# Why Distractors with Need-Supportive Content can Mitigate Ironic Effects of Thought Suppression

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Abstract

Thought suppression is a self-regulatory strategy commonly used to avoid unwanted thoughts although it can ironically make unwanted thoughts more intrusive and accessible. To reduce these ironic effects, it is important to explore mechanisms underlying effective suppression. The present study recruited 126 undergraduate students and examined the influence of distractor content on suppression outcomes by examining perceived satisfaction and immersion of distractors as mechanisms of effective suppression. Based on self-determination theory, we proposed that distractors associated with the satisfaction of the psychological need for autonomy would mitigate ironic effects of thought suppression because they would be perceived as satisfying and immersive. Results showed that need-supportive distractors reduced intrusion frequency because they were indeed perceived as more satisfying. Our findings also point towards the unique satisfying properties of distractors involving psychological need satisfaction because effects of single, pleasant and personally relevant distractors have been controlled for. Findings are discussed using Wegner's (1994) theories of thought suppression and principles of self-determination theory.

*Keywords*: thought suppression; distractor; satisfaction; psychological need; self-determination theory

Thought suppression is a self-regulatory strategy that is commonly used by both clinical and non-clinical populations (Beevers, Wenzlaff, Hayes, & Scott, 1999; Najmi, Riemann, & Wegner, 2009). It describes individuals' attempts to eliminate an unwanted thought from awareness by trying to avoid thinking of the unwanted thought. According to Wegner's (1994) ironic process theory, when capacity for self-control is reduced either by stress, cognitive load or time pressure, the intended control does not merely fail but ironically it may result in mental states that are the opposite of those that are desired (Wegner, 1994). In such instances for example, a dieter with an intention to lose weight may suppress the thought of high calorie foods, ironically resulting in the development of an uncontrollable obsession to eat high calorie foods, more so than before the commencement of the diet.

According to Wegner (1994), ironic phenomena are due to the nature of a feedback system comprising two processes working in synergy to produce mental control (Wegner, 1994). An *intentional operating process* is present in consciousness, remains in awareness and it is inefficient in the sense that its operation requires considerable effort and mental resources. The main function of the operating process is to orient the person towards environmental cues and/or memory inputs that are consistent with the desired mental state. For example, if suppression of thoughts related to high-calorie foods (e.g., not thinking about chocolate chip cookies) is what the person is attempting to accomplish, the operating process will search and bring distracting thoughts into consciousness that are semantically opposite, or unrelated to high calorie foods (e.g., thinking of healthy foods or video games). This self-distracting strategy of thought suppression is used because the operating process can only bring thoughts into consciousness and not avoid them or drive them away (Wegner, 1994). There is also an *ironic monitoring process* that is relatively automatic, not part of our conscious awareness, efficient, less effortful and not under the complete control of the individual (Wegner & Erber, 1992). This process operates in the background continuously and monitors intrusions of the unwanted thought in order to alert the operating process to renew its efforts. For example, in the case of suppression of thoughts related to high calorie foods, the monitoring process will be searching for items reflecting high calorie foods because the presence of such thoughts in consciousness indicates failure of the operating process to maintain attention on thoughts unrelated to high calorie foods. The operating and monitoring processes work in synergy to produce mental control. Their functioning starts once mental

control is intentionally undertaken (Wegner, 1994). During thought suppression the unwanted thought can intrude as a result of failures of the operating system to find a distracting thought or other reasons such as reminder stimuli in the environment. Each intrusion will be registered by the monitoring system in order to prompt the operating system to reinitiate its efforts (Wegner, 1994).

The ironic process theory has been very influential in explaining a wide range of mental phenomena observed in laboratory settings during and after suppression of thoughts (Wegner, 1994; Wegner, Shortt, Blake, & Page, 1990; Wenzlaff, Wegner, & Roper, 1988). In particular, this theory can explain why individuals instructed to suppress a thought report returns and increased accessibility of the unwanted thought during and after suppression relative to individuals instructed to express a thought (Wegner & Erber, 1992; Wegner et al, 1987). The reason for this is that thought suppression is a difficult task often resulting in failures of the operating process to find absorbing distracters – distractors that create a line of thought in which individuals are immersed for long periods of time (Wegner, 1994). As a result, the monitoring process that is searching for signals of failure registers the unwanted thought in consciousness whenever an avenue of association to the unwanted thought is encountered or when failure to produce a distracting thought is noted (Wegner et al., 1987). The outcome of this monitoring process is increased accessibility of the unwanted thought in memory and resurgence of the unwanted thought (Wegner & Erber, 1992).

