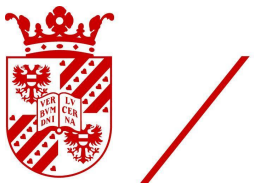

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Suppression induced forgetting: a correlational study on performance on the Think/ No-Think task with individual scores for repressive coping and dissociation

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Abstract

Suppression induced forgetting (SIF) arises if the repeated recall of memories is consciously tried to block. One prominent way to investigate SIF is based on performances on Think/ No-Think tasks. Previous studies suggest that defense mechanisms as repressive coping and dissociation are correlated with SIF. Repressive copers are assumed to be better in thought suppression when directly instructed in an experiment than people without a repressive coping style. Furthemore, people with dissociative experiences are thought to be better in cognitive tasks compared to those without dissociative experiences. In the current study, undergraduate Psychology students were asked to take part in a TNT task. If the suppressed items of this task are less successfully recalled than the baseline items, it would indicate a SIF effect. To assess for repressive coping and dissociation, participants completed the Taylor Manifest Anxiety Scale (TMAS), the Marlowe-Crowne Social Desirability Scale (MCSD) and the Dissociative Experiences Scale (DES). We found no statistically significant correlation for SIF and repressive coping and SIF and dissociation. We also did not find a moderating effect of repressive coping and SIF on dissociation. However, we observed a significant correlation between repressive coping and dissociation.

Keywords: suppression induced forgetting, think/no-think task, repressive coping, dissociation, correlation

Contents

Introduction

Everybody sometimes wishes to forget certain memories. People use different coping strategies to hinder unwanted memories from coming to mind. Some researchers and clinicians argue that this is what happened in the case of Nicole Kluemper. Nicole Klumper developed (false) memories of her mother bathing her as a child with "putting her fingers too far where she should not have." Although she had no memory of her mother abusing her before she came to therapy again, this flashback arose after seeing a video of her younger self stating this in an old therapy session (Chattopadhyay, 2017). Until today, Nicole Kluemper does not know for sure what to believe.

Concerning the case of Nicole Kluemper, previous researchers and clinicians based their practices on "repression folklore," assuming that people ban unwanted memories and traumatic experiences from their conscious minds (Loftus, 1996). Through therapy, clinicians can recall those unwanted memories back to the conscious mind, resulting in patients needing treatment for these conscious memories. However, science is divided when it comes to the question of whether the repressed memories can become aware again or if people instead generate false memories (Loftus, 1996). The generation of false memories can have harmful consequences for the patient and their (wrongfully) suspected perpetrators. This debate, titled "memory wars," is still nowadays a crucial debate in the field of repressed memories (Otgaar et al., 2021).

Can we voluntarily repress our memories?

Regarding the story of Nicole Kluemper, the question arises if it is desirable to recall all memories. Friedrich Nietzsche stated: "Blessed are the forgetful; for they get the better even of their blunders" (Hu et al., 2017). Forgetting is a shortcoming of our memory as memory tries to retain specific information without success. Principally, it is stated that the forgetting emerges either from the time that is passed where memory is subsequently less

available for recall (Thorndike, 1913), from the competition of different memories for recall (Underwood, 1957), or when due to a change of context, memory recall is better or worse depending on contextual cues (Tulving, 1974) (Stramaccia et al., 2021). Nonetheless, forgetting can also be seen as a development, updating our memory or removing either irrelevant or undesirable information (Bjork, 1989). However, forgetting all unwanted memories seems impossible sometimes. Environmental cues can provoke all kinds of unwanted memory retrieval, with the outcome that individuals often try to suppress this retrieval process. However, how can one detect this mechanism of suppression? In a study conducted by Bergstörm et al. in 2013, outcomes showed that criminals could intentionally manipulate forensic tests concerning their memory by suppression. These tests are administered to test whether a suspect has specific knowledge that only a guilty person could know. The mechanism of suppression of memory can be seen with activity in the brain (Benoit & Anderson, 2012). However, there is not only neurological proof of memory suppression; one task that was designed to test this is the Think/No-Think task (TNT task) (Anderson & Green, 2001). The original aim of the TNT task was to empirically test whether people can stop the retrieval of unwanted memories voluntarily. The TNT task was the first test to show that suppression of unwanted memories is not only attributed to people experiencing trauma. This was done by showing participants pairs of words that they were asked to remember. Later, one word of some word pairs is presented, and the participant is instructed to either think of the other associated word or stop the recall of the word through suppression. If the participants can recall the word pair that was not supposed to suppress better than a word pair from the no-think condition, the experiment is a success. Moreover, an independent-probe phase is implemented to examine whether memory recall is impaired, even if a cue is hinting at the word pair. Hence, the independent-probe phase suggests the accessibility of the target word. This is done by showing the first letter of a word with a semantic category word together. Participants again should recall the previously suppressed

words worse than the words from the no-think condition. Moreover, the suppression of the words was not very different than when the words were again presented without the cue (same-probe phase). Therefore, the assumption of associative disruption can be excluded as suppression takes only place for items consciously chosen. The underlying mechanism of suppressing unwanted memories are executive control processes, generating that if suppressing unwanted memories occurs in a way that it is not reaching consciousness, and inhibitory control processes occur, the memory retrieval for the items that were supposed to be suppressed should be worse than for baseline items. Up to now, it is the most prominent example of evidence that memories can be suppressed voluntarily.

The relationship between suppression induced forgetting and repressive coping

If the suppressed items of the TNT task are less successfully recalled than the baseline items, science speaks of "suppression induced forgetting" (SIF) (Hu et al., 2017). It arises if the retrieval of unwanted memories is consciously and repeatedly tried to block. The more recurrently an item gets suppressed, the higher the forgetting (Hu et al., 2017). Essentially, it is suggested that the effect is to protect us from recalling unwanted information.

One process that is connected to SIF is the direct retrieval suppression mechanism. It is associated with inhibitory top-down processing in the hippocampus through the right dorsolateral prefrontal cortex (Benoit & Anderson, 2012; Gagnepain et al., 2014). To regulate the suppression of the retrieval process, individuals often apply inhibitory processing strategies. Bjork (1989) described retrieval inhibition as "a suppression–type process directed at the to-be-inhibited information for some adaptive purpose" (p.324), which is suggested to imply not being able to retrieve information but not the loss of information. The statement that individuals insulate themselves from negative stimuli is coherent with study outcomes of goal-directed models of autobiographical memory (McAdams, 2001). It is suggested that clinical examples of excessive variants of inhibitory strategies are disorders such as posttraumatic stress disorder, functional amnesia, dissociative fugue, and dissociative identity

disorder (Brewin, 2001; Kihlstrom & Schacter, 1995). Moreover, outcomes suggest that some individuals are more proficient in applying protective processing strategies than others. These individuals often have a so-called “repressive coping style.” Principally, repressive coping refers to repression and inhibition of harmful or undesirable feelings or experiences and is often used as a self-protection strategy (Weinberger et al., 1979). Repressive copers can be described as having low scores in self-reported anxiety and high scores in self-reported defensiveness (Weinberger, 1995). Weinberger compared repressive coping individuals with low, anxious individuals (low anxiety; low defensiveness), high anxious individuals (high anxiety; low defensiveness), and defensive high anxious individuals (high anxiety; high defensiveness). Back in the 19th century, Freud stated that restricting unpleasant feelings leads to diseases that were, among other things, presented as repression. He described it as an unconscious defense mechanism against trauma, but as well as a voluntary decision to prevent unpleasant memories from coming to mind (Geraerts et al., 2007). Repressive coping as a defense mechanism can be explained by repressive copers having a higher threshold for perceiving unpleasant cues. Thus, they display more distraction strategies and fewer punishment strategies compared to other defense mechanisms (Myers, 1998). Furthermore, repressive copers often demonstrate an avoidant attentional style, for instance, altering their attention away from negative stimuli. Resulting, they show characteristic memory deficits, especially autobiographical memory. Moreover, repressive copers also demonstrate worse memory for neutral stimuli as well. These memory deficits may be one reason why repressive copers have more substantial SIF scores than healthy control groups (Stramaccia et al., 2021). This statement is coherent with the assumption that individuals with low anxiety are better at intentionally induced forgetting, which is, as stated above, one core trait of repressive copers. Hence, it is not surprising that studies show that repressive copers are better at thought suppression than people without a repressive coping style (Alston et al., 2013). Repressive coping is oftentimes conducted in an emotion-focused mechanism, e.g., as emotional

dissociation (Bonanno et al., 2004); as repressive copers display relatively low-stress levels in current situations but show heightened stress levels internally, for instance, in autonomic arousal (Weinberger et al., 1979).

How are suppression induced forgetting and dissociation associated?

