What is the Effect of Recalling Four Compared to Twelve Negative Childhood Memories on Metamemory Beliefs?

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PSB3E-BT21/22_1A: Bachelor Thesis

Group number 29

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February 14th, 2022

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Abstract

In previous research, participants that experienced recall difficulty were paradoxically more likely to assume to have poor memory. The effect of recalling negative childhood memories on metamemory judgments was investigated. Participants asked to recall 12 negative childhood memories were compared to those asked to recall four. We hypothesized that all participants score higher on unspecified- than specified repression beliefs regardless of condition. Furthermore, we expected participants in the 12-memory condition to report a larger: decline in accessibility, increase in repression beliefs, and reduction in childhood pleasantness. Additionally, we explored if beliefs on how accessible one memory is might be influenced by alexithymia, which is related to difficulties describing- and experiencing feelings and an externally oriented thinking style. I hypothesized that the higher the participant's alexithymia score, the less accessible the participant would judge their childhood memory. Our experimental study in form of an online questionnaire had a 2x2 mixed design. It was administered to a sample of 112 university students. We found a statistically significant difference between unspecified and specified repression beliefs. All other results were not in line with our expectations: Participants scored higher on specified- than on unspecified repression beliefs. The difference in change scores of accessibility and completeness were not statistically significant. Additionally, there was no significant increase in both specified- and unspecified repression beliefs and no significantly larger reduction in childhood pleasantness. There was a significant, weak correlation between alexithymia and accessibility.

Keywords: recall, repression, metamemory, alexithymia

What is the Effect of Recalling Four Compared to Twelve Negative Childhood Memories on Metamemory Beliefs?

I must have repressed that. Das hab ich wohl verdrängt. Ik heb het verdrongen. We talk about the repression of memories so casually in our day-to-day lives, as if there was never a polarizing debate surrounding it. In fact, a study found that 89% of their participants knew a case in which someone recovered repressed memories, out of which most derived this information from television (Golding et al., 1996, as cited in Otgaar et al., 2019). However, even though repression is such a common topic, it is highly controversial and can have implications in therapeutic-, legal-, and academic settings (Otgaar et al., 2019).

The Controversy of Repressed Memories

Repressed memories cannot be accessed consciously due to an active process known as repression (Otgaar et al., 2019). A fundamental part of the debate surrounding repressed memories is Sigmund Freud's definition of repression, although both repression skeptics- and proponents frequently criticize him (Davis, 2005; McNally, 2005, as cited in Otgaar et al., 2019). The fundamental assumption of Freud's psychoanalytic theory is that repression is an unconscious mechanism aiming to protect the individual from memories they cannot cope with (Boag, 2018). Based on Freud’s principle, repression is constructed out of three ideas: Individuals repress traumatic events, the repressed content is clinically significant, and recovering the traumatic memories from the unconscious to the conscious mind is required for symptom relief (Otgaar et al., 2019).

However, memory scientists frequently criticize repression, including its implications (Otgaar et al., 2019). A potentially dangerous implication of the belief in repression is that individuals who suspect that they might have repressed memories often extensively search their memories for instances of abuse (Belli et al., 1998). As this task is experienced as

difficult, individuals may conclude that they cannot remember a lot, and consider this an indication that something bad must have happened (Belli et al., 1998).

Metamemory Judgements

When it comes to these memory searches, there are two common strategies individuals use to evaluate the quality of their own memory (Winkielman et al., 1998). The first strategy is to focus on the quantity of information they can recall. So, the more information is recalled, the better the individual assumes their memory to be. The second strategy is to rely on how easy or difficult individuals experience recalling memories, which is based on the idea of availability heuristics (Tversky & Kahneman, 1973, as cited in Winkielman et al., 1998). In this case, individuals may assume that they have a good memory if they experience the recall as easy or have poor memory if they experience recall as difficult (Winkielman et al., 1998).

To test this, Winkielman et al. (1998) asked participants to either recall twelve childhood memories, considered a difficult task, or recall four childhood memories, considered easy. Paradoxically, the participants in the 12-memory condition were more likely to judge their memory as poor than the participants in the 4-memory condition, even though the former recalled a lot more memories. Additionally, the participants who had to recall a lot of memories agreed more with the statement that they cannot recall large parts of their childhood compared to the participants who had to recall only a few memories. The researchers state that the more memories an individual has to recall, the more difficult the task is experienced. Therefore, the participants misjudged the experienced difficulty due to poor memory as opposed to a result of task demands (Winkielman et al., 1998).

