Mechanisms Underlying Effective Thought Suppression Using Focused-Distraction

Strategies: A Self-Determination Theory Approach.

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Abstract

Research has shown that thought suppression is not an ideal mental control strategy as it can ironically increase intrusions and accessibility of unwanted thought. Although focused-distraction has been shown as an effective strategy in mitigating such ironic effects, mixed findings have rendered this evidence inconclusive. In the present study, we sought to resolve this inconsistency by examining variables related to distractor content as mechanisms for effective thought suppression, an aspect yet to be examined. Building on ironic process theory and self-determination theory, the current study predicted that distractors associated with fulfilment of the psychological need for competence would improve thought suppression outcomes because they would be satisfying and immersive to think about. We asked 93 undergraduate students to engage in a thought suppression task and examined the influence of perceived satisfaction and immersion of distractors as mechanisms mitigating ironic effects of thought suppression. Results supported our predictions. In addition, they suggested that our predicted relationships persisted after controlling for effects of focused-distraction strategies that focused participants' attention on a neutral object and distractors reflecting the attainment of the extrinsic goal of financial success. This allows us to eliminate the alternative explanations that need-supportive distractors are effective as a result of the focused-distraction strategy in general, or due to its pleasant and personally relevant content. Findings suggest that effectiveness of focused-distraction in thought suppression can be augmented by using satisfying and immersive distractors, such as those with need-supportive content.

Keywords: thought suppression; ironic effects; psychological needs; satisfaction; immersion.

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Thought suppression is a widely-used thought control strategy involving attempts to remove

an unwanted thought from consciousness by trying not to think of the unwanted thought

(Beevers, Wenzlaff, Hayes, & Scott, 1999; Najmi, Riemann, & Wegner, 2009). Studies have

shown that thought suppression is not an ideal mental control strategy as it ironically

increases accessibility and intrusions of the unwanted thought during and after thought

suppression (Clark & Purdon, 2009; Hooper, Sandoz, Ashton, Clarke, & McHugh, 2012;

Wegner & Erber, 1992). Wegner (1994) explained ironies of thought suppression by

proposing a feedback system where two cognitive processes, namely a conscious *intentional*

process and an automatic *monitoring process* work antagonistically to produce mental

control. The primary function of the intentional process is to orient individuals towards

distractors that direct attention away from the unwanted thought (Wegner, 1994). The

monitoring process on the other hand is responsible for detecting failures of the intentional

process in generating distractors (Wegner & Erber, 1992). According to Wegner (1994)

ironic effects occur because the monitoring system brings the unwanted thought back into

awareness whenever the intentional system fails to find a distracter.

One reason why the intentional system fails to generate distractors is because, by

default, the intentional system searches for a relatively large number of distractors during

thought suppression operations (Ju & Lien, 2016). Such broad search instigates failure in the

intentional system in finding distractors, especially when individuals experience cognitive

load or stress (Mason et al, 2007; Wegner, 1994). Accordingly, researchers have examined

the utility of 'focused-distraction' strategies that focus attention on a single distractor in

reducing ironic effects (Harvey & Payne, 2002; Mikulincer, Dolev & Shaver, 2004; Watson

& Purdon, 2008). In principle, focused-distraction should reduce accessibility and intrusions

of unwanted thoughts because it reduces the range of distractors, and hence potential attentional lapses that individuals experience during thought suppression. However, studies have shown that focused-distraction strategies do not always lower intrusion and accessibility of unwanted thoughts compared to 'free-distraction' strategies that do not instruct individuals to focus on a single distractor (Harvey & Payne, 2002; Watson & Purdon, 2008, Wegner, Schneider, Carter, & White, 1987). Inconsistent findings have been observed not only for neutral distractors (Lin & Wicker, 2007; Luciano & Gonzalez, 2007), but also positively valenced distractors which should in theory be easier to focus on since they are often more meaningful than neutral thoughts (Najmi et al, 2009; Watson & Purdon, 2008). Although studies have often examined the influence of various parameters such as different types of unwanted thoughts (Denzler, Forster, Liberman & Rozenman, 2010), cognitive load (Nixon, Cain, Nehmy & Seymour, 2009), and distraction strategies (Watson & Purdon, 2008) on suppression outcomes, none have attempted to resolve the aforementioned inconsistencies by examining distractor related properties. In the present study, we asked ourselves the broad question of *why* some distractors are effective at mitigating ironic effects of thought suppression. Specifically, the following section outlines our rationale for proposing that perceived immersion and satisfaction of the distractor are two mechanisms underlying effective thought suppression.

