The relationship between reported individual differences in thought suppression and rebound effect

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Abstract

The rebound effect of thought suppression refers to the recurrence of unwanted thoughts after individuals consciously try to avoid thinking about them. This effect is believed to be linked to negative mood, with one reinforcing the other.

However, existing literature on thought suppression questions the replicability of the rebound effect and its bond to mood, which this paper explores. The White Bear Suppression Inventory, a tool for identifying individuals at risk of developing chronic thought suppression, was used to examine how individual differences in suppression ability relate to the rebound effect.

In an experimental between-subjects design, we tested 61 healthy first-year psychology students. Manipulation checks revealed no significant effects, and our results did not support the presence of thought rebound or mood reinstatement in this replication. Specifically, the two experimental phases showed no increase in suppressed target thoughts or mood ratings. Furthermore, no significant relationship was found between individual differences and the rebound effect, either because the manipulation was ineffective or because other interpersonal factors may interact with the rebound effect.

Future research should consider a larger sample size and focus on the link between individual differences in thought suppression to aid the development of therapeutic strategies. The existing literature points to an association between suppression and psychopathology.

Keywords: rebound effect, mood reinstatement, thought suppression, replication

The relationship between reported individual differences in thought suppression and rebound effect

A common expression, “the pink elephant in the room”, is used when trying to avoid addressing an unpleasant situation (“Elephant in the room,” n.d., para. 5). A similar concept exists in our minds and is referred to as thought suppression. Iijima and Tanno (2012) define the rebound effect of thought suppression as the increase in unwanted thoughts following suppression. This phenomenon was first identified by Wegner et al. (1987), who asked participants in an experiment to either suppress or freely express thoughts of a white bear. They found that people experienced a more substantial recurrence of the target thoughts after suppressing them than those expressing their thoughts freely, therefore naming it the white bear effect. To explain why suppressed thoughts resurface, Wegner (1994) proposed the ironic process theory (IPT). This theory suggests that suppression triggers an active search for distractions to prevent rumination while an automatic process monitors any recurrence of the suppressed thought. The rebound effect occurs when the search for distractors is interrupted (e.g., by cognitive resource depletion), allowing the suppressed thought to resurface.

The Link to Mood

An earlier experiment by Wenzlaff et al. (1991) draws on the implications of the IPT, where the type of thought instruction participants received (suppression or expression) interacted with their initial mood (positive or negative). Specifically, participants who were instructed to suppress while experiencing a negative mood at the beginning of the experiment reported significantly more negative mood scores at the end. Based on this, Wenzlaff et al. (1991) claimed that the mood one experiences during the suppression of thought creates a bond between the two, which can reinstate the mood whenever the thought is called to mind again. This bond can be further related to the concept of distracter associations, which claims that when suppression is

finalized, any item previously employed to distract the individual from thinking of the suppressed thought (e.g., the music used to induce a mood state) can instead produce the rebound effect, acting as a reminder of the suppressed thought
(Wenzlaff & Wegner, 2000).

The accumulated body of research in the literature surrounding the rebound effect led to speculations about whether a potential readiness to perceive negative thoughts would be reflected in producing the mood states associated with their corresponding thoughts (Wegner & Zanakos, 1994). In other words, continuous thought suppression should be related to measures of depressed and anxious affect. Building on this reasoning, Wegner and Zanakos (1994) developed the white bear suppression inventory (WBSI) to identify reliable individual differences in active thought suppression and implications for the individual's psychological well-being. Through their analysis, they found that the WBSI could aid in identifying individuals who utilize thought suppression as a means of mental control, as well as those who are sensitive to depressing thoughts and developing depressive affect (Wegner & Zanakos, 1994).

Yet, it needs to be highlighted that many attempts to replicate the framework surrounding the rebound effect of thought suppression have provided mixed results (e.g., Clark et al., 1991; Merckelbach et al., 1991), which in turn cast doubt on the reliability of the research from Wegner et al. (1987).

Replication of the Rebound Effect

Replication is essential for ensuring scientific findings' reliability, validity, and generalizability (Nosek & Errington, 2020). The Open Science Collaboration (2015) examined 98 psychological studies and found that only 40% of replications yielded results consistent with the original studies. Attempts to replicate the white bear experiments (e.g., Clark et al., 1991; Merckebach et al., 1991; Rutledge et al., 1993) also highlighted limitations that may affect the

rebound effect's generalizability and reliability. One limitation was the lack of personal relevance of the suppression item (e.g., thinking about an upcoming test), yet investigating this did not produce the rebound effect. Still, Rutledge et al. (1993) hypothesized that cognitive performance factors (e.g., mathematical ability in selective university entrance exams) might be of influence in the production of the rebound and found a significant difference between rebounders and non-rebounders. Their data suggest a moderator variable related to specific cognitive domains, such as visualization or visual memory skills, which may make it more difficult to suppress unwanted mental images, like the white bear.

