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of
Psychology and Neuroscience

Maastricht Student Journal of Psychology and Neuroscience (MSJPN)

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Dear reader,

It is our pleasure to present the fifth edition of the Maastricht Student Journal of Psychology and Neuroscience (MJSPN).

In this issue 7 manuscripts are published. Five of these manuscripts are reports of empirical studies diligently performed by students at the faculty of psychology and neuroscience. In addition, one inspiring essay and one informative literature review are included in this edition.

We are very grateful for the input that we have received from both the authors and the student reviewers. We would like to thank them for their time and effort in writing a manuscript, improving it, and conducting a careful review process. Without them, this edition would not have been possible.

As the journal is still developing the editorial board was supported with four new members. We welcomed Dr. Stefan Jongen, Caroline Benjamins, Astrid Meesters and Laura Borghans as section editors. They did a great job at guiding the authors towards a publication and we look forward to work with them on the next edition.

Please feel free to contact any member of the board in case you are interested in participating in the next issue of the MJSPN. Any Maastricht student can become an author, every student with a BSC can become a reviewer. There, now we give the word to the 7 bright students that published their work. Enjoy!

The editorial board,

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SANNE HOUBEN

‘That didn’t happen’: Memorial Consequences of False Denials for Neutral and Negative Material

Original Paper

The current experiment assessed the memorial consequences of false denials (i.e., denying an event had happened) for neutral and negative material. 86 participants viewed neutral and negative pictures and their memory and belief for these pictures was tested. Specifically, participants were randomly assigned to three conditions: (1) Internal Denial, participants were instructed to falsely deny questions related to the pictures; (2) External Denial, participants received negative feedback from the experimenter; or (3) Control, participants were instructed to provide answers to questions they are completely sure about, and were told not to guess. A day later, participants had to rate their memory and belief once more. The most important finding was that internal denial resulted in participants falsely denying they had talked about a certain detail with the experimenter, when in fact they did. The current results indicate that denying an experienced event may adversely affects memory for the interview itself.

Keywords: false denials; omission; memory; valence; nonbelieved memories

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INTRODUCTION

Research into child eyewitness testimonies is difficult because the statements are often of unknown accuracy (Bidrose & Goodman, 2000). This is usually the case in legal trials that lack objective evidence. Oftentimes, these cases are about sexual abuse. Research shows it is often hard for a child to reveal the abuse because the child does not want to hurt the offender and has difficulty discussing the abuse itself (Lyon, 1995). Thus, victims of sexual abuse often do not disclose upon their victimization and sometimes even falsely deny that they were victimized. However, it is still unclear what happens to the memories of a traumatic event when people falsely deny an event. In the current study, the goal was to examine the memorial consequences of these false denials (i.e., denying an event that actually did happen to them). To understand this phenomenon in more depth, it is important to provide more information concerning eyewitness testimonies, as they are often a source of evidence in a trial.

Oftentimes, judges and juries have to rely on eyewitness testimonies for legal decision-making when objective evidence is lacking (Smeets, Candel, & Merckelbach, 2004). During an evaluation of such testimonies, the central focus is on the accuracy, consistency and completeness (Smeets et al., 2004) of these statements. When a testimony consists of memory errors (e.g., false memories), it is frequently regarded as inconsistent and inaccurate. Therefore, many studies examining the role of memory in legal settings have focused on these false memories (i.e., a memory of an event that did not actually occur) and their underlying precursors (see Ceci & Bruck, 1993; Loftus, 2004; Otgaar, Howe, Peters, Sauerland, & Raymaekers, 2013a). There are two types of false memories that are generally distinguished: Spontaneous and suggestion-based false memories.

Spontaneous false memories are frequently induced by using a popular method called the Deese-Roediger-McDermott (DRM; Deese, 1959; Roediger & McDermott, 1995) paradigm. Here, participants receive wordlists of semantically related words (e.g., tears, fear, weep) that are all associated to a critical, so-called 'lure' word (e.g., cry). By either using recall or recognition tests, participants have to indicate whether they have heard the word. Both recall and recognition tests show that a significant number of participants falsely remember the critical lure word (see e.g., Brainerd & Reyna, 2008; Otgaar et al., 2013a).

Suggestion-based false memories are generally studied by using misinformation or implantation techniques (Loftus & Ketcham, 1991; Loftus, 2005). In the misinformation paradigm, participants are presented with stimuli and receive suggestive questions in the form

of misinformation, followed by a memory test. In the implantation paradigm, participants receive narratives of a false childhood life event ostensibly 'obtained' from their parents. Both techniques indicate that participants can falsely remember events. False memories are of importance in court because eyewitnesses can be pressed to recall elements from a crime scene or suggestive questions can be asked during interrogation. These suggestive questions can contain misinformation, which could alter one's perception and memory about the event (Lane & Zaragoza, 2007). Eyewitness errors are the most contributing factor to wrongful convictions (Saks & Koehler, 2005), hence it is no surprise that the role of memory in legal cases is of great interest among researchers.

Though research on false memories is of great importance, one might wonder whether they are always relevant in eyewitness testimonies for determining, for example, the accuracy of a testimony. Smeets and colleagues (2004) showed that the link between consistency and accuracy (i.e., consistency implies accuracy) is actually quite rare in practice. Participants were asked on two occasions to write detailed accounts of a violent movie fragment they had seen. Accounts were evaluated on accuracy, consistency and completeness. Their results showed that these three concepts seem to be independent concepts: Testimonies can be accurate but also inconsistent. On top of that, results also indicated that omission errors (i.e., leaving out information), and not false memories, accounted for most inconsistencies in testimonies. The findings demonstrated that completeness is the most problematic feature of testimonies. To conclude, omission errors, not false memories, are the most problematic feature of eyewitness testimonies. However, to date, there is virtually no empirical knowledge about the determinants of omission errors or related constructs as false denials.

False denials are likely to occur in legal cases in which, for example, there is a suspicion of child sexual abuse. Recent studies show that many victims falsely deny to having been maltreated (see Lyon, 2007; Vieira & Lane, 2013). Scientific case studies of childhood sexual abuse (see e.g., Bidrose & Goodman, 2000; Leander, Christianson, & Granhag, 2007) compare victim testimonies with available objective evidence (e.g., video and/or audiotapes, confession of offender). Looking at the level of support for the allegations made by the victims, these studies have shown that although the testimonies contain accurate details, victims often provide false denials.

There are different reasons underlying false denials: the perpetrator repeatedly tells the victims that the event did not occur, the event itself can elicit emotions of fear when the perpetrator is a stranger or when the perpetrator is familiar, or that the victim wants to protect the offender (Leander et al., 2007; Lyon, 1995). Therefore, victims of child sexual abuse often

delay disclosing the abusive event for several years. In such a period, strategies as false denials are often used to withhold information of the traumatic incident (Lamb & Edgar-Smith, 1994). However, the most prominent reason for false denials is likely to be shame (Leander et al., 2007). Victims of sexual abuse may be too embarrassed to talk about the details of the event.

What happens when victims repeatedly falsely deny to have experienced an event and then suddenly report about the event? Curiously, the empirical findings on memorial consequences of false denials are extremely limited. Vieira and Lane (2013) are one of the few that studied how false denials affect memory. In their study, participants viewed pictures of simple objects, and received the instruction to repeatedly lie (i.e., false denials) or tell the truth about these pictures by describing them or denying seeing them. Two days later, participants had to indicate honestly if the presented picture was studied, and if they had to lie or tell the truth during session 1. The results of the false denials condition indicated that falsely denying studied pictures resulted in decreased memory performance whereas falsely describing unstudied pictures enhanced memory performance. Hence, according to this study, false denials can have a negative effect on memory performance.

In a recent study by Otgaar, Howe, Memon, and Wang (2014a), the mnemonic effects of false denials were examined in children and adults. Participants viewed a video. Afterwards, participants were randomly assigned to one of three groups. In the control group, participants were instructed to answer questions they were absolutely sure about, without guessing. In the forced confabulation condition, participants were forced to answer all questions, even if this meant they had to guess. In the false denial condition, participants had to falsely deny in response to each question. A week later, participants received a source memory test, indicating their memory and belief once more. Interestingly, participants in the false denials condition did not report having talked to the experimenter about a certain detail, when in fact they did. This might suggest that previous false denials have adverse effects on memory performance. The results imply that denying experienced events is not a good strategy during an interview setting with regard to sexual abuse, because false denials seems to have adverse effects on memory performance.

The current experiment will include an internal denial condition (in line with Vieira & Lane, 2013; and Otgaar et al., 2014a) and an external denial condition. The external denial condition is relevant from a theoretical perspective, because it is informative to know whether suggestions can alter one's memory (i.e., make memory less accessible or less likely to be reported). From a practical perspective, it is relevant for legal cases (e.g., child sexual abuse cases), in which perpetrators repeatedly tell their victim that certain events did not happen. A

recent study by Scoboria, Boucher and Mazzoni (2015) showed that people withdraw their belief in autobiographical memories when receiving social feedback from an external source. This leads to developing non-believed memories (i.e., a memory you no longer belief in) and hence altering memory. The use of such an external denial condition is applied in omission studies, which matches the aspect of false denials (see Merckelbach, van Roermund, & Candel, 2007).

A subsidiary aim of the current experiment was to examine the memorial impact of false denials for negative and neutral stimuli. Because in legal cases, the-to-be-reported event (e.g., child sexual abuse) is likely to be negative, a distinction is made between neutral and negative stimuli. Studies using stimuli of different valence and which resemble omission research are studies about directed forgetting or retrieval-induced forgetting (RIF; Dehli & Brennen, 2009). These studies show contradictory results. In such research, participants receive stimuli of different valence (i.e., positive, neutral, negative). Participants receive the instruction to forget previous trials because these were merely practice trials (directed forgetting studies), or participants have to determine whether the stimuli were presented in the study phase, whilst not cued with the category (RIF studies). Some studies found better recall for positive stimuli (see e.g., Harris, Sharman, Barnier, & Moulds, 2010; Power, Dalgleish, Claudio, Tata, & Kentish, 2000), others found better recall for negative stimuli (McNally, Clancy, Barrett, & Parker, 2004; Minnema & Knowlton, 2008). Talmi and Moscovitsch (2004) demonstrate that negative information is differently organized in memory than neutral information. Meaning, negative stimuli is more interrelated than neutral stimuli. As a result, negative stimuli might increase the possibility that other negative memories become activated and hence memory for negative stimuli is enhanced.

Taken together, the current study will address the following three research questions: First, to what extent do false denials have an effect on memory performance? Second, what is the difference between the effect of external and internal false denials on memory? Third, what is the impact of emotional valence on memory performance? Based on earlier experiments described above, it is hypothesized that false denials might lead to worse memory performance, i.e., more false denials of true events and hence deteriorating memory. Additionally, if the instruction to falsely deny or receive external false denials is associated to social feedback, false denials might lead to the formation of non-believed memories, thus memory performance is hypothesized to be worse for external false denials than for internal false denials. Finally, it is hypothesized the effect of false denials might be stronger for neutral stimuli, compared to negative stimuli.

METHOD

Participants

In the current experiment, 86 participants were tested ($M_{\text{age}} = 21.16$, $SD = 2.53$, range 18–31; 72 women). Participants were undergraduate students from the Faculty of Psychology and Neuroscience, Maastricht University. They received a credit point or a €7.50 financial compensation for their participation. The experiment was approved by the standing ethical committee of the Faculty of Psychology and Neuroscience, Maastricht University.

