Running head: Thought Suppression

Thought Suppression of Multiple Personally-Relevant Target Thoughts.

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Abstract

Thought suppression has been previously associated with increased frequency of suppression target thoughts during and after efforts to suppress. All previous research has investigated the effect of attempts to suppress a single target thought. Given that the majority of people with conditions such as obsessive compulsive disorder report multiple distressing intrusive thoughts, the generalizability of previous research to real clinical situations is questionable. We sought to extend previous thought suppression research by investigating the comparative effect of attempting to suppress one, versus attempting to suppress three, personally-relevant target thoughts. We observed an immediate enhancement effect, but no evidence for the rebound effect. Attempts to suppress three targets resulted in the same total number of intrusions as attempts to suppress a single target. These results are consistent with the Ironic Process of Mental Control model.

1.0 Introduction

Individuals often escape unwanted memories by attempting to push them out of conscious awareness (Wegner & Zanakos, 1994). Thought suppression is the voluntary, conscious form of repression (Anderson & Green, 2001). Where repression usually represents unconscious forgetting, suppression is intentionally removing a thought from conscious awareness (Beevers, Wenzlaff, Hays, & Scott, 1999). In an attempt to reduce emotional or cognitive discomfort people may aim to suppress troublesome thoughts. Suppression seems to be a commonly utilized strategy, despite emerging research over the last two decades illustrating the difficulty of complete suppression (e.g., Wenzlaff & Wegner, 2000).

Uncontrollable intrusive thoughts are often reported by people with clinical disorders such as depression, obsessive-compulsive disorder, and posttraumatic stress disorder (Clark, 2005; APA, 2000). These thoughts cause people with these conditions marked distress and controlling these thoughts can be a difficult or impossible task. Intrusive thoughts also occur in surprisingly high proportion in non-clinical samples (Purdon & Clark, 1993). Some authors have asserted that suppressing distressing thoughts may inflame the severity of a psychological disorder (e.g., Wegner, 1997). Thought suppression is usually employed by individuals to escape from unwanted thoughts, however, the opposite often occurs.

The paradoxical effects of thought suppression were first described in the classic experiment by Wegner, Schneider, Carter, and White (1987). The experiment illustrated the difficulty that people have in suppression of a simple thought such as a white bear. Since then, many researchers have investigated the phenomenon of thought suppression in many situations, for example: smokers attempting cessation (e.g., Salkovskis & Reynolds, 1994), and dieters attempting to suppress thoughts of

food (e.g., O’Connell, Larkin, Mizes, & Fremouw, 2005; Oliver & Huon, 2001). Most people may be familiar with the difficulty of falling asleep, especially when trying to suppress thoughts from consciousness during the process of falling asleep (Ansfield, Wegner, & Bowser, 1996). Thought suppression intuitively sounds like a reasonable technique, yet it never seems to work completely.

1.1 Ironic Process of Mental Control

Individuals may attempt to suppress thoughts which are interpreted as distressing (Clark, 2005; Wenzlaff, 1993). For example; individuals with obsessive compulsive disorder may attempt to prevent the occurrence of personally unacceptable (“ego-dystonic”) intrusive thoughts. However, a person may eventually undermine their own complete suppression of a thought simply by mentally checking whether they are actually suppressing the target thought (Beevers et al., 1999). This was a major conclusion of Wegner et al. (1987) after these authors found that complete suppression proved to be impossible. Wegner (1994) eventually proposed a theory to explain the phenomenon named the Ironic Process of Mental Control.

Wegner’s (1994) theory was produced to account for intentional and counter-intentional effects which result from personal thought-control efforts, and explains processes which are believed to contribute to the difficulty of thought suppression. The processes which govern our thinking are aimed at achieving a desired state. A desired state is the task which one wishes to achieve, whether it is happiness, walking, eating, or suppressing a thought. The mental control process, as per this theory, contains two mechanisms: the Intentional Operating Process and the Ironic Monitoring Process.

The Intentional Operating Process (IOP) is an effortful and consciously channelled process which locates mental content which will achieve the desired state

of the individual. The IOP recalls sensations and memories consistent with the desired state. It is when a state is to be avoided, that difficulty arises. Wegner (1994) explains that these operations can not withhold items from consciousness, but rather can only draw items into consciousness. Therefore, distractors are drawn into consciousness by the IOP to help an individual avoid a thought.