Another study examined three factors influencing the ability to suppress thoughts: cognitive resources, motivation, and metacognitive beliefs about unsuccessful suppression (Magee et al., 2012). Of these, only motivation was shown to affect suppression ability positively. However, this study's reliance on comparing psychopathological and non-clinical groups limits the generalizability of its findings to other samples.

The inconsistencies across replications make it challenging to determine the generalizability and reliability of the white bear effect. However, the WBSI's focus on individual tendencies to suppress thoughts and its connection to depressive symptoms suggest that the rebound effect may interact with various individual differences (e.g., Rutledge et al., 1993) and predispositions, warranting further investigation.

To summarize, Wegner et al. (1987) identified the white bear effect, which refers to the heightened resurgence of suppressed at a later time. The ironic process theory aims to explain this by suggesting that two systems (e.g., conscious distraction and automatic monitoring) work together to produce the rebound effect. Wenzlaff et al. (1991) further found that thoughts and negative mood influence each other bidirectionally, with the resurgence of one leading to the reinstatement of the other. The existing literature inspired the development of the WBSI, which

measures people's tendencies to suppress thoughts and helps identify people at risk for chronic thought suppression. The WBSI and replications that focused on including individual difference variables (e.g., Rutledge et al., 1993; Magee et al., 2012) highlight an apparent link between the occurrence of the rebound effect and individual difference variables. Yet failures in replicating the original experiment (e.g., Merckelbach et al., 1991) have cast doubt on the reliability and generalizability of the rebound effect of thought suppression (Open Science Collaboration, 2015).

This paper focuses on replicating the experiment where mood manipulation was implemented to test the relationship between mood and thought (Wenzlaff et al., 1991). In doing so, we can gain insight into the methodology, including the generalizability and reliability of the original experimental design to bring about the rebound effect and test the claimed relationship between mood and thought (Derksen et al., 2024). Furthermore, the Open Science Collaboration (2015) highlighted that replication failures could point to either the original or the replication work being flawed, and since we can observe discrepancies in replications (Rutledge et al., 1993; Clark et al., 1991), we must investigate the findings again to draw an educated conclusion. Therefore, this study aims to explore further the relationship between thought suppression and the rebound effect. To prevent participants from recognizing the white-bear effect, we altered the target item to suppress white whales. Two different conditions were administered in the first half of the experiment, where participants were instructed to either suppress or express thoughts of a white whale while listening to either negative or neutral music. In both thought-reporting periods, participants were asked to report their thoughts as they occurred. Participants completed a mood stabilization task between the two phases and then repeated the thought-reporting procedure without the suppression instruction or music. Replicating this procedure allowed us to compare the four conditions in a between-subjects setting. We employed two hypotheses to test

the effectiveness of the administered manipulations and two hypotheses to test the theory surrounding the rebound effect.

Hypothesis 1. We hypothesize that participants in the negative mood induction condition will report lower mood ratings in the first phase compared to those in the neutral mood induction condition.

Hypothesis 2. We expect participants to exhibit fewer white whale thoughts in the first phase of the experiment in the suppression condition compared to those in the expression condition to verify the effectiveness of the suppression manipulation.

Hypothesis 3. We expect participants in the suppression condition during the first phase will report a higher frequency of thoughts about the target item (white whale) in the second phase, compared to those in the expression condition in the first phase, indicating the thought rebound.

Hypothesis 4. We anticipate that participants in the negative suppression condition will report lower mood ratings in the second phase compared to those in the two neutral conditions and the negative expression condition, which indicates the rebound effect of mood.

This replication only tested the relationship between mood and thought, yet individual differences seem to play a role in bringing about the rebound effect (Rutledge et al., 1993). Therefore, I will attempt to shed some light on the following question: What is the relationship between individual differences in the ability of thought suppression and rebound effect. For this purpose, I utilized the white bear suppression inventory (WBSI) (Wegner & Zanakos, 1994) and focused on individuals in the suppression condition, which should experience a larger thought rebound than the other group.

Hypothesis 5: I expect to find a positive correlation between the white whale thoughts in the suppression condition and the total score on the WBSI, where a larger correlation indicates the rebound of white whale thoughts.

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Method

Participants

61 (23% Male, 77% Female, 0% nonbinary/other) first-year undergraduate students in Psychology from the University of Groningen took part in this study. Their mean age was 20.17 years (*SD* = 2.51). The participants came from various countries, with the highest percentage from the Netherlands (46%) and Germany (13%). All participants voluntarily participated to receive credits for their course *(A Practical Introduction to Research Methods PSBE1-28).* Students came from the English- and Dutch-language psychology programs, of which the admittance criteria were fluency in English.