Materials

The stimuli are pictures derived from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2005). The pictures represent emotionally-negative and neutral scenes. All pictures were previously rated by using a 9-point scale (1 = negative; 9 = positive) of the Self-Assessment Manikin (SAM; Lang et al., 2005). The pictures were chosen based on their valence, not too many details present, central position of the critical item and if the critical item was clear to see. A paired samples t -test indicates that the chosen negative and neutral pictures significantly differed in valence ($M = 2.75$, $SD = 0.74$ and $M = 5.00$, $SD = 0.38$ respectively, $t(11) = 7.56$, $p < 0.001$), arousal ($M = 5.14$, $SD = 0.76$ and $M = 3.23$, $SD = 0.71$ respectively, $t(11) = -5.50$, $p < 0.001$), and dominance ($M = 4.10$, $SD = 0.70$ and $M = 5.85$, $SD = 0.47$ respectively, $t(11) = 7.99$, $p < 0.001$). Previous research used some of the selected pictures from the IAPS database (see Humphreys, Underwood, & Chapman, 2010). The pictures were presented by using E-Prime, viewed on a 17-inch computer screen. The IAPS pictures were shown for 5000 ms with 1000 ms ISI (in accordance with Vieira & Lane, 2013).

Design and Procedure

The current experiment employed a 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) split-plot design. The variable condition is a between-subjects factor and the variable valence is a within-subjects factor. Participants were randomly assigned to the different conditions and were tested in laboratory rooms at the psychology faculty at Maastricht University. Valence was provided in a counterbalanced order.

The study contains two sessions separated by a 24-hour interval. During the first session, participants were presented with 12 negative and 12 neutral IAPS pictures, presented in

a blocked order. Half of the participants first viewed the negative pictures, followed by the neutral pictures. The other half of the participants received the reverse order. Participants received the instruction to look carefully at the pictures, because they would receive some questions about the pictures. After viewing the IAPS pictures, participants received a short distractor task (playing Tetris), lasting for 5 minutes. Then, participants' baseline memory and belief for details was measured. Participants were asked ten items related to details present in the pictures (e.g., What was the woman at the office doing?), and they had to indicate their belief (1= definitely not seen, 8= definitely seen) and memory (1=no memory at all, 8=clear memory) for the presented question. These questions were derived from the Autobiographical Memory and Belief Questionnaire (ABMQ; Scoboria, Mazzoni, Kirsch, & Relyea, 2004), because research has shown people can develop so-called non-believed memories: Memories of which the belief in the occurrence of the event is undermined (Otgaar, Scoboria, & Mazzoni, 2014b). These non-believed memories are most likely to occur when people receive feedback suggesting a certain event did not occur (Otgaar, Scoboria, & Smeets, 2013b).

All questions were asked in chronological order of the picture slides. Hereafter, participants received a 5-minute filler task by playing Bejeweld. To finish the first session, participants ended with an event questionnaire, consisting of ten open-ended questions. Six questions were asked during the baseline questioning (ABMQ; i.e., true-event questions: Which jewellery did the woman wore?). The remaining four questions pertained to false details (i.e., who was lying in bed?), not asked during the ABMQ. For this event questionnaire, participants in the Internal Denial condition ($n = 29$) were instructed to deny in response to each question (e.g., 'What object was between the blue T-shirt and the jeans?' Answer: 'There was no object between the blue T-shirt and the jeans'). Participants in the External Denial condition ($n = 29$) received negative feedback to three true event questions and two false event questions from the experimenter (e.g., as response to the participant's answer: That [specific detail] was not present in the picture, think about this for tomorrow). Participants in the Control condition ($n = 28$) were instructed to provide answers to questions they are completely sure about, and they were told not to guess. All participants received the same event questions.

The second session took place the next day. This session started by informing to test the memory of the pictures. Participants received a source memory and belief test, containing twelve items each consisting of two closed questions (i.e., yes/no), in chronological order. For example: (a) "When we talked yesterday, did we talk about which jewellery the woman wore?" [Person question]; (b) "When you viewed the pictures, did you see which jewellery the woman wore?" [Picture question]. Then, participants had to rate their memory and belief once more.

The source memory items contained six true event questions asked during session 1 (derived from the event questionnaire), two true events not asked in session 1 (derived from the ABMQ), two false event questions asked in session 1 (false event questions from the event questionnaire), and two false event questions not asked during session 1. Participants were debriefed after all participants were tested.

RESULTS

Source Monitoring

Memory and belief ratings of the pictures were investigated at Session 2. For belief ratings for the picture questions, a 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA was conducted on the belief ratings at Session 2. No main effect of valence, condition or interaction effect was found (all $ps > .05$).

For the memory ratings for the picture questions, a 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA was conducted. No main effect of valence, condition or interaction effect was present (all $ps > .05$).

Another analysis measured the differences in the number of correct answers of the person questions (i.e., ‘When we talked yesterday, did we talk about which jewellery the woman wore?’) about the interview itself. A 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA was conducted on the number of correct answers on person questions. No main effect of valence, $F(1, 83) = 2.08$, $p = .15$, $\eta^2_{\text{partial}} = .02$, or an interaction effect, $F(2, 83) = 1.02$, $p = .36$, $\eta^2_{\text{partial}} = .02$, emerged. A main effect of condition was obtained, $F(2, 83) = 8.81$, $p < .001$, $\eta^2_{\text{partial}} = .17$. That is, participants in the External Denial condition ($M = 4.93$, $SD = .09$) and participants in the Control group ($M = 4.91$, $SD = .10$) answered questions correctly more often than participants in the Internal Denial group ($M = 4.43$, $SD = .09$).

False Denials

The primary interest was to examine the memorial consequences of false denials on memory performance. The first analysis pertained to whether falsely denying details might cause participants to report they did not talk about the certain details when in fact they did (i.e.,

person questions). A 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA was conducted on the mean total number of false denials. No statistically significant main effect of valence, $F(1, 83) = .02, p = .88, \eta^2_{\text{partial}} = .00$, or a statistically significant interaction effect, $F(2, 83) = .13, p = .87, \eta^2_{\text{partial}} = .00$, emerged. As expected, a statistically significant main effect for condition was obtained, $F(2, 83) = 12.37, p < .001, \eta^2_{\text{partial}} = .23$. Participants in the Internal Denial group were more likely to falsely deny they had talked to the experimenter about a certain detail ($M = .70, SD = .08$) relative to the other groups (External Denial: $M = .17, SD = .08$; Control group: $M = .21, SD = .08$; see also Figure 1).

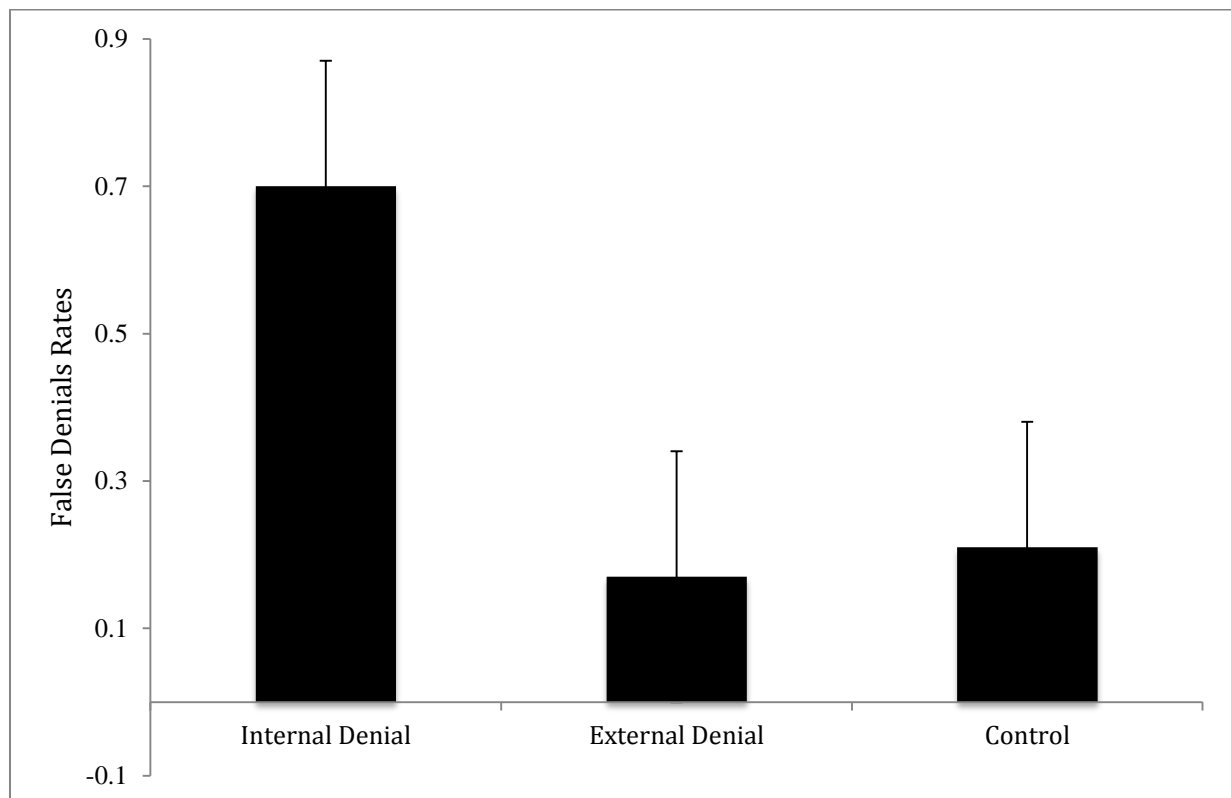


Figure 1. False denials rates on person question per condition (error bars represent 95% confidence intervals).

False denials pertaining to picture questions (i.e., claiming they did not see the specific detail when asked during session 2, but did provide the correct answers during session 1) were measured by a 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA. No statistically significant main effect of valence, condition or a statistically significant interaction was present (all $ps > .05$).

Memory

An additional interest of the current study was to see if the procedure might have led to nonbelieved memories. Ratings as nonbelieved memories were applied when memory scores were at least two scale points higher than the belief ratings.

During Session 2 participants could have developed nonbelieved memories. A 3 (Condition: Internal denial, External denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA was conducted on the ratings of nonbelieved memories during Session 2. At first glance, participants in the External Denial condition seemed to have developed more nonbelieved memories ($M = .15$, $SD = .04$) compared to the other groups (Internal denial: $M = .05$, $SD = .04$; Control: $M = .05$, $SD = .04$). However, a main effect of condition was absent, $F(2, 83) = 1.71$, $p = .18$, $\eta^2_{\text{partial}} = .04$. No main effect of valence, $F(1, 83) = .56$, $p = .45$, $\eta^2_{\text{partial}} = .01$, and no interaction effect emerged, $F(2, 83) = .78$, $p = .46$, $\eta^2_{\text{partial}} = .02$.

An exploratory analysis pertained to whether participants might report they had talked about a certain detail when in fact they did not talk about it with the experimenter (i.e., false memory). A 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA was conducted on the number of false memories for person questions during Session 2. At first glance, results indicate more false memories for person questions for negative valence ($M = .03$, $SD = .02$) than neutral valence ($M = .01$, $SD = .01$). However, no main effect of valence, condition or interaction effect emerged (all $ps > .05$). A 3 (Condition: Internal Denial, External Denial, Control) \times 2 (Valence: Negative vs. Neutral) repeated measures ANOVA was conducted on the number of false memories on picture questions (i.e., a false memory for a picture emerged if a participant reported they had seen a detail when in fact they could not have seen it). No main effect of valence, $F(1, 83) = .08$, $p = .78$, $\eta^2_{\text{partial}} = .00$, or an interaction effect, $F(2, 83) = .69$, $p = .50$, $\eta^2_{\text{partial}} = .02$ was obtained. However, a main effect of condition did emerge, $F(2, 83) = 3.90$, $p = .02$, $\eta^2_{\text{partial}} = .09$. Results showed that participants in the Internal Denial condition ($M = .43$, $SD = .07$) and External Denial condition ($M = .31$, $SD = .07$) developed more false memories than the control group ($M = .16$, $SD = .07$).

