engelhard, Toffolo e Van Uijen (2011) hanno recentemente replicato questo esperimento, ottenendo gli stessi risultati. I comportamenti protettivi potrebbero non aver avuto effetti dannosi perché i partecipanti si erano impegnati a mettere in atto esercizi di esposizione (ri-contaminarsi) dopo aver utilizzato comportamenti protettivi. In questo articolo si è sottoposto a verifica il ruolo dell’impegno a esporarsi di nuovo quando si mettono in atto comportamenti protettivi. Questi ultimi sembrano promuovere
la sensazione di controllo sulle emozioni, pertanto potrebbero risultare non completamente nocivi e potrebbero avere addirittura effetti benefici.

Parole chiave: Obsessive-Compulsive Disorder, Safety behaviour, Exposure therapy.

INTRODUCTION

Faced with a realistic threat, avoidance is, obviously, an adaptive strategy. When the perceived threat is unrealistic, avoidance is maladaptive: it prevents the organism from learning that the threat is unreal and that no harm will occur in the absence of avoidance. Therefore, avoidance may serve to maintain unrealistic fear. This provides a solid rationale for in vivo exposure to feared stimuli as treatment of anxiety disorders (Wells et al., 1995). While avoidance behaviour involves avoidance of confrontation with a fearful stimulus (CS), safety behaviour (SB) may be displayed when the CS is present, and is aimed at neutralizing or reducing its threatening aspects. Like avoidance, SB is adaptive in the case of realistic threats, but is held to be maladaptive when unrealistic threats are concerned. As the non-occurrence of negative outcomes of the CS may be attributed to the SB («If I had not carried out this SB, the CS would have been followed by a catastrophe»), SB’s are held to maintain unrealistic fear. Understandably, many authors argue that it is necessary to stimulate patients to drop SB’s for effective treatment of anxiety disorders. This would help them realize that the feared consequences of the CS will not materialize, irrespectively of SB’s.

The assumption that SB’s impede the effects of psychological treatment of anxiety disorders is supported by a number of studies. McManus, Sacadura and Clark (2008) found that safety behaviours were ineffective in reducing anxiety in high and low anxious participants. Morgan’s and Raffle’s (1999) small sample of 16 participants with social phobia improved significantly on various outcome-measures when they were instructed to drop SB’s, compared to mere exposure. A study by Wells and colleagues (1995) used a within-subjects-design in 8 participants with social phobia, and yielded the same conclusions. Adverse effects of SB’s were also found in two independent studies for claustrophobic fear reduction (Power, Smits & Telch, 2004; Sloan & Telch, 2002).

However, the notion that SB’s serve to maintain anxiety disorders and reduce the effects of in vivo exposure has been repeatedly challenged. As early as 1984, De Silva and Rachman reported a study in which one group of agoraphobic patients was urged to stay in a feared situation until their fear dropped to a pre-defined level, and the other group was urged to leave the feared situation at any time. Surprisingly, these differences had no influence on fear reduction at the end of the experiment. In a replication, participants reported even less fear in the escape-condition, with the effects still evident at a 3-month follow up (Rachman et al., 1986).

Based on these studies, Sartory, Master and Rachman (1989) tested an intervention for agoraphobia including SB’s. They used the therapist as a safety signal and encouraged participants to walk towards the therapist at the most fear-inducing situations. This
intervention did not reduce the effects of traditional exposure. More recently, Milosevic and Radomsky (2008) allowed one group of snake-fearful participants to use safety gear (gloves, goggles) during an exposure session, while the other half was not allowed to use safety gear. Both groups improved equally well, but the «safety gear» group approached the snakes faster and reported less stress in the process. A study by Deacon et al. (2010) reported equal effectiveness of SB’s compared to traditional exposure for individuals with high claustrophobic fear. Sy et al. (2011) also found positive effects for SB’s in students with claustrophobic fear, including heightened self-efficacy. Furthermore, in a study by Hood et al. (2010), participants with a fear of spiders were able to approach spiders more quickly when using SB’s.