Immersion and Satisfaction as Mediators

Wegner's (1994) ironic process theory proposed that a distractor should be effective in reducing resurgence of unwanted thoughts during thought suppression when it is absorbing/immersive. Broadly speaking, a distractor is immersive when it is emotionally involving and vivid (Agarwal & Karahanna, 2000). Immersive distractors should reduce intrusion and accessibility of unwanted thoughts because they should keep individuals' attention on the distractor for long periods during thought suppression. Interestingly, the

importance of immersion is also supported by the source monitoring literature, which suggests that misremembering imaginary thoughts as real memories may be contingent on high levels of immersion in the imagined events (Johnson, Hashtroudi & Lindsay, 1993).

Evidence from the personality and memory literature allowed us to reason that levels of satisfaction also contribute to the effectiveness of distractors in thought suppression. According to Sheldon, Elliot, Kim and Kasser (2001) and Talarico, LaBar and Rubin (2004), satisfying memories instigate high levels of positive affect and low levels of negative affect and are more easily conjured. In essence, the concept of satisfaction refers to an evaluation of the pleasantness and intensity of arousal levels triggered by a particular memory. An additional reason why perceived satisfaction levels of the distractor may aid in its effectiveness is that according to memory models proposed by Conway (2001) and Conway and Pleydell-Pearce (2000), memory networks are organised based on emotional valence. For example, positively valenced memories are more likely to activate other positively valenced memories compared to neutral or negatively valenced memories. Since unwanted thoughts are mostly neutral or negatively valenced (Abramowitz, Tolin & Street, 2001), it makes sense to use positively valenced distractors in order to minimise 'valence-congruent' cues that could trigger activation of unwanted thoughts (Beevers et al, 1999).

At an empirical level, measures of immersion correlate with measures of satisfaction because immersive experiences are often satisfying in real life-settings. However, it is important to emphasise that these two constructs are not identical as there may be situations that predominantly engage one, rather than both constructs (Conway, 2001; Conway & Pleydell-Pearce, 2000), such as recent break-ups from romantic relationships which could be immersive but *unsatisfying*. Perceived immersion and satisfaction of the distractor could therefore have independent effects in accounting for effective thought suppression.

What Distractors are Immersive and Satisfying and Why?

The current study proposes that thoughts that reflect fulfilment of innate psychological needs would be perceived as satisfying and immersive to think about. These include autonomy (i.e., the need to experience oneself as initiator and regulator of one's own actions), competence (i.e., the need to produce outcomes and understand instrumentalities leading to those outcomes) and relatedness (the need to experience satisfactory relationships with others and with the social order in general) (Deci, Ryan, & Williams, 1996). This proposition has been supported by numerous studies stemming from Deci and Ryan's (1985) self-determination theory that initially differentiated goals into intrinsic and extrinsic categories. Broadly speaking, intrinsic goals involve pursuit of self-improvement, community contributions, meaningful relationships and protection of the environment while extrinsic goals reflect pursuit of financial success, appearance and fame. From a self-determination theory perspective, intrinsic goal pursuit is more satisfying and immersive than extrinsic goal pursuit because intrinsic goals facilitate fulfilment of psychological needs (Deci & Ryan, 2000). For example, self-improvement goals such as 'getting better at basketball' have clear 'need-supportive' properties because they support fulfilment of the psychological need for competence. In contrast, the goal of financial success does not necessarily support the fulfilment of psychological needs and hence its need-supportive properties are less salient.

To date, replete evidence have shown that individuals rate need-supportive events as more satisfying than extrinsic events which are not need-supportive (Brdar, Rijavec & Miljkovic, 2008; Robak & Nagda, 2011; Roca & Gagne, 2008; Sheldon et al., 2001; Vansteenkiste & Lens, 2006). For example, in studies conducted by Sheldon et al (2001) and Robak and Nagda (2011) it was shown that autonomy, competence and relatedness were rated among the top four most salient properties of participants' most satisfying life events. Furthermore, numerous studies in the computer and gaming literature have established a link

between immersion and pursuit of intrinsic goals or need-fulfilment (Agarwal & Karahanna, 2000; Przybylski, Weinstein, Murayama, Lynch & Ryan, 2012; Roca & Gagne, 2008; Shang, Chen & Shen, 2005). However, previous studies have not examined as yet whether need-supportive (intrinsic) thoughts yield high levels of satisfaction and immersion when they are used as distractors in a thought suppression experiment. Despite this, the empirical evidence accumulated so far allows us to reason that if thoughts with need-supportive content are satisfying and immersive, and satisfaction and immersion are two qualities of effective distractors, then thought suppression strategies that utilise distractors with need-supportive content will reduce intrusion and accessibility of unwanted thoughts. In sum therefore, although satisfaction and immersion have previously been treated as either outcome measures or moderators (Przybylski et al, 2012; Robak & Nagda, 2011; Roca & Gagne, 2008; Sheldon et al, 2001), the current study sought to investigate them as mediating mechanisms through which need-supportive distractors operate to facilitate effective thought suppression.