DISCUSSION

The primary aim of the current study was to examine the memorial consequences of false denials for neutral and negative material. The main results can be catalogued as follows. During baseline testing, no difference between neutral and negative pictures was observed on the number of correct answers. However, belief and memory ratings were higher for neutral questions than for negative questions across all conditions. Thus, participants were more certain and remembered neutral details more vividly than negative details during Session 1. These findings did not emerge on Session 2.

The most important finding concerns the finding about the memorial consequences of false denials. Overall, participants in the Internal Denial condition made more incorrect answers than participants in the External Denial or in the control group. The analysis showed that falsely denying that certain details had occurred impacted correct memory performance. The results indicate that participants in the Internal Denial group, and only for person questions, were more likely to falsely deny they had talked to the experimenter about a certain detail. This finding is in line with the results of Vieira and Lane (2013) and Otgaar and colleagues (2014a). This effect could be explained by the source-monitoring framework (Johnson, Hashtroudi, & Lindsay, 1993). According to the SMF, repetition of details should increase source accuracy and therefore memory should be enhanced. However, when using repeating responses such as false denials, the detail is not repeated. False denials could require less cognitive operations. Participants who repeatedly had to falsely deny during the interview, have declined memory for the conversation about the specific detail. As a result, participants were less likely to remember what they talked about during Session 1 (see also Vieira & Lane, 2013).

The fact that the previous results did not emerge for the External Denial group could be the consequence of the fact that these participants were able to respond with 'I do not know'. A fixed number of questions were selected for the experimenter to deny. So, if a participant's answer was correct or incorrect, the experimenter could deny the answer. However, due to the fact the participants could say that they did not know, the experimenter was unable to deny certain questions. As a result, for some participants in the External Denial group the experimenter could respond to only four questions, whilst falsely deny only one question for other participants.

For criminal investigations, the goal is to obtain complete and accurate account of eyewitness accounts. However, using ‘don’t know’ responses can put this at risk (Scoboria & Fisico, 2013). In a recent study by Scoboria and Fisico (2013) the influence of instructions to encourage or discourage ‘don’t know’ responses was examined. Participants watched a video and were randomly assigned to a ‘don’t know’ encouraged, ‘don’t know’ discouraged or control group. Results indicated that the use of ‘don’t know’ responses leads to avoiding questions that would otherwise be answered incorrectly. Although encouraging ‘don’t know’ responses could be harmful (e.g., the output is lower), this does not affect accuracy. Based on the latter finding, Scoboria and Fisico (2013) advise interviewers to encourage use of ‘don’t know’ responses, because they lead to more accurate reports.

It is possible that for the current study, the false denial effect only appeared when the participants themselves falsely denied the question, and not if someone else falsely denied the question for them. That is, it might be the case that when actively falsely denying questions yourself, one probably uses more memory processes (e.g., cognitive inhibition). On top of that, though the External Denial instruction was similar to the instructions used in the omission studies, there was no objective evidence available for the participants (see e.g., Otgaar et al. 2010). That is, participants in the External Denial condition were not presented with objective evidence that might persuade them that their answer was incorrect.

A subsidiary aim of the present experiment was to examine whether the procedure might lead to the production of nonbelieved memories. The reasoning behind this was that previous studies indicate that social feedback enhances the development of nonbelieved memories (see e.g., Otgaar et al., 2013b; Scoboria et al., 2015). Participants in the External Denial condition received such social feedback. The External Denial condition did show more nonbelieved memories, but the results indicate that this finding is not statistically supported.

Another memorial consequence was the production of false memories. At first glance, results suggest that the production of false memories for person questions were more likely to appear for negative questions. However, there was no statistical difference. The production of false memories for picture questions were more likely to occur in participants in the Internal Denial and External Denial condition than in the control group. False denials might have a paradoxical effect on reporting incorrect claims of having seen the pictures at a later point in time. These findings resemble the findings of Vieira and Lane (2013), which they attribute to fluency effects in memory.

From a practical perspective, the findings are of importance for victims who do not disclose their victimization. Victims sometimes falsely deny the traumatic event, but the

current results suggest that falsely denying is not a good strategy. When a victim of child sexual abuse is interviewed about the event, the child could falsely deny having been abused because of multiple reasons (e.g., shame, loyalty to the perpetrator, fear; Leander et al., 2007). However, when the child is interviewed for a second time, the child might not recall what has been discussed during the first interview. As a result, answers can be inconsistent during subsequent interviews. Such inconsistencies are seen as an indicator for low credibility of such statements (Smeets et al., 2004). Though the current experiment was not based on traumatic experiences, it does indicate that false denials lead to a decline of memory performance. Hence, victims of traumatic incidents are advised to talk about the event than falsely denying the event.

To summarize, the current experiment has shown that false denials lead to worse memory performance. Participants were most likely to falsely deny that they discussed a certain detail with the experimenter when they were instructed to deny the specific detail a day before. This experiment used a similar procedure as the study of Otgaar et al. (2014a), but with different materials. However, the current study did replicate the findings of Otgaar and colleagues (2014a) with picture stimuli. The results join the findings of Vieira and Lane (2013) and Otgaar et al., (2014a) in suggesting that falsely denying affects memory in a consequential manner. However, underlying causes of false denials and possible other memorial effects are still unknown and thus more research is needed to understand the precursors and its consequences for memory. This would lead to a more understanding of cognitive processes underlying false denials.

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GUILLAUME DURAND

A Pilot Study on the Effectiveness of a Heat-Pain Stimulus to induce Pain, Anxiety, and Fear

Original Paper

While the majority of previous studies assessing pain-related variables in psychopaths used electric shocks, little is known about the effectiveness of alternative pain-inducing methods to increase emotional responses such as fear and anxiety. A small sample of healthy undergraduate men ($N = 15$) was recruited to assess the effectiveness of a heat stimulus to induce pain in an immediate versus delayed punishment paradigm. Although pain catastrophizing, anxiety, and threat of pain did not increase throughout the experiment, participants experienced a significant increase of fear of pain and pain intensity, indicating that the heat stimulus was effective in inducing pain. Furthermore, subjects were slower in initiating the pain stimulus during the first five trials, but no time difference was found during the 15 remaining trials. No correlation was found between psychopathic traits and pain-related variables, with the exception of inconsistent results within the Fearless Dominance factor. Findings are discussed in terms of improvement for a larger scale study involving psychopathic individuals.

Keywords: Heat-Pain, Pilot Study, Anxiety, Fear, Psychopathy

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INTRODUCTION

Psychopathy is a personality disorder characterized by a lack of empathy, callousness, manipulative behavior, impulsivity, and a parasitic lifestyle (Berg et al., 2013; Seibert, Miller, Few, Zeichner, & Lynam, 2011). Although not inherent components of the construct, several traits such as lower levels of anxiety, greater fear immunity, along with greater pain tolerance, are moderately associated with psychopathy (Berg et al., 2013; Miller, Rausher, Hyatt, Maples, & Zeichner, 2014; Skeem & Cooke, 2010). However, results regarding these associated constructs are highly mitigated, as some researchers refute the existence of a correlation between psychopathy and constructs such as anxiety and pain due to the lack of evidence found in their respective studies (Fedora & Reddon, 1993; Visser, Ashton, & Pozzebon, 2012).

This discrepancy across conclusions regarding the association of pain and psychopathy may stem from multiple sources, such as the instruments used to induce pain within psychopaths and non-psychopaths, and the type of population used, such as inmates and healthy individuals from the community. Early experiments investigating the relationship between pain and psychopathy were performed in male inmates by the use of electric shocks, and held similar results to one another (Hare & Thorvaldson, 1970; Hare, 1965, 1966, 1968). These previous studies support that, while receiving painful electric shocks, psychopaths are not conditioned to fear pain, are not threatened by the fear of pain, are willing to receive higher levels of pain when incentives such as cigarettes are used, and report an overall lower level of pain than non-psychopaths.

A subsequent study has identified a link between psychopathy and the choice of immediate versus delayed punishment (Hare, 1966). Results suggest an absence of threat of pain in psychopaths, who were unable to develop any fear conditioning over time. Alternatively, non-psychopaths experienced more fear, which prompted behavioral responses to face the pain stimulus as soon as possible. When given the option of receiving a strong electric shock either immediately or in 10 seconds, 50% of the psychopaths opted for the immediate shock, while 67% of non-psychopaths opted for immediate shock during the first trial. Over the course of the trials, non-psychopaths developed a higher preference for the immediate shock, rising to a total of 82.3%. However, preferences remained constant for psychopaths throughout the experiment. This study demonstrates the effectiveness of electric shocks to induce differential behavioral responses in psychopathic and non-psychopathic individuals.

Fedora and Reddon (1993) challenged the hypothesis that psychopaths are more difficult to condition using fear of pain. They investigated the tolerance level to electrical stimulation within psychopathic and non-psychopathic inmates along with a control group composed of healthy male volunteers from the community. They concluded that, although both inmate groups could tolerate higher levels of pain than the control group, the tolerance did not differ between psychopathic and non-psychopathic inmates. The authors attributed these results to differential learning in inmates, as incarcerated populations face harsher treatment in everyday life than non-incarcerated individuals.

Due to the inconsistent findings of previous research performed with male inmates by the use of an electric shocking device, a subsequent study was performed on 104 individuals from the community (Miller et al., 2014). The purpose of this study was to determine the effectiveness of inducing pain and behavioral responses with alternative pain stimuli in psychopaths. Pain tolerance in response to an algometer, a cold pressor, and electrical stimulation was compared to the level of psychopathic traits. Results highlighted weak but significant correlations between the expression of psychopathic personality traits and pain tolerance to pressure ($r = .27$) and electric shock ($r = .25$), but not tolerance to cold pressor ($r = .05$). Although results were not conclusive regarding the use of a cold pressor, the significant correlation of psychopathic trait expression with pressure supports the possibility of assessing the fear of pain response with respect to psychopathy with an alternative and untested pain-inducing device, such as a heat-inducing device.

To our knowledge, no previous study has used a heat stimulus in psychopathy-related research. Considering the lack of previous data on the effectiveness of a heat stimulus in inducing pain in psychopaths, a preliminary study in a healthy sample is needed to assess its effectiveness before engaging in a costly and time consuming larger scale study. Indeed, due to the weak correlations found between pain tolerance and psychopathy, and the difficulty of recruiting large samples of psychopaths, a healthy sample is necessary for a preliminary study in order to ensure the stimulus' variability during the experiment in order to limit potential ceiling effects (Miller et al., 2014). A lack of variability within behavioral responses during an experiment within a healthy sample would reduce the possibility to detect differences when compared to psychopaths. Considering every individual possesses psychopathic traits to different degrees, and that psychopaths are at the far end of the continuum of psychopathic traits, a pilot study in a healthy sample may be sufficient to provide preliminary results regarding the correlation between higher psychopathic traits and response towards fear of pain variables (Berg et al., 2013). Hence, the purpose of this pilot study is to establish a paradigm for

a future study assessing how psychopathic individuals react towards pain in terms of fear-related constructs, such as anxiety, pain catastrophizing, and threat. Furthermore, the design of the current study should take fear conditioning of psychopaths into consideration. Based on previous work (Hare, 1966), participants were given the choice to start a pain stimulus immediately or after a 10 second countdown over the course of 20 trials. After every 5 trials, participants' perception of fear-related variables such as fear of pain, pain intensity, and threat of pain was assessed. The temperature was set to increase after every trial in order to reduce habituation and to increase fear of pain.