Therefore, another group of people who are more proficient in applying protective processing strategies than others are people who encounter dissociative experiences. As stated above, dissociation is seen as a clinical example of these protective processing strategies. Dissociation refers to a mental process of detachment of memory, thoughts, and feelings. One typical example experience is the so-called "highway hypnosis," which is the loss of consciousness when driving for an extended period (DePrince & Freyd, 1999). As dissociation is often displayed as a defense mechanism, it is not unexpected that dissociation is associated with trauma. A study by van den Hout et al. (1996) stated that scoring high on self-report assessments of traumatization was correlated with attributes of dissociation. Additionally, their results showed that dissociation and suppression were positively associated. Supporting this, it was found that people who suppress unwanted memories also often score high on dissociation measurements such as the "Dissociative Experiences Scale" (DES) (Bernstein & Putnam, 1986; Muris & Merckelbach, 1997). Relating to trauma, memory processes can be impaired when, for instance, a person constantly applies self-protecting strategies such as dissociation, where it distracts itself from the traumatic memories, especially during the development of trauma, the encoding of these traumatic events would be impaired (Eisen & Lynn, 2001). Correspondingly, studies found that people scoring high on the DES show a high acceptance of false memories. Moreover, it is suggested that dissociation subsists with motivated suppression, e.g., dissociative amnesia (Staniloiu & Markowitsch (2012). It is even assumed that dissociation is a consequence of suppression (Muris & Merckelbach, 1997). Hence, it is not surprising that traumatized individuals are suppressing unwanted memories. Coping with traumatic memories through dissociation is

mediated by the risk that these memories bring to the self and probably affect the attentional system (Freyd, 1996). Corresponding to that, people with high scores on dissociative tests show more interruptions in their voluntary attention performances (DePrince & Freyd, 1999). Relating to SIF, people with dissociative experiences also are thought to be superior in cognitive tasks to people without dissociative experiences, as dissociative tendencies and basic cognitive processes of memory are interconnected (DePrince & Freyd, 1999). Overall, it can be said that a connection between dissociation and memory impairments exists (Eisen & Lynn, 2001).

Summary and Predictions

In sum, prior studies showed that repressive copers are better in thought suppression when directly instructed in an experiment than non-repressive copers (Alston et al., 2013). Furthermore, people with dissociative experiences are thought to be superior in cognitive tasks to those without dissociative experiences, as dissociative tendencies and basic cognitive processes are interconnected (DePrince & Freyd, 1999). Moreover, it is assumed that people who repress their memories also have a greater level of dissociative experiences, as their abilities in forgetting are superior (Garssen, 2007). In the current study, the primary purpose was to examine the performance of SIF with individual scores of repressive coping and dissociative experiences. A TNT task was administered to examine SIF, with a learning phase of hint-response words (e.g., Vault - Gold). Afterward, a test-feedback phase is administered to investigate the memorization of the response words. Subsequently, the think/ no-think phase is conducted, followed by one independent probe phase and one same probe phase. Repressive coping will be measured with the Taylor Manifest Anxiety Scale (TMAS) (Taylor, 1953) and the Marlowe-Crowne Social Desirability Scale (MCSD) (Crowne & Marlowe, 1960). The reason for this choice of tests is that, as described above, repressive coping is composed of low anxiety and high defensiveness. This can be examined with the TMAS and the MCSD, respectively. Furthermore, as stated above, people who suppress unwanted

memories also often score high on dissociation measurements as the DES. Therefore, this test will be used to test for dissociative experiences. We predicted a correlation between SIF and repressive coping, as well as between SIF and dissociation. Also, we believed that repressive coping and dissociation are correlated as well. Additionally, we not only predict a correlation between repressive coping and dissociation, but also that this correlation differs at different levels, depending on SIF. This prediction arised, since it is assumed that SIF is associated with repressive coping and dissociation, and SIF being the underlying mechanism of these both variables.

Method

Participants

35 participants took part in the experiment, with 6 being male and 29 being female, and all of them being undergraduate psychology students at the University of Groningen. All participants are native or close to native English speakers, as they all complete their studies in English. All participants were recruited through the university volunteer panel SONA and participated in this experiment for course credits. The SONA numbers of the participants were deleted after data collection. The study was approved by the Ethics Committee of the Faculty of Psychology of the University of Groningen. The data from one participant had to be excluded due to a time-out (duration of test-feedback phase more than 25 minutes) and the data of another four participants was incomplete, as they did not complete the questionnaires. Therefore, the final number of participants that was used to only examine the TNT data was 34 (male: 6 ; female: 28) and the number of participants that was used to examine the TNT data with the data from the questionnaires was 30 (male: 6; female: 24).

Materials

Think/No-think task

This online study of the TNT task was adopted from the main study of Wiechert et al. (2022) (osf.io/e75a6). The stimuli of the study (obtained from Benoit & Anderson, 2012) contained 54 cue-target word pairs (e.g., Vault - Gold). These were divided into 36 word pairs (split up into 3 sets of 12 baseline word pairs, 12 think word pairs and 12 no-think word pairs), and 18 filler word pairs. The baseline word pairs, the think word pairs, and the no-think word pairs were counterbalanced across participants in three conditions. For the same- and independent-probe phase, eight filler words were presented in the beginning of each phase. Afterwards, 36 critical words were presented in a random order. The original study by Wiechert et al. (2022) comprised of an additional questionnaire at the end of the experiment, that this study did not contain. The TNT task was executed through “Inquisit”.

Diagnostic Questionnaire

During the TNT task, more precisely during the think/no-think phase, a diagnostic questionnaire was administered twice (Anderson et al., 2004) (osf.io/e75a6). The questionnaire includes seven items. Six out of the seven items are measured on a 5-point Likert scale (0 - Never; 4 - Always). It contains questions such as, e.g., “When you saw the RED hint word, how often were you able to avoid thinking about the word that went with it ?”. This specific question was used as an additional variable in our study to observe for participants' own estimation of their SIF abilities (“SIF Estimation”).

Additional Questionnaires

All additional questionnaires were combined in one big questionnaire and presented in the form of an online Qualtrics study.

Marlowe-Crowne Social Desirability Scale

The Marlowe-Crowne Social Desirability Scale (MCSD) is a self-report questionnaire and consists of 33 items (Crowne & Marlowe, 1960). All items are measured on

a dichotomous scale (true/false) containing statements such as: “I never hesitate to go out of my way to help someone in trouble.” The scores are summed up and can range from 0-33. We added one control item (“I am a student”) at the end of the questionnaire to ascertain participants’ are paying attention.

Taylor Manifest Anxiety Scale

The Taylor Manifest Anxiety Scale (TMAS) consists of 20 items that are all measured on a dichotomous scale (true/false) (Taylor, 1953). It concludes statements such as: “At times, I think I am no good at all.” Again, the scores are summed up and can range from 0-20. To control for participants’ attention, one control item was added at the end of the questionnaire (“I am human”).

Dissociative Experiences Scale

The Dissociative Experiences Scale (DES) comprises 28 items measured on an 11-point Likert scale (0% - Never; 100% - Always) (Bernstein & Putnam, 1986). Including statements are, e.g., “Some people have the experience of not being sure whether things they remember happening really did happen or whether they just dreamed them”. The DES final score is calculated with the average of all answers, with a maximum score of 100. Again, to ascertain for participants’ attention, we added one control item at the end of the questionnaire (“Please indicate the score of 80%”).

Procedure

Participants conducted the study online, in a private setting, using their own laptop/computer. The experiment was divided into a TNT task, which was adapted from another study (osf.io/e75a6) and one self-constructed online Qualtrics study. Both studies were conducted in English. All participants were informed about the study by an information sheet before the study took place. Moreover, every participant signed a consent form beforehand. After the experiment, every participant was briefed about the study by a debriefing form.

Think/No-Think task

The first part of our study consisted of the TNT task that was adopted by Wiechert et al. (2022). It was divided into five phases; learning phase, test-feedback phase, practice no-think phase, think/ no-think phase, same probe test phase (with practice phase) and independent probe test phase (with practice phase). In addition, between the practice no-think phase and the think/ no-think phase, and during the think/no-think phase, a diagnostic questionnaire was applied. The different phases are described below:

Learning Phase

In the learning phase, participants were asked to learn the 54 cue-target word pairs presented on the screen. Then, each cue-target word pair was randomly presented for five seconds, with the target word on the right side and the cue word on the left side.

Test-Feedback Phase

In the test-feedback phase, only the cue words were presented on the screen for 5 seconds. Then, the participants were instructed to recall the associated target word and say it aloud. A drop-off procedure (Levy & Anderson, 2012) was implemented for this phase. If the participant recalled the target word correctly, the researcher removed the specific cue-target word pair from the list of the still unknown words. This procedure took place with the researcher pressing “1” on the keyboard of their computer/ laptop. If the participant did not recall the target word correctly or did not recall the target word at all, the correct target word was presented in blue for 2.5 seconds. This way, the participant had the chance to remember the word again. The word was presented until the participant can recall it correctly. Therefore, every cue-target word pair was presented until the participant recalled all of them correctly. The experiment proceeded to the next phase only if the participant managed to recall all target words correctly. If, after 20-30 minutes, the participant did not manage to recall all the target words correctly, the experiment was terminated and noted as “time-out”.

Practice Think/No-Think Phase

If the participant had an accuracy of 100% for the associations, the experiment proceeded to the practice think/ no-think phase. For this phase, the cue words were presented each for 3.5 seconds. The cue words were presented in green (think) or red (no-think). The participant was instructed to say the associated target word out loud if the cue word was presented in green. If the correct associated target word was recalled and said aloud, the researcher entered this by pressing "1" on their keyboard. If participants did not recall the associated target word in 3.5 seconds, the correct target word appeared in blue for 2 seconds. If the cue word was presented in red, the participant was asked not to say nor think the associated target word. However, an error message appeared if the participant said something. The practice phase contained 48 trials with 12-word pairs. These 12-word pairs included six "think," and six "no-think" items presented four times each.

Diagnostic Questionnaire

After the practice think/no-think phase, the diagnostic questionnaire was administered (Anderson et al., 2004). This questionnaire accomplished that the participants were following the experiment as supposed to. The researcher was reading the questionnaire items out loud and entered the participants' responses. The exact same questionnaire was conducted in between the think/no-think phase again.

Think/No-Think Phase

The think/ no-think phase was built up the same as the practice think/ no-think phase; the colors and the feedback were the same. However, the think/ no-think phase entailed all in all 288 trials with 144 think and 144 no-think trials. The 288 trials included 24 cue words presented on the screen, with 12 being think and 12 being no-think, which were repeated 12 times. The think/ no-think phase was divided into three blocks, with a one-minute break between those blocks. Each block contained 96 trials. The researcher entered the answers again by pressing "1" on their keyboard. As stated above, the diagnostic questionnaire was administered again in the middle of this phase.