Due to the paradoxical effects of thought suppression, researchers have become increasingly interested in examining effectiveness of various thought suppression strategies in reducing intrusion of unwanted thoughts. The main suppression strategies examined in previous literature are free-distraction and focused-distraction. Free-distraction involves participants simply being told not to think of the unwanted thought (Mikulincer, Dolev, & Shaver, 2004). Focused-distraction involves participants suppressing a thought by focusing their attention on a single distractor. These include neutral distractors, where participants were told to focus on a particular non-emotive object or thought in order to avoid the unwanted thought (Hattori & Kawaguchi, 2010; Luciano & Gonzalez, 2007), and pleasant distractors, where participants were asked to focus on a pleasant thought in order to avoid the unwanted thought (Najmi et al, 2009). These suppression techniques were often contrasted with a baseline or control group which was either a monitoring condition in which participants were asked to think of anything they wanted (Lin & Wicker,

2007) or an expression condition in which participants were asked to deliberately think about the thought that suppressors were trying to avoid (target thought; Wegner, Schneider, Carter, & White, 1987). For both of these control conditions, participants were also asked to track the frequency of the target thought. Free-distraction has been frequently cited as a less effective strategy in suppressing unwanted thoughts than focused-distraction (Wegner et al, 1987). The reason for this is that individuals cannot find distractors that are absorbing enough to keep their attention away from the unwanted thought for long intervals of time (Wegner, 1994). Therefore participants' minds often wander between thoughts (Ju & Lien, 2016), leaving gaps in attention through which the unwanted thought intrudes (Mason et al, 2007). Another proposed reason was the feature-positive vs feature-negative distinction. Specifically, Wegner (1994) pointed out that free-distraction involves the use of a feature-negative (trying to think of a non-target thought) search process which is cognitively more demanding compared to focused-distraction which utilises a feature-positive search (trying to think of a target thought).

Since most unwanted thoughts are emotionally negative, pleasant thoughts have been suggested to be more effective distractors because they activate a polar opposite network of mental representations (Beevers et al, 1999). However, previous studies looking at focused distraction with pleasant distractors have not conclusively supported their superiority over free distraction and focused distraction (Harvey & Payne, 2002; Watson & Purdon, 2008). One reason for this is that previous studies have not systematically examined underlying mechanisms facilitating successful suppression. More specifically, although studies have examined the effects of different distraction strategies on ironic effects (Harvey & Payne, 2002; Watson & Purdon, 2008), they have not investigated *why* some distractors such as pleasant thoughts tend to be more effective at mitigating the ironic effect than others, such as neutral distractors.

In light of the aforementioned question, we proposed two potential mechanisms of effective suppression in the current manuscript. Since Wegner (1994) suggested that intrusions during suppression can be due to individuals' inability to generate absorbing distractors in which they are immersed for long periods of time, the *immersive* properties of the distractor may be one mechanism aiding effective thought suppression. Another mechanism may be how *satisfying* individuals find the distractor since distractors with

a positive emotional valence are less likely to activate negatively valenced thought networks, as is the case with most intrusive thoughts (Beevers et al, 1999). Running from this logic, the present study sought to examine whether focusing on memories that facilitate a sense of psychological need satisfaction could be effective in mitigating ironic effects of thought suppression because they are satisfying and immersive. The following section outlines the reasons behind this speculation.

**Psychological Need-Satisfaction**

Self-determination theory (Deci & Ryan, 1985) is a theory of human motivation that posits that people are endowed with three innate psychological needs for autonomy (the need to experience oneself as initiator and regulator of one's own actions), competence (the need to produce outcomes and understand the instrumentalities leading to those outcomes) and relatedness (the need to experience satisfactory relationships with others and with the social order more in general). On the basis of this assumption, self-determination theory differentiates events, such as goals, motives, memories and experiences, into intrinsic (or need-supportive) events that satisfy psychological needs, and extrinsic events that are associated with extrinsic goal pursuit or attainment (Sheldon, Elliot, Kim, & Kasser, 2001). At a goal and phenomenological level, self-determination theory posits that experiences related to intrinsic goals are those that satisfy basic psychological needs (Vansteenkiste, Lens & Deci, 2006). These intrinsic goals capture pursuit and attainment of goals related to personal growth and development, community, meaningful relationships and protection of the environment. In contrast, according to this theory, extrinsic goals do not lead to the satisfaction of psychological needs, and may, in fact, undermine or thwart them. These extrinsic goals reflect pursuit and attainment of goals such as financial success, fame and image (Deci, Koestner, & Ryan, 1999).