However, once the recall task entails many events, everyone is likely to experience difficulty (Winkielman et al., 1998). This, in turn, increases the likelihood that individuals draw on naïve beliefs (Wong & Weiner, 1981, as cited in Winkielman & Schwarz, 2001). Winkielman and Schwarz (2001) tried to test this by testing participants' repression beliefs

after asking them to recall either four or twelve memories. The researchers suggest that believing that negative memories are repressed leads the participants who had to recall many events to interfere that they have had an unpleasant childhood when attempting to recall childhood events and experience difficulty. Participants generally expect to easily recall childhood events, which is why the experience of difficulty might be more probable to trigger a search for explanations than experiencing the ease of recall (Winkielman & Schwarz, 2001).

Similarly, Merckelbach et al. (2001) asked participants two recall either many (9) or a few (3) negative childhood memories and measured their beliefs on memory accessibility and repression afterward. The results suggested that participants that had to recall nine events rated the accessibility of their memory lower than the participants that only had to recall three memories. Contrary to their expectations, the 9-memory condition also suggested lower agreement with the statement that they had repressed many childhood memories. The researchers concluded that explicitly asking about repression might be a limitation to the above-mentioned paradoxical effect and seems to depend on if the questions are framed in terms of difficulty or content.

Wessel et al. (2020) aimed at a conceptual replication of the previously mentioned studies (Winkielman et al. 1998; Winkielman and Schwarz, 2001; Merckelbach et al., 2001). Complementary to Merckelbach et al. (2001), the researchers did not find a significant relationship between recalling many memories and believing to have repressed memories.

Alexithymia

As mentioned above, experiencing recall difficulty triggers a search for explanations (e.g., repression beliefs) because participants generally assume to 'know' their past and therefore expect it to be easy to access their memories (Winkielman & Schwarz, 2001). Nevertheless, this leaves room to explore if specific individual differences already influence

how accessible participants judge their negative childhood memories before introducing recall difficulty.

One of these individual differences might be alexithymia, a personality trait present in all people to a different degree (Taylor, 1984). High levels of alexithymia (HA) have been linked to difficulties to identify feelings (DIF), difficulties to describe feelings (DDF), and an externally oriented thinking style (EOT) (e.g., Vermeulen & Luminet, 2009). As these characteristics indicate reduced awareness of one's emotions, participants with HA scores focus more on practical details of events instead of emotional features (Luminet, 2001). This underlines the notion that HA scores indicate the experience of difficulties in emotional information retention (Apgáua & Jaeger, 2019). Therefore, individuals with HA might already be used to the experience of difficulty when thinking back on their negative childhood memories and do not assume their childhood memories to be as easily accessible as individuals with low alexithymia scores (LA).

The Current Study

The current study aims at a conceptual replication of Wessel et al. (2020) while integrating some elements of other studies (Merkelbach et al., 2001; Winkielman et al., 1998: Winkielman et al., 2001). We chose a replication study as the ability to recreate findings is an essential part of the scientific process and separates science- from pseudoscience (Zwaan et al., 2018). Earlier studies did not replicate the results (Wessel et al., 2020; Merckelbach et al., 2001). However, replication studies have different functions, and one replication cannot realize all functions at once (Zwaan et al., 2018). Therefore, testing earlier findings again with different research designs, operational definitions, and samples is crucial. (Zwaan et al., 2018).

There are six to-be-tested variables. The first variable is the judgments of how accessible one’s childhood memories are (cf. Merckelbach et al. (2001). Second is the

completeness of the memories (cf. Winkielman et al., 1998). The third and fourth variables consist of specific- and generic questions on having repressed memories (cf. Houben et al., 2019, study 2; cf. Merckelbach et al., 2001). The fifth variable is childhood pleasantness (cf. Winkielman & Schwarz, 2001). Lastly, the sixth variable is the difficulty of recall (cf. Winkielman et al., 1998).

