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ORIGINAL ARTICLE

Thought Suppression Confronting a Reminder Stimulus: An Effective Strategy for the Management of Intrusive Thoughts?

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Abstract Previous studies indicate that suppression is a counterproductive mechanism of thought control. In the current paper we examined whether individuals can successfully suppress an intrusive thought confronting a reminder of it, a suppression technique employed on memory research. Thus, 76 undergraduates performed a thought suppression task with three monitoring intervals and were randomly allocated to a suppression-only, suppression confronting a reminder stimulus or monitor-only condition. Data analysis yielded an absence of paradoxical effects (rebound) on target thought frequency. However, the examination of the annoyance associated with the intrusions indicated that those individuals instructed to suppress without confronting the reminder maintained the same level of discomfort reported at baseline, whereas the other participants reduced the discomfort level, suggesting that the confrontation with a reminder is a recommendable strategy for emotion regulation. The implications of these findings are discussed in relation to the clinical and cognitive research on thought control.

Keywords Thought suppression · Intrusive thoughts · Rebound effect · Exposure

Introduction

Freud (1915/1957) posited the existence of two mechanisms, suppression and repression, that keep unbearable things and unwanted memories out of awareness. Nowadays, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, Text

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Revision) (American Psychiatric Association; APA, 2000) offers a less psychoanalytical conceptualization of both mechanisms, but it also establishes that their function is to keep unpleasant thoughts and feelings outside awareness. According to the APA (2000), repression and suppression are currently conceptualized as automatic (unconscious) and voluntary (conscious) processes, respectively. Psychological research on thought suppression began with the ''white bear experiment'' (Wegner & Schneider, 2003; Wegner, Schneider, Carter, & White, 1987). In this study, two groups of undergraduates were instructed to verbalize their stream of consciousness during two consecutive periods and ring a bell each time they thought about a white bear. One group of participants was told to suppress the target thought during the first period, and express it during the second one. The other experimental group received the same instructions, but in reverse order. Results showed that subjects from the initial suppression condition reported a higher number of intrusions than those initially instructed to express the target thought. In sum, it was found not only that suppression is inefficient, but also maladaptive, because it produces an hyperaccessibility of the unwanted thought.

As a follow-up of these paradoxical results, Wegner (1989, 1994) developed the theory of *ironic processes of mental control*. In this theory, two simultaneous processes are implicated in thought suppression. On the one hand, an *intentional operating process* that executes a conscious search of alternative thoughts to replace the target to be suppressed. On the other, an *ironic monitoring process*, which is automatic, unconscious and looks continuously for possible failures of the intentional operating process. The theory states that the paradoxical effects of thought suppression are more likely to occur under conditions that reduce the efficacy of the intentional operating process, as when subjects are under cognitive load or present a depressed mood (Wegner & Erber, 1992; Wegner, Erber, & Zanakos, 1993). In these special occasions, the ironic monitoring process takes control of consciousness, provoking a flood of unwanted intrusive thoughts. To date, the literature on this topic has not found direct evidence of the processes postulated by Wegner until recently (Page, Locke, & Trio, 2005). In addition, there are alternative or complementary explanations of the rebound effect, which have also obtained empirical support (Enticott & Gold, 2002; Forster & Liberman, 2001; Liberman & Forster, 2000).

Almost two decades after the Wegner et al.'s (1987) seminal study, a large body of work has focused on the consequences of thought suppression (for a review see Abramowitz, Tolin, & Street, 2001; Wenzlaff & Wegner, 2000). Thus, some studies have obtained the initial enhancement effect (e.g., Howell & Conway, 1992; Markowitz & Borton, 2002; Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994), some have found the rebound effect (e.g., Davies & Clark, 1998; Harvey & Bryant, 1998; McNally & Ricciardi, 1996), and some others none of them (e.g., Belloch, Morillo, & Giménez, 2004; Borton, 2002; Kelly & Kahn, 1994; Merckelbach, Muris, van den Hout, & de Jong, 1991; Muris, Merckelbach, & de Jong, 1993; Roemer & Borkovec, 1994). Despite these inconsistencies, the meta-analysis of twenty-eight controlled studies performed by Abramowitz et al. (2001) revealed a small to moderate rebound effect of thought suppression, varying in magnitude as a function of different recording methods, types of target thoughts and length of the suppression period.