To date, a considerable number of studies have documented that pursuit and attainment of intrinsic goals is experienced as more meaningful and satisfying than the pursuit of extrinsic goals (Brdar, Rijavec, & Miljkovic, 2009; Robak & Nagda, 2011; Sheldon et al, 2001; Vansteenkiste, Lens & Deci, 2006). Weinstein, Przybylski and Ryan (2009) demonstrated that individuals *immersed* in intrinsic events that were related to the goal of protection of the environment (i.e., viewing pictures of nature) experienced a sense of positive affect, autonomy and relatedness to nature more so than those exposed to extrinsic events (pictures of man-

made settings). In addition, Roca and Gagne (2008) suggested that intrinsically satisfying experiences are more immersive than experiences related to extrinsic events. These studies collectively suggest that memories associated with pursuit and attainment of intrinsic (need-supportive) goals are more immersive and satisfying than that of extrinsic goals. This line of evidence therefore has clear implications for predicting that prompting individuals to think of need-supportive (intrinsic) distractors will facilitate successful thought suppression because they are satisfying and immersive. Despite the clear implication that need-supportive distractors possess qualities that can mitigate ironic effects of thought suppression, researchers examining the thought suppression paradigm have never taken a self-determination theory perspective. In fact, previous thought suppression studies have rarely investigated mechanisms underlying effective thought suppression by focusing on variables associated with distractor content. In a notable exception Najmi and Wegner (2008) showed that priming distracting stimuli that were semantic associates of the unwanted thought actually increased accessibility of the unwanted thought. In the current study, we will use a self-determination theory approach to examine the role of perceived satisfaction and immersion of distractors in the relationship between distraction strategy and effective suppression.

**Overview of the Study and Hypotheses**

The present study sought to test whether using distractors associated with satisfaction of the need for autonomy mitigated ironic effects of suppressing a negatively valenced thought (‘violence’) because they were satisfying and immersive. Important to note is that the present study also included a condition that used a single neutral distractor (‘yellow leaf’), and one that used pleasant personally relevant distractors reflecting attainment of the extrinsic goal of image-attractiveness. These conditions were incorporated to ensure that effects of the need-supportive distraction strategy on suppression outcomes can be attributed to the need-supportive element itself, above and beyond confounding factors including the pleasantness and personal relevance of the distractor and the general technique of focused-distraction. At an operational level, our hypothesis is supported if the indirect effects of need-supportive distraction on intrusions and accessibility of the unwanted thought via immersion and satisfaction are significant after controlling for effects of neutral and extrinsic distractors.

Most thought suppression studies have measured intrusions of unwanted thoughts using self-reported methods by way of pressing a key (Luciano & Gonzalez, 2007), retrospective recall (Lin & Wicker, 2007; Page, Locke, & Trio, 2005) or ringing a bell (Wegner et al, 1987). Some have also measured accessibility of the unwanted thought via reaction time tasks (Wegner & Erber, 1992) or word completion tasks (Lin & Wicker, 2007) to avoid bias inherently present in self-report measures (Purdon & Clark, 2001). In the present experiment, to avoid recording devices (such as bells and clickers) acting as retrieval cues of the unwanted thought, intrusions were measured post-suppression by having participants recall their estimated number of unwanted thought intrusions during suppression. In addition, we measured accessibility of the unwanted thought using a word completion task. Participants were further required to memorise a nine-digit number during the experiment because Wegner (1994) suggested that ironic effects of thought suppression are more salient under cognitive load.

Arousal/fatigue levels (Baumeister, Simpson, Ware, & Weber, 2015) are believed to influence suppression performance since fatigue can tax cognitive capacity and therefore undermine the operating system. Trait absorption levels (Parsons, Barnett, & Melugin, 2015) is also believed to influence suppression performance since individuals who are predisposed toward higher trait absorption can be immersed in the distractor with more ease. These variables were therefore controlled for as covariates. Effects of extrinsic and neutral distractors were also controlled for in order to ensure effects of the need-supportive condition can be attributed to need-supportive distractor content.

## Method

### Participants and Design

Participants were 126 undergraduate students (22 male, 104 female, mean age = 22.1, *SD* = 6.0) who participated in this study in exchange for either course credit or a $15 shopping voucher. The present study used a one-way experimental design with 'suppression strategy' (free, focused, extrinsic, need-supportive[1])

[1] In addition to the 126 participants mentioned, we also included a 'concentration' condition (n = 31, Mean age = 21.3, *SD* = 3.8, 8 male, 23 female) in order to confirm that the free-distraction group's accessibility levels represented ironic effects. This concentration condition instructed participants to deliberately think of

as the between-participant variable and 'intrusion frequency' and 'accessibility' of the unwanted thought as outcome variables. Participants were randomly allocated to each group with a final count of 32 in the 'free-distraction' (Mean age = 22.3, *SD* = 6.9, 4 male, 28 female) and 'extrinsic-distraction' (Mean age = 22.1, *SD* = 6.2, 7 male, 25 female) conditions and 31 in the 'focused-distraction' (Mean age = 22.5, *SD* = 5.4, 7 male, 24 female) and 'need-supportive distraction' conditions (Mean age = 21.6, *SD* = 5.4, 4 male, 27 female). Power analysis indicated that a minimum of 60 participants was required for regression analyses to detect a medium effect size (f2 = .15) 80% of the time. The inclusion criteria were that participants must have English as their first language and not have any diagnoses of mental illness or learning difficulty. Experiments did not begin until ethical approval was obtained from the human research ethics committee of the University and took place individually in experimental cubicles. Some elements of the study such as timing and cognitive load were computerised using the E-prime experimental software (Schneider, Roush, Eschman & Zuccolotto, 2013).