To conclude, in our current study, we hypothesize that: *Regardless of condition, we expect participants to 1) Agree more with statements about unspecified-, rather than specified repression. We expect the participants asked to recall twelve memories to 2) Show a larger decline in their childhood memory accessibility. 3) Show an increase in agreement with statements implying that their childhood memories are repressed. 4)Report a greater reduction in their childhood pleasantness. Furthermore, we expect that the higher the participant's alexithymia score, the less accessible the participant will judge their childhood memory.*

Method

Participants

Initially, a sample of Psychology students (N = 128) of the University of Groningen was recruited. Our final sample consisted of 112 participants, with 84 female students, 27 male students, and one non-binary student (Mage = 19.92, SD = 2.15). Participants of both the Dutch and the International programs opted to enroll in the study. After participating in the study, they received compensation in study credits for the course 'A Practical Introduction to Research Methods.' There were no specific requirements to participate in the study except being over sixteen, which is the default in a university environment. Participants who felt uncomfortable recalling negative childhood events were advised not to partake in the study.

Power Analysis

To find our desired sample size, we conducted a priori power analysis with G*Power (Faul et al., 2009). Therefore, we divided the standard α= 0.05 by six, the number of questionnaires we used to answer the main research question. Consequently, α= 0.05/6 = 0.008. We decided to on high power = 0.95 because we were conducting a replication study and wanted to lower the chances of missing an association. Additionally, we strived for a moderate effect size of d= .5 (Cohen, 1992).

Design and Materials

For our experimental study in the form of an online questionnaire, we used a 2x2 mixed design. The between-participant factor was the condition in which participants either had to recall four- or twelve negative childhood memories. The within-participant factor was time, where the answers on the baseline questionnaire were compared to the answers on the post-measure. The following measures, in this order, were used to assess memory beliefs:

Memory Accessibility and Completeness

Memory accessibility and completeness were measured using two items (cf. Merckelbach et al., 2001; cf. Winkielman et al., 1998). Visual analog scales were used to access them (0 = strongly disagree – 100 = strongly agree). The higher the score, the less accessible the memory seems to be judged (Merckelbach et al., 2001). The items were:

1. "Many of my childhood memories are difficult to access."
2. “Regarding my childhood memory, there are large parts of my childhood after the age of 5 that I can’t remember.”

Unspecified- and Specified Repression Beliefs

Unspecified Repression Beliefs. The first repression variable was measured with the item “I have repressed many of my childhood memories” (cf. Merckelbach et al., 2001) using a visual analog scale (0 = strongly disagree – 100 = strongly agree).

Specified Repression Beliefs. The second repression variable was measured on three items (cf. Houben et al. 2019). Visual analog scales were used for all of them (0 = strongly disagree – 100 = strongly agree). A reliability analysis of the scale indicates good internal reliability with a Cronbach's alpha of $\alpha = .820$. The items were:

1. "It is quite possible that certain childhood memories are blocked. That means they are stored somewhere in my unconscious mind, but I cannot access them, even if I try."
2. “It is quite possible that certain memories in my unconscious mind cause symptoms.”
3. “It is quite possible that becoming aware (i.e., remembering) of my unconscious memories will lead to a relief from symptoms.”

Childhood Pleasantness

The experienced pleasantness of the participant's childhood was measured on five items (Winkielman & Schwarz 2001). A reliability analysis of the scale indicates good internal reliability with a Cronbach's alpha of .896. The items were:

1. "How pleasant was your childhood?" (Visual Analogue Scale; 0 = not at all pleasant – 100 = extremely pleasant)
2. "How often did you feel sad in your childhood?" (Visual Analogue Scale; 0 = almost never – 100 = very often)
3. "How often did you feel happy in your childhood?" (Visual Analogue Scale; 0 = almost never – 100 = very often)
4. "How often did you feel worried in your childhood?" (Visual Analogue Scale; 0 = almost never – 100 = very often)
5. "How often did you feel care-free in your childhood?" (Visual Analogue Scale; 0 = almost never – 100 = very often)

Memory Recall Task

The participants were asked to retrieve either four or twelve negative childhood memories from ages 5-7 and 8-10. The participants were asked not to give too many details but to specify the place, content, and actors by their initials/relationship status.

Other Measures

Additionally, the difficulty of retrieval was measured in the form of a manipulation check "You have been asked to write down several different negative childhood events. How difficult was the task for you?" (Winkielman et al., 1998). Attention/careless responding was checked twice. During the baseline and post measurements with the item "Please select the

end (at the right) of the scale." (Visual Analogue Scale; 0-100, no anchors specified). In terms of demographic information, only age and gender were asked of the participants.