The Ironic Monitoring Process (IMP) searches for consistent thoughts, feelings, behaviours, and sensations with the desired state. When failure to adhere to the desired state is detected by the IMP, the IOP is activated in an effort to restore the desired state (Wegner, 1994). The IMP compares the current state to a template of the desired state. When the current task or operation does not match the template a failure is signalled. The IOP then attempts an effortful reinstatement of the desired state. Figure 1 illustrates the Ironic Processes of Mental Control for suppression as outlined in Wegner's (1994) model.

1.2 Paradoxical Effects of Thought Suppression

Two major effects are sometimes seen to occur in experimental thought suppression studies: The *immediate enhancement* effect and the *rebound* effect.

1.2.1 Immediate Enhancement Effect

The immediate enhancement effect is inconsistently found in thought suppression studies. This effect refers to the increased frequency of target thoughts during a suppression period. More simply, more instances occur of the target thought during suppression attempts than if no attempt to suppress was being made. The effect has been found with clinical and non-clinical samples (e.g., Lavey & van den Hout, 1990), when the control group expresses (e.g., Muris, de Jongh, Merckelbach, Postema, & Vet, 1998) or just receives a mention of the target thought (e.g.,

Salkovskis & Reynolds, 1994), when the target thought is personally relevant (e.g., Muris et al, 1998), neutral (Muris, Merckelbach, van den Hout & de Jong, 1992), or negative in emotional valence (e.g., Sullivan, Rouse, Bishop & Johnson, 1997), and with short (e.g., Harvey & Bryant, 1999), and long suppression periods (e.g., Trinder & Salkovskis, 1994). There is, however, considerable variation in findings (Abramowitz, Tolin, & Street, 2001).

Most authors insist that the immediate enhancement effect is only completely evident if there are more intrusions of a thought from the suppression group over the control group, indicating that the act of suppression causes the thought frequency increase. However, comparing against an expression period rather than a mention period is not a realistic approach to assessing whether an immediate enhancement effect occurs (Rassin, 2005). Rassin has suggested that it may be easier to discover this effect by using one of two different methodological approaches. The first approach is to have a control which verbally streams their thought by using a control of *no mention*. This could measure a person's normal disturbing intrusive thought frequency. However, employing a verbal streaming task may confound the results of the other tasks. The second technique would simply be to ask the participant whether they thought of the target more, less, or the same amount during suppression compared to normal life. The latter will be used in this study in order to assess if the immediate enhancement effect is occurring.

1.2.2 Rebound Effect

The rebound effect was perhaps the more unexpected finding from the experiment of Wegner et al. (1987). The original suppression group reported significantly more thoughts of the target during the expression period than the original

expression group which expressed their target thought from the outset. Explanations for rebound effects vary. Some of the early rationales include the self-perception theory (Bem, 1972). The theory says that a person who performs behaviour in the presence of an external constraint will perform that behaviour at an increased rate when the constraints are removed. Wegner et al. (1987) also gave plausibility to this explanation. Liberman and Forster (2000) offered an explanation that the rebound effect occurs due to a motivational effect to counteract the failure incurred during suppression. Few studies offer solid explanations for why the rebound effect occurs. In some research, the effect is not found at all (Abramowitz et al., 2001). Over the past two decades methodological issues have been subject to investigation to fully understand the rebound effect. Of the original study, Wenzlaff and Wegner (2000) point out that the practice effect primes the participant for only the initial period following the practice. However, the post-suppression rebound in expression has actually been found to be due to the prior suppression process (Clark, Ball, & Pape, 1991). Clark et al. (1991) tested this by disallowing practice. This meant that cues were formed specifically through the thought suppression process, and not through a verbal streaming practice.

Similarly to the immediate enhancement effect, the rebound effect has mixed findings on its occurrence (Abramowitz et al., 2001). The current study uses personally relevant thoughts which cause the participant distress. It is not logically expected that a person would want to think of their distressing thought(s) any more than required. Therefore, it may not be appropriate to predict a rebound effect with personally relevant, distressing thoughts as they are a practiced thought in everyday life and not actually desired to be thought. Furthermore, after suppression, exhaustion may occur due to actually thinking the thought, and with initial expression, intrusions

would be expected due to the participants' desire to fulfil the experiments requirements. Current explanations for the rebound effect do not seem to cover personally relevant thoughts which cause a person distress to think about. Whilst the rebound effect is not expected, this study predicts that the immediate enhancement effect will occur.