In the context of contamination fear, Rachman et al. (2011) evaluated the effects of typical OCD-cleaning behaviours in 80 healthy participants. They tested whether, compared to traditional Exposure plus Response Prevention, replacing Response Prevention by SB’s would reduce the effects of in vivo exposure. Initially, participants had to touch 6 dirty objects and report their feelings of contamination, «fear», «danger» and «disgust» (referred to as CFDD) on a 0-100 scale. The object with the highest rating on contamination was selected for use during two subsequent sessions. Over the course of these two sessions, participants had to touch the object repeatedly. One group was allowed to use hygienic wipes after each trial as long as they wished, until their hands felt clean (SB). The other group merely reported their feelings after a delay of 30 s (traditional exposure with response prevention, ERP). For both groups, drops in scores for fear, danger and disgust were similar, whilst the reduction in feelings of contamination in the SB group exceeded the reduction in the traditional Exposure plus Response Prevention group. The findings were taken to suggest that, at least in Obsessive-Compulsive Disorder and under certain conditions, SB’s might not be hindering the positive effects of in vivo exposure.

Van den Hout, Engelhard, Toffolo and van Uijen (2011) identified and addressed some methodological weaknesses of the Rachman et al. (2011) study. First, to make sure that the effects in both groups were not mere artefacts of the assessments, a non-treatment control group was added. Second, the cleaning time in the SB+ group was restricted to 30 s in order to match the traditional exposure group. Third, only participants in the SB+ group in Rachman et al.’s (2011) study were told that the treatment might have positive effects. To prevent unintended influences of this communication, the traditional exposure group received the same information in the replication. After these methodological improvements, the effects were replicated: again, both treatments were comparably effective, and both were significantly more effective than no treatment, for all measures, while SB+ was more effective for contamination. Given that for some patients in vivo exposure can be rather demanding, especially in early stages of treatment, this suggests that there may be a role for the «judicious use» of safety behaviours in the treatment of anxiety disorders, a position earlier defended by Rachman, Radomsky and Shafran (2008).

In sum, the available body of research provides a rather confusing picture of the effects of SB’s in exposure treatments. Under some conditions, the effects are negative, while under other conditions, negative effects are not observed and even positive effects of SB’s may be reported. What are these conditions?
Note that in the studies reviewed above that found no negative effect of SB’s, participants made the commitment to return to the feared context after the exposure + SB’s. Knowing that one will return to the feared situation might change the meaning of the SB. In, e.g., the Rachman et al. (2011) and van den Hout et al. (2011) studies, participants were told that after using the hygienic wipe to clean their hands, they were supposed to actively contaminate themselves again, and the prospect of re-contamination may make SB’s irrelevant. Following this argument, exposure combined with SB’s plus explicit commitment to continue exposure should be at least as effective as traditional exposure with response prevention in which such commitment is typically made. On the other hand, exposure with SB’s but without commitment to continue should be less effective than the two other interventions. Building on the papers by Rachman et al. (2011) and van den Hout et al. (2011) these predictions were tested in the current experiment. Extrapolating from these findings, we predicted that, compared to the other conditions, exposure with SB’s and a strong commitment to continue would be superior on ratings of contamination.

Another question is whether the reduced stressfulness of exposure with SB may favour a faster reduction of CFDD (see above), especially of contamination. This second hypothesis was suggested by a non-significant trend in Van den Hout et al.’s experiment and would be in line with the above-mentioned findings of Milosevic and Radomsky (2008). A faster drop may be especially interesting if ERP and SB high commitment to continue would prove to have roughly the same overall effectiveness.

As in the earlier studies (Rachman et al., 2011; van den Hout et al., 2011), feelings of CFDD served as dependent variables, measured on 100 mm Visual Analogue Scales. Apart from the first independent variable, SB’s vs. response prevention, another independent variable, namely commitment, was added. In the SB groups, the high commitment group (SB/C+), commitment was stressed both verbally and in the form of a written contract. In the SB with low commitment group (SB/C-), participants were told to stop any time they liked. In the previous experiments, SB was operationalized as the use of hygienic wipes. However, as pilot observations suggested that the credibility of these wipes as being antibacterial was not optimal, we used liquid disinfectant instead.