Overview of the Study and Hypotheses

The present study aimed to examine whether instructing individuals to focus on need-supportive distractors can reduce ironic effects of thought suppression as a result of perceived satisfaction and immersion of distractors. Building upon Wegner's (1994) ironic process theory and tenets of self-determination theory (Deci & Ryan, 1985), we hypothesised that distractors with need-supportive properties would reduce intrusion and accessibility of the unwanted thought because they would be satisfying and immersive. In keeping with previous thought suppression experiments, the control condition of the current study was a free-distraction group where participants were not instructed to focus upon any distractor (Wegner et al, 1987). We incorporated and controlled for two additional variables and two additional measures in order to further clarify effects associated with distraction strategies. The first was effects associated with valence and the personally involving nature of need-supportive

distractors (Conway & Pleydell-Pearce, 2000). This was achieved by incorporating an extrinsic-distraction condition in which participants were instructed to focus on a positive personally relevant event that reflected attainment of the extrinsic goal of financial success. We also incorporated a focused-distraction condition in which participants were prompted to attend to a single neutral distractor ('yellow leaf') to eliminate the alternative explanation that effects of need-supportive distractors were due to participants focusing on single distractors in general. Significant indirect effects of the need-supportive distraction condition on thought suppression outcomes via immersion and satisfaction can therefore be attributed to the need-supportive properties of distractors. Furthermore, we measured trait absorption and arousal levels in order to control for the effects of individual differences of thought immersion and fatigue levels on suppression outcomes (Baumeister, Simpson, Ware & Weber, 2015; Parsons, Barnett & Melugin, 2015). Finally, we used a self-report questionnaire to check whether our manipulations of distraction strategies were successful in inducing competence and financial success related experiences.

In sum, we planned to control for effects associated with focused-distraction, extrinsic-distraction, trait absorption and arousal levels in our analyses to rule out potential confounds. Given this, our hypothesis would be supported at an operational level if the suppression strategy using need-supportive distractors (compared to a typical free-distraction strategy) exerted indirect effects on intrusions and accessibility of the unwanted thought indirectly via immersion and satisfaction. In the current study, we tested this hypothesis by prompting participants to suppress a thought that was not emotive ('foot') under cognitive load because according to Wegner (1994), ironic effects are more salient when participants suppress a thought under cognitive load.

Method

Participants and Design

Participants were 93 undergraduate students (33 male, 60 female) with a mean age of 21.0 years, ($SD = 3.6$) who took part in this experiment either in exchange for course credit or a \$15 shopping voucher. The study utilised a one-way experimental design with 'suppression strategy' (free, focused, extrinsic, need-supportive[1]) as the between-participant factor and 'intrusion frequency' and 'accessibility' of the unwanted thought as dependent variables. One participant was excluded because of an unreasonably high number (71) of intrusions. Using a table of random numbers generated from an online randomisation software, 23 participants were allocated to the 'free-distraction' (Mean age = 20.8, $SD = 3.0$, 9 male, 14 female), 'extrinsic' (Mean age = 21.7, $SD = 5.1$, 8 male, 15 female) and 'need-supportive' conditions (Mean age = 20.6, $SD = 3.1$, 10 male, 13 female) whereas 24 participants were allocated to the 'focused-distraction' condition (Mean age = 21.1, $SD = 2.7$, 6 male, 18 female). Power analysis indicated that a regression analysis could detect a medium effect size ($f^2 = .15$) 80% of the time if the total sample size of the study was 60. To our knowledge, all participants had English as their first language and none had any form of mental illness or learning difficulty. These inclusion criteria were outlined on the university recruitment platform and students were required to confirm their eligibility before signing up for this experiment. The experiment took place individually in experimental cubicles. Some procedures were

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[1] In the present study, in addition to the four suppression conditions, we also incorporated a fifth 'concentration' condition in which participants were instructed to think of the unwanted thought. This condition allowed us to examine whether levels of accessibility observed in the free-distraction group represented ironic effects. Broadly speaking, free-distraction yields ironic effects if accessibility levels to the unwanted thought are equivalent across free-distraction and concentration conditions (Wegner & Erber, 1992). In the current study, the free-distraction condition yielded ironic effects because the correlation between concentration and free-distraction conditions in accessibility ($r = -.18$, $p = .09$) of the unwanted thought was not statistically significant. Given this and due to space limitations, data from the concentration group was not presented in detail in this manuscript.

computerised using the E-prime experimental software (Schneider, Roush, Eschman & Zuccolotto, 2013). Ethical approval was obtained from the university ethics committee.