**Procedure**

After obtaining informed consent and measures of arousal levels from all participants, those allocated to the extrinsic and need-supportive conditions were asked to generate a recent pleasant event facilitating a sense of image-attractiveness and autonomy respectively. Following this, we induced cognitive load by instructing all participants to remember a random nine digit number presented on the computer screen for 30 seconds. It was emphasised that they would be asked to recall this number near the end of the experiment. The thought suppression task instructions were then read to all participants (Please see Appendix A) which prompted them to avoid thinking of the word 'violence' for the next five minutes. The manipulation of thought suppression strategies was followed immediately and then the thought suppression task commenced. Participants then filled questionnaires that assessed immersion and satisfaction levels of the distractor and the items of manipulation check. This was followed by the word completion task for

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the unwanted thought. Analysis confirmed that the free-distraction condition yielded ironic effects because no significant difference was found between concentration and free-distraction conditions in accessibility of the unwanted thought ($p > .05$; Wegner & Erber, 1992). Given this and due to space limitations, we did not use the concentration group as a control condition.

which participants were instructed to complete as quickly as possible without hesitating on any single item. After this task was completed, participants were asked to recall the nine digit number and estimate the frequency of unwanted thought intrusions during the thought suppression task. Finally, they were asked to complete the trait absorption questionnaire before being debriefed, thanked and escorted.

**Manipulation of Thought Suppression Strategies**

In accordance with basic thought suppression instructions (Wegner et al, 1987), participants in all conditions were told that their primary task was to avoid thinking of the word 'violence'. In addition, participants in the need-supportive and extrinsic-distraction conditions were told that to help divert attention from the unwanted thought they should focus on the previously generated event that satisfied their need for autonomy and desire for image-attractiveness respectively. Similarly, focused-distraction (neutral distractor) participants were asked to focus on the thought of a 'yellow leaf' (Wegner et al, 1987) while free-distraction participants received no further instructions. The verbatim scripts of these manipulation instructions are presented in Appendix A.

**Measures**

**Need-supportive distraction**. A simple contrast code was used to represent this variable in which need-supportive distraction participants were assigned a value of '1' and free-distraction participants were assigned a value of '-1'. All remaining participants were assigned a value of '0'.

**Extrinsic-distraction.** A simple contrast code was used again to represent this variable in which extrinsic-distraction participants were assigned a value of '1' while free-distraction participants were assigned a value of '-1'. All remaining participants were assigned a value of '0'.

**Focused-distraction.** Similarly, a simple contrast code was adopted to represent this variable in which focused-distraction participants were assigned a value of '1' while free-distraction participants were assigned a value of '-1'. All remaining participants were assigned a value of '0'.

**Trait absorption**. The Tellegen Absorption Scale (TAS; Tellegen, 1982) was used to evaluate individuals' propensity to be immersed in an experience, event or thought using 34 true/false items (e.g., 'It is sometimes possible for me to be completely immersed in nature or in art and to feel as if my whole state of consciousness has somehow been temporarily changed'). The TAS yielded a satisfactory level of internal consistency ($\alpha = .82$).

**Arousal/fatigue**. The Perceived Arousal Scale (PAS; Anderson, Deuser & DeNeve, 1995) measured state arousal/fatigue levels using 24 single word items (e.g., 'active', 'sharp'). Participants were asked to describe the degree to which they were currently experiencing these different types of sensations. Responses were made on five-point scales ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). The PAS yielded a satisfactory level of internal consistency ($\alpha = .91$).

**Perceived immersion.** A modified version of Ryan, Rigby and Przybylski's (2006) immersion scale was used to measure perceived immersion of the distractor thought. Participants responded to six items in total using seven-point scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Two items assessed physical immersion (e.g. 'Exploring the content of the thought felt like it was real'), the next two items measured emotional immersion (e.g. 'I was not impacted emotionally by the thought'), and the final two items assessed narrative immersion (e.g. 'Thinking about the thought made me forget that I was actually here in front of the computer'). The immersion scale yielded a satisfactory level of internal consistency ($\alpha = .85$)[2].

**Perceived satisfaction.** Participants were directly asked a single question on how satisfying they thought the distractor(s) was. Responses were gathered on four-point scales ranging from 1 (*somewhat satisfying*) to 4 (*extremely satisfying*).