Thus, there were three groups. As in van den Hout’s experiment (2011), one group underwent traditional exposure plus response prevention (ERP). Two groups were allowed to use disinfectant as SB, one with commitment (SB/C+) and one without (SB/C-). No non-treatment control group was included, because van den Hout et al. (2011) already proved the relative effectiveness of exposure with or without SB’s over merely a pre-test and post-test without any intervention in between. Cf. van den Hout et al. (2011), the experiment started with a pre-test, requiring participants to touch 6 different dirty objects. The same objects as in Van den Hout et al. were used, but care was taken to increase perceived dirtiness, because some of the objects evoked low scores in the previous experiments. Subsequently, 1 item was selected and 20 exposure trials followed. Finally, participants rated all items again during a post-test, without using SB. One session was used. It was expected that SB/C+ would be comparable or more effective than ERP, whilst SB/C- would be the least effective in decreasing CFDD-scores. The overall effectiveness
of the interventions was evaluated by comparing levels of CFDD-scores before and after the trials. In the previous experiments, participants were allowed to wipe their hands after the post-measurement. As this could have confounded the outcomes, this was not allowed in the current experiment. Also, CFDD assessments were made after each of the 20 trials. This allowed for testing of the second hypothesis: contamination-scores in the SB/C+ were expected to drop the fastest, in relation to the other groups.

Apart from these core hypotheses, the design also allows for the testing of additional expectations. It seems logical that, as feelings of CFDD decrease, control over these feelings increase, and this was indeed found by Van den Hout et al. (2011). If there are differences in drops between groups, it may be assumed that the magnitude of changes in control mirror these group-differences in CFDD reduction. Lastly, one may wonder whether effects will generalize to other objects. Van den Hout et al. (2011) found no between-group difference, which may be due to a methodological weakness. That is, scores for all objects were averaged, but as mentioned before, some objects evoked very low scores to begin with, leaving little room for further improvement, which could have caused a floor effect. In the current calculation of generalization, we excluded objects with pre-scores < 20 on contamination and the measures on generalization were based on objects receiving scores higher than 20 at pre-test. Therefore the number of objects on which the generalization scores were calculated varied slightly between individuals.

METHODS

Participants

The sample of 48 participants (mean age 23.98; SD 6.1; 31 female) consisted of student volunteers from Utrecht University. Participants were given a choice between payment and course credit for their participation. Initially, 62 students were invited. Participants with a score of less than 50 on contamination at the pre-test (see below) were excluded from the study (n = 10). Furthermore, 2 participants did not complete the study and another 2 were excluded because they did not believe in the effectiveness of the disinfectant.

Procedure

One 45-min session was held with each participant, consisting of the introductory sequence (including signing of the contract), baseline measurement, experimental trials, post-test, generalization test and finally debriefing.

Introduction & contract

The SB/C- condition was explained verbally and in the contract to be signed that participation was voluntary and completion of the experiment was not required, as the data could be used in any case. The SB/C+ condition was explained verbally and in the contract that participation was voluntary, but the data could not be used if the experiment was terminated early, and for this reason the participant was urged to do his/her utmost
best to complete the experiment. Subsequently, informed consent was obtained, and the informed consent sheet included a paragraph on commitment:

High commitment (SB/C+ and ERP)

Participation in the experiment is voluntary. For this experiment it is, however, of great importance that participants do not end the experiment prematurely, as the data will otherwise be unusable for the researchers. By providing his/her consent to the experiment, the participant thus declares to perform his/her utmost best to finish the series of 20 trials.

Low commitment (SB/C-)

The participant is completely free to decide whether or not to continue with the experiment. If the experiment is experienced as unpleasant or annoying, the participant can quit at any moment. Finishing the experiment is not necessary for the usability of the data. By providing his/her consent to the experiment, the participant declares knowledge that it is voluntary, and that participant is authorized to quit the trials.

Baseline measurement

Participants were then presented with the 6 objects in a random order and were asked to touch them and rate their feelings of CFDD. To increase perceived dirtiness, the experimenter wore rubber gloves while handling the objects. Gloves or soap were not offered to participants. Following the baseline measurement, the object with the highest contamination rating was selected for use in the experimental trials, with a minimum required contamination score of 50.

Experimental trials

After obtaining expectancy-scores, participants were shown the chosen object. First, they were asked to report their expected decline in CFDD-emotions. Then participants started with the first trial: they were asked to touch the object and report their feelings of CFDD on the 0-100 scale. In the two SB conditions, disinfectant was offered after each presentation and participants were asked to rub their hands with it for 30 s. In the ERP condition, participants were asked to wait for 30 s. After this, all participants were asked to report their feelings of CFDD. This procedure was repeated 20 times. Finally, after trials 1 and 20, perceived control ratings were obtained.