An increase of anxiety, pain catastrophizing, fear of pain, pain intensity, and threat of pain over the course of the experiment was expected. It was also hypothesized that participants would display an increase of preference to start the pain stimulus faster over the course of the experiment. Confirmation of these two hypotheses would support the effectiveness of the experimental design to use heat as a pain stimulus in psychopathy research. Lastly, a negative correlation between psychopathic traits and fear-related variables was expected alongside a positive correlation between psychopathic traits and the time to initiate the pain stimulus.

METHODS

Participants

A total of 15 male undergraduates from Maastricht University was recruited and gave written informed consent to take part in this experiment. This study was approved by the Ethical Committee of Psychology from Maastricht University. The participants' ages ranged between 19 and 28 years ($M = 23.20$, $SD = 2.91$). Due to the preliminary nature of the study, no further inclusion or exclusion criteria were applied.

Instruments

Self-report measures

Psychopathic personality traits

The Psychopathic Personality Inventory-Short Form (PPI-SF) is a 56-item self-report questionnaire and is derived from the original 187-item PPI (Lilienfeld & Widows, 2005). It assesses eight psychopathic traits, namely Machiavellian Egocentricity, Social Potency, Fearlessness, Coldheartedness, Impulsive Nonconformity, Blame Externalization, Carefree Nonplanfulness and Stress Immunity. The questionnaire is rated on a 4-point Likert scale ranging from 1 ('False') to 4 ('True'). The PPI-SF is divided into two factors: Fearless Dominance (FD), which includes Social Potency, Fearlessness and Stress Immunity, and Impulsive Antisociality (IA), which includes Machiavellian Egocentricity, Impulsive Nonconformity, Blame Externalization, and Carefree Nonplanfulness. This questionnaire is considered to be highly consistent, with Cronbach's alpha ranging from $\alpha = .70$ to $.94$ (Cale & Lilienfeld, 2006; Mullins-Nelson, Salekin, & Leistico, 2006; Tonnaer, Cima, Sijtsma, Uzieblo, & Lilienfeld, 2013). The internal consistency of the PPI-SF in the present study was fairly low ($\alpha = .29$), which is not surprising as two opposite constructs (FD and IA) were being assessed in a small sample. Examination of internal consistency by alpha revealed that the Stress Immunity subscale possesses a negative value ($\alpha = -.24$), possibly due to a sudden increase of stress at the start of the experiment. Participants' total scores ranged from 116 to 143 ($M = 130.73$, $SD = 8.01$), with higher scores indicating higher levels of psychopathic traits.

State anxiety

The State-Trait Anxiety Inventory – State Anxiety subscale (STAI Y1) is a self-report scale measuring state anxiety (Spielberger, Gorsuch, & Lushene, 1970). The State Anxiety subscale consists of 20 items with answer options ranging from 1 ('Not at all') to 4 ('Very much so') with a possible score between 20 and 80. The subscale assesses an individual's anxiety at a specific time or situation. Previous studies confirmed the scale's validity and that it has good internal consistency, with Cronbach's alpha ranging from $\alpha = .88$ to $.93$ (Fonseca Pedrero, Paino, Sierra Baigrie, Giráldez, & Fernandez, 2012; Vigneau & Cormier, 2008). The internal consistency for the STAI Y1 in the current sample at pretest and posttest were $\alpha = .83$ and $\alpha = .87$ respectively.

Pain catastrophizing

The Pain Catastrophizing Scale (PCS) is a self-report instrument assessing the extent to which an individual has catastrophizing thoughts (i.e.: 'I worry all the time about whether the pain will end') while under pain using a 13-item scale (Sullivan, Bishop, & Pivik, 1995). The items are rated on a 5-point scale ranging from 0 ('Not at all') to 4 ('All the time'). The PCS is considered consistent with a previously reported alpha of $\alpha = .95$ (Osman et al., 2000). In the current study, Cronbach's alpha was $\alpha = .82$ at pretest and $\alpha = .86$ at posttest.

Pain experience

Three Numeric Rating Scales (NRS) were used to assess the experience of pain. The NRS ranged from 1 to 10, and the participants were instructed to circle the number corresponding to their subjective perception of the item in question. Fear of pain was assessed with the question “How much do you fear the current pain you are experiencing?” Pain intensity was assessed with the question “How painful is the current pain you are experiencing?” The threat of pain was assessed with the question “How threatening is the pain you are currently experiencing?” Questions were administered between blocks (1 block being equal to 5 trials) when the pain stimulus was inactive. Items were formulated in terms of “current pain,” which required the participant to take into consideration the whole block itself rather than a specific time point.

Pain stimulus

A Pathway model ATS thermode from the manufacturer Medoc Ltd., connected to the software E-Prime, was used. The active area of the thermode was 30 x 30 mm. The baseline temperature was set at the recommended value of 32°C. During the experiment, the time until the participant started the pain stimulus was recorded via the space bar of a computer keyboard.

Calibration

All participants went through a calibration phase to ensure they could withstand the maximum temperature during the experiment, which was set at 47.7°C. The thermode was attached to the ventral wrist of the dominant hand during both the calibration period and the experiment. The dominant hand was selected in order to maximize the recorded threat of pain, as individuals presumably feel a greater threat from something affecting their most functional hand. Calibration started at a baseline value of 32°C and increased by 1°C every second until the maximum of 47.7°C was reached or when the participant pushed the stop button. This step was repeated three times, with a one-minute break between each session. The participant's personal maximum was set as the result obtained on the third calibration trial.

Procedure

At the beginning of the experiment, participants were invited to complete the PCS and the STAI-Y1. This step was followed by the calibration of the heat stimulus. All participants

achieved the maximum temperature of 47.7°C within three calibration trials. After resting for 10 minutes while filling in the PPI-SF, participants were placed in front of a monitor, ready to start the experiment.

The experiment consisted of 20 trials, which were divided into 4 blocks of five trials each. At the beginning of each trial, participants were instructed to press the space bar in order to see the temperature they would receive. Participants were led to believe that the temperature shown on screen was the temperature they would receive during the trial. The purpose of this deception was to further increase baseline levels of fear within all participants. The temperature on the screen started at 40°C and increased by 1°C after each trial. The real temperature received by participants through the thermode started at 43°C and increased by 0.25°C after each trial. Each trial started at baseline temperature (32°C), and would increase in less than 2 seconds to the corresponding temperature. After the temperature was displayed, participants were given the choice to wait for a maximum of 10 seconds before receiving the heat stimulus. Alternatively, the participants could manually activate the pain stimulus before the end of the 10-second countdown by pressing the space bar of the computer keyboard. Once activated, the pain stimulus would last for a total of 7 seconds. After these 7 seconds, the temperature of the thermode would return to the baseline temperature, and participants would receive instructions to press the space bar when they were ready to see the temperature for the next trial on screen, followed by the next 10-second countdown. Between each block, participants were asked to fill in the three NRS to assess their experience of pain throughout the experiment. Participants completed the STAI Y₁ and the PCS once again as posttest measures at the end of block 4. Participants' response times before starting the pain stimulus were recorded through the E-prime software after each trial.

Statistical analyses

The data were analyzed using SPSS version 21.00. Several types of statistical analyses were performed in order to answer the three hypotheses. First, PCS and STAY Y₁ pre and post test scores were examined using a paired sample t test in order to assess whether pain catastrophizing and anxiety levels would increase over time, as was predicted by the first hypothesis. Then, repeated multivariate analyses of variance (MANOVAs) were performed on the three NRS (fear of pain, pain intensity, and threat of pain) over the 4 time points in order to examine a potential increase of these variables over time. Post-hoc pairwise comparisons, adjusted via a Bonferroni correction for multiple testing, were performed to further test the first hypothesis in regard to an increase of fear of pain, pain intensity and threat of pain. A

Bonferroni corrected repeated MANOVA was performed to test whether a preference to start the pain stimulus sooner as the experiment progressed would be observed. A Pearson correlation was performed on mean response time and fear-related variables to examine potential associations between lower response times and higher fear-related scores. Lastly, associations among psychopathic traits, fear-related variables, and mean response times were explored using Pearson bivariate correlations.

RESULTS

Anxiety and pain catastrophizing levels over time

Paired sample t-tests were performed on the PCS and STAI Y1 to examine whether anxiety and pain catastrophizing levels would increase by the end of the experiment. Although the mean scores at posttest ($M = 9.80$, $SD = 6.54$ and $M = 30.13$, $SD = 7.14$) were lower than at pretest ($M = 13.13$, $SD = 7.09$ and $M = 32.40$, $SD = 6.34$) for both questionnaires, these differences were non-significant (PCS: $t(14) = 1.92$, $p = .076$, STAI Y1: $t(14) = 1.41$, $p = .180$).

Fear of pain, pain intensity, and threat of pain over time

Repeated MANOVAs were performed on the values obtained for the three NRS' (fear of pain, pain intensity and threat of pain) at the four time points to test whether fear of pain, pain intensity and threat of pain increased over time. A summary of these results can be found in Table 1. Several significant differences were found for all three scales. For the fear of pain scale, mean scores increased from 1.47 (0.74) after block 1 to 2.67 (1.59) after block 4, Wilks' $\Lambda = .40$, ($F(3, 12) = 6.03$, $p = .01$). A within-subjects contrast test revealed a significant quadratic function ($F(1, 14) = 10.03$, $p = .007$). Pairwise comparisons revealed that the mean score of fear of pain of block 4 was significantly higher than that of block 1 ($p = .042$), block 2 ($p = .020$), and block 3 ($p = .003$), indicating an overall increase of fear towards the end of the experiment. For the pain intensity scale, mean scores ranged from 1.87 (0.99) to 4.47 (2.30), increasing from block 1 to block 4, Wilks' $\Lambda = .29$, ($F(3, 12) = 9.74$, $p = .002$). A within-subjects contrast test revealed a significant quadratic function ($F(1, 14) = 14.69$, $p = .002$). Pairwise comparisons did not identify a significant difference between block 1 and block 2. However, a significant increase was found between block 1 and block 3 ($p = .020$), between block 2 and block 3 ($p =$

.003), and between all other blocks (block 1 and 4, block 2 and 4, and block 3 and 4) ($p < .001$). For the threat of pain scale, mean scores ranged from 1.27 (0.46) to 2.87 (2.13), but were not significantly different from one another, Wilks' $\Lambda = .55$, ($F(3, 12) = 3.30$, $p = .058$). Therefore, no supplementary analysis was performed on the threat scale. Overall, these results partly support the first hypothesis, showing an increase in fear of pain and pain intensity over time during an increase in temperature.

Table 1. Mean score and standard deviation of the PCS, the STAI Y₁, and the three Numeric Rating Scales at baseline and all four time points.

	PCS	STAI Y ₁	Fear of pain	Pain intensity	Threat
Time 0	13.13 (7.09)	32.40 (6.34)			
Time 1			1.47 (0.74)	1.87 (0.99)	1.27 (0.46)
Time 2			1.47 (0.74)	2.07 (1.16)	1.40 (0.63)
Time 3			1.80 (1.14)	3.00 (1.46)	1.80 (0.94)
Time 4	9.80 (6.54)	30.13 (7.14)	2.67 (1.59)	4.47 (2.30)	2.87 (2.13)

Note. PCS = Pain Catastrophizing Scale; STAI Y₁ = State Trait Anxiety Inventory – State Anxiety subscale; Fear = Fear of pain; Pain = Pain intensity; Threat = Threat of pain; Time 0 = Baseline; Time 1 to 4 = End of Block 1 to 4.