[2] An additional scale was used - the internal validity check which included three items. These evaluated the degree to which participants subjectively perceived that their success in the suppression task was due to the immersive nature of the distractor (e.g., 'I was able to keep away the thought of violence most of the time because I felt immersed in the thought of the yellow leaf'). Four-point response scales were adopted ranging from 1 *(strongly disagree)* to 4 *(strongly agree)*. Since the relevance of this measure was contingent on significant indirect effects of distraction strategy on suppression outcomes via immersion and this was not detected, we decided not to report this measure.

**Perceived autonomy.** Participants were asked: 'did the thought give you a sense of freedom of choice and/or self-expression'? A four-point scale ranging from 1 (*no more*) to 4 (*much more*) was used to gather responses.

**Perceived image-attractiveness.** Participants were asked: 'how much more physically attractive did the thought make you feel'? A four-point scale ranging from 1 (*no more*) to 4 (*much more*) was used to gather responses.

**Intrusion frequency.** Participants were asked retrospectively to estimate the total number of intrusions experienced during the thought suppression task. They were asked to estimate this number to the nearest integer, and in cases where they gave a range, the average value was used. Participants' estimations ranged from .5 to 25 intrusions.

**Accessibility of the unwanted thought.** An adapted version of the word completion task (Anderson, Carnagey & Eubanks, 2003) was employed to measure accessibility of 'violence' related words. This task presented participants with 34 different word stimuli all with missing letters on a piece of paper. Participants were required to quickly complete as many words as they could without hesitating on any word for too long. Of the 34 word stimuli, 17 were random word fillers (e.g., 'A_T_R') that were unrelated to 'violence' and the remaining 17 were associate words (e.g., 'KI_ _') that could be completed into either a 'violence' related word (e.g., 'KILL') or an unrelated word (e.g., 'KISS'). The sequence of filler words and associate words were randomly ordered. Accessibility is reflected through number of associate words that have been completed into a violent-related word with more words indicative of higher accessibility to the unwanted thought.

## Results

### Preliminary Analyses

Table 1 presents the overall descriptive statistics and correlations. First and foremost our manipulations appeared to be successful as shown by correlations. Statistically, this inference is supported by positive correlations between the need-supportive contrast-code and perceived autonomy, and between the extrinsic

contrast-code and perceived image-attractiveness. These manipulation checks indicate that relative to free-distraction participants, need-supportive condition participants were more likely to focus on memories that satisfied the need for autonomy[3]. On the other hand, extrinsic-distraction participants were more likely to focus on memories that satisfied the goal for image-attractiveness compared to participants in the free-distraction condition. Furthermore, in line with self-determination theory (Deci & Ryan, 1985) and Wegner's (1994) ironic process theory, satisfaction and immersion were both negatively correlated with intrusion and accessibility of the unwanted thought. As predicted, these relationships suggest that satisfaction and immersion were both prominent features of effective distractors that reduced intrusions and accessibility of the unwanted thought. Another interesting observation is related to the pattern of correlations between each distraction strategy and satisfaction and immersion. Specifically, the correlations between need-supportive, extrinsic and focused (neutral) distraction conditions and both mediators were moderate, weak and uncorrelated respectively. This pattern suggests that the need-supportive condition experienced the highest level of satisfaction and immersion from the distractor thought compared to the extrinsic and focused-distraction condition. Finally, the outcome variables were negatively and significantly correlated with the need-supportive condition but no other conditions. This signifies the potency of the need-supportive distraction strategy over other strategies in reducing intrusions and accessibility of the unwanted thought even without accounting for mediating mechanisms.

**Main Analysis**

A series of multiple regression analyses were used to test the hypotheses of this study. Specifically, we used Hayes and Scharkow (2013) index approach to mediation and regressed the dependent variables of intrusion frequency and accessibility separately on distraction strategy, immersion and satisfaction while trait absorption and arousal levels were specified as covariates. To test our hypotheses, we first specified the

[3] Manipulation checks were also conducted for a range of other extrinsic and intrinsic goals according to self-determination theory (Deci & Ryan, 1985; Sheldon et al, 2001), these include perceived popularity-influence, money-luxury, relatedness and competence. These however, were not used in the analyses as preliminary correlations showed no confounding associations between conditions and manipulation checks of non-condition-congruent goals. E.g. participants in the need-supportive condition consistently generated distractors facilitating a sense of autonomy and only autonomy, without supporting other needs or extrinsic goals.

need-supportive contrast code as the predictor variable while controlling for focused-distraction and extrinsic-distraction. Table 2 pointed out a significant indirect effect which suggests that need-supportive distraction did indeed predict intrusion frequency via perceived satisfaction but not immersion. As our hypotheses predicted, this indicates that the need-supportive distraction strategy reduced the number of intrusions during suppression because it generated memories that were perceived as satisfying to think about, more so than that of free, focused, and extrinsic-distraction. In addition, this observed indirect effect reflected a partial mediation for satisfaction since need-supportive distraction also showed a negative and significant direct effect on intrusions ($\beta$ = -2.00, [-3.15, -.84], $p$ = .00). On the other hand, need-supportive distraction only demonstrated a significant direct effect on measures of accessibility ($\beta$ = -2.23, [-2.85, -1.61], $p$ = .00) while showing an absence of statistically significant indirect effects.