Alexithymia

Alexithymia was measured using the TAS-20, following a five-point Likert Scale (Bagby et al., 1994). The TAS-20 consists of twenty questions with three subscales. Five items measure the individual's difficulty in describing feelings, seven measure the difficulty of identifying feelings, and eight measure if the individual tends towards an externally-oriented thinking style.

Procedure

The Ethics Committee of Psychology of the Behavioral and Social Sciences Faculty of the University of Groningen (EC-BSS) has approved this study. The study was conducted in English, collecting participants via convenience sample through the SONA-participant pool. The study was conducted online through a Qualtrics questionnaire (Qualtrics, Provo, UT), which the participants accessed through the SONA participant system. Informed consent was given at the beginning of the study, including explaining what is asked of the participant, the consequences of choosing to participate or quit the study, and the purpose and treatment of data.

Next, the participants were asked to fill out the TAS-20, a baseline questionnaire on specified and generic repression beliefs, as well as two other questionnaires (MSEQ and CEQ), which were used to measure separate hypotheses of other student's bachelor theses. The alexithymia hypothesis and the two other hypotheses were exploratory and served an educational purpose. They are independent of the rest of the experiment.

At the same time, the Qualtrics randomizer function randomly allocated the participants to either the 12- or the 4-memory condition. The participants were then asked to retrieve negative childhood memories and state the memories' place, content, and actors. Afterward, the participants had to rate task difficulty and answer the questions on repression belief again. The participants of the four-memory condition were asked to recall an additional eight memories to exclude the general incapacity to recall twelve memories.

Lastly, the participants were asked to fill in their age and gender and received a debriefing. The debriefing included the study's purpose, resources as in Student Service Centre or general practitioner, and educational information (e.g., struggling with the memory task is normal) at the end of the questionnaire.

Data Analysis

The participant's responses were saved in Qualtrics and afterward exported into IBM SPSS Statistics 25, where at first, 12 new variables were created. The variables were the pre- and post-measure scores of the scales mentioned above and their change scores. The pre-and post-measure scores were created by computing the mean score of the items in a scale (e.g., mean score of the three specified repression items at baseline), whereas the change scores were created by subtracting the post-measure score of a scale from the baseline measure score of that scale (e.g., post-measure mean of specified repression scale – baseline mean of the specified repression scale).

Out of the 128 initial responses, thirteen participants were excluded for failing the attention checks and 3 for not giving consent. Outliers were defined as scores that fall 1.5x Interquartile Range below the first quartile or above the third quartile, demonstrated by SPSS Boxplots. Participants who did not come up with all twelve negative childhood memories were not

excluded from the study, as being unable to come up with memories can still indicate effortful memory retrieval.

The descriptive statistics were analyzed at the beginning of the data analysis, followed by an independent samples t-test to analyze the manipulation check (difficulty of recall). To test hypothesis 1, reliability for the specific repression items was checked first, then a one-tailed dependent sample paired t-test between the average specified- and unspecified repression scores was conducted. Hypothesis two was analyzed with two one-tailed independent samples Welch *t*-tests, of which one accessibility- and the other one completeness with condition tested. Two one-tailed independent samples t-tests were conducted to test the third hypothesis, whereas one tested specified repression and the other tested unspecified repression. To test hypothesis 4, items 2 and 4 had to be reverse coded first. Then reliability of the childhood pleasantness items was checked. Afterward, a one-tailed independent samples Welch *t*-test was conducted between the childhood pleasantness change score and condition.

To test the exploratory hypothesis, five items of the TAS-20 had to be reverse coded first. Afterward, the TAS-ALL variable was computed, consisting of the sum score of the TAS-20 items for each individual. The hypothesis was tested with a Pearson correlation between the TAS-ALL scores and the baseline measure accessibility score.

Statement of Transparency

The current study was pre-registered on the Open Science Framework before data collection, which can be found at https://osf.io/64ud9/?view_only=f8eaa839e1a4409fab2709c7d417645f. In the pre-registration, we stated that if our goal of $N = 266$ is not reached by the beginning of January 2022, we will analyze a preliminary dataset to meet the deadline of the Bachelor Thesis

projects. This turned out to be the case, as we could not reach the desired sample size by January 2nd, 2022.