Change of response times over time

Repeated MANOVAs were performed on the response times for each block to examine the second hypothesis, related to an expected difference over time to start the pain stimulus. Based on examination of the stem-and-leafs plots, two extreme values considered to be outliers were normalized by replacing their respective scores with the average of the corresponding block. Examination of the stem-and-leafs plots revealed that these outliers did not differ from the rest of the sample on other variables. Mean response time in seconds from block 1 to block 4 changed from 1.61 ms (0.59) to 0.96 ms (0.52), Wilks' $\Lambda = .34$, ($F(3, 12) = 7.78$, $p = .004$). As shown in Fig 1, mean response time throughout the experiment decreased in a cubic function, ($F(1, 14) = 8.24$, $p = .012$). Pairwise comparisons with an applied Bonferroni correction revealed a significant difference between block 1 and 2 ($p = .002$), block 1 and 3 ($p = .005$), and block 1 and 4 ($p = .001$). Due to the rarity of cubic functions in psychological studies, these results should be interpreted with caution.

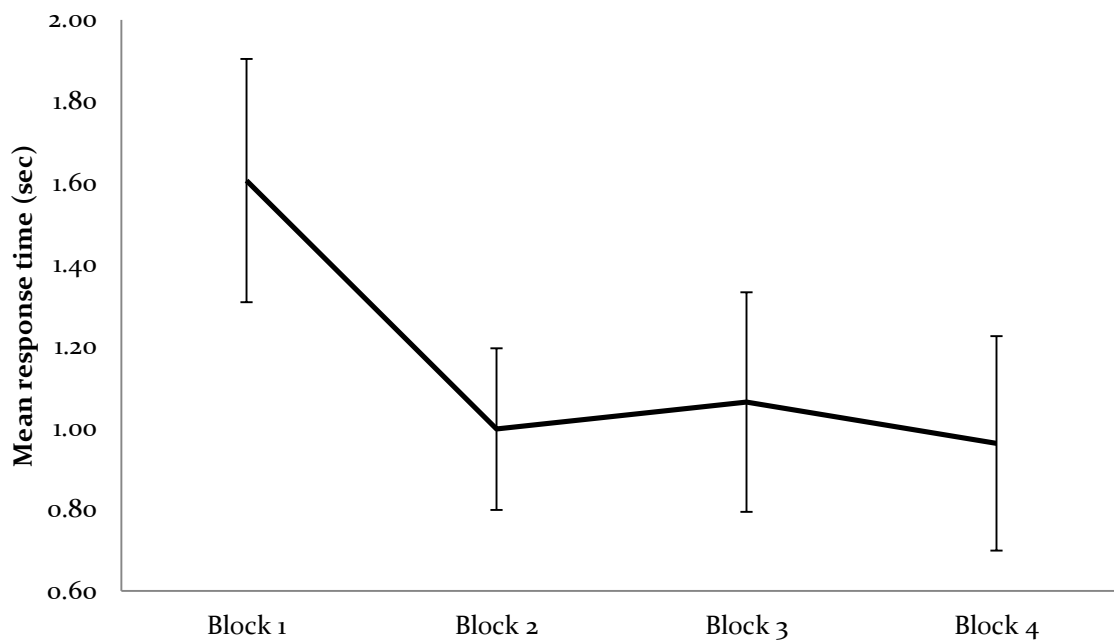


Figure 1. Mean response time in seconds across the four blocks with error bars at 95% confidence.

Associations between response times and fear of pain, pain intensity and threat of pain

A Pearson bivariate correlation was performed on mean response time and fear of pain, pain intensity and threat of pain in order to assess the potential existence of a relationship between high levels of fear of pain, pain intensity and threat of pain, and response times. The analysis revealed no significant correlation between any variables.

Correlation with psychopathic traits

Further analyses were performed to investigate the third hypothesis, which claimed a negative correlation between psychopathic traits and fear-related variables, as well as with mean response time to initiate the pain stimulus. A Pearson bivariate correlation was performed between the PPI-SF total, FD, and IA scores, along with all mean scores of fear-related variables and mean response time. While no significant correlations were found between the PPI-SF total score or the IA score and fear-related variables, positive correlations were found between FD and PCS scores at pretest ($r = .53$, $p = .044$), indicating that higher levels of pain catastrophizing were associated with higher levels of FD. Furthermore, FD was also positively correlated with the sum of the painfulness NRS score across the four blocks ($r = .53$, $p = .044$),

and with the sum of the painfulness, fearfulness and threat NRS scores from block 1 ($r = .61$, $p = .017$). No significant correlations were found between PPI-SF variables and mean response time.

DISCUSSION

This study sought to examine the potential for a heat pain stimulus to be used in a large scale experiment by examining how individuals react in terms of fear-related variables over time when exposed to an increasing heat stimulus. This experiment also examined potential fear conditioning through use of a heating device by assessing potential changes of preference over time towards immediate versus delayed onset of pain. Finally, correlations between psychopathic personality scores and fear-related variables, along with mean response time to initiate the pain stimulus, were examined to obtain preliminary results on the effectiveness of a heat pain device for a larger study on psychopaths.

Several conclusions can be drawn from the results of this pilot study. First, although posttest scores of the PCS and STAI Y1 were lower than the scores at pretest, these scores were not significantly different between time points. Indeed, pain catastrophizing and anxiety remained the same before and after the experiment. This lack of difference between pretest and posttest could be explained by the level of pain given throughout the experiment. It is possible that a heat pain device might not be painful enough to trigger an increase in pain catastrophizing or anxiety. These findings are inconsistent with the results obtained for the NRS ratings regarding fear of pain and pain intensity. While the threat of pain remained nonsignificant throughout the experiment, which could be explained by the safe nature of a laboratory environment in a university, fear of pain and pain intensity displayed significantly higher scores towards the end of the experiment than at the beginning. While there were no significant differences between each time point, it is possible that the heat-device was strong enough to elicit a change in subjective fear and pain levels towards the end of the experiment. However, the maximum averages obtained for fear of pain and pain intensity on a scale of 10 were 2.67 and 4.47 respectively, suggesting a weak increase overall. Despite their significance, the lack of differences between early time points, the differences between all time points for pain catastrophizing, anxiety and threat of pain, and the low average scores at the end of Block

4 suggest to reject the first hypothesis. These preliminary findings are not sufficiently conclusive to expect changes in the majority of fear-related variables in a larger scale study.

While encouraging, the present results also cannot support the second hypothesis, which expected a change over time in mean response time to initiate the pain stimulus. While a linear or quadratic regression would have been more promising, the significant cubic regression obtained is abnormal, as it supports a slow response time at the beginning and end of the experiment while displaying a fast response time during the middle of the experiment. Examination of the results demonstrates that only the response mean of block 1 differs from other blocks. It is possible that the higher mean response time in block 1 is due to a lack of habituation. After a few trials, participants may better understand the concept of pushing the space bar of the computer keyboard to initiate the pain, would explain the lack of difference between blocks 2, 3, and 4. This potential interpretation of mean response time is supported by the absence of any correlation between response time and fear-related variables.

The results obtained to confirm the third hypothesis failed to provide strong evidence of a correlation between psychopathic traits and the use of heat as a pain inducing stimulus. Indeed, no correlations were found between PPI-SF total score or IA and higher levels of fear-related variables or different mean response time. Surprisingly, a few correlations were found between FD scores and higher levels of initial pain catastrophizing and fear-related variables, along with higher subjective painfulness. These results are inconsistent with the well-established notion of a lack of fear in FD (Fowles & Dindo, 2009; Hale, Goldstein, Abramowitz, Calamari, & Kosson, 2004; López, Poy, Patrick, & Moltó, 2013). It is possible that these results stem from the limited number of participants. Furthermore, the negative alpha value found in the Stress Immunity subscale of the PPI-SF demonstrates that some individuals who started with low scores finished the questionnaires with high scores, and vice versa. Considering Stress Immunity is one of the three subscales of FD, it is possible that the responses reported by the participants were too inconsistent to provide a reliable FD score.

This pilot study possesses several limitations, starting with the low number of participants. Although this number is adequate to perform within-subject analysis on the whole sample, small correlations may only be detectable with a larger sample. However, considering the goal of the study, a small sample was necessary to critically evaluate the initial experimental design. This study was also limited by gender bias, as only men participated in the study. It is possible that the results could have differed by including a female sample. However, previous findings indicated a lack of correlation between psychopathic traits, fear of pain, and pain catastrophizing in a female sample (Caes et al., 2012). It may therefore be

necessary to focus the experiment on a male population before developing a mixed-gender study. Furthermore, in order to reduce possible acclimation effects, participants should be given a series of non-painful trials at the beginning to familiarize themselves with the procedure.

This study examined the effectiveness of a heat-pain device for triggering a psychological reaction in terms of pain catastrophizing, anxiety, fear of pain, pain intensity, and threat of pain. No differences were found in pain catastrophizing, anxiety and threat of pain throughout the experiment. While a few significant results were found in fear of pain and pain intensity over the course of the experiment, these results are not strong enough to validate the use of a heat pain stimulus. Furthermore, the difference in mean response time was only present in the first block, suggesting a habituation effect rather than fear conditioning over time. Finally, no correlations were found between fear-related variables and mean response time against PPI-SF total score, and inconsistent results were found on FD.

The aforementioned results suggest that several aspects of this experimental design need to be modified for future research. First, electrical pain stimuli should be prioritized over temperature pain stimuli, as electrical pain displays better outcomes in the field of psychopathy (Hare & Thorvaldson, 1970; Hare, 1965, 1966; Miller et al., 2014). Second, the display of temperature on screen does not seem to be necessary and should be removed, as none of the participants reported to actually believe that the displayed temperature was the temperature they were receiving. Third, the experiment should avoid a low number of trials ($n = 20$ in the current experiment), and should instead implement a larger number of trials while instructing the participants to stop the experiment when their limit is reached. This method may cause more distress, especially in non-psychopaths, while ensuring a constant increase of pain in order to reduce the possibility of habituation. These modifications to the experimental design should be sufficient for a large-scale study assessing pain tolerance in psychopaths and non-psychopaths.

Overall, the present findings suggest that a heat pain stimulus may not be strong enough to trigger fear-related reactions in participants. Similar to the cold pressor previously used to assess tolerance of pain in psychopathic individuals, the heat pain stimulus fails to demarcate itself as a reliable pain-inducing instrument (Miller et al., 2014). It is therefore recommended to perform experiments assessing pain tolerance levels in psychopathic individuals by the use of electric shock, due to its reliability and easiness of use (Miller et al., 2014).

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KLÁRA ERTL

Stigma on the Homeless in the USA and Hungary: An Essay on the Interplay of Prejudice with the Sociocultural Environment

Essay

Homelessness is an increasingly severe problem in many countries around the world. The homeless are often stigmatized by the rest of society. This essay explores how several contextual factors can moderate the expression of prejudice towards the homeless in two countries with different backgrounds, Hungary and the USA. Ambivalent opinions of the homeless exist in both societies, and prejudice is present to some extent in both, but especially in Hungary. Differences and similarities in public attitudes are related to specific challenges of a Western capitalist system, present in both countries, and of the legacy of Communism, unique to Hungary. Psychological mechanisms and cultural values also influence prejudice, such as the perception of threat towards the ingroup, a need for stability, individualism and belief in a just world. It is hoped that this essay can contribute to a complex and dynamic understanding of prejudice.