1.3 The Problem of Multiple Suppression Targets

Individuals with clinical conditions often report the occurrence of not just one, but multiple different intrusive thoughts (Purdon & Clark, 1993; Rasmussen & Eisen, 1992). Despite this, previous research has focused exclusively on the intrusion of single suppression targets into conscious awareness. It is unclear how these results would generalise to suppression attempts where there is more than one thought to be excluded.

Wegner's (1994) model asserts that when a suppression target intrudes into consciousness, the IOP is engaged and draws a distractor into awareness. This excludes the suppression target from awareness, maintaining the desired goal-state of the IMP. This model would predict that suppression of multiple thoughts would not result in any greater frequency of total intrusions than attempts to suppress a single target. The intrusion of any of the suppression targets would effectively engage the IOP, with associated distraction. Alternatively, if the attempt to suppress a larger number of thought targets led to increased frequency of total intrusions, this would suggest that a revision of Wegner's (1994) model may be necessary.

1.3.1 The Current Study

Whilst Purdon and Clark (1993) illustrated that people often have intrusive thoughts, and probably multiple intrusive thoughts, no study has clearly measured the

difference of singular targets verses multiple targets. This study will seek to investigate single verses multiple target differences in suppression and expression. This current study intends to assess the thought suppression paradigm in relation to currently relevant thoughts of people. Furthermore, we chose to investigate thoughts which are currently causing the person distress. These are the kinds of thoughts which one may commonly attempt to suppress, thus ensuring a reliable generalisation from results to reality. This study will investigate the thought suppression paradigm with a subsequent expression period. Target thoughts will be provided by participants. These thoughts will be naturally occurring in the participants' life and causing them some degree of distress. The study will investigate the immediate enhancement effect via a new method proposed by Rassin (2005), as well as the rebound effect.

1.3.2 Hypotheses / Predictions

The current study was designed to assess a trio of a priori hypotheses. Firstly, we predicted that the immediate enhancement effect will occur: Participants will think of their target thoughts during the suppression period more than compared to normal life. Secondly, the rebound effect is not expected to occur: The group that expresses their target thoughts after suppressing will not have more thoughts during the expression period than the group that expresses from the outset. Finally, and most importantly, three targets will not elicit any more frequent total intrusions than a single target.

2.0 Method

2.1 Design

The experiment employed a 2×2×2 mixed factorial design. The independent variables were *group*, *targets*, and *period*. Each variable had two levels. The *group*

variable was manipulated between-subjects with levels of *suppress first* and *express first*. This indicates which experimental task each group does first, suppression or expression. The *targets* variable was also manipulated between-subjects. The levels were *one target* and *three targets*. This indicates the number of targets a person is required to suppress and express during the experiment. Finally, *period* was a repeated measure factor, thus manipulated within-subjects. The levels were *suppression period* and *expression period*. This is the actual period of suppressing or expressing their thoughts. The dependent variable was thought frequency. This measured the number of thought intrusions which occurred within each period.

2.2 Participants

A total of 44 (55%) female and 36 (45%) male undergraduate students participated in the study in exchange for partial course credit. Student participants were recruited through a poster placed on a research recruitment noticeboard. All participants indicated during the consent procedure that they had never been treated for OCD. Participants ranged in age from 18 to 54 years ($M = 22.5$, $SD = 5.37$).

2.3 Materials and Stimuli

2.3.1 Suppression Targets. A list of example thoughts which may cause distress was supplied to participants, derived from obsessions found in non-clinical persons. These were extracted from the Obsessive Intrusions Inventory (OII; Purdon & Clark, 1993) and from interviews with students about distressing thoughts which were most common/relevant to their life-situation. Participants were then asked to provide five distressing thoughts which had occurred for them in the past month. Thoughts did not have to appear on the list. Participants were able to write their nominated thoughts in code to avoid embarrassment, with the experimenter not

knowing the participant's actual thoughts. Next, the participant rated each thought for the amount of distress it caused them to think about, on a scale between zero and ten. At this point in the questionnaire, the experimental tasks occurred (suppression and expression).