The exclusion criteria included failing to meet the validity checks included in the questionnaires (e.g., "To indicate that you are paying attention, please select disagree somewhat") or indicating that they were not of current sound psychological status ("Are you currently diagnosed with or in treatment for any mental disorders?"). Initially, N = 64 participants were screened. However, three participants (4.69% of the total sample) were excluded because they failed the attention check in the questionnaires.

The Ethics Committee of the Faculty of Behavioral and Social Sciences approved the study at the University of Groningen. Its research code is PSY-2425-S-0047.

Design and Power analysis

We compared the mood (Neutral vs Negative) with instruction type (Suppression vs Expression) in a between-subjects design. Six separate independent sample t-tests were used to test the main hypotheses. Secondly, a correlational design was employed for the individual analysis. The participants were randomly assigned to one of the moods- and thought-instruction conditions and only exposed to one of the combinations. Overall, 27 participants were assigned

to the suppression condition, 34 to the expression condition, 30 to the neutral mood condition, and the remaining 31 to the negative mood condition. This procedure generated four possible combinations of the conditions: negative suppression (N = 9), negative expression (N = 22), neutral suppression (N = 18) and neutral expression (N= 12).

An a priori power analysis using G*power analysis (Erdfelder, Faul, & Buchner, 1996) was used to calculate the total sample size. To reach our desired power of 0.90 (a 90% chance of detecting a true effect), the calculations indicated that we require at least 119 participants when rejecting the Null with $\alpha = 0.05$ and aiming for Cohen's $f = 0.3$.

Materials

All materials, except for the individual exploratory measures, were adapted from Wenzlaff et al. (1991). To obtain the thought records and run the questionnaires, we used Qualtrics (Qualtrics, 2025).

Thought Records

The thought records were obtained by using Qualtrics (2025). Two designated pages were integrated into the file, which contained a text field to obtain the thought reports and a timer of nine minutes to ensure equal time limits for each participant. For the first phase of the experiment, we integrated music into the thought-reporting page on Qualtrics (2025), that would play either negative (Russia Under the Mongolian Yoke, Field of the Dead, from Alexander Nevsky, Op. 78, by Prokofiev) or neutral music (Common Tones in Simple Time, by John Adams). Next to the digital thought records, we handed out a paper with a pen to tally occurrences of thoughts of a white whale manually. The papers were in A4 format with print on the front indicating "Phase 1" and "Phase 2" on the back.

Positive and Negative Affect Schedule

A modified version of the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) was used to measure the mood ratings of participants. This version included the original 10 positive-affect items (e.g., determined, excited, interested) and 10 negative-affect items (e.g., irritable, ashamed, afraid). Furthermore, 3 items assessing neutral mood (e.g., idle, placid, unconcerned), 3 filler/ distractor items (e.g., permissive, materialistic, scientific) and 3 items (e.g., blue, merry, sad) used in the original study by Wenzlaff et al. (1991) were included. Items were rated on a 5-point Likert scale ranging from (1) “very slightly or not at all” to (5) “extremely”. PANAS reliability scores were assessed for positive affect (Cronbach’s Alpha = .61), compiled of the 10 positive-affect items and negative affect (Cronbach’s Alpha = .75), compiled of the 10 negative-affect items.

White Bear Suppression Inventory

The White Bear Suppression Inventory (WBSI) was included for exploratory purposes. It was developed by Wegner and Zanakos (1994) and consisted of 15 questions. Responses to the questions (e.g., “There are images that come to mind that I cannot erase”, “I wish I could stop thinking of certain things”) were recorded on a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). The overall score was calculated by adding the responses, with total scores varying from 15 to 75, where higher scores reflected a greater tendency to suppress thoughts. According to a reliability analysis based on the data of this study, the inventory demonstrated high internal consistency (Cronbach’s Alpha = .87).

Procedure

The data collection period ran from the 28th of November 2024 until the 20th of December 2024. The study was conducted in English. All six researchers conducted the test sessions in rotation. All programs needed for the experiment were inspected and tested by all

team members. Participants signed up for participation through the local recruitment platform Sona (Sona Systems, https://www.sona-systems.com). The researchers briefed the participants and, before signing the consent, asked whether the participants were currently diagnosed with or in treatment for any mental disorders. Participants were tested in the laboratory at the Stationsplein building in Groningen and instructed according to *script* in Appendix B. The participants received instructions during the experiment through Qualtrics (Qualtrics, 2020).

We employed deception to mask the true purpose of our study and avoid confounding variables. Participants signed a RUG-based informed consent form for the study "Binding Thoughts and Music."