Same Probe Test Phase

The order, of which participants get which probe phase first, was counterbalanced. In the same probe test, a cue word was presented. The cue word was now presented in white, so it did not have the color red or green anymore, and the participant was asked to recall the associated target word, regardless of the color of the think/no-think phase before. This time, no feedback was given. Participants' answers are entered by pressing “1” on the keyboard again.

Independent Probe Test Phase

In the independent probe test, new words that are associated with the specific target words were presented on the screen, combined with the first letter of the specific target word (e.g. Royalty - Q). Participants were asked to recall the target word, which first letter was provided. No feedback was given as well. The answers were again entered by pressing “1” on the keyboard.

Additional Questionnaires

Once participants completed the first part of the study, they were given an invitation code for the second part of the study, the additional questionnaires. This second part consisted of one questionnaire that contained the three questionnaires mentioned above (MCSD, TMAS, DES) and another questionnaire (Well-Being Questionnaire) composed into one Qualtrics link. Participants could decide their time of executing the questionnaire on their own and were not supervised during that time (no researcher was checking in on the participants). After both studies, participants were debriefed and compensated.

Statistical analysis

All data analyses were conducted in SPSS.

Data preparation

The data for the TNT task was obtained through merging the summary data of each participant together in Inquisit. For the data for the Diagnostic Questionnaire, we also merged the data together in Inquisit for each participant. The data for the additional questionnaires was downloaded from Qualtrics as a SPSS file (the option "recode" seen but unanswered questions as -99" was chosen). Before analyzing this data, we excluded one participant out of the TNT data due to a time-out in the TNT task. The guidance for the data file of the TNT task was retrieved from osf.io/e75a6. Therefore, we could rename the variables into BaselineSP, SuppressionSP, BaselineIP, and SuppressionIP. Before merging our data files in SPSS, we made sure that all our data files were sorted on one variable. Thereby we made sure that all data files have the same order of participants. After merging our data files together, four participants were excluded due to not completing the additional questionnaires. Furthermore, we checked if all participants "passed" the control questions. No control question was answered wrong.

Data analysis

Due to our limited time frame of three weeks, an amount of 35 participants was found to be sufficient. To assess SIF, the recall of the no-think items was subtracted from the baseline items. The higher the score, the higher the forgetting. Moreover, we used the variables SIF.SP and SIF.IP, to discriminate for same-probe and independent-probe respectively. We included the third question of the Diagnostic Questionnaire in our correlations to examine participants' estimation of their SIF. For repressive coping, we used the Index of Self-Regulation of Emotion (ISE). We considered high scores of the TMAS and MCSD as a sign of high anxiety and high social desirability. Therefore, we calculated: ISE= 20 - (TMAS score - MCSD score) (Mendolia, 2002). The assumptions of normality, linearity,

homoscedasticity and the existence of outliers were examined before we started with our hypothesis testing. To test our hypotheses, a bivariate Pearson correlation was conducted for the first three hypotheses (*H1* Participants who obtain high scores for repressive coping have higher SIF; *H2* Participants who obtain high scores for dissociation are better in SIF; *H3* Participants who obtain high scores for repressive coping also obtain high scores for dissociation). The statistical analysis for the fourth hypothesis (*H4* "SIF" is a moderator between repressive coping and dissociation) was conducted with a moderation analysis with repressive coping as X, dissociation as Y, and SIF as moderator. All correlational analyses were computed through SPSS and the moderator analysis through PROCESS macro (model 1) (in SPSS) (Hayes, 2022). Our results are published in the open science framework (osf.io/d6x4y).

Results

Suppression induced forgetting (SIF)

Table 1 gives the descriptive statistics for the variables of Baseline and Suppression for SP and IP, as well as for SIF.SP, SIF.IP and SIF Estimation. Figure B1 displays the values of BaselineSP and SuppressionSP (in Appendix B) and Figure B2 of BaselineIP and SuppressionIP (in Appendix B). The values of SIF.SP and SIF.IP can be found in Figure B3 (in Appendix B).

Table 1.

Mean and standard deviation attributed to Baseline scores, Suppression scores, SIF effect (SIF.SP and SIF.IP) and SIF Estimation (N=34; N=30)

	N = 34		N = 30	
	M	SD	M	SD

Baseline				
BaselineSP	.82	.14		
BaselineIP	.64	.15		
Suppression				
SuppressionSP	.81	.19		
SuppressionIP	.64	.18		
SIF				
SIF.SP	.01	.18	.01	.19
SIF.IP	0	.23	.01	.24
SIF Estimation	2.18	1	2.07	.98

Note. This table shows the descriptive statistics for the SIF effect, divided into SIF.SP, SIF.IP and SIF Estimation. Displayed with N before and after exclusion of participants. BaselineSP = Baseline same-probe words, BaselineIP = Baseline independent-probe words, SuppressionSP = Suppression same-probe words, SuppressionIP = Suppression independent-probe words, SIF.SP = SIF effect in same-probe, SIF.IP = SIF effect independent-probe

Variables

The descriptive statistics for the variables of repressive coping and dissociation are stated in Table 2.

Table 2.

Mean and standard deviations scores attributed to Repressive coping and Dissociation

	N	M	SD
Repressive coping	30	24.93	7.32
Dissociation	30	78.93	38.12

Note. This table shows the descriptive statistics for repressive coping and dissociation. Displayed with N after exclusion of participants.

Correlation

There were no missing values in our data and the critical value for significance testing was $\alpha = 0.05$.

Assumptions

SIF.SP

According to the Shapiro-Wilk test, the assumption of normality for SIF.SP was not met with W (30) = 0.92, p = .03. But the assumption of normality was met when looking at skewness (values between -1 and 1). When looking at histograms, the assumption of normality seems to be met. Regarding residual plots, the assumption of normality was not met. There were no outliers (Figure C1 in Appendix C). The assumption of linearity was not met. The assumption of homoscedasticity was not met as well.

SIF.IP

According to the Shapiro-Wilk test, the assumption of normality for SIF.IP is not met with W (30) = .9, p = .01. Looking at skewness, the assumption for normality was met. Looking at Histograms, the assumption of normality seems to be met. Regarding residual plots, the assumption of normality was not met. We could observe outliers by looking at a box plot (Figure 1). However, regarding the trimmed mean, these outliers are not classified as

influential and are therefore not excluded (Table 3). The assumption of linearity was not met. The assumption of homoscedasticity was met by looking at a scatter plot for SIF Estimation by SIF.IP.

Figure 1.

Outliers in SIF.IP presented in a box plot

Note. The figure shows the outliers [.58, -.58, -.58] of SIF.IP. SIF.IP = SIF effect in independent probe. N = 30

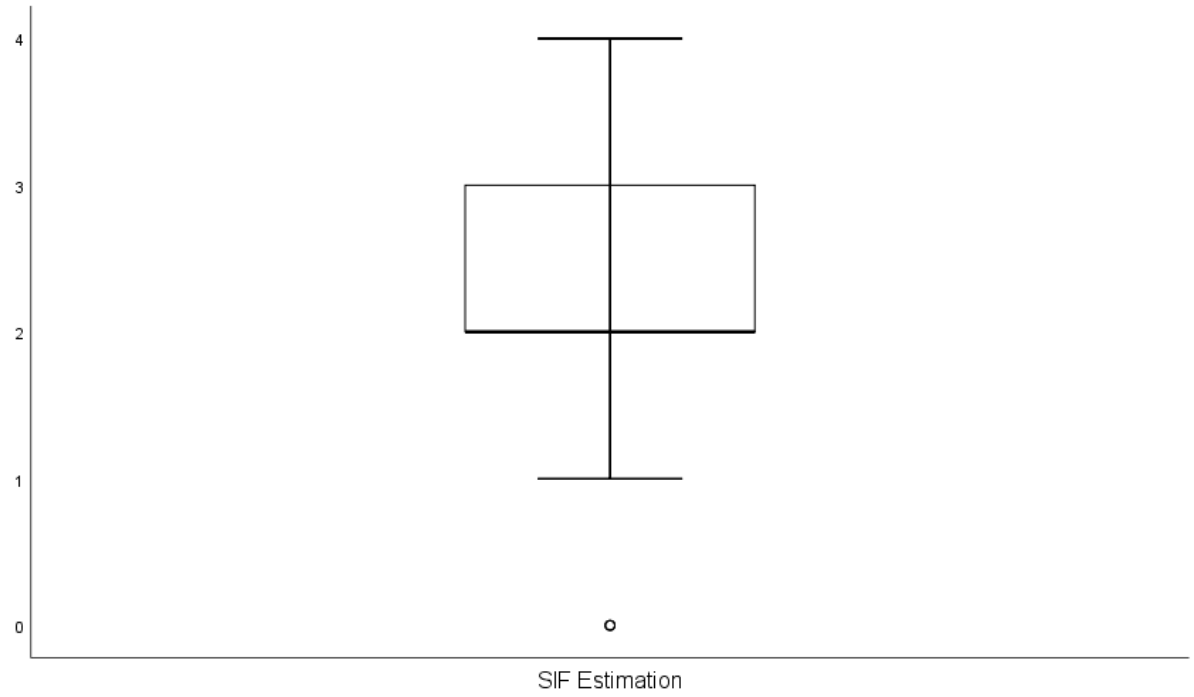
SIF Estimation

For testing the assumption of normality for SIF Estimation, the Shapiro-Wilk test shows W (30) = .87, p = .01. However, if we look at the assumption of normality for skewness, the assumption is met. According to histograms, the assumption of normality is met. Regarding residual plots, the assumption of normality was not met. By looking at box plots we could observe outliers (Figure 2). If looking at the trimmed mean, the outliers are not classified as very influential and are therefore not excluded (Tabel 3). The assumption of

linearity was not met. Looking at a scatter plot, the assumption for homoscedasticity was met for SIF Estimation by SIF.IP.