Keywords: Homelessness, Prejudice, Discrimination, USA, Hungary

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INTRODUCTION

Lying on a bench or on a doorstep, dressed in shredded clothes, with filthy hair and worn-out shoes. Carrying big plastic bags, or sitting on the street with a paper cup for small change. A host of associations are evoked by that one word: “homeless”. Virtually each one of us has some picture in their mind when thinking of homeless people, which makes them an established social category. There is a sad reason for this: the homeless have been present in society for a very long time, and they are for many of us a fact of everyday life. Still, despite their visibility, they are in some ways the most invisible group of all; invisible because most of us have never had a real conversation with a homeless person, and because, at any moment, those we see on the street are only a small part of all the homeless. Most are in a shelter, standing in line for food, or a variety of other places. Knowing so little about them, how accurate is the image that we spontaneously activate when thinking about the homeless? If our image of them is biased, what are the consequences for the homeless themselves? How come we develop negative views of them, and why is this more common in some places than in others? In this essay, I will attempt to answer these questions.

Homelessness: An overview

Homelessness has no universally recognized definition. The homeless are very diverse, and some definitions are broader than others, both in terms of which situation a person should be in to be considered homeless (e.g. living on the street, in temporary accommodation, or inadequate housing) and for how long this situation should last. Definitions depend on the country (e.g. Tipple & Speak, 2005), but also on the different purposes of the persons using the definition; for example, advocacy groups for the homeless, policymakers, and researchers (Toro, 2007).

For example, The McKinney-Vento Homeless Assistance Act defines a homeless person as someone lacking a fixed place to sleep, or living in a supervised institution designed for temporary accommodation, or a place not normally used by humans for sleeping (as cited in Dail, 2000). The European ETHOS definition adds persons that could lose their housing at any moment, and those living in substandard or overcrowded housing (as cited in Hladikova & Hradecky, 2007). Tipple and Speak (2005) point out that a real “home” includes not just shelter, but many other things such as security and social connection; thus many people might have a shelter but not a home.

It is estimated that worldwide, about 1 billion people lack adequate housing, of which 100 million are homeless (Capdevila, 2005; Tipple & Speak, 2005). In Europe, there are more than 4 million homeless a year (Minnery & Greenhalgh, 2007). In the USA, the broadest estimate is 3.5 million (National Law Center on Homelessness and Poverty, 2013).

The homeless show many similarities with the non-homeless poor, and can thus be seen as a subpopulation of the poor (Philippot, Lecocq, Sempoux, Nachtergaele, & Galand, 2007). In developed countries, the homeless have many common characteristics, such as overrepresentation of males, people suffering from mental illness and drug abuse, and ethnic minorities and discriminated groups (Toro, 2007). Many suffer social isolation (Zufferey & Kerr, 2004). Youth, women and families as distinct subgroups of homeless appeared only recently and especially in the USA (Toro, 2007; Shinn, 2007).

Less than 1% of the homeless have chosen to live this way (Dail, 2000). There are many reasons to become homeless, which can be individual and structural (Minnery & Greenhalgh, 2007). Some examples of structural causes are high unemployment, lack of cheap housing (Dail, 2000), eviction (Hladikova & Hradecky, 2007), an inadequate welfare system (Shinn, 2007), and discrimination of minorities in areas of housing and employment (Shinn, 2007; Pleace, 2010). Individual problems are both causes and consequences of homelessness, and include, for example, relationship conflicts, mental and physical illness (Dail, 2000; Albert & Dávid, 2001), domestic violence (Dail, 2000), and leaving foster care at 18 (Hodgson, Shelton, Van den Bree, & Los, 2013). Lacking a protective social network is also a prominent cause (Albert & Dávid, 2001).

To address homelessness, every country has its own helping system, often focused on primary assistance such as providing food, clothes and temporary shelter (Philippot et al., 2007). Many authors point out that it would be better to focus on prevention of homelessness and direct provision of housing (e.g. Minnery & Greenhalgh, 2007). Toro (2007) and Shinn (2007) argue that successful countries are those providing generous social welfare and universal healthcare, which prevents creating homelessness in the first place (Toro, 2007; Shinn, 2007).

Prejudice towards the homeless across societies

The homeless are among the most rejected groups of society. Before explaining why this is so, I will first present the concept of prejudice further. Prejudice is defined as “an attitude or orientation towards a group (or its members) that devalues it directly or indirectly, often to the benefit of the self or own group” (Hewstone, Stroebe, & Jonas, 2012, p. 452). Discrimination is

the behavioural expression of this attitude; in Kimmel's (2011) words, "Discrimination occurs when we treat people who are similar in different ways, or when we treat people who are different in similar ways" (p. 257). When someone is a member of a group that is often discriminated against and considered negatively by most people in society, that person is stigmatized. Goffman (1963) defines stigma as "an attribute of a person that is deeply discrediting, and reduces the person in our minds from a whole and usual person to a tainted, discounted one" (p. 3).

Hewstone et al. (2012) present many theories to explain the phenomenon of prejudice. For example, authoritarianism, characterized by simple thinking and strong adherence to norms, and social dominance orientation, characterized by a preference for hierarchy and justifying of inequality, are both related to prejudice. They are personality traits as well as ideologies. Furthermore, we all have certain cognitive biases that help us to make sense of our complicated social world, and prejudice towards a group can be one way of simplifying one's worldview. At the intergroup level, we can develop negative attitudes towards an outgroup if it seems to present a threat to our ingroup and its security, interests, resources or shared values. Finally, outgroups may evoke negative emotions such as fear, anger or contempt, that are felt more strongly if they are shared among members of our ingroup.

Different groups evoke different emotions and attract different forms of prejudice. According to the stereotype content model (Fiske, Cuddy, Glick, & Xu, 2002), the content of prejudice varies along the dimensions of competence (are members of this group efficient at achieving their goals?) and warmth (are they well-intentioned towards my group?). Combining these dimensions results in four different ways of seeing an outgroup, one of which is contemptuous prejudice. This form of prejudice combines low warmth and low competence, and is directed at groups that evoke frustration, anger and disgust, such as the homeless. This category of prejudice is referred to by Fiske et al. (2002) as "pure derogation". They found that out of 25 social groups, the homeless were perceived lowest on both warmth and competence (Fiske et al., 2002).

Why would the homeless be so rejected? Breitner, Györi and Gurály (2002) argue that they evoke fear because they are unknown to us, and walking past them without helping evokes cognitive dissonance, since we like to consider ourselves helpful. This can be resolved either by helping or by blaming the homeless for their own situation, which means they are not worthy of help. Lopez and Ryder (2012) write that they bother us because they are physically unappealing and break norms, publicly performing activities that are normally carried out in private, such as urinating and sleeping. Even though we may know that they

have no choice in the matter, we tend to interpret these behaviours as wrong. We thus blame the victim for their own plight, because we think everyone only gets what they deserve. This belief is called the Belief in a Just World (Lerner & Miller, 1978). People who endorse it think that good actions usually lead to good outcomes and bad actions to bad outcomes, so conversely, someone's situation is a result of their own doings. If the victim is innocent, their situation is severe and unexplainable, and you cannot help them, as is often the case for the homeless, they are more likely to be blamed (Lerner & Miller, 1978).

Although we are all prone to prejudice to some extent, it is also subject to the norms and values of a particular culture. Norms are shared expectations within a group of what (not) to do, and they can include accepting and expressing prejudice, but may also, alternatively, condemn prejudice and discrimination (Hewstone et al., 2012, p. 239; p. 475). What determines these norms? First, societies differ on how widespread characteristics such as just world beliefs are. For example, Furnham (1985) found that students in an unjust society, South Africa under apartheid, had higher just world beliefs than their British counterparts. Since they were all white and middle-class, he argued that they are socialized to this belief in order to justify their privilege.

Furthermore, societies differ on some cultural dimensions, as proposed by Hofstede (1983), including power distance, individualism, and uncertainty avoidance. Power distance refers to how a society deals with hierarchy: does it accept unequal distribution of power? Uncertainty avoidance refers to how a society deals with ambiguous situations and change (Hofstede, 1983). Individualism refers to the relative importance given to independence of the individual versus connectedness of the group (Crandall, D'Anello, Sakalli, Lazarus, Nejtardt, & Feather, 2001). The dimension of power distance shows theoretical links with prejudice: Furnham (1993) studied just world beliefs in twelve cultures, and found that power distance was related both to just and unjust world beliefs. He hypothesized that in an unequal society, people in high positions believe in a just world and people in low positions in an unjust world. Power distance is also strongly related to social dominance orientation, one of the discussed predictors of prejudice (Ekehammar, Akrami, Gylje, & Zakrisson, 2004). For the dimension of individualism, Crandall et al. (2001) hypothesized that prejudice arises when a person is seen as responsible for a certain attribute that is culturally devalued, but only in individualist societies, where personal responsibility is important (Crandall et al., 2001).

Political factors might play a role: poverty and wealth were explained differently in Western and postcommunist nations in a study by Kreidl (2000). People in postcommunist nations accepted inequality less and related both wealth and poverty to individualistic and

structural causes. People in Western nations more often attributed wealth to individualistic causes (if someone is rich and successful, it is due to their effort, intelligence, etc.). In three countries undergoing political changes, poverty was mainly blamed on the system (Nasser, Abouchedid, & Khashan, 2002). As we have seen when discussing just world beliefs, those who give individualistic explanations of success and failure are likely to blame the victim, and thus to be prejudiced.

Finally, Larsen and Deigaard (2013) argue that the organization of the social system influences how positively or negatively the poor are depicted in the media, which in turn influences public opinion. In their study, British newspapers contained more negative stories about the poor than Scandinavian newspapers. In the UK, the welfare system is very selective, which sparks debates about who is deserving of welfare and scandals about abuse of benefits; whereas in Scandinavia, everyone is entitled to welfare, so there is no need to ask who is most deserving.

Thus, the society one lives in strongly influences one's attitudes about the poor, other stigmatized groups, and to what extent they are responsible for their own plight. This essay will explore the attitudes of society towards the homeless in the USA and Hungary and compare these two countries to find similarities and differences. I chose to examine the situation of the homeless because, as discussed above, they are a suitable example of a commonly stigmatized group. I chose to compare Hungary and the USA since both have a high occurrence of homelessness compared to most developed countries (Toro et al., 2007; McGah, 2005), but they differ very much in their historical, cultural and political background. I will attempt to explain differences and convergence in the way the homeless are seen in these countries by referring to these contextual differences, as well as to common psychological mechanisms, hoping to encourage, by this example, complex and dynamic understandings of prejudice. In what follows, I will first present some features of American and Hungarian culture, then discuss for both countries separately some background information on the situation of the homeless and the public attitude towards them, followed by a short summary. Finally, a comparison will be attempted, followed by a discussion of limitations, suggestions and a conclusion.

Characteristics of Hungarian and American culture

Hungary and the USA each have their own cultural peculiarities. In a comparison of 50 countries, the USA ranked first on the individualism dimension (Hofstede, 1983). The USA place great emphasis on individual freedom (Phelan, Link, Stueve, & Moore, 1995). Cozzarelli,

Wilkinson and Tagler (2001) called both the Belief in a Just world and the Protestant work ethic “core American values”. The term “Protestant work ethic” refers to the idea that everyone has an equal chance of succeeding in life, and can do anything if only they work hard enough (Cozzarelli et al., 2001). Thus, Americans tend to give individualistic explanations of failure (Wright, 1993). Americans are more likely than people in other developed nations to say that people are in control of their own destiny (Kohut, Wike, & Horowitz, 2007). Thus it seems that individual achievement is very important in American society. At the same time, among developed countries, the USA display the highest income inequality (Alvaredo, Atkinson, Piketty, & Saez, 2013) and are the only country without universal healthcare (David, Stremikis, Squires, & Schoen, 2014). This suggests the idea of equal opportunity is illusory, and emphasis on freedom comes at the cost of security. Another peculiarity of American society is the great importance of race: in the USA, questions of race have shaped society, and many issues continue to be framed in terms of race (Philogène, 2004).