Procedure

After providing informed consent, participants completed a measure of arousal levels. Participants allocated to the extrinsic and need-supportive conditions were then asked to generate a recent pleasant event facilitating a sense of financial wealth and competence respectively. Immediately after, we induced cognitive load by prompting all participants to memorise a nine digit number presented on the computer screen for 30 seconds. Participants were told that they would be asked to recall this number at the end of the experiment. All participants were then provided with a description of the thought suppression task (Please see Appendix A). Participants were told to avoid thinking of the word 'foot' and to record a 'vertical-dash' whenever 'foot' came to mind during the next five minutes. This was followed by the manipulation of thought suppression strategies and the thought suppression task itself. All participants then completed measures that assessed perceived immersion and satisfaction of the distractor and the manipulation check. The next task was a computerised lexical-decision task that aimed to measure accessibility of the unwanted thought. At the end of the experiment, participants were asked to report the nine digit number and complete a measure of trait absorption. Finally, participants were debriefed and thanked for their participation.

Manipulation of Thought Suppression Strategies

In accordance with previous thought suppression experiments (Luciano & Gonzalez, 2009; Wegner et al, 1987), all participants were told to not think of the word 'foot'. While free-distraction participants were given no further instructions, focused-distraction participants were told that in order to assist them with suppression, they should focus their attention on a 'yellow leaf' (Wegner et al, 1987). Extrinsic-distraction participants were told

to think of an event that satisfied their desire for money-luxury in order to assist them with suppression. Examples of frequently used events by extrinsic-distraction participants include 'receiving a pay rise at work' and 'receiving a discount'. Analogously, need-supportive distraction participants were told to think of an event that satisfied their need for competence in order to assist them with suppression. Examples of frequently used events by need-supportive-distraction participants include 'getting better at netball' and 'mastering computer skills'. The scripts of these manipulations are presented in the Appendix.

Measures

Focused-distraction. This variable was represented as a simple contrast code that assigned a value of '1' to focused-distraction participants and a value of '-1' to free-distraction participants. All other participants were assigned a value of '0'.

Extrinsic-distraction. This variable was represented as a simple contrast code that assigned a value of '1' to extrinsic-distraction participants and a value of '-1' to free-distraction participants. All other participants were assigned a value of '0'.

Need-supportive distraction. Similarly, this variable was represented as a simple contrast code that assigned a value of '1' to need-supportive participants and a value of '-1' to free-distraction participants. All other participants were assigned a value of '0'.

Trait absorption. This variable was measured using the Tellegen Absorption Scale (Tellegen, 1982). This scale includes 34 true/false items that assess individuals' propensity to be immersed in a thought (e.g., 'I can be deeply moved by a sunset').

Arousal/fatigue. This variable was measured using the Perceived Arousal Scale (PAS; Anderson, Deuser & DeNeve, 1995) which includes 24 word items (e.g., 'active', 'sharp') describing different types of arousal/fatigue rated on five-point scales ranging from 1

(*very slightly or not at all*) to 5 (*extremely*). The alpha reliability of the PAS was satisfactory (α = .93).

Perceived immersion. We employed Ryan, Rigby and Przybylski's (2006) scale in measuring immersion. This scale contains six items with two items assessing physical immersion (e.g. 'I felt as if I am actually there in the world of the thought'), two items assessing emotional immersion (e.g. 'I experienced feelings in the thought as deeply as if I was actually in the moment'), and two items assessing narrative immersion (e.g. 'The content of the thought made me experience genuine happiness'). Participants responded on seven-point scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The alpha reliability of the immersion scale was satisfactory (α = .82)[2].

Perceived satisfaction. This variable was measured using a single question asking participants how satisfying the thought was. Participants responded on a four-point scale ranging from 1 (*somewhat satisfying*) to 4 (*extremely satisfying*).