From our point of view, one of the crucial aspects in this research line, which still remains unclear is the role played by the strategies employed by subjects when trying to suppress an unpleasant thought. Thus, the study of the specific strategies used by the intentional operating process to eliminate the unwanted thoughts is particularly

relevant from a clinical perspective, in order to find those thought control strategies that help individuals to deal with their unpleasant intrusive thoughts. The literature studying the impact of different strategies on emotion regulation is abundant (Gross, 1998, 1999, 2002; Ochsner & Gross, 2005; Parkinson & Totterdell, 1999), although there is a lack of studies experimentally addressing the consequences of different strategies on thought control (Beevers, Wenzlaff, Hayes, & Scott, 1999; Harvey & Payne, 2002; Hertel & Calcaterra, 2005; Salkovskis & Campbell, 1994). Nevertheless, the literature on emotion regulation offers some important a priori clues about the possible effectiveness of the type of control strategy used. For instance, the studies conducted by Gross (1998, 1999, 2002) show that suppression is associated with low levels of positive emotion experience, poor life satisfaction and well-being, and increased sympathetic activation of the cardiovascular system. At the cognitive level, it is also related to memory impairment due to the high consumption of cognitive resources. In contrast, attentional deployment is considered adaptive because it regulates emotional arousal in a positive manner. The literature on thought control has given robust support to this approach, because distraction (an attentional deployment strategy) has demonstrated to be an effective way to deal with undesirable thoughts (Harvey & Payne, 2002; Hertel & Calcaterra, 2005; Salkovskis & Campbell, 1994; Wegner et al., 1987).

But, apart from distraction, there could be other effective techniques to gain control over unwanted thoughts and dysfunctional emotions. Anderson & colleagues (Anderson and Green, 2001; Anderson et al., 2004; Levy & Anderson, 2002) have recently used an experimental paradigm called think/no-think to study the inhibition of unwanted memories. The procedure consists in the systematic training to think or no think in a response in the presence of the associated stimulus. In the think trials, the associated response to the cue has to be given as fast as possible, whereas in the no-think trials, subjects have to fixate their attention in the cue word and have to reject the possible entrance of the associated memory into consciousness. Following the Wegner's (1994) theory, when this technique is employed the intentional operating process remains focused on the reminder stimulus. At the same time, the ironic monitoring process initiates a search of elements that are not the reminder stimulus, which makes quite unlikely the resurgence of the unwanted item. The originality of Anderson and Green's procedure lies in the fact that subjects are explicitly instructed to avoid the strategy of distraction. In the suppression (no-think) trials, participants are told to concentrate in the cue word in order to avoid the entrance into consciousness of the associated target.

The primary purpose of the present research is to assess the efficacy of the suppression method proposed by Anderson and Green (2001) for the control of intrusive thoughts. In the present study, participants in one of the experimental conditions have to avoid thinking about an intrusive scene (target), while they are mentally visualizing a reminder stimulus of that scene. We will compare this suppression method with the traditional thought suppression and monitor-only conditions. Instead of the typical neutral thoughts (e.g., white bears) used in some previous studies, we will use a complex situation with certain level of emotional implication as target thought. Although the literature on thought suppression is not completely univocal about the role of emotional valence (see Abramowitz et al., 2001), we think that distinctive thoughts attract more our attention and are more difficult to put aside from our minds.

With the aforementioned literature review in mind, we hypothesize that both suppression groups will reduce the frequency of the target thought at short-term. We are

not going to include a cognitive load during suppression, an important condition for the occurrence of the immediate enhancement effect (e.g., Wegner & Erber, 1992; Wegner et al., 1993). But, we think that individuals with classic suppression instructions, in contrast to those instructed to suppress confronting a reminder stimulus, will show an increase in the number of intrusions at long-term (rebound effect) in comparison with the monitor-only group. We base our predictions on the Wegner's theory (1994), which posits that the operating and monitoring processes engage in feature-positive or feature-negative searches. Following this theory, in the case of those subjects that have to concentrate on the target reminder, the operating process will be searching for the presence of it, a feature-positive search that will help them to draw attention away from the target thought, whereas the monitor process will be searching for items that are not the target reminder, a feature-negative search. In the case of the participants receiving classic thought suppression instructions, the operating process will initiate a feature-negative search for items that are not the target thought, whereas the monitor will search for it, a feature-positive search. Taking into account that feature-positive searches are easier than feature-negative searches, long-term mental control will be more difficult to be achieved in the classic suppression condition. Additionally, we base our predictions on Anderson and collaborators works (Anderson & Green, 2001; Anderson et al., 2004), which demonstrate that when normal individuals encounter reminders of something they like not to think about, they have the capacity of avoiding the resurgence of the unwanted memories through the conscious recruitment of inhibitory mechanisms. The effects of inhibitory control accumulate with practice, that is, the more the subject suppresses the unwanted memory, the higher is the level of forgetting. Therefore, the participants in the present study will have to suppress confronting a reminder during a considerable period of time in order to significantly decrease the accessibility of the target thought. Concerning the emotional experience associated with the intrusions of the target thought, in concordance with the expected findings in thought frequency, we think that those told to suppress without confronting a reminder stimulus will experience more discomfort or annoyance at the postsuppressional period than the participants instructed to monitor the presence of the target and those instructed to suppress confronting a reminder stimulus.