Results

Data Screening

Initially, 128 responses were recorded. Three participants were excluded from the study because they did not consent, and 13 were excluded for failing at least one attention check (they scored lower than 95). There were 29 outliers in the sample, which were found in the change scores of accessibility, completeness, specified-, unspecified repression, and childhood pleasantness, as well as in the averaged scores of the post- and pre-measure of childhood pleasantness. Following the pre-registration, the data were analyzed with and without the outliers. Excluding the outliers did not result in a statistically significant difference to the data, including the outliers. The analysis without outliers can be found in the Appendix (see Table 2 & 3).

There was one participant that participated in the study twice. However, one of their attempts was unfinished and was removed due to failing the second attention check. I decided to keep the participant's other entry in the study, as we cannot be sure if double-participation would even influence the results. First, the participant did not complete the manipulation task in their incomplete entry. Second, we cannot be sure that double-participation influences the results as all of the participants already knew what the study entailed, as we gave a rough description of the to-be-completed tasks in the sona recruitment form. The final sample consisted of 112 participants, with 56 participants in each condition.

Preliminary Analysis

The manipulation check was analyzed using a one-tailed independent samples Welch *t*-test, which showed a statistically significant difference $t(107.49) = -4.51$, $p < .000$, $d = 0.85$, of the experienced difficulty in the 12-memory condition ($M = 51.11$, $SD = 24.4$) compared to the 4-memory condition ($M = 70.48$, $SD = 20.92$).

Hypothesis Testing

Hypothesis 1: Unspecified – Versus Specified Repression

For the first hypothesis, the average specified- and unspecified repression belief scores were tested for differences using a one-tailed dependent samples Welch *t*-test. There was a statistically significant difference $t(111) = 4.94$, $p < .000$, $d = .47$ between specified- and unspecified repression beliefs scores. However, the mean scores indicate that participants score higher on specified repression beliefs ($M = 47.32$, $SD = 22.98$) than on unspecified repression beliefs ($M = 36.07$, $SD = 24.47$). Raw data scores of this hypothesis and the following main hypothesis can be found in the Appendix (see table 1).

Hypothesis 2: Accessibility

To test the second hypotheses, the change scores of accessibility and completeness were subjected to one-tailed independent samples Welch *t*-tests with the grouping variable condition. The difference between the means of the 12-memory condition ($M = 9.83$, $SD = 22.23$) and the 4-memory condition ($M = 3.9$, $SD = 21.25$) of accessibility was not statistically significant $t(109.78) = -1.44$, $p = .076$, $d = .27$. Similarly, the difference in means between the 12-memory condition ($M = 11.27$, $SD = 18.61$) and the 4-memory condition ($M = 3.83$, $SD = 21.9$) for completeness was not statistically significant $t(107.21) = -1.93$, $p = .03$, $d = .37$.

Hypothesis 3: Repression Beliefs

To test the third hypothesis, two one-tailed independent samples Welch *t*-tests with the grouping variable condition were conducted for specified- and unspecified repression. Participants in the 12-memory condition (M = 2.38, SD = 19.32) reported a non-significant larger increase in specified repression beliefs $t(89.06) = -.385$, $p = .35$, $d = -.07$, compared to the 4-memory condition (M = 1.22, SD= 11.38). Similarly, there was a non-significant larger increase in unspecified repression beliefs $t(104.92) = -2.02$, $p = .023$, $d = -.38$, in the 12-memory condition (M = 10.73, SD = 18.08) compared to the 4-memory condition (M = 2.91, SD = 22.6).

Hypothesis 4: Childhood Pleasantness

To test hypothesis four, a one-tailed independent samples Welch *t*-test with the grouping variable condition was conducted. Participants in the 12-memory condition (M = -.97, SD = 8.84) reported a non-significant larger decrease in childhood pleasantness $t(88) = .448$, $p = .33$, $d = .09$, compared to the 4-memory condition (M = -.36, SD = 5.1).

Exploratory Hypothesis: Alexithymia

A Pearson correlation between alexithymia and baseline accessibility scores with $\alpha = 0.05$ was conducted to test the exploratory hypothesis. The analysis revealed a significant, weak correlation between alexithymia and accessibility $r(110) = .25$, $p = .009$ (see figure 1, appendix).