What can be said about Hungary? Fűri (2005) studied Americans and Hungarians working together and found that Americans give more value to work and achievement, and Hungarians to stability and precision. In a study by Kolman, Noorderhave, Hofstede and Dienes (2003), Hungary scored high on uncertainty avoidance and power distance, and low on individualism, compared to Western countries. The authors described Hungarians as suspicious and defensive. Compared to people from three other Central European countries, Hungarians agreed more with the statement “when people fail in life, it is their own fault”. West (1994) describes widespread feelings of insecurity in Hungary shortly after the collapse of communism. In a city bordering Serbia and Romania, security was the residents’ main topic of conversation. They did not trust anyone and were afraid of being robbed or attacked, especially by the many strangers streaming into their city. In a comparison of 11 European countries, Hungarians scored highest on ethnic prejudice (Jagodzinsky & Dobbelaere, 1999). In a survey (Sik, 2007), Hungarians were asked whether they were favourable to immigrants entering the country. The majority (61%) said that it depended on whom, and these were given a list of immigrant groups. For four immigrant groups, 77-87% did not want them in the country. Even more surprisingly, 68% did not want Polesians, a fifth non-existent immigrant group made up by the researchers. Thus, Hungarians seem to be hostile towards strangers. The most rejected minority of Hungary, though, has been in the country for centuries. The Roma, a.k.a. gypsies, suffer deep poverty and systematic discrimination (Kende, 2000).

HUNGARY

Background

I will provide some historical context for the situation of the homeless in Hungary. Until 1989, the country was under Communist rule. When this system collapsed, it left a huge toll on Hungarian society (Udvarhelyi, 2014). The economy broke down, leading to massive poverty and unemployment; housing prices rose dramatically (Oross, 2001; Udvarhelyi, 2014). The homeless appeared suddenly, in big numbers (Dávid & Snijders, 2002). Although homelessness existed under Communism, it was pretended it did not, and the few homeless who existed were labelled “dangerous work-avoiders” and locked up (Breitner et al., 2002). Under Communism, most people were guaranteed a job and housing, and many lived in government-owned workhouses, which mostly closed off or were privatized after the system change (McGah, 2005). Hungarians hoped that the change would make them thrive, but 25 years later, their society is still in crisis (Udvarhelyi, 2014). Today many citizens even feel it was better before (McGah, 2005), because under Communism, despite restrictions of freedom, at least there was security (West, 1994).

In Hungary, the official definition of homelessness is very similar to that of the McKinney Act mentioned above (Albert & Dávid, 2001). The right to housing is not written explicitly in the Constitution, therefore the government has no real responsibility to guarantee it (Bakos, 2008). There are an estimated 8000-20,000 homeless in Budapest, which has a population of two million (Dávid & Snijders, 2002; Breitner et al., 2002; McGah, 2005), and at least 30,000 in the whole country, which has a population of ten million (Breitner et al., 2002; McGah, 2005). The characteristics of Hungary’s homeless are mainly similar to those for developed countries in general; for example, most are men and most are aged 40 to 50 (Breitner et al., 2010). An annual countrywide study of the homeless found no evidence for a higher prevalence of alcoholism. In this study, the homeless turned out to be very busy most of the day, travelling from service to service to get different basic needs met and do administration, standing in line, and generally surviving. Those who had some kind of job worked on average more than 7 hours a day (Breitner et al., 2010). Breitner et al. (2002) explain that even though alcoholism might be as prevalent among the homeless as among other Hungarians, alcoholics are precisely those homeless we see on the street, since alcohol is not permitted in shelters (Breitner et al., 2002).

According to McGah (2005), lack of affordable housing is the main cause of homelessness in Hungary, noting that personal causes for homelessness are mostly the same everywhere, but in countries with a dysfunctional social system such as Hungary, structural causes are added. Help for the homeless is localized rather than centrally organized, and consists of many different services that help the homeless with their basic needs and administration (McGah, 2005; Hajléktalanokért, 2012). Since help only started in the '90s when homelessness appeared as a large-scale emergency, the focus has merely been on “extinguishing the fire” (Oross, 2001), that is, on superficial help. Bakos (2008) writes that the longer the homeless stay in helping institutions, the less chance they have of getting out of their situation as they are trapped in a cycle of dependency. To be eligible for temporary housing, it is often required to be drug-free, “capable of independent living”, and to have an income (Hajléktalanokért, 2012) – impossible criteria for most of the homeless. A new solution called “Housing First” has been tried on a small scale in Budapest, which provides the homeless first with housing without any conditions attached, and only later with other services (“Why Housing First?”, Downtown Emergency Service Center, n.d.). This method has proved very effective, but unfortunately it is hard to implement in Hungary due to lack of funding, lack of social housing, difficulty to convince landlords in the private sector, and the pessimism of social workers (Bakos, n.d.; Balogi & Fehér, 2014).

Prejudice towards the homeless in Hungary

As we have seen, mistrust towards outsiders is very present in Hungarian society. Part of the explanation lies in its unique history: for centuries, it has been repeatedly attacked and occupied by more powerful peoples (Udvarhelyi, 2014); after WWI, it lost two-thirds of its territory and population to surrounding countries as defined by the Trianon Treaty; and when Communism collapsed, it left Hungarians in a material crisis as well as a crisis of insecurity and confusion (Udvarhelyi, 2014; West, 1994).

The scapegoat at which to direct these negative feelings are first the Roma. They are the largest minority in Hungary, comprising 3-8% of the population (Koulis, 2005). The negative consequences of the system change disproportionately fell on them, and now, they suffer mass unemployment and poverty, school segregation and persistent discrimination and persecution by citizens, the police and the government (Kende, 2000; Udvarhelyi, 2014).

Poverty is often framed as a “Roma problem”, even though most of Hungary’s poor are not Roma (Járóka, 2010). Roma they tend to live in large families, in overcrowded slums (Breitner et al., 2002) in poor segregated villages (Járóka, 2010; Udvarhelyi, 2014). 20-30% of the

homeless may be Roma (Győri, Gurály, & Szabó, 2014; Udvarhelyi, 2014). Roma are disproportionately subject to evictions (Dér & Eberle, 1998), and homelessness among them is rising (Breitner et al., 2002), but still, they constitute only a minority of the homeless. According to Udvarhelyi (2014), though, public discourse on the Roma and on the homeless is very similar.

That discourse often revolves around “protecting the security of respectable citizens” against the danger the homeless present, while they are being more and more criminalized (Kovács, personal communication, January 30, 2015). In 2013, Hungary became the first country in the world where living on the street is illegal according to the Constitution itself (Udvarhelyi, 2014). After general sympathy for the homeless when they were a new phenomenon in the '90s, “compassion fatigue” set in – Hungarians grew tired of them and directed their feelings of fear and frustration towards them. Today, the homeless are arrested and fined for begging, rummaging in bins or sleeping in public, and portrayed as dangerous by politicians and the media (Udvarhelyi, 2014), or as a landscape-spoiling nuisance (The City is for All, 2013; Missetics, 2010). Attempts are made at driving them away from the capital's public spaces (Udvarhelyi, 2014; Füri, 2012; The City is for All, 2015).

A study of discrimination towards the homeless by representatives of the state found that a large majority of the homeless consider themselves discriminated, mainly by civilians, police and public space supervisors (The City is for All, 2013). They reported discrimination and humiliation in public transport, healthcare and employment. Examples are employers failing to pay homeless people for their work, denial of health treatment, destruction of tents, unnecessary ID checks all day round, or even a security guard throwing hot water on a sleeping homeless person. Interviews with people whose job brings them in contact with the homeless revealed mixed opinions. Some were positive, some expressed strong prejudice, and yet others admitted the conditions of their job gave them no choice in their treatment of the homeless.

In a study of nursing students, only 39% stated having a positive attitude towards the homeless, 24% agreed that their access to healthcare equals that of non-homeless people, and 63% approved the use of force against the homeless (Zrinyi & Balogh, 2004). In a public opinion poll, all respondents reported giving money to the homeless and supported helping them back into society, and two-thirds said they had the right to use public spaces. But many thought the homeless do not want to work or get more money from begging than an average worker in Budapest, and two-thirds supported forcing the homeless to use shelters (Győri, 2006). In another poll, a large majority agreed that the homeless should be cared for, helped to find a job, and that more shelters should be built, and only 2% that they should be punished;

but 43% supported banning them from the city centre, 31% blamed the homeless for their situation, and 74% supported forcing them to go to shelters (Győri, Gurály, & Szabó, 2014).

Hungarians seem to have ambivalent opinions on the issue. Through these polls it is also clear that there is ignorance about the true situation of the homeless, leading to inaccurate stereotypes. In reality, the homeless do what they can to get some income and survive, and only 5-20% practice begging (Breitner et al., 2002), an activity that barely permits to survive the day (Wright, 1988; Győri, 2006). In the winter of 2014, The City is for All, an advocacy group, set up posters around the city centre of Budapest to inform about homelessness and counteract stereotypes (see picture).



A poster in the centre of Budapest raising awareness about homelessness (photo by author).

Summary

In Hungary, homelessness is a symptom of the deep crisis the country experiences since the fall of Communism, and it has been unable to deal with this problem. Helping institutions cannot handle its dimensions and have to work under an essentially unhelpful government. Some cultural factors that prevail in Hungary today encourage a prejudicial norm, such as pessimism and need for certainty coupled with feelings of insecurity and mistrust (Udvarhelyi, 2014; West, 1994; Balogi & Fehér, 2014). The insecurity felt as a consequence of the crisis is, according to Udvarhelyi (2014), a cause of negative attitudes about the homeless. In terms of theories of prejudice, it seems that they are perceived as a threat and evoke collective negative

emotions. Ethnic prejudice towards the Roma resembles and probably overlaps with prejudice towards the homeless (Udvarhelyi, 2014). The homeless are widely discriminated and criminalized by the government and authority figures (Udvarhelyi, 2014; The City is for All, 2013). This punitive approach, as well as negative presentations of the homeless in the media, may further polarize public opinion. Still, in surveys, citizens support helping the homeless (Győri, 2006; Győri et al., 2014). Why this ambivalence?

Homelessness is a complex issue likely to evoke complex opinions. People may be in favour of helping the homeless in principle, but also hold many erroneous stereotypes. Most people are not aware, for example, that there are not enough shelters to accommodate all the homeless (Hajléktalanokért, 2012), that the homeless gladly accept work (Breitner et al., 2010), but that finding work is nearly impossible without already disposing of housing and income. Dangers faced by the homeless include infected wounds, violence and theft, severe underfeeding, and freezing to death (Breitner et al., 2002). People may underestimate the hardships of homeless life compared to their own, and wrongly believe that homelessness is a choice.

Finally, even if they empathize with the homeless, no politician wants their name to be associated with the homeless in the media (The City is for All, 2013), in order to be judged favourably by voters (Győri, n.d.), and authority figures may discriminate against the homeless simply to obey the expectations of their job (The City is for All, 2013). In short, politicians, governmental policy, the media, and misinformed citizens influence each other, reinforcing the societal norm in a vicious circle. Though in this case, that societal norm is negative, a positive norm could have the effect of a beneficial circle, as is the case in Scandinavia (Larsen & Dejgaard, 2013).