Further regression analyses were conducted in which the same relationships were examined for effects of focused-distraction and extrinsic-distraction on intrusions and accessibility levels. Converging with previous findings (Watson & Purdon, 2008), we were unable to detect any ameliorating indirect or direct effects of focused-distraction on thought suppression outcomes. Specifically, we found a positive (rather than negative) significant indirect effect of focused-distraction on intrusions through satisfaction and immersion. This, together with a positive but non-significant corresponding direct effect ($\beta$ = .72, [-.39, 1.83], $p$ = .20) indicates that using a neutral distractor may in fact increase unwanted thought intrusions primarily because it is less satisfying and immersive to think about. In terms of predicting accessibility levels, the only significant effect of focused-distraction was a positive direct effect ($\beta$ = 1.38, [.79, 1.97], $p$ = .00). This again indicates a counterproductive effect of using neutral distractors on unwanted thought accessibility, this time with no mediating role of satisfaction and immersion. Finally, consistent with our predictions, no statistically significant indirect effects of extrinsic-distraction on suppression outcomes were detected (see Table 2). Correspondingly, no evidence was found for direct effects of extrinsic-distraction on intrusions ($\beta$ = .93, [-.12, 1.99], $p$ = .08) or accessibility levels ($\beta$ = .03, [-.54, .59], $p$ = .93).

## Discussion

Previous studies have not systematically examined the underlying mechanisms that facilitate effective thought suppression such as the effects of variables associated with distractor content. The present study sought to address this gap in the literature and aimed to examine the role of immersion, satisfaction and distractor content in ameliorating thought suppression outcomes. This was achieved by examining if and why distractors that facilitate a sense of autonomy were effective in thought suppression under cognitive load. Converging with our predictions based on principles of self-determination theory (Deci & Ryan, 1985), regression analyses indicate that adopting distractors reflecting the satisfaction of psychological needs is helpful in reducing ironic effects of thought suppression. Specifically, individuals who contemplated memories reflecting the satisfaction of the need for autonomy experienced fewer unwanted thought intrusions and a lower level of accessibility of the unwanted thought. Mediation analyses also suggest that need-supportive distractors were effective at reducing unwanted thought intrusions because they were perceived to be satisfying to think about.

In the present study participants found need-supportive distractors more satisfying than alternative distractors, yet the pattern of results was less clear for levels of immersion. This finding suggests that successful thought suppression using the need-supportive distraction strategy depends on perceived satisfaction of the distractor. In addition, this finding points to the distinct mediating role of satisfaction from immersion. Specifically, immersion is a cognitive concept that reflects concentration of attention. In contrast, satisfaction is a phenomenological concept that varies in valence. As such, although there is a significant correlation between satisfaction and immersion levels, finding a thought satisfying does not necessarily mean that one will be immersed in it and the converse is also not necessarily true. A potential explanation for the lack of significant indirect effects via immersion could be the presence of cognitive load. As Wegner (1994) suggested, individuals' ability to be immersed in a distractor may be compromised by the imposition of cognitive load, leaving effects of satisfaction more salient. On the other hand, the finding that perceived satisfaction did play a crucial role in ameliorating intrusion frequency runs parallel with Beevers et al's (1999) propositions. Specifically, they proposed that pleasant distractors activate a network of positively valenced thoughts and are therefore less likely to overlap with unwanted thoughts which are typically negatively valenced, as is the case with the present study.

We were eager to make sure that the effectiveness of the need-supportive distraction strategy can be attributed to the element of need-supportive distractor content itself rather than confounding factors. This was achieved by using focused-distraction (neutral distractor) and extrinsic-distraction as additional covariates, the latter of which prompted participants to use a pleasant and personally relevant memory associated with the goal of image-attractiveness. The resulting indirect effect of need-supportive distraction on intrusion via satisfaction therefore suggests that there is something unique about need-supportive distractor content itself that assists in reducing intrusions during suppression. Specifically, need-supportive distractors reduced intrusions above and beyond the effects of single, pleasant and personally relevant distractors, evidently because the element of psychological need satisfaction is more satisfying to think about.