Discussion

The purpose of this study was to understand better how the individual's beliefs about memory retrieval influence the judgment of their memory. Considering this, four general- and one exploratory hypothesis were tested. The main results can be summarized as follows. In line with our expectations, participants of the 12-memory condition rated the task as more difficult than the 4-memory condition. Moreover, there was a statistically significant difference between the agreement with specified- and unspecified repression statements. Unexpectedly, there was a higher agreement with statements of specified repression beliefs than with unspecified repression beliefs. Also, contrary to our expectations, the findings of the three further main hypotheses are not supported by data. Meaning that first of all, the differences in change scores was not statistically significant for both accessibility and completeness. Second, we observed a non-significant increase in agreement with both specified- and unspecified repression beliefs. Third, we observed a non-significant larger decrease in childhood pleasantness. Furthermore, the exploratory hypothesis showed a weak correlation between alexithymia and accessibility.

Our Findings in Light of Previous Studies

We observed some similarities with previous findings. First, our finding that the 12-memory condition experienced the recall task as significantly more difficult than the 4-memory condition is in line with earlier findings (Winkielman et al., 1998; Winkielman & Schwarz, 2001; Wessel et al., 2020). The difficulty manipulation entailed that once a recall task involves many events, everyone will likely experience difficulty (Winkielman et al., 1998). This goes against participants' expectations, as they usually expect recalling childhood memories to be easy and will lead them to rely on the experience of difficulty as an indicator of poor memory (Winkielman et al., 1998). Second, participants were more likely to agree

with statements of specified- than unspecified repression, as earlier research indicated that participants tend to agree more with a precise definition of repression compared to statements that are open to interpretation (Otgaar et al., 2019). Third, our finding of a non-significant larger decrease in childhood pleasantness is possibly in line with the notion that the experience of difficulty when retrieving childhood memories by itself is not enough to influence the judgment of how pleasant one assumes their childhood to have been (Wessel et al., 2020; Winkielman & Schwarz, 2001). Fourth, the finding of higher alexithymia scores being weakly correlated with decreased memory accessibility is in line with earlier finding of a possible decline in memory for emotional information, which we can consider negative childhood memories to be (Apgáua & Jaeger, 2019).

Differences to previous research are that we found no significantly larger decline in how accessible and complete participants judge their childhood memory (Merckelbach et al., 2001; Winkielman et al., 1998). Moreover, we found no statistically significant increase of agreement with unspecified repression or specified repression statements, whereas earlier studies observed that participants that had to recall many memories agreed more with statements of having repressed memories (Winkielman et al.,1998).

Theoretical Implications of Our Findings

Repression is a well-known and often casually used term (e.g., I can't remember this. I must have repressed that!'), which is ingrained in contemporary Western societies (Otgaar et al., 2019). However, using the terms repression or repressed memories in a survey can have numerous connotations, which results in difficulties in conceptualizing repression (Otgaar et al., 2001). Our study tackled this issue by including two repression variables with different connotations. The unspecified repression statement left the participants room for a personal

interpretation of repression, whereas the specified repression statements consisted of a more precise definition of repressed (cf. Merckelbach et al., 2001; cf. Houben et al., 2019, study 2).

A possible explanation on why we observed an increase in agreement with repression beliefs after the manipulation is that the participants did not rely on the experienced difficulty in judging the quality of their memory (Merckelbach et al., 2001). We asked about their repression beliefs beforehand, which indicates the absence of memory content (Merckelbach et al., 2001). Therefore, asking the participants questions on the repression of their childhood memories might have drawn their attention towards the mere presence of the memories they can recall instead of the experience of difficulty (Merckelbach et al., 2001). By contrast, the paradoxical effect might occur if the questions are framed in terms of recall difficulty and accessibility, similar to Winkielman et al. (1998).

As for the childhood pleasantness hypothesis, an alternative explanation is that the experience of difficulty alone is not enough to alter the judgments of childhood pleasantness (Winkielman & Schwarz, 2001). Our study did not manipulate repression beliefs beforehand, contrary to earlier studies (Winkielman & Schwarz, 2001). Therefore, a pre-existing repression belief might be necessary for an effect (Winkielman & Schwarz, 2001).