Method

Participants

Seventy-six undergraduates who were studying psychology at University of Valencia (Spain) received course credit in exchange for their participation in this research. The gender composition of the sample was 88.2% female and 11.8% male. The average age of the participants was 19.28 years (SD = 4.15).

Apparatus

Desktop computers running E-Prime vs. 1.0 software (Schneider, Eschman & Zuccolotto, 2002) were used to present written instructions and to record subjects' responses via keypress.

Measures

Intrusive thought frequency was measured from a keypress response. We used event marking (asking subjects to press the space bar indicating the presence of the target thought) as the primary dependent variable. The amount of discomfort produced by the occurrences of the target thought during the first and third experimental period was assessed by means of a 0–9 Visual Analogue Scale (VAS) anchored at each end.

Procedure

The experiment was conducted in a quiet laboratory with the subjects sitting in a comfortable chair facing a computer. Participants were randomly allocated to three groups: suppression + reminder, suppression and control. There were 29 subjects (26 females) in the suppression + reminder group, 25 subjects (22 females) in the suppression group, and 22 subjects (19 females) in the control group.

Target thought induction

Before the beginning of the experimental periods, all subjects completed two imagination tasks: In the first task, they closed their eyes and they had to mentally visualize the hall of the faculty until they obtained a vivid and detailed image. In the second task, subjects closed their eyes again and they had to mentally visualize the following scene:

> Please, try to mentally visualize again the hall of the faculty. Imagine that you are in the hall and suddenly you notice that your clothes are torn and you are naked in front of a lot of students and professors, who are laughing at you and looking an incredible scene: a student is naked in the hall of the faculty.

They mentally visualized the scene until they obtained a vivid and detailed image.

Experimental periods

Subjects were told that along the experiment they would be asked to report intrusive thoughts about the scene they had imagined before, pressing a key (space bar). All subjects had their eyes closed and used headphones to attenuate external noises during all periods. During period 1, all participants were instructed as given below.

> During the next minutes, you have to mentally visualize the hall of the faculty. You might think about the scene —I am naked in the hall of the faculty—, but you do not have to. If at any time you think about that scene, please press the space bar.

The first period was a baseline period used to assess the initial frequency of the intrusive thought. Then, all participants completed the discomfort VAS. During period 2, participants in the control condition received the same instructions as during period 1, whereas participants in the two suppression conditions were instructed as given below.

Suppression

> During the next minutes, please record your thoughts as you did before. You may think about anything that you like, but now it is very important that you try as hard as you can to suppress the scene —I am naked in the hall of the faculty-. Be sure to press the space bar if you think about that scene.

Suppression + reminder

> During the next minutes, please record your thoughts as you did before. You have to mentally visualize the hall of the faculty, but now it is very important that you try as hard as you can to suppress the scene —I am naked in the hall of the faculty-. Be sure to press the space bar if you think about that scene.

Period 3 was identical to the first period for all participants. Following this final period, all participants again completed the discomfort VAS. Periods 1 and 3 were 5 min in length, while period 2 was 10 min in length. The experiment lasted approximately 40 min in total. Finally, subjects were thanked for their participation and debriefed.