Findings of the present study support principles of self-determination theory. In particular, the importance of psychological need satisfaction has previously been demonstrated in various different settings such as academic goal pursuit (Vansteenkiste, Lens & Deci, 2006), subjective perception of life events (Robak & Nagda, 2011; Sheldon et al, 2001), online shopping (Shang, Chen & Shen, 2005) and software experience (Roca & Gagne, 2008). However, the importance of psychological need satisfaction has never been tested when such thoughts are used as distractors in thought suppression. The present study therefore extends this empirical arsenal to include the thought suppression context, further confirming the importance of satisfying universal psychological needs as proposed by self-determination theory. Findings of this study also provide ideas for future research that seeks to merge principles of self-determination theory with thought suppression. For example, instead of examining need-supportive thoughts as distractors, it would be interesting to explore if *need-thwarting* thoughts exacerbate ironic effects of thought suppression when used as a 'to-be-suppressed' thought.

Interestingly, evidence from this study both challenges and refines previous theories (Wegner, 1994) and empirical findings (Cioffi & Holloway, 1993) that gave support to the feature-positive vs feature-negative distinction. Wegner (1994) initially proposed that feature negative searches were a more cognitively demanding process than feature positive searches. Broadly speaking, focused-distraction should

therefore be a more effective suppression strategy than free-distraction, especially when cognitive load is imposed, as is the case with the present experiment. While the effectiveness of focused-distraction using need-supportive distractors supported this theory, focused-distraction using a neutral-distractor actually produced a greater number of intrusions during suppression. Moreover, the effectiveness of need-supportive distractors was mediated by perceived satisfaction while the counterproductivity of neutral distractors was mediated by lack of perceived satisfaction and immersion. This intuitive finding allows us to speculate that the effectiveness of focused-distraction strategies are influenced by perceived satisfaction and immersion of distractor content. Specifically, their ability to allay intrusions is conditional on the premise that the distractor used during thought suppression is perceived to be satisfying and immersive.

**Limitations and Future Suggestions**

Our results indicate that the relationship between using need-supportive distraction and reduced intrusion frequency via immersion was marginally significant. Studies are therefore required to examine the effects of immersion further. In the current study, participants were asked to suppress a negatively valenced non-discrete thought in order to mimic real life settings (Beevers et al, 1999). While personally relevant thoughts, akin to episodic memories were used as the distractor in the need-supportive and extrinsic conditions, the unwanted thought was nevertheless a non-personally relevant thought, akin to a semantic memory. Moreover, this was tested in a student sample. Therefore results may not yet be generalisable to those frequently suppressing personally relevant memories such as certain clinical populations. Future studies are therefore encouraged to examine if present findings can be replicated in a more diverse sample using personally relevant unwanted thoughts. Finally, the present study specifically focused on the psychological need for autonomy and the extrinsic goal of image-attractiveness. In order to extrapolate our findings to psychological needs and extrinsic desires in general, future studies are encouraged to explore a diverse range of psychological needs and extrinsic goals such as relatedness, competence, fame and power.

**Conclusion**

The present study is the first to provide empirical evidence to suggest that distractor content plays a crucial role in allaying unwanted thought intrusions during thought suppression under cognitive load. Specifically, in line with self-determination theory, distractors with need-supportive content helped reduce the number of unwanted thought intrusions because they were perceived as more satisfying than distractors without need-supportive properties. Furthermore, need-supportive distractors were effective in a unique way, over and above the effects of pleasant, personally relevant and single distractors in general. We can therefore conclude with confidence that effectiveness of need-supportive distractors was due to the element of need-satisfaction specifically. Thought suppression has often been used as a self-regulatory strategy to manage intrusive thoughts in contexts like dieting, smoking cessation, alcohol reduction, and many other inevitable challenges individuals face on a daily basis. Current findings can therefore be extended to potential real world applications for both clinical and non-clinical populations. Clinicians and researchers could potentially use need-supportive memories as distractors to facilitate more successful thought suppression in these contexts.

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Table 1

*Descriptive statistics and correlations between variables*

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Focused-distraction | 1.0 | | | | | | | | | | |
| 2. Extrinsic-distraction | .50** | 1.0 | | | | | | | | | |
| 3. Need-supportive distraction | .51** | .50** | 1.0 | | | | | | | | |
| 4. Perceived image-attractiveness | .01 | .71** | .04 | 1.0 | | | | | | | |
| 5. Perceived autonomy | -.08 | .21* | .53** | .28** | 1.0 | | | | | | |
| 6. Satisfaction | -.01 | .23** | .35** | .28** | .58** | 1.0 | | | | | |
| 7. Immersion | .03 | .20* | .38** | .17 | .57** | .60** | 1.0 | | | | |
| 8. Accessibility | .07 | -.15 | -.48** | .00 | -.51** | -.36** | -.37** | 1.0 | | | |
| 9. Intrusions | .02 | -.03 | -.36** | -.01 | -.48** | -.40** | -.43** | .53** | 1.0 | | |
| 10. Arousal | .09 | .01 | .07 | -.04 | .06 | .01 | .05 | -.02 | .01 | 1.0 | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 11. Absorption | .12 | .01 | .07 | .01 | .17 | -.04 | .17 | -.03 | -.13 | -.05 | 1.0 |
| Mean | - | - | - | .71 | 1.36 | 2.49 | 22.25 | 6.83 | 8.82 | 79.97 | 18.13 |
| SD | - | - | - | 1.06 | 1.11 | .93 | 7.69 | 2.26 | 4.93 | 12.98 | 5.87 |

*Note*. Coefficients with an asterisk are statistically significant at $p < .05$ level. Coefficients with a double asterisk are statistically significant at $p < .01$ level.