Figure 2.

The Outliers in SIF Estimation are presented in a box plot



Note. This figure shows the outliers [0, 0, 0] in SIF Estimation. N = 30.

Repressive coping

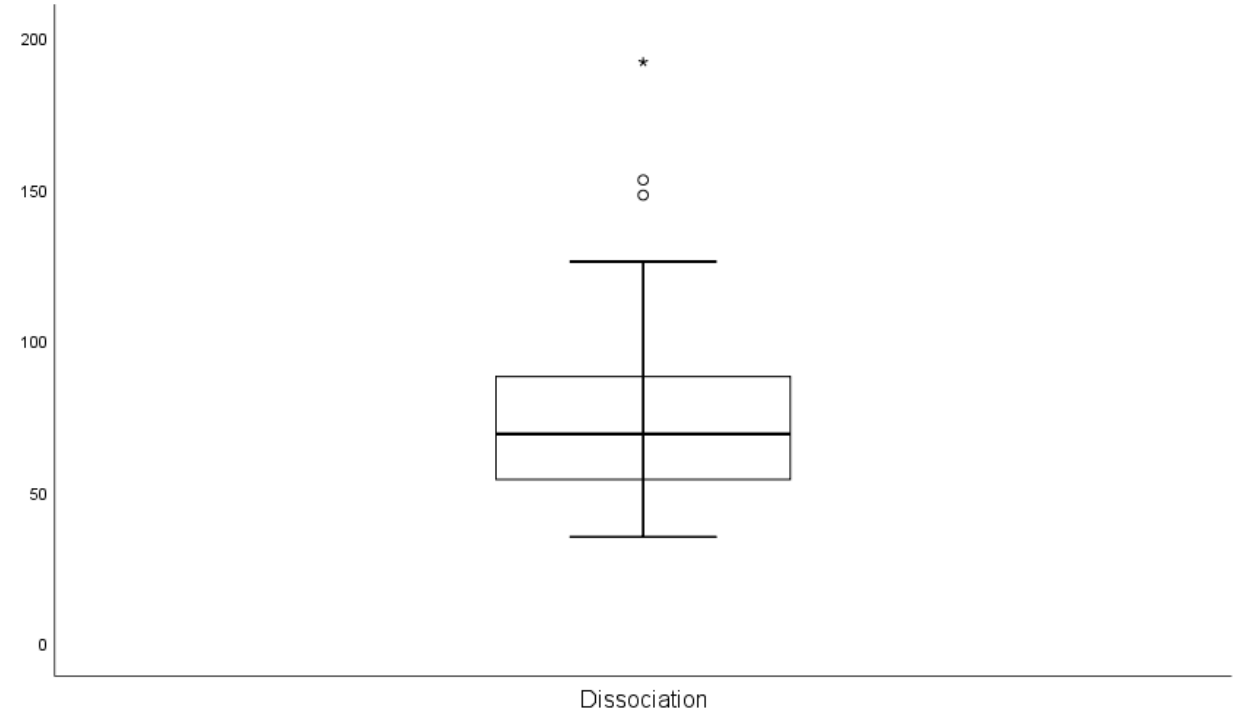
The variable repressive coping was the only variable where, according to the Shapiro-Wilk test, the assumption for normality was met W (30) = .97, p = .53. When looking for skewness, the assumption of normality is met. However, looking at histograms, the assumption of normality is not met. Regarding residual plots, the assumption of normality was met. There was an absence of outliers (Figure C2 in Appendix C). The assumption of linearity was, when looking at scatter plots, only met for dissociation by repressive coping (Figure 4). The assumption of homoscedasticity was met for dissociation by repressive coping, when looking at scatter plots (Figure 4).

Dissociation

For dissociation the Shapiro-Wilk test rejected the assumption of normality with W (30) = .88, p = .01. Moreover, the assumption of normality was also not met if looking at skewness. The assumption of normality also does not seem to be met when looking at histograms. Regarding residual plots, the assumption of normality was met. We could observe outliers by looking at box plots, with one extreme outlier (Figure 3). Nonetheless, these outliers are not classified as influential, according to the trimmed mean, and are therefore not excluded (Table 3). Looking at scatter plots, the assumption of linearity was only met for dissociation by repressive coping (Figure 4). When looking at scatter plots, the assumption of homoscedasticity was met for dissociation by repressive coping (Figure 4).

Figure 3.

Outliers in dissociation presented in a box plot.



Note. The figure shows the outliers [192, 153, 148] of dissociation. N = 30.

Table 3.

Mean, trimmed mean and outliers for SIF.IP, SIF Estimation, and dissociation

	M	TM	Outliers
SIF.IP	.01	.02	.58, -.58, -.58
SIF Estimation	2.07	2.09	0, 0, 0
Dissociation	79.93	75.81	192, 153, 148

Note. This table shows the mean (M), the trimmed mean (TM) and the outliers of SIF.IP, SIF Estimation, and Dissociation. SIF.IP = SIF effect independent-probe. This table demonstrates why the outliers were found to be non-influential. N = 30.

SIF and Repressive coping

H1: Participants who obtain high scores in repressive coping, also show more SIF

The correlation between repressive coping and SIF (SIF.SP and SIF.IP) was analyzed with a Pearson correlation and with Spearman's rho. The coefficients are shown in Table 4.1 and 4.2. The correlation was non-significant for Pearson and Spearman's rho.

SIF and Dissociation

H2: Participants who obtain high scores in dissociation, also show more SIF

The correlation between dissociation and SIF (SIF.SP and SIF.IP) was analyzed with a Pearson correlation and Spearman's rho. The coefficients are shown in Table 4.1 and 4.2. The correlation was non-significant for Pearson and Spearman's rho.

SIF and SIF Estimation

The correlation between SIF Estimation and SIF (SIF.SP and SIF.IP) was analyzed with a Pearson correlation and Spearman's rho. The coefficients are shown in Table

4.1 and 4.2. The correlation was non-significant for Pearson; however, we could find a significant correlation for SIF Estimation and SIF.IP with Spearman's rho with p= .02.

Table 4.1.

Pearson correlations for SIF with repressive coping, dissociation, and SIF Estimation

		SIF.SP	SIF.IP
Repressive coping	r	-.03	-.23
	p	.87	.21
Dissociation	r	.22	.16
	p	.24	.39
SIF Estimation	r	.14	.41
	p	.47	.02

Note. This table shows the Pearson correlation coefficients for SIF with repressive coping, dissociation, and SIF Estimation. SIF.SP = SIF effect same-probe, SIF.IP = SIF effect independent-probe. N = 30.

Table 4.2.

Spearman's rho correlations for SIF with repressive coping, dissociation, and SIF Estimation

		SIF.SP	SIF.IP
Repressive coping	r	.04	-.19
	p	.84	.31
Dissociation	r	.19	.17
	p	.31	.37

SIF Estimation	r	.06	.29
	p	.77	.13

Note. This table shows the Spearman's rho correlation coefficients for SIF with repressive coping, dissociation, and SIF Estimation. SIF.SP = SIF effect same-probe, SIF.IP = SIF effect independent-probe. N = 30.

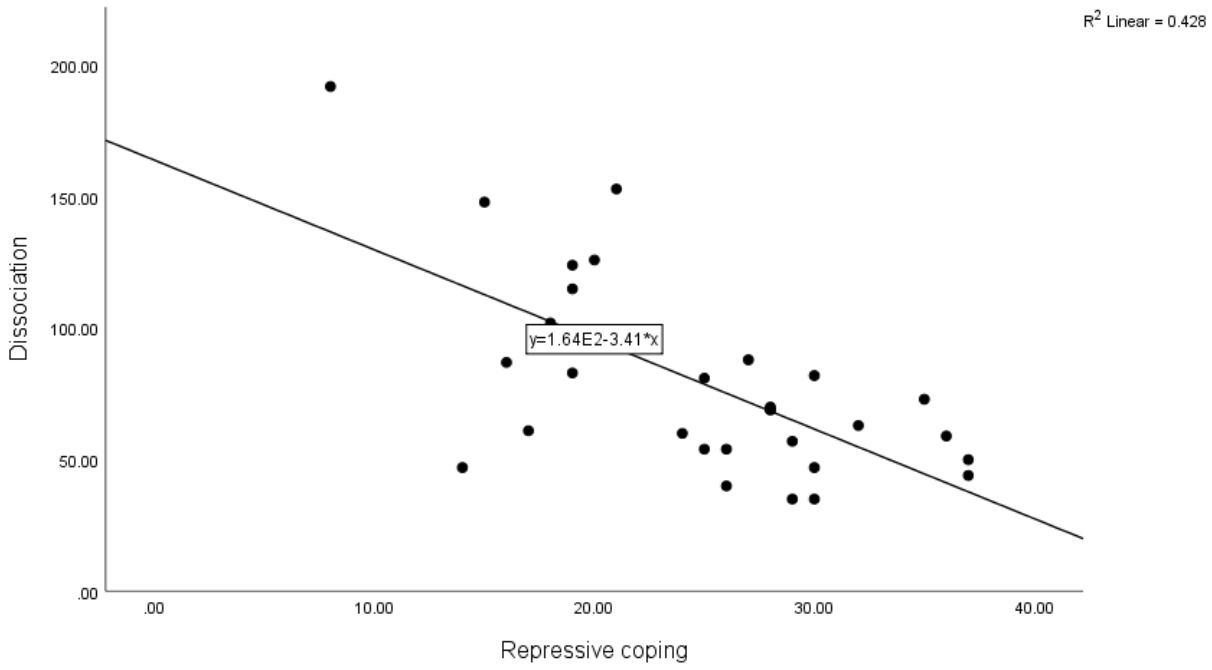
Repressive coping and Dissociation

H3: Participants who obtain high scores in repressive coping also obtain high scores in dissociation

The correlation between repressive coping and dissociation was analyzed with a Pearson correlation and Spearman's rho and found to be significant with Pearson r(28) = -.65, p< .001 and Spearman's rho r (28) = -.56, p<.001. The correlation is shown in Figure 4 and in Figure B4 in Appendix B.