Generalization, manipulation checks and post-test

After the last trial, participants were asked to reduce any persisting feelings of CFDD. The 6 contaminants were presented again in the same order as in the pre-test, and participants were asked to touch them and rate their feelings of CFDD without being allowed to use the soap. CFDD ratings relating to the object used in the exposure trials served as post-test. Finally, 3 questions related to the manipulations were asked.
**Materials**

**Objects**

In accordance with van den Hout et al. (2011), 6 different «contaminants» (dirty objects) were used:

1. **Shoe.** The sole of participants’ own shoes. Participants were asked to rub them three times.
2. **Money.** A stained and ripped five-euro note and some old coins in a plastic bag.
3. **Rubbish.** A small, old looking rubbish bin filled with (safe) collected rubbish: food wrappers, used coffee cups, straws, tissues and a small empty bottle. To increase dirtiness, a wet tissue was temporarily added to the contents, and honey was rubbed around the opening of the can.
4. **Phone.** An old, dusty, dirty looking phone, whose dial-numbers were also rubbed in with a small amount of honey to make it slightly sticky.
5. **Culture sample.** A 50 ml test tube containing water mixed with make-up to provide a non-transparent brown colour. The label read «PATH 194, 01.09.08», and the tube was kept in a small zipped bag labelled «Biohazard».
6. **Ab specimen.** A small biohazard zip bag containing a surgical glove, a disposable oral thermometer, open grimy looking Band-Aid, a 2 ml micro-tube containing a drop of hand sanitizer, a small piece of ripped rolled-up gauze and a cotton stick.

**Soap**

A 500 ml bottle with dispenser of an antibacterial disinfectant with the brand name «Sterilium» was used as «disinfectant». The bottle actually contained only a small amount of the disinfectant (just enough for the solution to remain a blue colour and distinctive odour), which was highly diluted with water, to prevent participants’ hands from drying out.

**Software**

For randomization of contaminants, presenting order and condition-assignment, the website http://www.randomizer.org was used. To analyse the data, the software: «Statistical Package for the Social Sciences» SPSS © version 17 by IBM was used.

**Measurements**

**Feelings**

Intensity of feelings was assessed using the CFDD scale (Rachman et al., 2011), which measures Contamination, Fear (of contamination), Disgust and Danger on a scale from 0 (not at all) to 100 (extreme). In order to subsequently gauge the emotions during Pre-test and Post-test, the following question was continually asked right after touching each object: «How much contamination/danger/fear of contamination/disgust do you feel now (on a scale from 0-100)?». The same question was asked right after each touch during the
trials, with the addition that it was asked again after a 30-sec. interval during which the participant either washed their hands (SB conditions) or waited (ERP).

**Manipulation check**

The Participants were asked to rate the following statements on a scale from 1 (not at all) to 5 (extremely): «The contract I had to sign had a substantial effect on my decision to finish/stop with the experiment», and «I considered quitting the experiment». In the SB conditions, participants were also asked to indicate whether or not: «I had the feeling that my hands were cleaner after using the soap». (Y/N). If answered with No, the participant’s data were excluded from the analyses (N = 2).

**Perceived control**

Perceived control was measured with the question: «How much control do you feel over your feelings of contamination/fear of contamination/danger/disgust on a scale from 0-100?». This was asked twice: after the first trial and after the 20th trial.

**RESULTS**

**Pre-post changes of CFDD**

Pre-post changes were evaluated twice, with two different post-measurements: between the pre-test and post-test and between the pre-test and after trial 20, with 8 x 3 x 2 split plot ANOVA’s, for all CFDD separately. In all ANOVA’s, condition (SB/C+, SB/C-, ERP) was the between-group factor and time (pre-test vs. post-test) the within-group factor. The results showed significant main effects for Time for all CFDD and both post-measures, indicating an overall reduction in scores, irrespective of condition, as expected: For pre-test – trial 20 (figure 1): Contamination: \(F(1,45) = 151.15, p < .001, \eta^2 = .77\); Fear: \(F(1,45) = 65.89, p < .001, \eta^2 = .59\); Disgust: \(F(1,45) = 92.33, p < .001, \eta^2 = .67\); Danger: \(F(1,45) = 35.10, p < .001, \eta^2 = .44\). For pre-test – post-test (figure 2): Contamination: \(F(1,45) = 144.36, p < .001, \eta^2 = .76\); Fear: \(F(1,45) = 63.00, p < .001, \eta^2 = .58\); Disgust: \(F(1,45) = 76.37, p < .001, \eta^2 = .63\); Danger: \(F(1,45) = 33.31, p < .001, \eta^2 = .43\).