A question aimed at the participants' subjective analysis of their intrusions during the suppression period was asked. The question was aimed at gaining the participants judgment on whether they had more intrusions of the target thought during the suppression period, or in normal life. This was rated on a bipolar scale ranging from 1 ('thought of target much less during suppression than in normal life') to 7 ('thought of target much more during suppression than in normal life'). 2.3.2

Recording Program for Experimental Tasks. A custom-written computer-based program was used to measure the frequency of target thought intrusion. An intrusion was recorded by the program every time that the spacebar was pressed or the mouse was clicked.

2.4 Procedure

Participants were randomly assigned to each experimental condition. After writing down their five thoughts and rating them in terms of distress, the participant handed the questionnaire to the researcher. The researcher circled the single most, or three most (depending on condition, one target or three targets), distressing thoughts marked down by participant, as per their distress rating. These would be designated as their target thought(s). Depending on condition (suppression first or expression first) the participants would complete the appropriate experimental task on the computer. During the suppression task, participants were instructed: "Over the next 300 seconds, you should do your best to NOT think about the target thought(s). Each time one of

these thought(s) occurs to you, either click the mouse or press the <SPACEBAR>.” During the expression period, participants were instructed: “Over the next 300 seconds, you should do your best to think about the target thought(s). Each time one of these thought(s) occurs to you, either click the mouse or press the <SPACEBAR>.”

After completion of the first task the researcher was informed and the second task would then occur. On completion of the two experimental tasks, the questionnaire was then completed.

3.0 Results

3.1 Preliminary Descriptive Analyses

The number of intrusions occurring to the participant group during the suppression period ranged from 1 to 31 ($M = 9.80$, $SD = 7.71$). When asked to rate how well they believed they had suppressed their thoughts on a Likert-type scale ranging from 1 (“Very poorly”) to 7 (“Very easily”) participants ranged from 2 to 7 ($M = 3.88$, $SD = 1.41$). The number of intrusions recorded during the suppression period was correlated with subjective reports of success of suppression ($r = -.55$, $p < .001$).

3.2 Hypothesis 1 – Immediate Enhancement Effect

To test the hypothesis that an immediate enhancement effect had occurred, a chi-square (χ^2) goodness-of-fit analysis was employed to analyse whether participants reported thinking of their target thoughts more (or less) during the *suppression period* compared to normal life. The assumptions of mutual exclusivity (and independent groups), expected frequencies, and no non-occurrence of observations were met for this χ^2 analysis. To analyse this hypothesis the scores were recoded into two categories to assess whether participants thought that they had intrusions of their target thoughts less (incorporating “less”, “much less” and “somewhat less”) or more

(combining “somewhat more”, “more”, and “much more”) during the *suppression period* than in normal life. Participants were much more likely to report thinking of the target thoughts much more during the *suppression period* than in normal life, than less, ($\chi^2_{(1, N = 64)} = 14.79, p < .001$). Table 1 shows the expected and observed counts in each of the groups.

3.3 Hypothesis 2 – Rebound Effect

Investigation of the rebound effect was tested as part of an analysis of variance, involving the independent variables of *Group* (suppress-first versus express-first, a between-subjects factor), *Period* (suppression versus expression, a within-subjects factor) and *Number of Targets* (one versus three, a between-subjects factor). The dependent variable was the number of intrusions reported. Data exploration revealed significant positive skew in many groups along with statistical normality departures. A log transformation was performed to create group normality and gain homogeneity of variance and homogeneity of covariance matrices between groups. Assumptions of normality, homogeneity of variance, sphericity, and homogeneity of covariance matrices between groups, and independence of data points were all then met. Whilst log transformations have been used for analyses, all tables, figures and confidence intervals refer to untransformed scores. Figures 3 and 4 show the mean number of intrusions for the suppression and expression periods.

There was a significant main effect of period, with participants reporting more intrusions during the expression period than the suppression period ($F_{(1, 70)} = 92.28, p < .001, M_{\text{Suppression}} = 9.80, SD_{\text{Suppression}} = 7.71, M_{\text{Expression}} = 20.58, SD_{\text{Expression}} = 17.23$). There was no significant main effect of group ($F_{(1, 70)} = 0.80, p > .05$), revealing that there was no difference in overall intrusion frequency (including both the suppression

and expression periods) between participants who suppressed first versus those who expressed first.