Results

Target thought frequency

Two participants were dropped as outliers, because their frequency of the keypress responses was greater than or equal to three standard deviations above their group mean during one or more periods (Tabachnick & Fidell, 1996). Both participants were from the suppression + reminder group. We also discarded six participants because they did not press the space bar during any experimental period. Three participants were from the suppression + reminder group and three from the control group. Both exclusion criteria (outliers and subjects with 0 target thought occurrences), initially proposed by Janeck and Calamari (1999), have been used in several researches (e.g., Belloch et al., 2004; Purdon & Clark, 2001). Effect sizes are reported on all the analyses commented below and are based on partial η^2 (Cohen, 1988).

The mean frequency of intrusions across groups and experimental periods is presented in Table 1. This variable (number of key presses) was analysed using a 3 (Group: suppression + reminder, suppression, control) × 3 (Period: periods 1, 2 and 3) mixed factorial ANOVA. There was a main effect of period, $F(2, 130) = 8.67$, $p < .001$, $\eta^2 = .12$, and a marginally significant main effect of group, $F(2, 65) = 2.72$, $p = .07$, $\eta^2 = .08$. However, these effects were qualified by a significant interaction $F(4, 130) = 5.78$, $p < .001$, $\eta^2 = .15$. Then, we computed planned comparisons to understand the interaction. The analysis of the baseline period revealed that participants of the suppression group reported more target intrusions ($p < .04$) than subjects of the suppression + reminder group, $F(2, 65) = 4.33$, $p < .02$, $\eta^2 = .12$. Therefore, frequency of intrusions during period 1 was used as a covariate for the analysis of the following experimental periods. The ANCOVAS yielded significant differences during the second period between the control group and the two suppression groups, $F(2, 64) = 6.69$, $p < .001$, $\eta^2 = .17$. That is, participants of the control group reported higher number of intrusions than those individuals instructed to suppress confronting a reminder

Table 1 Target thought frequency during the suppression task (standard deviation is shown between parenthesis)

Group	*n*	Period 1 (5 min)	Period 2 (10 min)	Period 3 (5 min)
Suppression + reminder	24	6.04 (6.17)	5.79 (5.61)	4.42 (3.82)
Suppression	25	11.72 (8.92)	8 (6.33)	7.24 (5.77)
Control	19	7.68 (4.32)	11.95 (9.96)	6.47 (7.40)

($p < .03$) and those that received classic suppression instructions ($p < .001$). The differences between the suppression groups were not statistically significant ($p > .10$). Finally, the groups did no differ in the frequency of intrusive thoughts during the third period ($F < 1$). In other words, there was no evidence of initial enhancement or rebound effects of suppression.

Discomfort associated with the target intrusions

The data are shown in Fig. 1. The discomfort VAS ratings were analysed using a 3 (Group: suppression + reminder, suppression and control) × 2 (Period: periods 1 and 3) mixed factorial ANOVA. The analysis yielded a main effect for period, $F(1, 65) = 17$, $p < .001$, $\eta^2 = .21$, and a group by period interaction, $F(2, 65) = 3.63$, $p < .04$, $\eta^2 = .10$. No significant effects ($F < 1$) were observed between groups during the baseline period (suppression + reminder, $M = 4.71$, SD = 2.2; suppression, $M = 5.04$, SD = 2.32; control, $M = 4.84$, SD = 1.98). However, the follow-up tests indicated a significant effect at period 3, $F(2, 65) = 3.85$, $p < .03$, $\eta^2 = .11$. Participants who had been instructed to monitor the presence of the target thought in the previous period ($M = 2.95$, SD = 2.70) reported less discomfort at long-term ($p < .03$) than did those who had been instructed to suppress ($M = 4.88$, SD = 2.22). We did not find significant differences between the suppression + reminder group ($M = 3.5$, SD = 2.38) and the other two groups (both p's $> .10$). The pattern of results shows a decline of discomfort over time (habituation effect) that is disrupted when suppression instructions are provided. Nevertheless, if suppression instructions are combined with the indication to concentrate on a reminder stimulus, the discomfort level associated with the avoided thought decreases along the time. In fact, additional planned comparisons revealed that the suppression + reminder and the control group experienced a significant decrease in discomfort from period 1 to period 3, $t(23) = 3.22$, $p < .005$ and $t(18) = 3.44$, $p < .005$ respectively, whilst the suppression group maintained the discomfort level, $t(24) = .36$, $p > .10$.