Perceived money-luxury induced by distractors. This variable served the role of a manipulation check and it was measured by asking participants: 'how much more financially wealthy did the thought make you feel'? Participants responded on a four-point scale ranging from 1 (*no more*) to 4 (*much more*).

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[2] An internal validity check was also completed by participants at the end of the experiment. This included three items (e.g., 'I felt immersed in the distractor thought(s) such that I was able to keep away the unwanted thought most of the time') that assessed whether participants' success during suppression was the result of the immersive nature of the distractors from a subjective perspective. Responses were made on four-point scales ranging from 1 *(strongly disagree)* to 4 *(strongly agree)*. Results showed that participants' success in suppressing the unwanted thought was correlated with their subjective feelings of immersion. However this measure was not reported in this article due to space limitations.

Perceived Competence induced by distractors. This variable also served the role of a manipulation check and it was measured by asking participants: 'how much more competent did the thought make you feel'? Participants responded on a four-point scale ranging from 1 (*no more*) to 4 (*much more*).

Intrusion frequency. Intrusion frequency was measured by counting the number of vertical dashes participants recorded during thought suppression. Participants' responses ranged from 0 to 30 intrusions.

Accessibility of the unwanted thought. We employed an adaptation of the lexical-decision task (Meyer & Schvaneveldt, 1971) to measure accessibility of the unwanted thought and its semantic associates. This task presented participants with stimuli that were words or non-word on a computer screen. Participants were required to decide whether each stimulus was a word or a non-word by pressing a computer key ('1' for word, '0' for non-word). There were 18 different word stimuli of which 13 were random word fillers (e.g., 'DEEP'), 4 were words semantically similar to 'foot' (e.g., 'SHOE'), and the final word was the target word ('FOOT'). Participants' reaction times to the target word was therefore collected as it reflects their accessibility to the unwanted thought with shorter reaction times indicative of greater accessibility levels. There were 18 different non-word stimuli consisting of random letter combinations such as 'MTXB'. All stimuli were four-lettered. Each stimulus was presented three times, totaling 108 trials. All words were selected from the original word list and frequent associates of Palermo and Jenkins' (1964) dictionary. The fillers were randomly chosen from all words with four letters. The associates were four most frequently observed words associated with the word 'foot'[3]. The 108 trials were randomly ordered and

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[3] Although Wegner and Erber (1992) found that ironic effects of thought suppression did not spread to the semantic associates of the target thought, we nevertheless included semantic associates in our task. Results converged with previous findings as reaction times to semantic

characterised by a one second blank screen followed by a 500ms fixation cross and finally the stimulus itself flashed for 250ms with an additional one second blank screen before the next trial began. This resulted in a 1250ms stimulus onset – response deadline asynchrony. Participants were asked to complete the trials as quickly as possible without compromising accuracy, and were given six practice trials before the actual trials. The task took no longer than four minutes to complete.

Results

Preliminary Analyses

Table 1 presents descriptive statistics and correlations between variables. As it is shown, correlations pointed out that our manipulations were successful in leading participants to think of distractors with extrinsic or need-supportive content. This conclusion is supported by positive correlations between the extrinsic contrast-code and perceived money-luxury and between the need-supportive contrast-code and perceived competence. For example, the positive correlation between the extrinsic contrast-code and perceived money-luxury suggests that, in comparison to free-distraction participants, extrinsic-distraction participants were more likely to contemplate experiences that reflected financial wealth. Likewise, the positive correlation between perceived competence and the need-supportive contrast-code suggests that relative to free-distraction participants, need-supportive condition participants were more likely to contemplate experiences that satisfied the need for competence[4]. Important to note is

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associates were uncorrelated with pertinent variables (all $ps > .05$), and therefore these results were not further mentioned. In the present paper, accessibility levels refer to reaction times in response to target words only.

[4] Manipulation checks were also conducted for a range of other extrinsic and intrinsic goals according to self-determination theory (Deci & Ryan, 1991; Sheldon et al, 2001), these include perceived popularity-influence, image-attractiveness, relatedness and autonomy. These however, were not used in the analyses as preliminary correlations showed no

the lack of a significant positive relationship between the need-supportive contrast-code and

perceived money-luxury, and between the extrinsic contrast-code and perceived competence.

These are an indication that our manipulation checks were effective in inducing condition

congruent distractor content without contamination by condition incongruent distractor

content. For example, relative to free-distraction participants, those in the need-supportive

condition focused on experiences that facilitated a sense of competence but not financial

success. Finally, converging with Wegner's (1994) ironic process theory, the negative

correlations between immersion and intrusion or accessibility of the unwanted thought

suggest that immersion was a key property of distractors that lowered frequency of intrusions

and accessibility of the unwanted thought.