Methodological Considerations

Besides the theoretical implications, there are also implications on a methodological level to consider. Like Wessel et al. (2020), our study was conducted in an online environment, which was the best choice considering the ongoing COVID-19 pandemic. However, changing the research environment from in-person, like in previous research (Winkielman et al., 1998; Winkielman & Schwarz, 2001; Merckelbach et al., 2001), to an online environment resulted in the following implications. The advantages of conducting the study online were that it was cheaper, more time-efficient, and easier to recruit a bigger sample than an in-person experiment (Davies et al., 2020). However, participants often give

shorter responses and offer less contextual information (Davies et al., 2020). Furthermore, it is more challenging to build a rapport, show appropriate care for participants, and there might be additional issues considering the participants' privacy as they might not have access to a private space and have to participate, e.g., in a public library or around family/roommates (Carter et al., 2021). As we asked the participants to write down negative childhood memories, they might feel uncomfortable disclosing these in front of others, which might be why a large part of the sample did not fill in all twelve childhood memories.

Another implication is that the participants knew beforehand that they would have to retrieve negative childhood memories. This was disclosed on the SONA recruitment form due to ethical considerations, as some students might not be comfortable with this task and specifically ask students who had adverse experiences in the past not to participate. However, this might have led the participants to already come up with negative childhood memories before answering the baseline questions, essentially already doing the task before the experiment. This is a potential reason for no significant change between baseline- and post-measure.

There are a couple of methodological considerations when it comes to the correlation between alexithymia and accessibility. Alexithymia is present in everyone to a different degree, which implies that associations between alexithymia and other measures also show up in normal and non-clinical samples (Taylor, 1984). However, other studies claim that alexithymia is only associated with difficulties remembering emotions at very high levels (Lundh et al., 2002). Our sample had relatively low levels of alexithymia, so there may only be a stronger correlation between alexithymia and accessibility in samples with high levels of alexithymia. This is consistent with the notion that the TAS-20, the scale I used to measure alexithymia, was developed to identify individuals with higher alexithymia levels and not discriminate between different levels of the construct (Lundh et al., 2002).

Implications for future research

Design

We deviated from Wessel et al.'s (2020) research design in that we, instead of mediation analysis, chose a 2x2 mixed design. Additionally, we added a baseline measure to compare with the post-measure. This design helped explore how much the recall task changed participants' beliefs. However, the baseline measure featured the measures of the exploratory analysis, which made it very long. This could be a potential limitation of the study, as it could have been too tiring for the participants. Therefore, it would make sense to include a shorter baseline measure in future studies.

Sample

Furthermore, Winkielman et al. (1998), Winkielman and Schwarz (2001), Merckelbach et al. (2001), Wessel et al. (2020), and our study all used a sample of undergraduate students, which means the mean age is similar in all studies. The earlier studies were conducted on a different generation than the newer studies. Most of the participants in Wessel et al.'s (2020) study (M = 20.15) and our study (M = 19.93) were not even born when the earlier studies were conducted. Evaluating how generational differences (e.g., media influence) affect repression beliefs and metamemory judgments would be interesting. Since all participants were college-aged, studying the topic on different age groups and individuals with a different cultural backgrounds should also be considered, as repression seems to be a more Western concept (Otgaar et al., 2019).

Practical Implications

Our findings could have potential practical implications in therapeutical settings, although caution should be exercised when generalizing our findings to different areas. A

potential implication for therapy is that it should be ensured that memory scientists, therapists, mental health professionals, and patients define repression the same way. Our findings of higher agreement with unspecified than specified repression beliefs indicate miscommunication surrounding the topic.

Conclusion

To conclude, this study aimed at a conceptual replication of Wessel et al. (2020), with the integration of elements of Winkielman et al. (1998), Winkielman and Schwarz (2001), and Merckelbach et al. (2001). We found that participants are more likely to agree with specified- then unspecified repression beliefs, suggesting that laypeople are more likely to agree with a scientific definition of repression. Our other main hypotheses were not supported, meaning there was no statistically significant difference in change scores of both accessibility and completeness. Furthermore, there was no statistically significant increase in both specified- and unspecified repression beliefs and no significantly significant larger reduction in childhood pleasantness. We found that higher alexithymia scores have a significant, weak correlation to lower childhood memory accessibility.