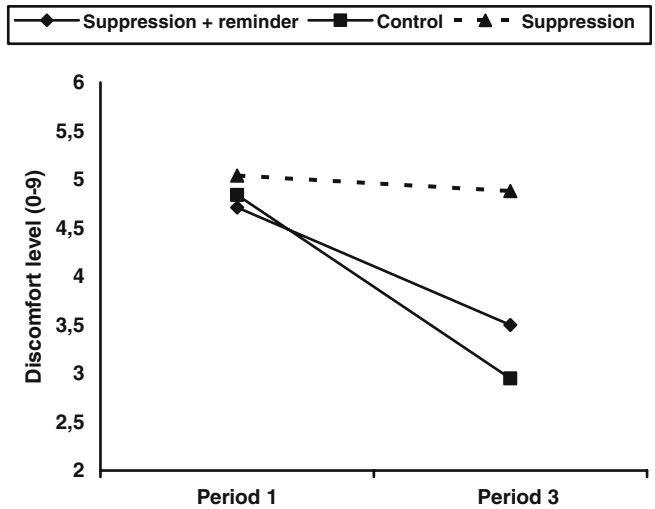

Fig. 1 Discomfort associated with the target intrusions during the first and third period of the experiment in the three groups of subjects

Discussion

The present study should be considered an attempt to address the applicability of the suppression strategy proposed by Anderson and Green (2001) to the thought suppression research. The findings of the present experiment partially demonstrate that the continuous suppression of a thought has negative consequences for the subject at long term, because it can avoid the natural habituation process. The analyses of the target thought frequency did not yield interesting significant results. Data analyses only indicated that during the second phase participants receiving suppression instructions reported less intrusions than those subjects with monitoring instructions. Contrary to our predictions, the participants that received classic suppression instructions did not indicate more intrusions than the other groups at the postsuppressional period. This absence of rebound is not unusual in the literature (e.g., Belloch et al., 2004; Borton, 2002; Kelly & Kahn, 1994; Merckelbach et al., 1991; Muris et al., 1993; Purdon & Clark, 2001; Roemer & Borkovec, 1994). Some previous researches have shown that the immediate increase of target thoughts usually occurs when the operating process is undermined by means of concurrent cognitive demands (Wegner & Erber, 1992, Wegner et al., 1993). For instance, Wegner and Erber (1992) instructed subjects to think or not to think about a target word and then measured their tendency to respond with that word to related or unrelated cues. Participants suppressing the target thought and instructed to respond with a time limit (cognitive load) showed a greater tendency to respond to the cues with the target word than did the subjects instructed to suppress without a time limit for responding or the subjects without suppression instructions. In our experiment we did no impose a cognitive load, and the predicted absence of immediate enhancement effects was obtained.

In sum, the target thought frequency did not achieve to capture the long-term counterproductive effects of suppression. This is the reason why an increasing amount of researches have proposed the measurement of other variables like unpleasantness, unacceptability, state self-esteem, mood state, etc., that are more sensitive to the potentially harmful effects of suppression (e.g., Borton, 2002; Markowitz & Borton, 2002; Purdon, 2001; Purdon, Rowa, & Antony, 2005). In our study, the discomfort associated with the target intrusions was higher with the classic thought suppression instructions as predicted by Gross (2002) conceptualization of suppression as a counterproductive mechanism of emotion regulation. We have to take into account that suppression increases arousal, a factor that could underlie the perceived discomfort measured with the Likert scale. Participants only reported less annoyance in the third period when they had been instructed to confront the reminder.

The in vivo appraisals about the target thought occurrences during the suppression attempts could account for the reported findings on this variable. For example, Purdon et al. (2005) in a research conducted with patients suffering an obsessive–compulsive disorder showed that during suppression, greater concerns about the thought coming true or indicating negative aspects of one's personality was related to greater discomfort over thought occurrences. In addition, an escalating perceived need to control the thought was associated with more negative mood at long term. Therefore, the individual appraisals about the target intrusions during suppression seem to predict the suppression effort, discomfort, and long-term mood state. In our study, it is possible that the employment of different suppression techniques provoked different cognitive appraisals over the thought control failures. Perhaps, the participants that suppressed confronting

the reminder stimulus made external attributions of their intrusions (e.g., ''How can I suppress this thought if I have to visualize an stimulus that reminds me it?''), whereas those that did not visualize the reminder during suppression attributed their thought control failures to internal factors (e.g., ''If I am not able to suppress this thought is because my mind is weak''). We think that this could be a possible explanation of the decrease in the discomfort level when the suppression attempts were carried out confronting the reminder stimulus, and the maintenance when these suppression efforts were made without the reminder.