Table 2 reports the means and standard deviations for each group in terms of intrusion

frequency and accessibility of the unwanted thought. An analysis of variance provided partial

support of overall effects of the need-supportive distraction condition on thought suppression

outcomes. This is because although participants in the need-supportive distraction group

reported fewer intrusions than participants in the free-distraction group (F (1, 92) = 7.02, p

< .001, η^2 = .19), the corresponding effects on accessibility of the unwanted thought were not

statistically significant (F (1, 92) = 1.95 p = .34, η^2 = .04). However, it is important to note

that although statistically non-significant overall effects rule out the possibility of proximal

indirect effects, it does not rule out potential distal indirect effects, which are the focus of the

present study since distal indirect effects reflect mediating processes (Shrout and Bolger,

2002).

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confounding associations between conditions and manipulation checks of non-condition-
specific goals. I.e. participants in the need-supportive condition consistently generated
distractors facilitating a sense of competence and only competence, without supporting other
needs or extrinsic goals.

Main Analysis

In the present study, our primary hypotheses were tested by conducting a series of multiple regression analyses using the Hayes and Scharkow (2013) index approach to mediation analysis. In those regression analyses, we specified the need-supportive contrast code as an independent variable. Perceived satisfaction and immersion were specified as mediators while trait absorption, arousal, focused-distraction and extrinsic-distraction were controlled for as covariates. Measures of intrusion and accessibility of unwanted thought were the dependent variables in two distinct bootstrap regressions (Preacher & Hayes, 2008). As shown in Table 3, results supported a negative indirect effect of need-supportive distraction strategies on intrusion frequency via satisfaction. This indirect effect was a proximal indirect effect because the overall effect of need-supportive distraction on intrusions was negative and statistically significant (β = -2.21, [-4.13, -.29], p = .02) (Hayes & Scharkow, 2013; Shrout & Bolger, 2002). Hence, converging with our initial hypothesis, these analyses pointed out that the need-supportive distraction strategy reduced intrusions because it was rated as satisfying. Turning now to the accessibility measures, it can be seen in Table 3 that there was an indirect effect of the need-supportive distraction strategy on accessibility via immersion. In addition, the indirect effect via immersion was analogous to a distal indirect effect because the overall effect of need-supportive distraction strategies on accessibility was not statistically significant (β = 18.45, [-29.87, 66.77], p = .45) (Hayes & Scharkow, 2013; Shrout & Bolger, 2002). Hence, in accordance with our initial hypothesis results also support the notion that need-supportive distraction strategies reduce accessibility of unwanted thoughts via immersion.

Finally, we conducted additional regression analyses in which we estimated effects of focused-distraction and extrinsic-distraction on thought suppression outcomes. In accordance with previous research (Watson & Purdon, 2008), results did not support meaningful indirect

effects of focused-distraction on intrusion or accessibility of the unwanted thought. Specifically, although the indirect effects of focused distraction on intrusion (via satisfaction) and accessibility (via immersion) were statistically significant, they suggested that the focused-distraction strategy increased (rather than decreased) intrusion and accessibility of the unwanted thought. In addition, consistent with our expectations, the indirect effects of extrinsic-distraction on intrusion and accessibility of the unwanted thought were not statistically significant (see Table 3).

Discussion

The present study sought to examine whether effectiveness of distraction strategies in thought suppression depends on certain qualities in the distractor used. Our findings provide insight into the processes through which distractors affect thought suppression outcomes. Converging with our expectations and previous research (Harvey & Payne, 2002; Watson & Purdon, 2008), regression analyses of indirect effects did not support effectiveness of using neutral or extrinsic distractors in thought suppression outcomes. At this juncture, findings might have led us to conclude that focused-distraction strategies using single distractors were maladaptive in general. However, the current study showed that this conclusion is misleading and premature, because focused-distraction using a distractor with need-supportive content was effective in reducing accessibility and intrusion of unwanted thoughts. In particular, in line with our expectations and Wegner's (1994) model of mental control, regression analyses showed that perceived satisfaction, immersion and content of thoughts constitute key factors that determine effectiveness of distractors in reducing ironic effects of thought suppression. The regression analyses support this conclusion because it showed that distractors with need-supportive content reduced intrusions and accessibility of the unwanted thought via satisfaction and immersion respectively. Given these findings, the current study suggests that effects associated with focused-distraction strategies depend on content-related features of

distractors. Specifically, effectiveness of a distraction strategy is conditional on the premise that distractors are satisfying and immersive, such as experiences that satisfy the psychological need for competence. Therefore, researchers investigating focused-distraction are advised to incorporate distractors with need-supportive content in order to avoid inconsistent findings and provide a more accurate measure of its effectiveness in reducing ironic effects of thought suppression.