Figure 4.

Values of repressive coping and dissociation in form of a simple Scatter Plot with Fit Line



Note. The scores for repressive coping and dissociation presented with N after exclusion of participants (N=30).

Moderation

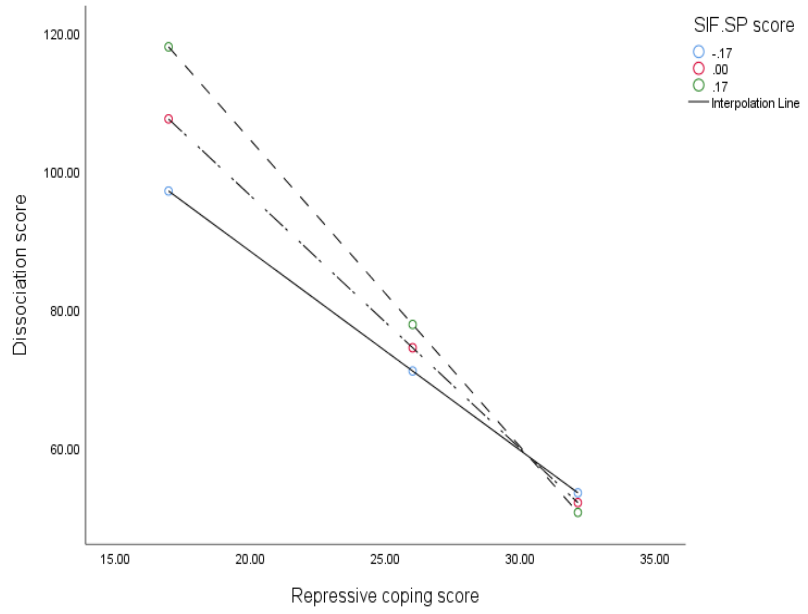
H4: SIF is a moderator between repressive coping and dissociation

SIF.SP

The moderation analysis between repressive coping and dissociation, with SIF.SP as a moderator, showed neither a significant effect for the model: R^2 = 0.44, F (3,26) = 1.82, p = .17 , nor for the interaction: F (1, 26) = .08, p = . 77. The interaction effect is depicted in Figure 5. The SPSS Output is shown in Appendix D .

Figure 5.

Interaction between repressive coping and SIF.SP for dissociation



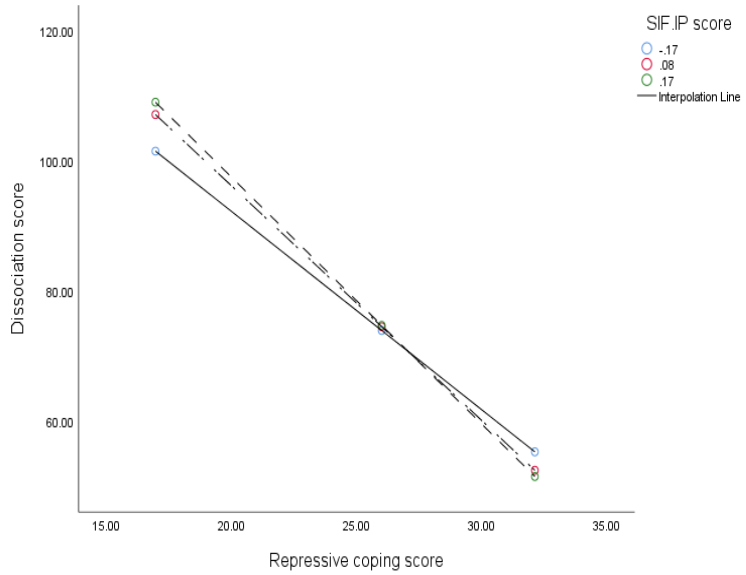
Note. This graph demonstrates the non-significant interactions between repressive coping and SIF.SP for dissociation, obtained from the moderation analysis. The SIF.SP score is divided into the 16th, 50th and 84th percentiles with [-.17, .00, .17] respectively (see legend). SIF.SP = SIF effect in same-probe. SIF.IP = SIF effect in independent-probe.

SIF.IP

The moderation analysis between repressive coping and dissociation with SIF.IP as a moderator showed a significant effect for the model: R^2 = 0.44, F (3,26) = 3.95, p = .02. The interaction was not significant: F (1,26) = .37, p = .55. The interaction effect is demonstrated in Figure 6. The SPSS Output is shown in Appendix E.

Figure 6.

Interaction between repressive coping and SIF.IP for dissociation



Note. This graph demonstrates the interactions between repressive coping and SIF.IP for dissociation, obtained from the moderation analysis. The SIF.IP score is divided into the 16th, 50th and 84th percentiles with [-.17, .00, .17] respectively (see legend). SIF.SP = SIF effect in same-probe, SIF.IP = SIF effect in independent-probe.

Discussion

The aim of the present study was to examine the performance on the TNT task with individual scores of repressive coping and dissociation. In general, we could neither observe or not observe a SIF effect in our experiment, as there was almost no difference between Baseline words and No-Think words in the same- and independent probe of our conducted

TNT task. Contrary to hypothesis 1, we could not find a significant correlation between repressive coping and SIF, neither in the same-probe phase nor the independent-probe phase. Furthermore, our second prediction was not supported, neither in the same-probe phase nor the independent probe phase. However, our third expectation was shown in our results. For our fourth hypothesis, we found a significant effect for the model of the moderation between repressive coping and dissociation, with the SIF effect in the independent-probe phase as the moderator. But as we could not show a significant effect in the interactions (in the independent-probe phase as well as in the same-probe phase), we cannot confirm our hypothesis.

But how can these results be explained?

Our first assumption for the correlation between repressive coping and SIF was derived from previous studies. Alston et al. (2013) stated that repressive copers are better in thought suppression than people without a repressive coping style. The idea behind this is that repressive copers have higher SIF scores than others because of memory deficits (Stramaccia et al., 2021). Our results show different findings to these previous studies. This was, when looking at the previous findings, rather surprising. One explanation could be that repressive copers may not display their repressive coping style during the TNT task. Although their assignment was to suppress the unwanted words, it could have been that there was a lack of motivation, as the unwanted words were only unwanted because the assignment said so, not because it was something negative or unpleasant for them. Studies reveal that people with a repressive coping style forget more negative material than healthy participants (Myers et al., 1998). Thus, the question arises if participants with tendencies of a repressive coping style do not actively use suppression due to their repressive coping style while participating in a study with only neutral word pairs. Furthermore, the memory deficits of repressive copers can be observed, especially for autobiographical memory (Myers, 1998). Therefore, one could assume that one reason that the hypothesis cannot be confirmed is the fact that this study only

used neutral words. There could also be speculation about the fact that repressive copers are maybe not completely aware of the fact that they display a defense mechanism. Moreover, due to their repressive coping, some attributes of their life, addressed in the TMAS and MCSD, are eventually repressed as well. Therefore, the answers of the TMAS and MCSD could not have been answered realistically. This would mean that we "missed" some people who express a repressive coping style, due to not answering the TMAS and MCSD realistically.

Also, our non-significant results for the correlation between SIF and dissociation were not in line with earlier findings. As previously stated, people who score high on tests like the DES show more interruptions in their voluntary attention performances (DePrince & Freyd, 1999). Moreover, people with dissociative experiences were thought to be superior in cognitive tasks. Therefore, are our results for the second hypothesis also somewhat surprising. The theory of participants not actively suppressing due to a lack of motivation can not only be applied for the assumption of the correlation between SIF and repressive coping, but also to our hypothesis of the correlation between SIF and dissociation. As dissociation is also displayed as a defense mechanism, the motivation for the suppression of words in an assignment might be different from items that are perceived as unpleasant. The idea of participants not being aware of some attributes in the additional questionnaires could also be the case with participants encountering dissociative experiences. Therefore, the question arises if the DES was filled out realistically. Furthermore, one can speculate that people who show signs of repressive coping and dissociation would answer the DES less realistically, as they could repress their dissociative experiences. In addition, to confirm our first two hypotheses, a SIF effect must be given. As we did not test for a SIF effect, we cannot make any confident statements; however, our results show that we can neither confirm nor deny it. However, our results may have looked different when a significantly SIF effect would have been given. Therefore, our results can be partly explained by this missing. Fortunately, the

results are in line with our third hypothesis, that repressive coping and dissociation are correlated with each other, and can therefore be confirmed. Furthermore, our results can be supported by the suggestions of Garssen (2007), who stated that people who repress certain memories also have a greater level of dissociative experiences, as their abilities in forgetting are superior.

No other studies predicted a moderation effect between repressive coping and dissociation with SIF as a moderator before, to the authors' knowledge. The significant model of the moderation with SIF effect in the independent-probe phase shows the correlation between repressive coping and dissociation. Even though our moderation analysis was non-significant, the results displayed more detailed information of the correlation between repressive coping and dissociation (Hypothesis 3). Independently of SIF levels, our results show that the higher participants' repressive coping, the lower their encounter with dissociative experiences. In participants with high repressive coping scores, it could be seen that all their scores obtained for dissociation were very low. This outcome was shown regardless of levels of SIF, although the lower the level of SIF, the higher the score in repressive coping. These outcomes show that the effect of SIF is not given when participants display high levels of repressive coping combined with high levels of dissociation.