The researcher guided the participant to one of six available testing cubicles. Each cubicle was equipped with a chair, a desk, headphones, a computer and keyboard and a door for privacy, which was kept closed at all times to ensure privacy and limit distractions. The researcher gave instructions for the 4 questionnaires and entered a participant ID, which was used to anonymize the data. The participant was instructed to leave the cubicle and report to the researcher when all questionnaires were completed.

Afterwards, the researcher guided the participant to the dedicated cubicle for the Go/No-Go test (parallel forms 1&2) from the Manual Response Inhibition (Tucha et al., 2013). The researcher gave instructions for the test procedure. After completion, the participant returned to their cubicle to receive instructions and perform thought report session 1. The participant further received mood manipulation at this stage by listening to somber music (Prokofiev, 1938/1955) or neutral music (Adams, 1979/1987). Qualtrics (2020) randomized the two conditions without the researchers' intervention. After entering a passcode to continue to the thought reporting page, the researcher explicitly gave instructions to either suppress (condition "s") or express (condition

"e") their thoughts about white whales during the entire 9 minutes of the task and afterwards complete the mood scale. The cue for either of the conditions was presented on the page where the passcode was entered. After this, the researcher left the cubicle and waited for the participant to complete the tasks. Afterwards, the researcher filled in a last passcode. Then, the participant received instructions and performed the Operation Span Task (OSPAN; Turner & Engle, 1989). After this, the researcher instructed the participant on the second thought-reporting period. After completion, the participant filled out the mood scale again. At the end of the experiment, the participants were thanked for their participation and were informed about receiving a debriefing by the 15th of January. Then, the researcher filled in the end-code and condition of the participant and granted the course credits for participation.

Analysis

The data were analyzed and visualized using SPSS 28 (IBM Corp, 2022) and JASP (Version 0.19.3; JASP team, 2024).

The hypotheses were tested using 6 separate independent sample t-tests. The dependent variables included the sum score of white whale thoughts in Phase 1 and Phase 2, the total mood score of Phase 1 (e.g., adding ratings on questions 1 through 20 on the PANAS in Phase 1), the difference score of mood between phase 1 and 2 (e.g., PANAS total phase 2 – PANAS total phase 1) and the difference score in white whale thoughts in the suppression condition between phase 1 and 2 (mood difference). The independent variables were the respective experimental phases (e.g., phase 1 or phase 2), conditions (e.g., negative or neutral mood and suppression or expression) and the total score on the WBSI. The significance of the two manipulations was inspected by comparing the induction of neutral mood against negative mood in the first phase (t-test 1) and the suppression against expression instruction in the first phase (t-test 2). The third t-test tested the difference in thought increase between phase one and two for the suppression against the

expression condition. To analyze hypothesis 4, a series of steps had to be followed. First, the negative suppression condition was compared to the negative expression condition (applying variable “condition_q” 1 = suppression, 2 = expression) to the mood difference (t-test 4). Next, the negative suppression- and neutral suppression conditions were compared. A mood condition filter (neutral mood = 1, negative mood = 0) was created based on entries in the thought reports corresponding to the mood induction conditions (e.g., “tr_neu” corresponds to neutral mood) and applied to the mood difference (t-test 5). Lastly, the negative suppression condition was compared with the neutral expression condition. First, the mood difference scores were filtered out by mood condition (e.g., for neutral: “include cases if” mood difference = 0). This filtered all mood scores of participants assigned to the neutral mood condition, indicated as “0”. All “system missing” entries could be automatically transferred to the negative mood condition. Next, the mood difference scores assigned to the neutral mood condition were filtered by instruction condition (“include cases if”: “condition_q” = 2). This step was repeated for the suppression instruction condition in the negative mood variable. It was made sure to assign “1” to all values that were included for neutral mood expression and “2” for all values contained in negative mood suppression. This procedure generated a filter variable for the mood difference. This was applied to the mood difference, and the neutral expression condition was compared with the negative suppression condition (t-test 6).

Through inspection of the QQ-plots, Boxplots and Shapiro-Wilk tests, it was confirmed that our data were not normal. Additionally, some extreme scores were identified by inspecting the boxplots for the white whale thought counts (e.g., phase 1, phase 2 and difference score for suppression condition). Yet, we decided to continue the analysis without adjusting the data set, calling for caution in interpreting the results.

Our research question was: Does the mood experienced during the thought-suppression session become reinstated after the previously suppressed thought is reinstated?

For the exploratory research, a correlation analysis was conducted between the total score on the white bear suppression inventory and the difference score between phases 1 and 2 for the white whale tallies in the suppression condition. The normality inspection through the Shapiro-Wilk test revealed that the WBSI total score was normally distributed, whereas the data for the difference score was not. Upon inspection of a boxplot of the difference score, 4 extreme values have been identified. Yet, the analysis was continued without adjustments to the data. Therefore, caution is warranted when interpreting the results.