The present study extends Wegner's (1994) model because it identifies properties in distractors that make them more effective at mitigating ironic effects of thought suppression. While Wegner et al (1987) initially focused on the distinction between free-distraction and focused-distraction using a neutral distractor, his model of thought suppression did not take into account the importance of distractor content (Wegner, 1994). In the present study, the indirect effects observed for need-supportive distraction on suppression outcomes suggest that distractors associated with the fulfilment of the psychological need for competence are effective because these experiences are satisfying and immersive. Essentially, this study found that satisfaction and immersion as mediators are inextricably linked to the success and failure of distraction strategies in thought suppression. Interestingly, this conclusion was also hinted by significant positive indirect relationships between focused-distraction and suppression outcomes (please see Table 3). These effects suggest that using a neutral distractor actually exacerbated (rather than mitigated) the ironic effect because they are less satisfying and immersive compared to distractors used in free-distraction.

The current study's design allows us to rule out the alternative explanations that effects of need-supportive distraction were solely due to the positive valence or personally involving nature of need-supportive distractors. This is because effects of need-supportive distraction were maintained even after controlling for extrinsic-distraction, which prompted participants to focus on a pleasant personal experience related to fulfilment of the desire for

money-luxury. We were also able to eliminate the confounding possibility that effects of need-supportive distraction were due to the general methodology of focused-distraction. This is because effects of need-supportive distraction were also maintained after controlling for the focused-distraction condition which instructed participants to focus on a neutral distractor. These findings are essential for theoretical progress in the thought suppression literature because they show that content of distractors play a unique role in effective thought suppression. Specifically, content of distractors contributes to their perceived levels of immersion and satisfaction, and consequently, effectiveness in reducing ironic effects of thought suppression.

The present study also has important implications for tenets of self-determination theory. We pointed out earlier that studies stemming from this theory have already established a link between psychological need fulfilment and various outcomes such as motivation and psychological well-being. Thus far, empirical evidence suggests that individuals report higher levels of motivation and psychological well-being (Ryan & Deci, 2000; Ryan & Deci, 2000) when they operate in contexts that are conducive to fulfilment of psychological needs than contexts that do not conduce toward fulfilment of psychological needs. By showing that distractors with need-supportive (but not extrinsic) content reduce ironic effects of thought suppression through satisfaction and immersion, the current study reveals for the first time beneficial effects of need-supportive (intrinsic) thoughts on mental control.

Limitations and Future Directions

In the current study, participants were students who were asked to suppress a single neutral thought that was not emotive. These aspects can limit the generalisability of the current findings to other populations and unwanted thoughts. Future replication studies in

clinical populations and with non-discrete emotive unwanted thoughts are therefore encouraged. The process by which need-supportive distraction affect intrusion frequency was also not entirely explained since the indirect effect of need-supportive distractors via satisfaction was distal. Hence, it may be important to examine whether there are additional mediators contributing to effects of need-supportive distraction on intrusions. Furthermore, need-supportive distractors used in the current study targeted the psychological need for competence. Hence, it may be important to examine whether similar results can be obtained using distractors that target the psychological need for autonomy and relatedness. Finally, we were unable to detect significant indirect effects via both satisfaction and immersion simultaneously on the outcome measures. Satisfaction was only found to play a role in intrusions while immersion was only found to influence accessibility outcomes. Perhaps replication studies with larger sample sizes are needed to examine whether this is a valid phenomenon or a statistical artifact.

Conclusion

The present study demonstrated that distractors that activated experiences associated with fulfilment of the psychological need for competence reduced ironic effects of thought suppression. Most pertinent, we showed that distractors with need-supportive content improved thought suppression outcomes because they were immersive and satisfying. At an applied level, current findings suggest that researchers can augment effectiveness of focused-distraction strategies in improving thought suppression outcomes by using distractors with need-supportive content. By employing need-supportive distractor content, future research may start addressing previously inconsistent findings and provide more accurate estimates of effects of focused-distraction strategies on thought suppression outcomes.