Limitations and Implications for future research

Nevertheless, our study shows multiple limitations that can be avoided in future studies. One limitation of our study could have been a language barrier, as most participants were not native English speakers. We could observe participants having difficulties with word pairs where one or both words were unknown. This was by researchers derived, as participants seemed to say certain target words to cue words that did not make sense at all. Additionally, it is harder to remember specific word pairs if one does not understand the meaning of those words. Even though a 100 % recall of the words was tested in the test-feedback phase, it seemed that only because one word pair is recalled correctly once, does

not mean that the participant fully remembers this word pair in the later test. Furthermore, some word pairs seemed to be easier to associate with each other than others. For most participants, the word pairs "vault-gold" or "college-certificate" were easier to remember and to associate than, e.g., "journey-trousers" or "accident-snow." This was assumed as we observed this during the experiment because a lot of participants took the longest to learn and recall those words. Moreover, this was also stated by a few participants.

Also, in the independent probe test, participants were more likely to associate, e.g., the words "royalty-queen" compared to "candy-gum," as gum may not be as clearly linked to candy as queen to royalty. Moreover, a lack of concentration could have occurred, as the study was conducted online. Distractions such as, e.g., roommates or constructions outside could have had a distracting effect on the participants. Even though the instruction entailed to complete the experiment in a quiet environment, some participants stated these distractions at the end. In addition, an unstable internet connection sometimes results in a delay in response. Due to the fast pace of the experiment, one little distraction could lead to missing a word. Furthermore, as it was an online study (as stated above), we could not observe the participants during the tasks and therefore could not control if they were paying attention or pretending to be attentive. Also, the factor of compliance could have played a significant role in the missing SIF effect. As we administered the diagnostic questionnaire twice, participants may have felt the pressure to say that they were able to suppress the items but were not saying them out loud. Furthermore, as we could not confirm the first or second hypothesis, the fourth hypothesis was also not proved. However, the results for the fourth hypothesis could show a different outcome if the assumption of the first and second hypotheses is given.

Clearly, future research is necessary to make any clear statements about the correlations between SIF, repressive coping, and dissociation. More research could go into the aspect if participants are complying out of social desirability and norms if they are asked to answer the question about their ability to suppress. This aspect can be assumed as the

correlation between the answers to SIF Estimation, and the SIF scores are not significant and are not associated with each other. Hence, participants might not have given an honest answer. Moreover, more requirements for participation could get introduced, as, e.g., participants with dyslexia could have problems with the word pairs, or someone who is color blind could have difficulties with the colors red and green. Furthermore, as our sample size was small, the same study could result in a different outcome with a bigger sample size. Also, individual differences with previous associations with words could influence the outcome. Participants with positive or negative memories of specific words could find it easier to remember or suppress these words than words that do not have a meaning to them (e.g., a person who likes dogs could more easily remember the word "Collie" than someone who does not). Additionally, it would be interesting to conduct this study as an EEG or fMRI study. As stated in a previous experiment by Benoit and Anderson (2012), memory suppression occurs in the hippocampus through the lateral prefrontal cortex. If this experiment had been conducted as a neurological study, we could have had more insight into whether suppression occurred. Further research could be implemented to follow up on this experiment to observe memory activity in suppression combined with repressive coping and dissociation.

To conclude, the present study investigated if the SIF effect correlates with repressive coping and dissociation, if repressive coping and dissociation are associated with each other, and if there is any moderating effect between repressive coping and dissociation with SIF as a moderator. The results show that repressive coping and dissociative experiences are strongly related. However, both factors are not associated with SIF. These findings differ from most previous research about SIF; however, not about repressive coping and dissociation. Still, those findings can affect our understanding of memory processes since we need them in our everyday lives. Moreover, our findings can contribute to our further understanding of the relation between memory suppression and coping mechanisms, which can also be applied in, e.g., clinical settings.

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Appendix A

Subject of the Appendix (Raw Data Guidance)

Inquisit-Part (Think/No-Think Task)

subject: Anonymous Subject ID

inquisit.build: Version property of Inquisit

computer.platform: computer that was used to collect data (win = Windows)

script.startdate: Date when data was collected in string format (51021 = 5th of May 2021)

script.starttime: Start-Time when data was collected

script.groupid: the group participants were in (we only have one group built into Inquisit; counterbalanced word condition are separate Inquisit scripts)

script.elapsedtime: Elapsed time during the TNT task in ms (excluding the Qualtrics at the end of the session)

expressions.propCorrect_Phase2: Accurate overall response in TNT phase (in %; 0-1)

expressions.propCorrect_Phase2suppression: Accurate response in suppression trials of TNT phase (in %; 0-1)

expressions.propCorrect_Phase2recall: Accurate response in recall trials of TNT phase (in %; 0-1)

expressions.propCorrect_Phase3: Accurate overall response in same-probe test (in %; 0-1)

expressions.propCorrect_Phase3suppression: Accurate response in suppression items of same-probe test (in %; 0-1)

expressions.propCorrect_Phase3recall: Accurate response in recall items of same-probe test (in %; 0-1)

expressions.propCorrect_Phase3baseline: Accurate response in baseline items of same-probe test (in %; 0-1)

expressions.propCorrect_Phase3filler: Accurate response in filler items of same-probe test (in %; 0-1)

expressions.propCorrect_Phase4: Accurate overall response in independent-probe test (in %; 0-1)

expressions.propCorrect_Phase4suppression: Accurate response in suppression items of independent-probe test (in %; 0-1)

expressions.propCorrect_Phase4recall: Accurate response in recall items of independent-probe test (in %; 0-1)

expressions.propCorrect_Phase4baseline: Accurate response in baseline items of independent-probe test (in %; 0-1)

expressions.propCorrect_Phase4filler: Accurate response in filler items of independent-probe test (in %; 0-1)

values.countPhaseIrecall: Trials the participant needed to learn all word pairs until 100% accuracy

values.countPhaseIstudy: variable to check whether all worked well; all participants should be given 54 word pairs to learn

values.ncorrect: variable to check whether all worked well; all participants should have learned 54 word pairs accurately

values.countPhaseII: variable to check whether all worked well; all participants should be given 292 trials (291 excluding the last break that was omitted after pilot) in the TNT phase (288 TNT trials + 3 breaks + Diagnostic Questionnaire)

values.countPhaseIII: variable to check whether all worked well; all participants should be given 36 cues in the same-probe test

values.countPhaseIIII: variable to check whether all worked well; all participants should be given 36 category items in the independent-probe test

[not in pilot data yet, but now integrated into the Inquisit script:

expressions.baseline3latency: average time of responding for baseline items in the same-probe test in ms

expressions.recall3latency: average time of responding for recall items in the same-probe test in ms

expressions.suppression3latency: average time of responding for suppression items in the same-probe test in ms

expressions.baseline4latency: average time of responding for baseline items in the independent-probe test in ms

expressions.recall4latency: average time of responding for recall items in the independent-probe test in ms

expressions.suppression4latency: average time of responding for suppression items in the independent-probe test in ms]

Counterbalancing: which word pair group the participant was in (A, B, C)

FirstAnalysis: which test appeared first (1 = same-probe first, 2 = independent-probe first)

Inquisit Part (First Diagnostic Questionnaire Items)

date: same as script.startdate

time: same as script.starttime

group: same as script.groupid

build: same as inquisit.build

DiagQuest_diag1_response: Diagnostic Questionnaire item 1 (response options: 0-4)

DiagQuest_diag1_latency: time it took to give a response in ms

DiagQuest_diag2_response: Diagnostic Questionnaire item 2 (response options: 0-4)

DiagQuest_diag2_latency: time it took to give a response in ms

DiagQuest_diag3_response: Diagnostic Questionnaire item 3 (response options: 0-4)

DiagQuest_diag3_latency: time it took to give a response in ms

DiagQuest_diag4_response: Diagnostic Questionnaire item 4 (response options: 0-4)

DiagQuest_diag4_latency: time it took to give a response in ms

DiagQuest_diag5_response: Diagnostic Questionnaire item 5 (response options: 0-4)

DiagQuest_diag5_latency: time it took to give a response in ms

DiagQuest_diag6_response: Diagnostic Questionnaire item 6 (response options: 0-4)

DiagQuest_diag6_latency: time it took to give a response in ms

DiagQuest_diag7_response: Diagnostic Questionnaire item 7 (response options: 0-4)