Results

Normality Analysis and Descriptives

Appendix A provides an overview of the statistics, descriptives and normality tests for hypotheses 1 through 4 and the exploratory analysis (hypothesis 5). Overall, it was found that the normality assumptions were violated for every variable (e.g., scores for white whale thoughts in phases 1 and 2, mood scores in phases 1 and 2, and difference score of white whale thoughts in the suppression condition), except for the total scores on the WBSI, which were approximately normally distributed.

Mood Manipulation

An independent sample t-test for comparing the two mood conditions in phase 1 was used to inspect the effectiveness of mood manipulation (hypothesis 1). Homogeneity of variances was assumed based on Levene's test for equality of variances (F = .08, p =. 77). The results of the independent sample t-test oppose the expectation that participants would report lower mood ratings in the negative mood condition (e.g., indicating the effectiveness of the mood manipulation) in the first phase compared to those in the neutral mood induction condition (t = .963, p = .17). Specifically, the analysis revealed no significant difference between the reported mood in the neutral condition (M = 44.40, SD = 9.74) and the negative mood condition (M = 42.13, SD = 8.66). This is further reflected by the small effect size (d = .25). Overall, the null hypothesis of no difference between the two mood induction conditions cannot be rejected.

Instruction Manipulation

The independent sample t-test for comparing the two instruction conditions in phase 1 was used to assess the effectiveness of the instruction manipulation (hypothesis 2). Homogeneity of variances was assumed based on Levene's test for equality of variances (F = 1.41, p =. 24).

The results of the independent sample t-test contrast with the assumption that participants would report fewer white whale thoughts in the first phase of the experiment in the suppression condition (e.g., indicating effectiveness of the manipulation) compared to those in the expression condition (t = -1.32, p = .10). Specifically, the analysis revealed no significant difference between the number of white whale thoughts in the suppression instruction condition in phase 1 (M = 6.37, SD = 4.56) compared to the expression condition (M = 8.09, SD = 5.41). This is further supported by a small negative effect size for the difference in means (d = -.34). Overall, the null hypothesis of no difference between the two instruction conditions cannot be rejected.

Thought Rebound

The analysis revealed no significant difference between the number of white whale thoughts in phase 2 when participants were previously in the suppression instruction condition in phase 1 (M = 10.52, SD = 10.93) and the expression condition (M = 8.15, SD = 10.66). This is further reflected in the small effect size comparing the differences between the means of the two groups (d = .22). Homogeneity of variances was assumed based on Levene's test for equality of variances (F = .55, p =.46). The independent sample t-test yielded no support to reject the null hypothesis of no difference between the groups (t = .85, p = .20). Overall, these results contradict the expectation that participants would report a higher frequency of thoughts about the target item (white whale) in the second phase when they were previously in the suppression condition (e.g., indicating thought rebound) compared to those in the expression condition (hypothesis 3).

Mood Rebound

The analysis consisted of three independent sample t-tests (e.g., negative suppression condition against negative expression conditions, negative suppression condition against neutral suppression condition and negative suppression condition against neutral expression condition) to investigate the difference between the mood ratings in phase 2 (hypothesis 4).

Negative Mood Conditions Test

Homogeneity of variances was assumed based on Levene's test for equality of variances (F = .10, p =. 76). The independent sample t-test yielded no support to reject the null hypothesis of no difference between the negative mood condition groups (t = .56, p = .29). Furthermore, the analysis revealed no significant difference between the mood scores for the negative suppression condition (M = 2.00, SD = 7.68), compared to the negative expression condition (M = 3.91, SD = 8.85). This is further reflected in the small effect size comparing the differences between the means of the two groups (d = .22).

Negative and Neutral Suppression Conditions Test

Homogeneity of variances was assumed based on Levene's test for equality of variances (F = .18, p =. 67). The independent sample t-test yielded no support to reject the null hypothesis of no difference between the suppression condition groups (t = .47, p = .32). The analysis revealed no significant difference between the mood scores for the negative suppression condition (M = 2.00, SD = 7.68), compared to the neutral suppression condition (M = 3.67, SD = 9.13) in phase 2. This is further reflected in the small effect size comparing the differences between the means of the two groups (d = .19).

Negative Suppression Condition and Neutral Expression Condition Test

Homogeneity of variances was assumed based on Levene's test for equality of variances (F = .00, p =. 96). The independent sample t-test yielded no support to reject the null hypothesis of no difference between the negative suppression condition and neutral expression condition groups (t = 1.60, p = .07). The analysis revealed no significant difference between the mood scores for the negative suppression condition (M = 2.00, SD = 7.68), compared to the neutral expression condition (M = 7.42, SD = 7.91) in phase 2. Yet, the t-test was close to the chosen

alpha level of .05, which relates to the medium effect size (d = .69) for comparing the difference in means between the two groups.