However, in contrast to the hypothesis, there were no differences between conditions for the decrease of scores, for three out of four CFDD measures. The exception was Contamination, as indicated by a Time x Condition interaction. For pre-test – trial 20: \(F(2,45) = 3.30, p = .046, \eta^2 = .13\). For pre-test – post-test: \(F(2,45) = .95, p = .021, \eta^2 = .16\). All other Time x Condition interactions were not significant: \(Fs(2,45) < 2.73, ps > .076\).

To examine which conditions differed for Contamination scores, pair-wise comparisons were made for pre-test minus post-test and pre-test minus trial 20-test difference scores, using t-tests. The results showed that the decrease for SB/C+ was superior to ERP: For pre-trial 20: \(t(30) = -2.29, p = .029, d = .81\). For pre-post: \(t(30) = -2.86, p = .012, d = .95\). The decrease for SB/C- lay between SB/C+ and ERP, and did not differ from either condition.
Figure 1  Reported feelings of contamination, disgust, danger and fear respectively at pre-test and trial 20.

Figure 2  Reported feelings of contamination, disgust, danger and fear respectively, at pre-test and post-test.
For pre–trial 20: SB/C- vs SB/C+ $t(24.4) = 1.31$, $p = .20$, $d = .46$; SB/C- vs ERP (equal variances not assumed), $t(25.81) = 1.45$, $p = .16$, $d = .51$. For pre-post: SB/C- vs SB/C+ $t(30) = 1.66$, $p = .11$, $d = .59$; SB/C- vs ERP $t(30) = 1.36$, $p = .19$, $d = .48$.

There were no significant main effects for Condition. All $F$s $(2,45) < .60$, $p$s > .56.

**Time course of effects**

To evaluate the time course of effects per condition, quadratic trends were analysed with a 3 x 22 MANOVA with Condition as between-subject factor (SB/C-, SB/C+, ERP) and Time as within-subject factor (pre-test, trial 1-20, post-test) was carried out for CFDD separately. The quadratic trends for time were significant for all measures; Contamination: $F(1,45) = 70.06$, $p < .001$, $\eta^2 = .61$; Fear $F(1,45) = 34.76$, $p < .001$, $\eta^2 = .44$; Disgust: $F(1,45) = 47.47$, $p < .001$, $\eta^2 = .51$; Danger: $F(1,45) = 29.45$, $p < .001$, $\eta^2 = .40$, indicating a non-linear reduction in scores (figure 3). There was only one significant Time x Condition interaction, namely for Contamination: $F(2,45) = 3.21$, $p = .05$, $\eta^2 = .13$ [other Time x Condition interactions: $F$s$(2,45) < .2.55$, $p$s > .08].

In separate trend analyses, the quadratic trend was significant for each condition, indicating that score-reduction in all conditions followed a non-linear curve. SB/C+: $F(1,45) = 31.62$, $p < .001$, $\eta^2 = .68$. SB/C-: $F(1,45) = 29.24$, $p < .001$, $\eta^2 = .661$. ERP: $F(1,45) = 13.08$, $p = .003$, $\eta^2 = .47$. To investigate in which condition scores dropped the fastest, two separate ANOVA’s (trial 1-10, 10-20) with the same design as for the

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**Figure 3**  Trend analysis measuring scores of contamination, disgust, danger and fear respectively. Trial 1 indicates pre-test, trial 22 indicates Post-test.
pre-post changes of effects were carried out. Results of the trial 1-10-ANOVA mirrored the overall pre-post effects. There was a main effect for Time, \( F(1,45) = 59.43, p < .001, \eta^2 = .57 \), and a significant interaction effect, \( F(2,45) = 3.51, p = .038, \eta^2 = .14 \), and the conditions differed from each other in the same way. That is, SB/C- vs. SB/C+ (equal variances not assumed): \( t(24.9) = -1.38, p = .18, d = .49 \); SB/C- vs. ERP \( t(30) = -1.44, p = .16, d = .85 \); SB/C+ vs. ERP: \( t(30) = -2.40, p = .02, d = .51 \). However, for the second ANOVA, covering trial 10-20, scores dropped significantly, indicated by a main effect for time, \( F(1,45) = 12.53, p = .001, \eta^2 = .22 \), but there was no longer a difference between conditions, indicated by the non-significant Time x Condition interaction, \( F(2,45) = .92, p = .41 \). Taken together, the effects indicated that scores dropped faster for the SB/C+ condition than for the ERP condition during the first half of the intervention, with the SB/C- condition in between, but all conditions decreased to the same degree in the second half.