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Appendix

Tables and Figures

Table 1

Pre- and Post-Measure Raw Mean Scores of Variables Used in Hypothesis 1-4

Variable	4-Memory Condition (N=56)				12-Memory Condition (N=56)			
	Pre		Post		Pre		Post	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SR	45.08	25.22	46.30	25.17	47.77	22.74	50.14	24.2
UR	33.21	27.40	36.13	28.11	32.11	23.16	42.84	27.40
Accessibility	53.77	25.46	57.68	25.07	57.40	23.54	67.23	23.56
Completeness	53.82	29.13	57.66	27.28	56.32	26.21	67.59	25.39
Pleasantness	66.45	18.09	66.09	19.28	65.56	16.79	64.59	18.76

**SR= Specified Repression, UR= Unspecified Repression.*

Table 2

One-tailed Dependent Samples Welch t-tests of Hypothesis 1 Without Outliers

Analysis		SR*	UR*				
	n	*M (SD)*	*M (SD)*	*t*	*df*	*p (one-tailed)*	*Cohen's d*
SR vs. UR	83	45.94 (23.09)	34.66 (25.41)	4.1	82	.000	.46

**SR= Specified Repression, UR= Unspecified Repression.*

Table 3

Overview of the Results of the Independent Samples Welch t-tests for Hypothesis 2-4 Excluding Outliers*

	4-memory condition (N=44)		12-memory condition (N=39)					
	M	*SD*	*M*	*SD*	*t*	*df*	*p (one-tailed)*	*Cohen's d*
Difficulty	49.52	24.75	70.31	20.49	-4.18	80.65	.00	.92
Accessibility	3.18	18.99	10.18	16.62	-1.79	80.99	.08	.39
Completeness	4.8	19.08	8.6	14.76	-1.01	79.6	.16	.22
SR**	2.3	11.25	.42	10.44	.79	80.82	.22	.17
UR**	2.4	12.08	8.82	14.03	-2.21	75.54	.02	.49
Pleasantness	-.40	3.58	.26	4.8	-.69	68.14	.25	.16

**Using the Variables: Difficulty (Manipulation check), Accessibility, Completeness, Specified Repression, Unspecified Repression, and Childhood Pleasantness. **SR= Specified Repression, UR= Unspecified Repression.*

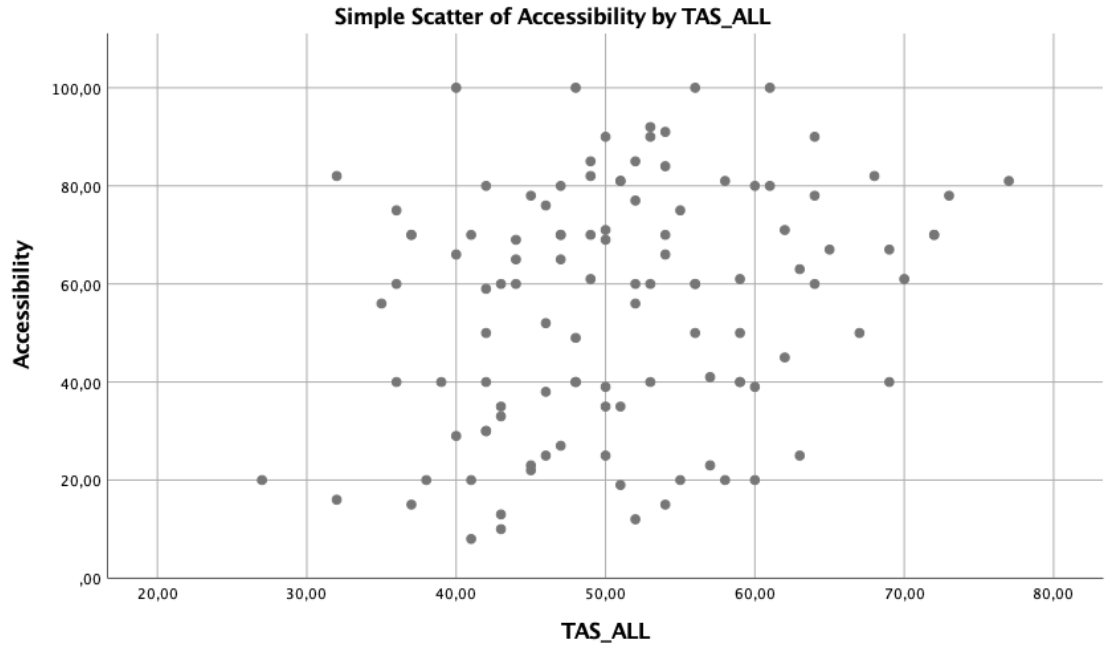

Figure 1. Scatterplot of TAS_ALL (Alexithymia) and Accessibility