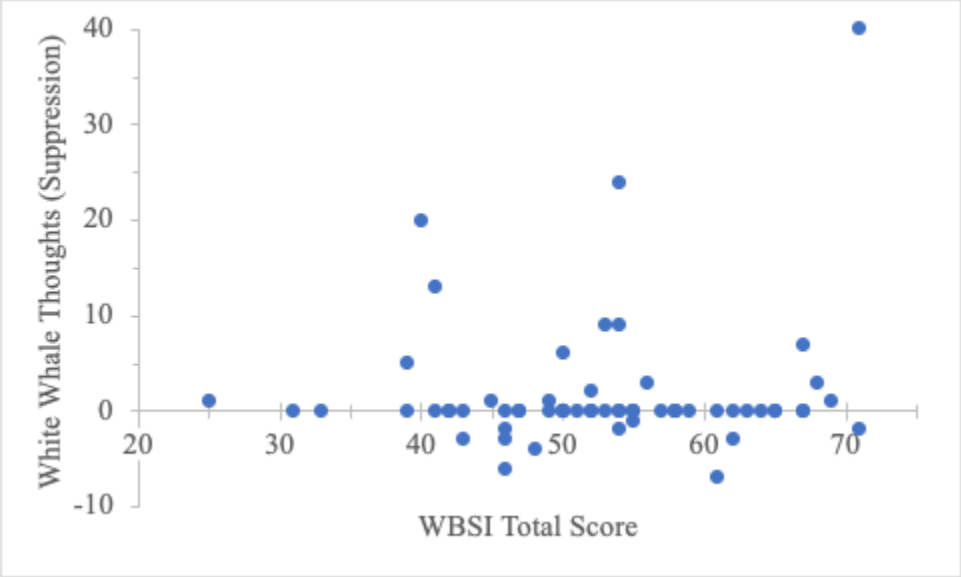
Overall, the results do not support rejecting the null hypothesis of no difference in all three cases. Therefore, this analysis did not support the assumption that participants in the negative suppression condition would report lower mood ratings in the second phase compared to those in the neutral conditions and the negative expression condition, which would indicate the rebound effect of mood.

Individual Analysis

Figure 1 illustrates the results of the correlation analysis and shows that there is a weak, positive non-significant correlation (r = .16, p = .22) between the difference score of the white whale thoughts between phase 1 and phase 2 (M = 4.15, SD = 1.97) and the total score of the WBSI (M = 52.54, SD = 10.04). Even though a positive correlation was found, it was not significant and did not offer support for hypothesis 5.

Figure 1

Scatterplot of Correlation



Note. This figure displays the correlation between the total score of the WBSI and the difference score of the white whale thought count between phase 1 and phase 2, for the suppression condition.

Discussion

This between-subjects experimental replication investigated whether the mood experienced during the thought-suppression session becomes reinstated after the previously suppressed thought was reinstated (Wenzlaff et al., 1991). We assessed thought and mood reinstatement by comparing thought counts and mood scores between Phase 1 and Phase 2. Mood- and thought-reinstatement would be indicated by increases in respective scores from Phase 1 to Phase 2 for the relevant condition (e.g., negative mood, suppression). However, our results did not replicate the bidirectional relationship between mood reinstatement and thought rebound (Wenzlaff et al., 1991).

Hypothesis 1 and 2

Instead, we found that the mood manipulation (t = .96, p = .17), and the instruction manipulation were nonsignificant (t = -1.32, p = .10). In simple terms, we could not create the intended variations in mood and thinking behavior. One possibility is that the sensitivity to detect the actual effect was affected by our design choices and could have led to the nonsignificance of our results (e.g., finding false negatives). Specifically, the insufficient power is likely influenced by our small sample size (N = 61) or poor design choices for administering the manipulation (Lakens, 2022). The notion of poor design choices finds support in previous replication attempts (e.g., Clark et al., 1991; Merckelbach et al., 1991). The authors stated that the manipulation was lacking in ecological validity, aimed at the "forced" (e.g., try to think specifically of a white bear) expression instructions in Wegner et al. (1987) that were also used in our replication. Another factor aimed at the nonsignificance of the mood manipulation could have been that many participants were about to leave for Christmas break. Christmas elicits different emotions in people; where some find Christmas to be a time of love and family-related values (Fagley,

2012, as cited in Muntz, 2016), whereas others feel that Christmas can be depressing and lonely (Friedberg, 1990; Velamoor et al., 1999, as cited in Mutz, 2016). Considering these points, preoccupation with Christmas can lead to preexisting mood effects that would collide with the mood manipulation we tried to implement, possibly influencing the results negatively.