The term SD indicates standard deviation of the mean.

Table 2

*Indirect effects of thought suppression strategies on intrusions and accessibility of the unwanted thought*

| Suppression strategy | Dependent variable | Indirect effects | B | SE | $BCI_{95}$ |
|---|---|---|---|---|---|
| Need-supportive (intrinsic) distraction | Intrusion frequency | via satisfaction | -.49* | .25 | -1.08 -.08 |
| | | via immersion | -.47 | .30 | -1.15 .01 |
| | Accessibility | via satisfaction | -.13 | .12 | -.39 .08 |
| | | via immersion | -.10 | .14 | -.38 .18 |
| Focused-distraction (neutral distractor) | Intrusion frequency | via satisfaction | .35* | .23 | .04 .97 |
| | | via immersion | .29* | .21 | .01 .89 |
| | Accessibility | via satisfaction | .09 | .10 | -.04 .36 |
| | | via immersion | .06 | .10 | -.09 .32 |
| Extrinsic-distraction | Intrusion frequency | via satisfaction | -.20 | .14 | -.60 .00 |
| | | via immersion | -.11 | .13 | -.55 .04 |
| | Accessibility | via satisfaction | -.05 | .06 | -.25 .02 |
| | | via immersion | -.02 | .05 | -.21 .03 |

*Note*. Parameters with an asterisk are statistically significant. β refers to unstandardized regression coefficients. The term SE captures the standard errors of the regression coefficients. The term $BCI_{95}$ reflects bias-corrected 95% confidence intervals.

## Appendix A

One of the two passages below will be read to participants so that they can generate an appropriate distractor depending on their condition (extrinsic or 'need-supportive').

**Extrinsic Condition**. Humans all have psychological desires, one such desire is our desire to have an attractive/appealing image. An event that satisfies your desire for image-attractiveness can be as small as doing your make up/dress up before a Friday night out, or perhaps looking better in the mirror after reaching a diet and/or exercise goal. Now that you understand what image-attractiveness means, please think of an event that had occurred in the last three months, however small it may be, that satisfied your desire for image-attractiveness. Please choose one that you can vividly recall and let me know what the event is so I can confirm that it is indeed an event that satisfies the aforementioned criteria. Please then write this event down using keywords on the piece of paper in front of you as this will be used in the next task.

**Need-Supportive Condition**. Humans all have psychological needs, one such need is our need for autonomy. Autonomy is a universal psychological need that is associated with our self-expression and desire to act in harmony with our values and goals, put simply, to make our own decisions and control our own lives. An event that satisfies your need for autonomy could be as small as doing something that you genuinely enjoy, or perhaps having the freedom to decide what career path to take after highschool. Now that you understand what autonomy means, please think of an event that had occurred in the last three months, however small it may be, that satisfied your need for autonomy. Please choose one that you can vividly recall and let me know what the event is so I can confirm that it is indeed an event that satisfies the aforementioned criteria. Please then write this event down using keywords on the piece of paper in front of you as this will be used in the next task.

One of the three passages below will be read to participants to manipulate the distractor content of different conditions.

**Free-Distraction Condition.** For the next part of this experiment, you will need to do all you can to avoid the thought of this word (experimenter hands over a piece of paper with the word 'violence' printed), that's right, try not to think about this for the next 5 minutes.

**Focused-Distraction Condition.** For the next part of this experiment, you will need to do all you can to avoid the thought of this word (experimenter hands over a piece of paper with the word 'violence' printed), that's right, try not to think about this for the next 5 minutes. To help you with this task, please focus on the thought of a yellow leaf.

**Extrinsic and Need-Supportive Conditions**. For the next part of this experiment, you will need to do all you can to avoid the thought of this word (experimenter hands over a piece of paper with the word 'violence' printed), that's right, try not to think about this for the next 5 minutes. To help you with this task, please focus on the event that you generated at the beginning.

**Concentration Condition**. For the next part of this experiment, you will need to do all you can to concentrate on the thought of this (experimenter hands over a piece of paper with the word 'violence' printed), that's right, try to focus on this thought for the next 5 minutes.