It is important to note that our results are in line with those obtained by Purdon and Clark (2001) and Belloch et al. (2004). Thus, Purdon and Clark (2001) instructed different groups of undergraduates to suppress or simply monitor an obsessional, neutral or positive thought during the first experimental period. Then, all groups received monitoring instructions. Analyses of thought frequency showed no evidence of an immediate or a rebound effect for any type of target thought, although suppression instructions caused sustained levels of intrusions across experimental periods. However, target thought frequency declined across periods in all control (non-suppression) groups. These authors argued that suppression interferes with habituation by two alternative ways; either because it terminates exposure to the thought or because it might prime expectations that personal intrusive thoughts can and should be controlled. Later, Belloch et al. (2004) reported similar results when they instructed subjects to suppress or not suppress an intrusive or neutral thought. Analyses on thought frequency yielded an absence of paradoxical effects during or after suppression instructions. Although, the two suppression groups showed no differences in the frequency of intrusions between the suppression and monitor-only periods. Additionally, the group that had to suppress the personal intrusive thought did not show a decrease in the annoyance caused by the intrusions.

In the present study the confrontation with a target thought reminder during a long period of time (the suppression + reminder and control group confronted the reminder during 20 min) is closely related to a widely employed and highly effective behavioural technique for the treatment of anxiety disorders that clinical psychologists call *exposure* (Abramowitz, 1996; Bradley et al., 2005; Deacon & Abramowitz, 2004). This technique consists in confronting fear-evoking situations or stimuli in a systematic way with the end to gradually diminish the typical avoidance responses of patients. Thus, with the exposure the clinician tries to promote habituation and provide corrective information about the dangerousness of the feared situations to the patient. In the present experiment, although the confrontation with the reminder stimulus was only in imagination, it has proven its efficacy on the reduction of negative emotions associated with the intrusions.

In the clinical context, patients with an obsessive–compulsive disorder (OCD) diagnosis show a deficient ability to suppress unwanted intrusive thoughts, images and impulses (APA, 2000). Specifically, a large body of empirical works, employing different experimental paradigms like thought suppression (Tolin, Abramowitz, Przeworski, & Foa, 2002), directed forgetting (Bohne, Keuthen, Tuschen-Caffier, & Wilhelm, 2005; Tolin, Hamlin, & Foa, 2002; Wilhelm, McNally, Baer, & Florin, 1996), inhibition of return (Nelson, Early, & Haller, 1993), or the Stroop task (Bannon, Gonsalvez, Croft, & Boyce, 2002) have demonstrated that OCD individuals display deficiencies in cognitive inhibition and make internal attributions of their suppression failures (Tolin et al., 2002). In our opinion, future studies on cognitive inhibition might extent the findings of the present research, addressing whether the combination of exposure and thought

suppression is effective for the management of persistent intrusive thoughts not only for healthy individuals, but also for OCD patients. In line with this point, in order to maximize the ecological validity, researchers should employ personally relevant intrusive thoughts as targets, instead of experimentally provided thoughts.

We have to take into consideration some limitations of the present research. First, the results are based on a student sample, restricted in age, education and socioeconomic level. Second, we depended on subjects' honesty and sincere reports of their intrusions, which is an important limitation in general of this type of experiments, because as Purdon and Clark (2000) and Tolin et al. (2002) pointed out, participants may be reluctant to report on thought suppression failures in order to be compliant with instructions. Another key issue is that we should have assessed the discomfort level associated with the target intrusions during the second experimental period, in order to know if there was an initial enhancement effect on this variable. Despite the results reported above suggest that thought suppression confronting a reminder stimulus is an adaptive strategy at long-term from an emotional point of view, perhaps, the suppression attempts confronting a reminder caused a higher amount of discomfort than suppression-only. Thus, future studies might analyze which are the short-term emotional consequences of this thought control strategy. Finally, given that some researches (e.g., Trinder & Salkovskis, 1994) have found a significant association between suppression effort and discomfort, the administration of a visual analogue scale measuring the effort at suppressing the intrusions would have allowed us to examine whether the effects on discomfort obtained at the third period could be accounted for by differences in this variable. This scale is useful because it also allows to assess the degree of compliance with the suppression instructions (manipulation check) as well as the spontaneous tendency to suppress the target thought without instructions to do so.

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