Hypothesis 3 and 4

A similar trend is reflected in the results testing the thought rebound ($t = .85$, $p = .20$) and the tests comparing the negative mood condition groups ($t = .56$, $p = .29$), the suppression condition groups ($t = .47$, $p = .32$) and the negative suppression condition and neutral expression condition groups ($t = 1.60$, $p = .07$). However, we should not disregard the possibility that these nonsignificant results point to the absence of a true effect, rather than reflecting false negatives. Some support for this notion comes from Wenzlaff (2011), who suggested that mood congruence (e.g., remembering information consistent with current mood) is not as robust as was previously assumed. He discussed the critical association of cognitive and emotional factors (e.g., goals, attention and emotional significance) to these memories. Following this line of reasoning, instructing to think of a white whale had virtually no emotional significance or personal relevance for the participants in our study, rendering any emotional attachment to the suppressed thoughts unlikely. Another point by Wegner et al. (1991) highlighted that thought suppression is influenced by various contextual and psychological factors (e.g., motivation), which in turn influence the likeliness of the rebound effect to occur. For our study, the lack of personal relevance or interest could have affected our participants' motivation to participate, negatively influencing our results (Magee et al., 2012). To summarize, the likelihood of these results reflecting the absence of a true effect finds some support in the existing literature that should be further clinically investigated.

Hypothesis 5

Lastly, there was no meaningful relationship between the total scores on the WBSI and the difference in thought count in the negative suppression condition (r = .16, p = .22). Yet, concluding these results would prove unreasonable. With a sample size of nine participants for this condition, the generalizability of the findings is doubtful. Furthermore, because neither manipulation was successful, it remains questionable what these results implicate (e.g., false negative or absence of actual effect). Future research should investigate whether a relationship between the WBSI and the rebound effect of thought suppression and negative mood exists in a larger sample with improved manipulation administration.

Limitations

Several limitations may have influenced our results. Firstly, we exclusively relied on a convenience sample, where students signed up to receive course credits. This influences their motivation to participate and creates difficulty in determining how seriously they took the research. This was reflected in multiple issues with the collection of our data. Some participants did not understand the instructions correctly, did not tally their thoughts according to them, and had to repeat the thought reporting. This could have exhausted the participants and, in turn, influenced the occurrence of white whale thoughts. Some participants did not understand the purpose of the thought report and questioned why we asked them to suppress their thoughts. This could have influenced the participants to engage in biases (e.g., participant reactivity, social desirability bias), therefore influencing their behavior and skewing our results (Lynn Institute, 2023).

Another concern is the type 2 error inflation due to a lack of power (Lakens, 2022). Our study's lack of power resulted from not reaching the minimum of 119 participants, small group

participants receiving the manipulation, and a non-normal distribution of our data. These factors could have influenced the statistical significance of our analysis and, in turn, led to false negatives.

Another point concerns the analysis for hypothesis 4, in which three t-tests were carried out, using one variable to compare to the three other conditions. This approach increases the risk of significant findings due to chance (Evans, A. N., 2022, Chapter 13, pp. 366-382). Since we did not find significance but had one test that almost reached the significance threshold, it is essential to remain vigilant about concluding this (e.g., finding significance with a larger sample).

Another point is the failure of manipulation; we should investigate the effects of the music we chose, how the instructions were phrased (e.g., Clark et al., 1991), and the context effects discussed by Wegner et al. (1991). Some participants reported enjoying the music used to induce a negative mood. If the music had the opposite effect of what we had hoped for, it could explain why the manipulation was unsuccessful.

Implications for future research

Future research should aim to replicate this study with a larger, more diverse sample to improve generalizability. Furthermore, from the current replication, no support has been found for the individual differences measure (e.g., WBSI) regarding its relation to the rebound effect. Yet, a collection of evidence still speaks to the rebound effect in combination with a third variable like visual memory skills (Rutledge et al., 1993) or psychopathological profiles (e.g., Lin, 2014; Purdon, 1999). Therefore, future research should investigate possible further links to aid in creating measures like the profiles of everyday thought suppression (Lin, 2014) or the WBSI (Wegner & Zanakos, 1994). These measures can help us further understand the impact of

thought suppression in terms of obsessive thinking and therapeutical interventions like acceptance and commitment therapy (Wegner, 2011).

Conclusion

We found that the mood- and instruction- manipulation were unsuccessful. Potential explanations include insufficient power and poor design choices. Additionally, the timing of data collection, coinciding with the pre-Christmas period, may have influenced participants' moods. Hypothesis testing for the thought rebound effect and mood reinstatement yielded no significant results. Factors like lack of personal relevance could have contributed to the findings. Lastly, there was no meaningful relationship between the total scores on the WBSI and the difference in thought count in the negative suppression condition, possibly resulting from the lack of power in our study and psychological factors (e.g., lack of motivation).