The rebound effect was evaluated by examining the interaction between the independent variables of group and period. A significant interaction was found ($F_{(1, 70)} = 6.42, p > .05$). Simple effect analysis compared differences between each level of the group variable at each level of the period variable. The express first group reported significantly more intrusions than the suppress-first group during the expression period ($t_{(72)} = 1.99, p < .05, M_{S-First} = 16.30, SD_{S-First} = 10.93, M_{E-First} = 24.86, SD_{E-First} = 21.09$). This result shows that the opposite of the rebound effect was observed, whereby those who expressed first experienced more intrusions than those who expressed after a period of suppression.

The two-way interaction between period and target was not significant ($F_{(1, 70)} = 0.38, p > .05$), nor was the three way interaction ($F_{(1, 70)} = 3.01, p > .05$).

Hypothesis 3 – Single versus Multiple Suppression Targets

The difference between the number of intrusions experienced by participants attempting to suppress one versus three targets was assessed as part of the ANOVA described above. There was no significant main effect of number of targets on number of intrusions, indicating that individuals attempting to suppress three targets experienced no more total intrusions than those attempting to suppress a single target ($F_{(1, 70)} = 0.44, p > .05$). Also, no difference was found between the three-target group and the one-target group in the number of intrusions during just the suppression period ($t_{(72)} = 0.32, p > .05, M_{One} = 9.51, SD_{One} = 7.82, M_{Three} = 10.08, SD_{Three} = 7.70$).

4.0 Discussion

The current study was conceived as an extension of previous thought suppression research, investigating the effect of attempts to suppress single versus

multiple target intrusions. We had predicted that the immediate enhancement effect would occur, while the rebound effect would not. Furthermore, we hypothesised that attempting to suppress three targets would not result in increased frequency, consistent with Wegner's (1994) Ironic Processes of Mental Control model.

All three of our a priori hypotheses were supported. An immediate enhancement effect was observed, whereby individuals reported increased frequency of their personally relevant distressing intrusions over what they experience in day-to-day life. No rebound effect was observed: Participants who had been attempting to suppress their target thoughts showed a reduced number of intrusions compared to those who had not been previously trying to suppress. Finally, the novel finding of the present research was that the number of attempted suppression targets did not alter the total frequency of intrusions.

Previous studies using personally-relevant suppression targets have shown inconsistent evidence for the immediate enhancement effect. Abramowitz, Tolin and Street (2001) reported no evidence for an immediate enhancement effect in their meta-analysis of thought suppression research. These authors acknowledge, however, that the methodology used to investigate this effect exerts a considerable effect on the outcome. We have followed Rassin's (2005) suggested method, which may explain our finding's discrepancy with this earlier work. The rebound effect is also observed inconsistently in previous research (Abramowitz et al, 2001). Our findings cast further doubt on the robustness of this effect. Again, the impact of methodological differences is the most likely explanation.

4.1 Implications for the Ironic Process of Mental Control Model

The Ironic Process model predicts that thought suppression would be associated with an immediate enhancement effect. The immediate enhancement

effect was observed in the current study: Active efforts to suppress personally-relevant intrusive thoughts resulted in an increase in perceived thought frequency above that experienced in normal life. Activation of the IMP appears to prime the individual for recurrence of the suppression target. It would appear that the target of suppression is held in a conscious memory store which is also shared by, or gives input to the stream of consciousness. Our finding of a ‘reverse-rebound’ effect is difficult to explain. Participants who expressed their thoughts first reported lower frequency than those asked to express after a period of suppression. In our sample, there may have been an amount of cognitive fatigue, whereby after five minutes of thought control (suppression), the individual was less able to repeatedly engage in expression of the thought targets.

A major test of Wegner’s (1994) model was whether the frequency of intrusions increased when the individual attempted to suppress multiple target thoughts. The Ironic Process model stipulates that the occurrence of any suppression target should trigger activation of the IOP, drawing other acceptable content into consciousness. This was observed in our results in that there was no difference in total intrusion frequency between individuals asked to suppress one target and those asked to suppress three targets. Had we shown that increasing the number of targets led to increased number of intrusions, this would have been difficult to accommodate in the existing model. Our results, however, were consistent with individuals distracting themselves (i.e., engaging the IOP) after the occurrence of any individual target.