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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. Need-supportive distraction	.50**	1.0									
3. Extrinsic-distraction	.50**	.50**	1.0								
4. Perceived money-luxury	-.06	.00	.65*	1.0							
5. Perceived competence	-.19	.39**	-.24*	-.11	1.0						
6. Satisfaction	-.28*	.18	.04	.18	.30*	1.0					

7. Immersion	-.21*	.18	-.04	.00	.32*	.64**	1.0			
8. Accessibility[a]	.14	-.04	.02	.10	-.15	-.11	-.26*	1.0		
9. Intrusions	.04	-.35*	-.20*	-.18	-.41*	-.47*	-.34*	.13	1.0	
10. Arousal	.33*	.25*	.08	-.15	.15	.11	.22*	-.03	-.21*	1.0
11. Absorption	-.08	-.15	-.05	-.02	-.08	-.10	-.02	-.15	.11	-.01	1.0
Mean	-	-	-	1.62	2.05	2.61	3.74	476.64	9.40	81.20	18.52
SD	-	-	-	.87	1.04	.85	1.56	127.17	5.78	14.51	6.04

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. [a]Accessibility analyses were conducted using reaction time data with positive and negative signs reversed to facilitate interpretation.

Table 2

Descriptive statistics of intrusion frequency and accessibility of the unwanted thought in each condition

Thought suppression outcome	Condition	Mean	Standard deviation
Intrusion frequency	Need-supportive distraction	5.78[a]	3.25
	Extrinsic-distraction	8.26[a]	3.66
	Focused-distraction	11.96[b]	5.95
	Free-distraction	11.48[b]	7.20
Accessibility	Need-supportive distraction	503.24[a]	149.65
	Extrinsic-distraction	479.49[a]	134.01
	Focused-distraction	437.84[a]	116.95
	Free-distraction	487.68[a]	102.30

Note. Accessibility was reflected by participants' reaction times to the word 'foot' during the lexical decision task where faster and slower reactions times were indicative of higher and lower accessibility levels respectively. Parameters with a different superscript are statistically significant at the $p < .05$ level as analysed via least significant difference (LSD) post hoc comparisons.

Table 3

Indirect effects of thought suppression strategies on intrusion frequency and accessibility of the unwanted

thought

Suppression strategy	Dependent variable	Indirect effects	β	SE	BCI$_{95}$
Need-supportive distraction	Intrusion frequency	via satisfaction	-.93*	.44	-2.06 -.24
		via immersion	-.02	.35	-.82 .59
	Accessibility[a]	via satisfaction	8.54	10.63	-9.44 33.65
		via immersion	-18.81*	10.76	-47.80 -3.72
Focused-distraction	Intrusion frequency	via satisfaction	1.61*	.67	.47 3.17
		via immersion	.02	.48	-.91 1.03
	Accessibility	via satisfaction	-14.75	17.40	-51.26 18.56
		via immersion	25.84*	13.14	5.98 60.22
Extrinsic-distraction	Intrusion frequency	via satisfaction	-.38	.40	-1.48 .17
		via immersion	.00	.12	-.27 .27
	Accessibility	via satisfaction	3.50	5.85	-3.54 21.69
		via immersion	.00	7.47	-15.50 15.56

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. [a]Accessibility analyses were conducted using reaction time data

with positive and negative signs reversed to facilitate interpretation.

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 pursuit for money-luxury. Money-luxury is associated with our desire to be financially wealthy and/or possess valuable items. An event that satisfies your desire for money-luxury can be as small as getting reduced price groceries, or perhaps on the other end of the scale, winning the lottery. Now that you understand what money-luxury means, please think of an event that had occurred in the last three months, however small it may be, that satisfied your desire for money-luxury. 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 competence. Competence is a universal psychological need that is associated with our desire to master different skills and hence control outcomes. An event that satisfies your need for competence could be as small as getting better at playing chess, or perhaps on the other end of the scale, winning chess competitions at the international level. Now that you understand what competence means, please think of an event that had occurred in the last three months, however small it may be, that satisfied your need for competence. 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 'foot' printed), that's right, try not to think about this for the next 5 minutes. If for any reason the thought enters your mind, simply note down each intrusion with a vertical dash on the piece of paper in front of you and continue the task.

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 'foot' printed), that's right, try not to think about this for the next 5 minutes. If for any reason the thought enters your mind, simply note down each intrusion with a vertical dash on the piece of paper in front of you and continue the task. 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 'foot' printed), that's right, try not to think about this for the next 5 minutes. If for any reason the thought enters your mind, simply note down each intrusion with a vertical dash on the piece of paper in front of you and continue the task. 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 'foot' printed), that's right, try to focus on this thought for the next 5 minutes.