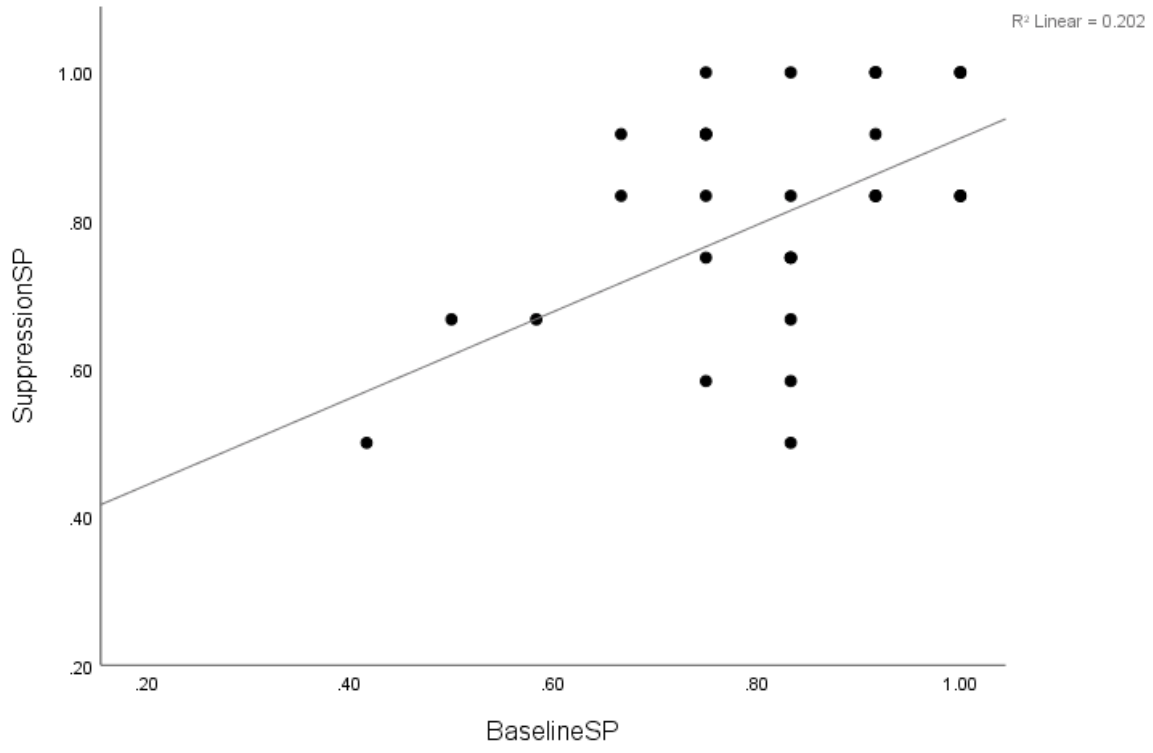
DiagQuest_diag7_latency: time it took to give a response in ms

Appendix B

Subject of the Appendix (Values of BaselineSP/IP, SuppressionSP/IP and SIF.SP/IP)

Figure B1.

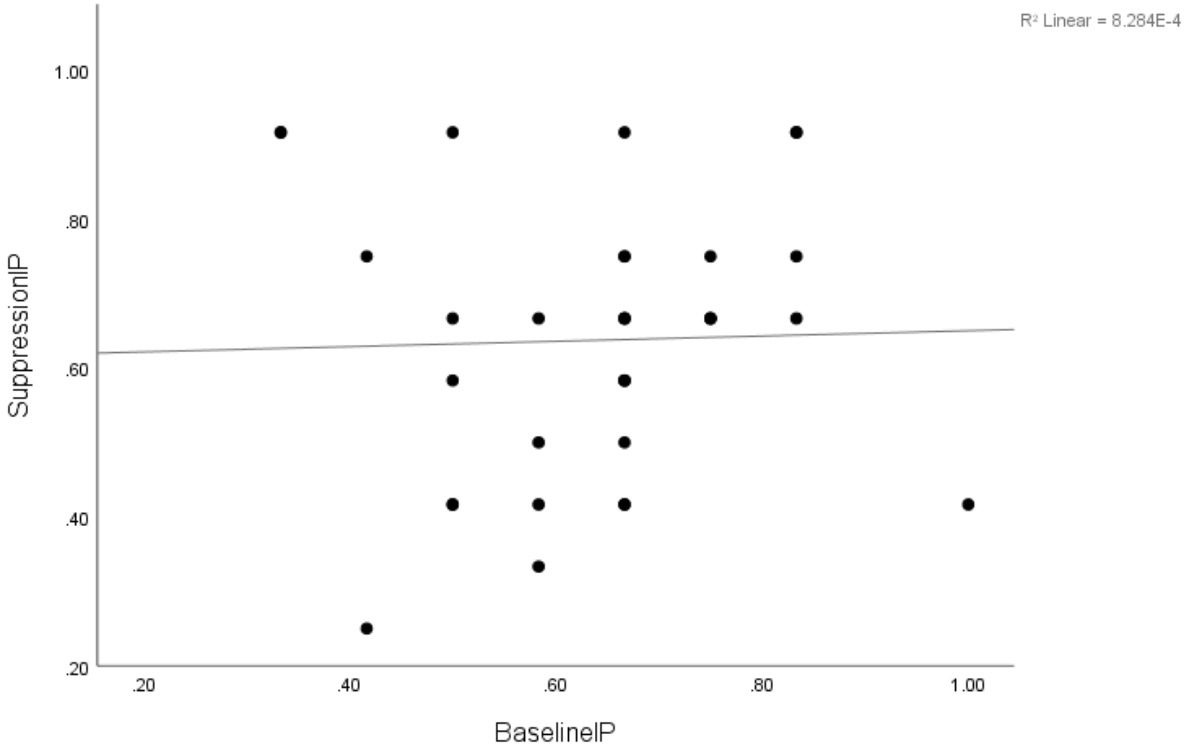
Values of BaselineSP and SuppressionSP in form of a Simple Scatter Plot with Fit Line



Note. BaselineSP = Baseline same-probe words, SuppressionSP = Suppression same-probe words. Displayed with N before exclusion of participants (N=34).

Figure B2.

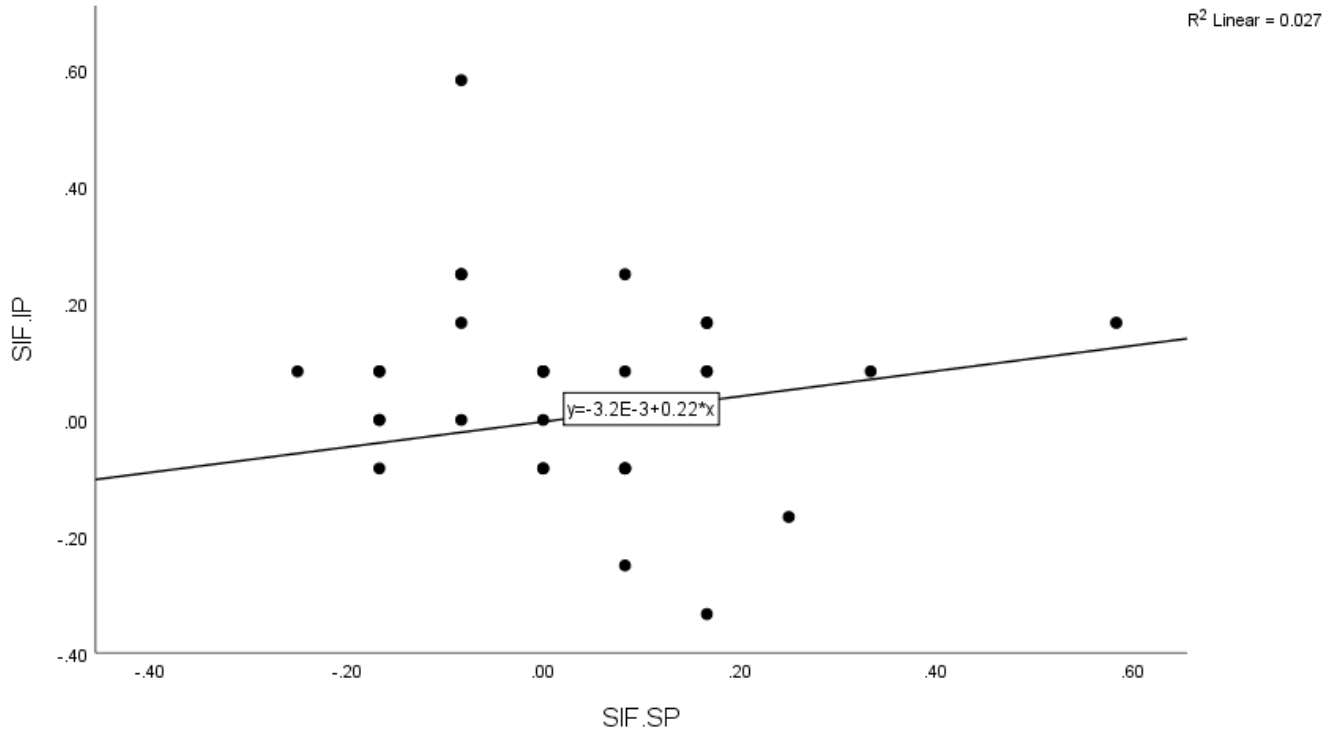
Values of BaselineIP and SuppressionIP in form of a Simple Scatter Plot with Fit Line



Note. BaselineIP = Baseline independent-probe words, SuppressionIP = suppression independent-probe words. Displayed with N before exclusion of participants (N=34).

Figure B3.