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Appendix A

Test Statistics and Descriptives Tables

Descriptives, Correlation and Normality Test for Total Score WBSI and Difference Score White Whale Thoughts in Suppression Condition

	M	SD	Shapiro-Wilk	p	r	p
WBSI total score	52.54	10.04	.99	.79	-	-
Difference scores white whale thoughts	4.15	10.23	.79	<.001*	.16	.22

Note. Where *p < .001. Is not significant.

Test Statistics for White Whale Thoughts Phase 1, White Whale Thoughts Phase 2, Mood Scores Phase 1 and Mood Scores Dependent on Condition Phase 2

					Levene's test for equality of variances	
	Cohen's d	t	df	p	F	p
White Whale thoughts phase 1	-.34	-1.32	59	.10	1.41	.24**
White Whale thoughts Phase 2	.22	.85	59	.20	.55	.46**
Mood scores phase 1	.25	.96	59	.17	.08	.78**
Suppression conditions phase 2	.19	.47	25	.32	.18	.67**
Negative mood conditions phase 2	.22	.56	29	.29	.01	.76**
Negative suppression against neutral expression phase 2	.69	1.60	19	.07	.00	.96**

Note. This table demonstrates the test statistics for the dependent variables.

Where *p < .05 is significant.

Where **p > .05 shows no significant differences.

Appendix B

Script

Disclaimer

Parts irrelevant to the individual research presented in this thesis have been removed from the script.

Introduction

Introduce yourself, ask which study participant came in for, ask about current diagnosis

IF YES: Unfortunately, this means that you cannot proceed with our experiment. We thank you for your time and wish you the best of luck. You will not receive any penalties for this, but you will not receive the credits either.

IF NO: I would like to ask you to read the research information letter. Most importantly, it states that you can always stop with the research and the data will be handled confidentially. If you agree, please sign the informed consent. You will get the informed consent twice, one for us and the other one you can take home. Please sign both if you agree.

(informed consent is signed)

Thank you for signing the informed consent. You can follow me.

Questionnaires

For the 1st part of the study, you will fill in a few questionnaires. Please read the questions carefully and answer them as truthfully as possible. If you have any questions while filling in the questionnaires, we will be here, so feel free to ask us. When you are done, you can go out of the cubicle, and we will give you further instructions

Go-No/Go test

...Explain to press green button when TRIANGLE present. Otherwise press nothing...

Wait for the participant to finish the test trial. Leave after the test trial and wait for the participant to finish in front of cubicle.

(Make sure to have a pen and paper with you)

Thought Reporting

For this part of the study, you will report your thoughts via the text box on the screen. You can write about whatever comes to mind, as if you're noting down a stream of thoughts that you're having. Please be mindful to write everything down in English, it doesn't really matter if you make mistakes in spelling or language...

Continue with Suppression or Exression

Suppression

Your task is to try not to think of a white whale. If you do think of a white whale, please tick mark one time on the piece of paper next to you. Do this every time you think of a white whale.

Expression

Your task is to try to think of a white whale. If you think of a white whale, please tick mark one time on the piece of paper next to you. Please make note of this in the text box, every time you have it. It doesn't matter if this interrupts your ongoing story. For example, you could

have a block of text, then mention the White Whale, after which you go on with the text and report a White Whale once more. Do this for everytime you think of a white whale.

Continue with

All this thought reporting is completely confidential, no one besides the researchers will see this. You will see a timer of 9 minutes. During these 9 minutes, please keep your headphones on at all times. After these 9 minutes, there will be a small button on the bottom right so that you can directly continue to the questionnaire that you may fill in. After you have filled in the questionnaires, please come out for further instructions. Do you have any questions so far? Good luck!

OSPAN

....Explain letter practice, math practice and combination part at the end. Ask if the participant has any questions. After the practice trial is finished, wish the participant good luck and leave cubicle. Wait for them to return to you after completion of the task....

(Make sure to have a pen and paper with you)

Expression

For the final part of the study, you will report your thoughts via the text box on the screen. Your task is to try to think of a white whale. If you do think of a white whale, please tick mark one time on the piece of paper next to you. Do this every time you think of a white whale. You will see a timer of 9 minutes, after which there will be a small questionnaire that you may fill in. After you have filled in the questionnaire, please come out for further instructions. Do you have any questions so far? Good luck!

Debriefing

Thank you for participating. What did you think of the experiment? We will debrief you by email about the purpose of the research by the 15th of January after which there will be another opportunity for you to withdraw your data. Do you have any questions?

We will grant you your SONA points later today.

Closing

After session ends: enter the endcode. Enter which condition this participant was put into, then reset Qualtrics by ending the survey and refreshing the page. Check the logbook for completeness. At the end of the day, all the data should be saved in Unishare. Save informed consent. Reward SONA credits.