4.2 Implications for Models of Psychopathology

Thought suppression research has been incorporated into the study of intrusive thoughts seen in various clinical disorders, particularly obsessive compulsive

disorder. The precise association between obsessive symptoms and thought suppression, however, remains unclear (Rassin, 2005; Smari, Birgisdottir, & Brynjofsdottir, 1995). Our findings do suggest that where individuals attempt to suppress multiple distressing thoughts, that this is no more difficult than the suppression of a single thought. In a disorder such as OCD, this would suggest some natural upper-limit to the frequency of intrusive negative thoughts, regardless of how many thoughts are suppressed. Further understanding of the relationship between suppression of multiple targets and OCD would require investigation using a clinical sample.

4.3 Implications for Methodology in Thought Suppression Research

Rassin (2005) recommended changes in methodology of thought suppression research to better address the question of whether an immediate enhancement effect was occurring. Using this method, we were able to see clear evidence for such an effect. We believe that comparison between subjective recent experience of intrusion under experimental conditions and subjective retrospective recall of intrusion frequency is the most valid method for detection of this effect. The use of multiple personally-relevant target thoughts was also a change from previous thought suppression research. We believe that this is a closer analogue of the actual presentation of clinical conditions such as OCD where multiple different intrusions are the norm (Purdon & Clark, 1993; Rasmussen & Eisen, 1992).

4.4 Implications for Counselling Practice

We also believe that our results have implications for counselling practice with individuals with OCD or other conditions in which suppression of distressing thoughts is attempted. In these situations, clients could be provided with information as to the problematic paradoxical effects of thought suppression. Clients may be

made aware that attempts to suppress distressing thoughts may in fact lead to increased occurrence, and encouraged to relinquish these efforts at suppression. These ideas are consistent with current cognitive-behavioural interventions in which the client is asked to repeatedly think their distressing thought as a way of reducing its emotional impact, and thereby removing the perceived need to suppress. We also believe that mindfulness based treatment approaches in which efforts to suppress are replaced with a willingness to allow thoughts to pass through consciousness are consistent with these counselling practice suggestions.

4.5 Limitations and Future Directions

There are limitations to the present research which broadly fall into two areas: methodology and generalizability. With regard to the methodology, it must be acknowledged that our study is unable to differentiate between the effect of attempting to suppress target thoughts, and the priming which occurs where participants are asked to nominate one or more personally-relevant intrusive thoughts. It is possible that the act of asking about these thoughts accounts for the increased thought frequency over the experimental period. It is difficult to conceive an experimental paradigm that nominates certain target thoughts without also priming these thoughts. Our methodology for assessing the immediate enhancement effect is different to that used by most previous authors, and follows the recommendation of Rassin (2005). It should be acknowledged, however, that this is based on a subjective, retrospective report of the 'normal life' occurrence of intrusions.

The generalizability of our results to real-life situations, including the intrusive thoughts characteristic of various forms of psychopathology, is also a concern. We attempted to make our results ecologically valid by using personally-relevant target thoughts, and also by using multiple thought suppression targets. Nevertheless, it

may be the case that motivation to suppress or express these personally-relevant cognitions may have been altered by the experimental procedure. In addition, the use of a five-minute suppression period, while convenient for experimental purposes, is dissimilar to the attempts of individuals with clinical conditions who are engaged in almost continual suppression efforts.

One particular point of note is that the number of studies using thought suppression paradigms in clinical populations is limited. Future research could attempt to replicate the current finding, or examine potential differences in a clinical sample. Furthermore, attempts should be made to examine the impact of attempts to suppress multiple thoughts, as is often the case in clinical presentations.

4.6 Conclusion

Our results provide further support for the Ironic Process of Mental Control model, including observation of an immediate enhancement effect. Most importantly, our results supported the model where the occurrence of any one of a set of thought suppression targets triggers activation of the IOP, rather than cueing for the intrusion of other suppression targets from the set.

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Author Note

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Table 1

Intrusions During Suppression Compared to Normal Life

	Observed <i>N</i>	Expected <i>N</i>	Residual
Less than Normal Life	17 (23%)	32.5	-15.5
More than Normal Life	48 (65%)	32.5	15.5
Total	65	65	0

Figure Captions

Figure 1. Diagrammatic illustration of Wegner's (1994) Ironic Process of Mental Control Theory

Figure 3. Mean number of intrusions per minute during the suppression period

Figure 4. Mean number of intrusions per minute during the expression period

Note. IOP = Intentional Operating Process