**Generalization**

To test whether effects of the interventions would generalize from the target item to the unselected items, scores on all items from the pre-test\(^1\) were averaged for each participant. The same was done for the post-test. The resulting mean generalization scores were analysed with a 3 x 2 split plot ANOVA with condition (SB/C+, SB/C-, ERP) as between-group factor and time (pre-test vs. post-test) as within-group factor. This procedure was only carried out for Contamination scores, the central variable. It was expected that scores would overall be lower at the post-test and, indeed, generalization took place: there was a significant drop in mean-contamination scores from the pre-test to the post-test, as indicated by a main effect for time: \( F(2,44) = 8.07, p = .007, \eta^2 = .16 \) (see table 1).

Besides that, it was of interest whether the effects would differ for the conditions. This was not the case. There was no significant Condition x Time interaction, \( F(2,44) = 1.50, p = .24, \eta^2 = .06 \), or main effect for Condition, \( F(2,44) = 1.50, p = .24, \eta^2 = .06 \).

<table>
<thead>
<tr>
<th>Object Generalization</th>
<th>Pre-Test</th>
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<tbody>
<tr>
<td>SB/C+</td>
<td>45.5 (14.3)</td>
</tr>
<tr>
<td>SB/C-</td>
<td>44.1 (12.4)</td>
</tr>
<tr>
<td>ERP</td>
<td>39.9 (14.8)</td>
</tr>
</tbody>
</table>

\(^1\) Items scored at < 20 were excluded, to prevent a floor effect (see end of introduction). One participant was excluded from the analysis, as he had no scores ≥ 20, other than the target item.
Subjective feelings of control

Participants’ feelings of control over CFDD feelings were compared from the pre-test to the post-test, with ANOVA using the same design as before. It was expected that control would increase inversely proportional to the decrease in scores and would mirror the differences in conditions. However, in contrast to this hypothesis, there were no changes over time whatsoever, indicated by no main effects for Time for all CFDD. All $F$s(1,45) < 3.10, ps > .09. Accordingly, there were also no Time x Condition interaction effects, all $F$s(2,45) < 2.01, ps > .15. However, differences emerged between the conditions in feelings of control over Disgust (irrespectively of time), $F(2,45) = 3.49$, $p = .04$, $\eta^2_p = .13$; all other CFDD: $F$s(2,45) < 1.90, ps > .16. For Disgust, pair-wise comparisons were conducted for pre-post control mean scores, using t-tests, to evaluate which conditions differed. The results showed that both SB conditions had significantly higher control scores than ERP. ERP vs SB/C+: $t(30) = 2.37$, $p = .03$, $d = .84$; ERP vs SB/C-: $t(30) = 2.18$, $p = .04$, $d = .80$. The SB conditions did not differ from each other: $t(30) = .16$, $p = .88$, $d = .06$ (see table 2).

Manipulation checks

There were no between-group differences in the self-rated effect of the contract on the decision to finish or stop the experiment (SB/C+: $M = 3.9$; $SD = 1.2$; SB/C-: $M = 4.1$, $SD = 1.1$; ERP: $M = 4.1$; $SD = 1.2$), $F(2,45) = .20$; $p = .82$. Likewise, there were no differences in the self-reported considerations to quit the experiment (SB/C+: $M = 4.8$; $SD = .6$; SB/C-: $M = 4.5$, $SD = .3$; ERP: $M = 4.9$; $SD = .3$) $F(2,34) = 0.19$; $p = .83$). Two participants from the SB conditions answered they felt their hands were not cleaner after washing, and they were removed from the analysis.