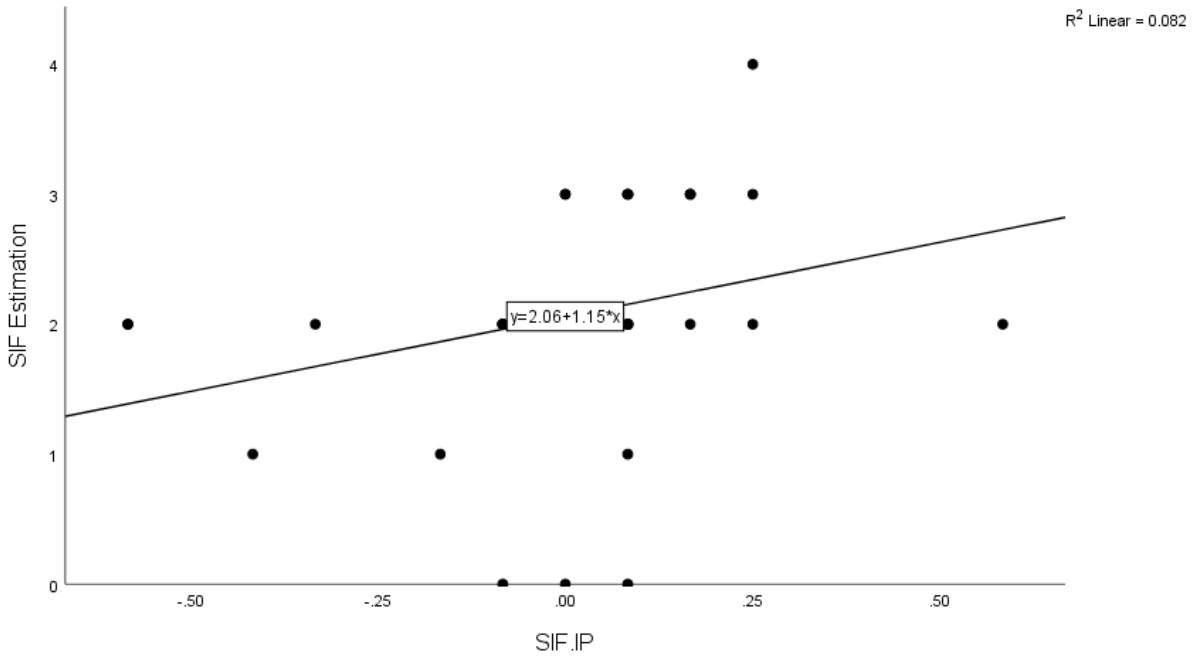
Values of SIF.SP and SIF.IP in form of a Simple Scatter Plot with Fit Line



Note. SIF.SP = SIF effect in same-probe phase, SIF.IP = SIF effect in independent-probe phase. Displayed with N before exclusion of participants (N=34).

Figure B4.

Values of SIF Estimation and SIF.IP in a Simple Scatter Plot with Fine Line



Note. The scores for SIF Estimation and SIF.Ip are presented with N after exclusion of participants (N=30). SIF.IP = SIF effect in independent-probe.

Appendix C

Subject of the Appendix (Proof of absence of outliers)

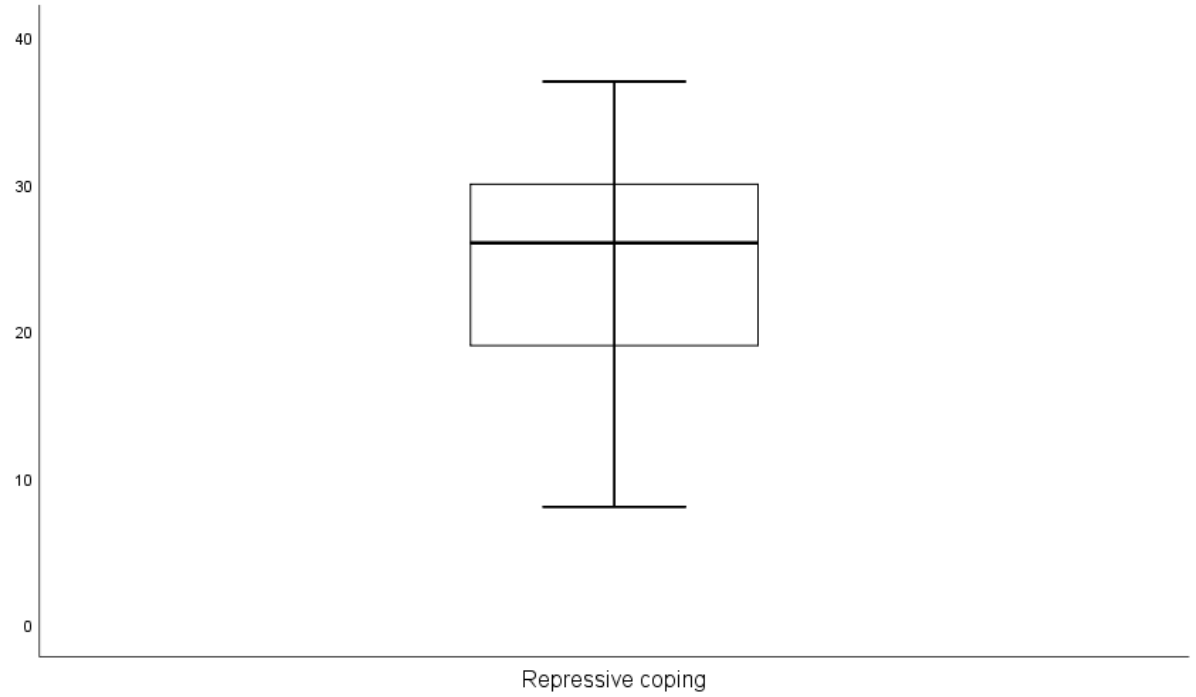
Figure C1.

Proof of absence of outliers in SIF.SP presented in a box plot.

Note. Proof of the absence of outliers in SIF.SP with N = 30. SIF.SP = SIF effect in the same-probe phase.

Figure C2.

Proof of absence of outliers in repressive coping presented in a box plot



Note. Proof of the absence of outliers in repressive coping with N = 30.

Appendix D

Subject of the Appendix (Output of moderation analysis)

Output D1.

Output of moderation analysis in PROCESS SPSS with SIF.SP as moderator.

```
Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.0 *****************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2022). www.guilford.com/p/hayes3

**************************************************************************
Model  : 1
    Y  : DISSO
    X  : REPRESS
    W  : SIF.SP

Sample
Size:  30

**************************************************************************
OUTCOME VARIABLE:
 DISSO

Model Summary
          R       R-sq        MSE     F(HC4)        df1        df2          p
      .7041      .4957   817.2689     1.8177     3.0000    26.0000      .1687

Model
              coeff    se(HC4)          t          p       LLCI       ULCI
constant   169.5368    64.1804     2.6416      .0138    37.6079   301.4658
REPRESS     -3.6555     2.3266    -1.5712      .1282    -8.4381     1.1271
SIF.SP     141.8369   450.0028      .3152      .7551  -783.1873  1066.8610
Int_1       -4.6799    16.1619     -.2896      .7744   -37.9023    28.5424

Product terms key:
 Int_1    :        REPRESS  x        SIF.SP

Test(s) of highest order unconditional interaction(s):
       R2-chng     F(HC4)        df1        df2          p
X*W      .0262      .0838     1.0000    26.0000      .7744
----------
    Focal predict: REPRESS  (X)
          Mod var: SIF.SP   (W)

Data for visualizing the conditional effect of the focal predictor:
Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/
   REPRESS    SIF.SP     DISSO      .
BEGIN DATA.
    16.9600     -.1667    97.1289
    26.0000     -.1667    71.1344
    32.1200     -.1667    53.5364
    16.9600      .0000   107.5398
    26.0000      .0000    74.4942
```

```
    32.1200      .0000    52.1226
    16.9600      .1667   117.9506
    26.0000      .1667    77.8539
    32.1200      .1667    50.7088
END DATA.
GRAPH/SCATTERPLOT=
 REPRESS  WITH     DISSO    BY       SIF.SP   .

*********************** ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

NOTE: A heteroscedasticity consistent standard error and covariance matrix
estimator was used.

------ END MATRIX -----
```

Note. SIF.SP = SIF effect in same-probe, DISSO = dissociation score, REPRESS = repressive coping score. N = 30.

Appendix E

Subject of the Appendix (Output of moderation analysis)

Output E1.

Output of moderation analysis in PROCESS SPSS with SIF.IP as moderator.

```
Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 4.0 *****************

          Written by Andrew F. Hayes, Ph.D.       www.afhayes.com
    Documentation available in Hayes (2022). www.guilford.com/p/hayes3

**************************************************************************
Model  : 1
    Y  : DISSO
    X  : REPRESS
    W  : SIF.IP

Sample
Size:  30

**************************************************************************
OUTCOME VARIABLE:
 DISSO

Model Summary
          R       R-sq        MSE     F(HC4)        df1        df2          p
      .6636      .4403   907.0406     3.9481     3.0000    26.0000      .0191

Model
              coeff    se(HC4)          t          p       LLCI       ULCI
constant   163.2877    35.5543     4.5926      .0001    90.2025   236.3729
REPRESS     -3.4200     1.2232    -2.7959      .0096    -5.9344     -.9056
SIF.IP      58.6971   120.9496      .4853      .6315  -189.9264   307.3206
Int_1       -2.1707     3.5534     -.6109      .5466    -9.4751     5.1337

Product terms key:
 Int_1    :        REPRESS  x        SIF.IP

Test(s) of highest order unconditional interaction(s):
       R2-chng     F(HC4)        df1        df2          p
X*W      .0119      .3732     1.0000    26.0000      .5466
----------
    Focal predict: REPRESS  (X)
          Mod var: SIF.IP   (W)

Data for visualizing the conditional effect of the focal predictor:
Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/
   REPRESS    SIF.IP     DISSO      .
BEGIN DATA.
    16.9600     -.1733   101.4918
    26.0000     -.1733    73.9765
    32.1200     -.1733    55.3488
    16.9600      .0833   107.1083
    26.0000      .0833    74.5564
    32.1200      .0833    52.5191
    16.9600      .1700   109.0048
```

```
    26.0000      .1700    74.7522
    32.1200      .1700    51.5636
END DATA.
GRAPH/SCATTERPLOT=
 REPRESS  WITH     DISSO    BY       SIF.IP   .

********************** ANALYSIS NOTES AND ERRORS ************************

Level of confidence for all confidence intervals in output:
  95.0000

NOTE: A heteroscedasticity consistent standard error and covariance matrix
estimator was used.

------ END MATRIX -----
```

Note. SIF.IP = SIF effect in independent-probe, DISSO = dissociation score, REPRESS = repressive coping score