Table 2 – Mean (SD) feelings of control over disgust at Trial 1 and Trial 20

<table>
<thead>
<tr>
<th>Feelings of Control (Disgust)</th>
<th>Trial 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB/C+</td>
<td>65.9 (19.6)</td>
</tr>
<tr>
<td>SB/C-</td>
<td>65.9 (26.8)</td>
</tr>
<tr>
<td>SB- C+</td>
<td>40.6 (25.2)</td>
</tr>
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</table>

DISCUSSION

This study sought to help elucidate the role of SB’s in exposure therapy. It was hypothesized that as long as SB’s are coupled with an explicit commitment to continue exposure trials, the former will have no negative effect on exposure and may even be superior to exposure without SB’s (traditional ERP). Three conditions were compared: Exposure
and SB’s with strong commitment to continue (SB/C+), Exposure and SB’s with a small commitment to continue (SB/C-) and ERP.

The main findings were as follows. First, for subjective feelings of contamination, SB/C+ outperformed ERP, while the effects of SB/C- fell in between. These findings mirror the data obtained earlier by Rachman et al. (2011) and van den Hout et al. (2011). In these earlier studies, participants in the SB conditions knew that at the post-test, after giving CFDD ratings they were allowed to clean their hands, and anticipation of SB’s may have lowered the experience of contamination. Here, the same result occurred at a «true» post-test, in which no SB was anticipated. The fact that SB/C+ was still superior to ERP attests to the robustness of the effect. The time pattern of contamination scores differed between the groups. In the SB/C+ condition, scores dropped faster in the first half of the trials. Admittedly, on the other assessments (fear, danger, disgust) no between-group differences occurred, but it may be added that Rachman et al. explicitly favour «contamination» as the core measure, and qualify the other assessments as merely «associated perceptions». Second, the positive effects of the three interventions generalized to contaminants that were not involved in the exposure trials.

Earlier, such generalization was not found (Rachman et al., 2011; van den Hout et al., 2011). Note that in the earlier studies generalization was tested on post-intervention feelings of contamination for objects that induced no, or hardly any feelings of contamination at pre-test. This may have caused a floor effect that may not have materialized here, because objects that were not experienced as contaminating at the pre-test were omitted from the post-test assessment. Although SB’s did not increase generalization, they also did not reduce generalization, which is not irrelevant from a clinical stance. Third, the perception of control over feelings of CFDD did not decrease over time. However, perceived controllability of these negative emotions was higher in the SB conditions. One might argue that efforts to control negative emotions are not necessarily helpful. Still, the increased feelings of control did not hamper the reduction in CFDD in the SB conditions.

SB/C+ outperformed ERP on the reduction in perceived contamination, but the superiority of SB/C+ was limited. Effects of contamination were not significantly larger compared to SB/C-, and when it came to fear, danger and disgust, ERP was equally effective as SB/C+. Why? A very real possibility is that the manipulation of commitment was not strong enough. That is, though only 2 participants were excluded because they felt the soap did not clean their hands, the C- group expressed no greater inclination to stop the experiment halfway. Possibly, the induced aversiveness of the contamination was too small to evoke any urge to quit. Of course, a manipulation may be effective without the effects becoming visible on self-reports of the type used here. The superior effects of SB/C+ may be taken to suggest this. Still, a fundamental demand characteristic of the role of research participant may be to at least finish the experiment and this dedication may have overshadowed stronger effects of the experimental manipulation.

When it comes to the explanation of the curious role of SB’s in exposure treatments, it seems unlikely that «commitment to future exposures» provides the final explanation. Milosevic and Radomsky (2008) argue that effects of SB’s crucially depend on whether the latter interfere with learning that the feared situation is in fact innocuous. If such interfe-
rence takes place («If I hadn’t sat down, the dizziness would have culminated in fainting»), then SB’s will reduce or block the positive effects of exposure. But SB’s may not necessarily reduce learning about the lack of threat. In fact, SB’s may stimulate approach, which in the absence of SB would not have occurred, thus improving disconfirmation learning. An example would be to wear gloves in the exposure treatment of spider phobia, which would allow for the observation that spiders do not jump on one’s hand etc.

Sometimes, irrational fears do not relate to negative external outcomes, but to emotions, which are elicited by the feared stimulus, and are expected to be unbearable. An example would be feelings of disgust after touching a specific contaminant. Thus, in the present experiment, the prospect of being able to disinfect one’s hands after contamination induced a sense of control, but this anticipation may not have interfered with the fact that the feelings of contamination are tolerable and wane over time.

Of course, the present data were obtained from non-patients. While the findings nicely fit with a series of clinical observations (cf. Rachman et al., 2011) if, to what degree, and in what respects the findings can be generalized to patients suffering from contamination fears is an empirical issue that awaits testing.
REFERENCES


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