THE USA

Background

In the USA, mass homelessness appeared earlier than in Hungary. As explained by Rossi (1990), before the '70s, there were few homeless, concentrated in "skid rows", hidden from view. They were mainly old white men living in cheap hotels close to railroads and other places they could work. Many were alcoholic, physically or mentally disabled. But from the end of the '70s, skid row disappeared as low-skilled jobs were taken over by machines and the cheap

hotels destroyed, and soon the “new homeless” appeared in big numbers. They too were extremely poor, socially isolated and often disabled. But contrary to the skid row residents, they lived on the street, without any job, and could not be ignored because they were scattered everywhere. Also, they were much younger; women, families and children were among them; and African Americans were overrepresented. The McKinney Act was passed in 1987 as a reaction to the phenomenon, creating programs to fight homelessness and signing into law the obligation of the country to do so (Rossi, 1990).

Estimates of the number of homeless in the USA, which has a population of 300 million (U.S. Census Bureau, 2015), vary from 300,000 to 3.5 million depending on the definition (Cordray & Pion, 1991). The number has increased since the 2008 economic crisis (Lopez & Ryder, 2012). Lifetime prevalence is estimated at 6% (Dail, 2000). As in other developed countries, men are overrepresented among the American homeless (Toro, 2007), but compared to Europe, there are more families (35% of the homeless), women (22%) and people under 18 (25 %) (Dail, 2000; Shinn, 2007; Sikich, 2008). Homeless families consist mainly of single mothers with several young children (Bassuk & Rubin, 1987). Another uniquely American phenomenon is overrepresentation of war veterans (Dail, 2000). Ethnic minorities are overrepresented, especially African Americans (Dail, 2000; Rossi, 1990). Again, mental illness and drug abuse are highly prevalent (Toro, 2007). But Wright (1988) notes that many seemingly bizarre behaviours of the homeless are adaptations to the conditions of street life, and that any sane person living on the street would score high on a conventional depression scale. In a study of homeless children, Bassuk and Rubin (1987) found that half would be in need of psychiatric referral due to severe anxiety, depression and developmental delays. Wright (1988) finds it proof of mental strength that the homeless even manage to survive. Indeed, they live on 25-40% of the poverty level income, with a life expectancy of about 50 (Rossi, 1990).

In the USA, several contextual causes of homelessness can be added to the usual culprits: deinstitutionalization of the mentally ill in the '60s-'70s, a restrictive welfare system, the recent economic recession, and lack of affordable housing (Rossi & Wright, 1987). There is even less social housing in the USA than in Hungary (McGah, 2005). The striking overrepresentation of African Americans hints to ethnic prejudice as a cause of homelessness, due to discrimination in many areas (Shinn, 2007). Despite African Americans being already disproportionately present among the poor, Gilens (1996) found that the public and media still dramatically overestimate this proportion, which may further perpetuate this ethnic prejudice.

The same kinds of services for the homeless can be found in the USA as in Hungary. State programs started with the McKinney act, which greatly improved help for the homeless, but still treated it as a temporary emergency instead of a chronic problem (Shinn, 2007). In 2009, the new HEARTH act was introduced, broadening the definition of homelessness and focusing more on prevention and on families and youth (National Alliance to End Homelessness, 2008). Since every state is free to use the HEARTH funding in its own way, in some states the new Housing First approach is being implemented while others keep the older “Continuum of Care” approach (NAEH, 2008) - giving services such as job training and therapy first, under the assumption that the person will get housing when they are “ready” for reintegration into society (Bakos, n.d.).

Prejudice towards the homeless in the USA

The USA are much more advanced than Hungary in helping the homeless. Still, though homelessness is not illegal at the national level, cities criminalize the homeless: examining 187 cities, a recent report (NLCHP, 2014) found that 18% prohibit sleeping in public and 24% begging in public throughout the whole city. 53% prohibit sitting or lying down in particular public places and 9% prohibit feeding the homeless. Criminalization increased since 2011 (NLCHP, 2014). Over half of America’s 50 biggest cities remove the homeless from the public eye, especially those with few shelters or affordable housing (Minnery & Greenhalgh, 2007). Recently the United Nations Human Rights Committee criticized the USA for violating international human rights through their criminalization of the homeless (UN, 2014).

When the homeless first appeared in the ’70s, they drew immediate sympathy. But already in the ’80s, politicians and media started portraying them as lazy freeloaders taking advantage of welfare (Guzewicz & Takooshian, 1992). This led to media reports that Americans showed “compassion fatigue” – that their attitudes towards the homeless had worsened (Tompsett, Toro, Guzicki, Schlien, Blume, & Lombardo, 2003). Is this so?

There are many studies available on Americans’ attitudes towards homelessness and poverty. A Public Agenda national poll (2002) found that a majority of the respondents think the homeless should not be bothered as long as they do not bother anyone, but also that the police should move them away if they drive people away from shopping areas, or if they seem disturbed or verbally threaten people. A later survey in New York City (Arumi, Yarrow, Ott, & Rochkind, 2007) found a majority of respondents stating that everyone has a right to shelter, and ready to pay more taxes to help the homeless. Structural explanations for homelessness prevailed, but individualistic explanations were also very common, and an overwhelming

majority thought that benefits for the homeless should be tied to conditions like psychological treatment or job training.

In examining the effect of education on attitudes to homelessness, Phelan, Link, Stueve and Moore (1995) found that higher levels of education did not change attitudes about the homeless' rights, led to more tolerance for them, but to less support for their economic aid. Their suggested explanation for these peculiar findings is that education socializes students to the normative American values: tolerance and equality, but also meritocracy, due to the belief that equal opportunity really exists. From this view, the homeless are to be respected as people, but their situation is their own responsibility.

It was found that attitudes towards the homeless are less compassionate in the USA than in several European countries, however, a big majority everywhere would be willing to pay more taxes to help them (Toro et al., 2007). Comparing the USA with Germany, Tompsett et al. (2003) rejected the idea of compassion fatigue in the USA, and acknowledged that Americans are more compassionate and well-informed than commonly thought, but still found Germans more compassionate than Americans. The authors thought the difference could be due to stronger values of harmony in Germany and of self-reliant individualism in the USA, and a more comprehensive welfare system in Germany than in the USA. Because everyone in Germany has a right to state assistance, there is less concern over who does or does not deserve aid. This argument is reminiscent of Larsen and Dejgaard's (2013) explanation.

Buck, Toro and Ramos (2004) studied media coverage of homelessness from 1974 to 2003. Coverage of homelessness increased throughout the '80s for popular media and '90s for professional journals. It was mainly sympathetic in popular media, with no evidence of compassion fatigue, but professional journals focused more on deviance than on structural causes of homelessness.

Some researchers have compared attitudes towards the homeless and the poor in general. According to Guzewicz and Takooshian (1992), people have more sympathy towards the homeless than the poor, because their distress is more visible and should be remediable, whereas poverty is perceived simply as an inevitable fact of life. In their study, opinion of the homeless varied widely from sympathy to disgust. Sympathy was correlated negatively with just world beliefs, authoritarianism, and surprisingly, social desirability. This last finding may suggest that the socially desirable norm among Americans is to criticize the homeless. In Wilson's (1996) study, people explained poverty more in individualistic and homelessness more in structural terms. He hypothesized that the values of American culture generally promote beliefs in individual responsibility, but that the special attention of the media for the

homeless, depicting them as victims of the system, gave them the status of societal problem. Lee, Jones and Lewis (1990) reached similar conclusions.

Other studies argue that opinion of the homeless is more negative than that of the poor in general, precisely because they are more visible. They are also more disruptive, unappealing, and homelessness is associated with other stigmatizing conditions (as cited in Lopez & Ryder, 2012). Phelan, Link, Moore and Stueve (1997) presented a story about a man to participants, varying two factors: whether the man was homeless or “just” poor, and whether he was mentally ill or not. Attitudes towards him were quite positive in general, but compared to the poor man, the homeless man elicited more social distance, and the mentally ill man was perceived as more dangerous and needing assistance. The effects of homelessness and mental illness were additive. Thus, homelessness is stigmatized more than poverty, and this is worsened by the stereotypic association of homelessness with mental illness.

Summary

Although the homeless have it better in the USA than in Hungary, they are still being criminalized in some cities (NLCHP, 2014). Surveys find ambivalent attitudes towards them among Americans (Phelan et al., 1995; Arumi et al., 2007): sympathetic opinions and resentment are both common. This might be because the USA are a huge, heterogeneous country, so one could hardly expect a consensus. Studies differ in their samples, measurement methods, and when they were carried out. But contradicting findings can also be explained by American values, which emphasize individual rights and freedom as well as responsibility and effort. The dominant ideology is that everyone has an opportunity of succeeding, everyone is responsible for their own situation, and the system is fair (as cited in Knecht & Martinez, 2009). People might be willing to show some respect and help for the homeless, while believing that they are mainly responsible for their own plight and should be moved away if they act botheringly (Public Agenda, 2002).

Attitudes clearly change with time. Sympathy towards the homeless prevailed at the beginning (Guzewicz & Takooshian, 1992), and although blame might have slightly increased since, no clear evidence was found of widespread compassion fatigue neither in the '90s nor in recent studies, contrary to what many had proposed (Tompsett et al., 2003; Buck et al., 2004). Researchers disagree on whether attitudes towards the homeless are more or less compassionate than towards the poor in general. Some argue that there is more sympathy for the homeless because of their status as a societal problem, emphasizing the role of the media in shaping public opinion (Guzewicz & Takooshian, 1992; Wilson, 1996). Others find that the

homeless are stigmatized more than the poor due to their disruptive presence and association with other stigmatized conditions (Phelan et al., 1997). Finally, the legacy of centuries of racism is still seen in the overrepresentation of African Americans among the homeless, and in the stereotypes the media perpetuate (Rossi, 1990; Gilens, 1996).

A COMPARISON

Homelessness exists against a different historical and societal background in Hungary and the USA, and many differences can be observed as a result. Mass homelessness started sooner in the USA, and both research on the subject and helping programs are much ahead compared to Hungary. Prejudice and discrimination towards the homeless are also more blatant in Hungary than in the USA. Furthermore, tracking tendencies from the appearance of mass homelessness to now, recent compassion fatigue can clearly be seen in Hungary but not in the USA. This is due to the discussed societal conditions unique to Hungary that encourage stigmatization while making it difficult to deal with the problem of homelessness. According to Udvarhelyi (2014), the transition to become an independent democracy is very hard for Hungary, since it had never really been one. She argues that the recent criminalization is similar to treatment of the homeless under Communism, but without the accompanying social infrastructure to prevent homelessness in the first place.

However, striking similarities can also be seen. In both countries, homelessness is a pervasive issue that appeared relatively recently on a large scale, and the homeless are increasingly criminalized. Their social systems also show common characteristics. Recently Hungary has started to resemble the USA in many respects such as high inequality, crisis of the economy and social welfare, and a highly punitive legal system (Misetics, 2010); it is a mix of American-style capitalism and returned Communist-style authority (Udvarhelyi, 2014). According to Misetics (2010), high penalizing occurs when a societal crisis needs to be contained. It seems that Western capitalism and transition from Communism both create unique challenges, the latter being a problem of Hungary, whereas the former is characteristic both for the USA and for Hungary. This situation can be contrasted to that in Scandinavia, Germany and some other Western European countries, where societal crisis is less present and the welfare system is generous (Larsen & Dejgaard, 2013; Tompsett et al., 2003).

Both countries show similar effects of psychological mechanisms and cultural norms and values on prejudice. Cognitive biases operate to help people make sense of their social environment, especially in a critical situation, as can be found in Hungary and the USA. Prejudice appears especially when an outgroup is perceived to threaten our ingroup and evokes negative emotions in members of our group; this seems to be the case for both countries, but especially Hungary. The belief in a just world, an important factor of prejudice towards disadvantaged groups, is very present in both societies. So is ethnic prejudice, particularly towards African Americans in the USA and Roma in Hungary, and this accompanies and reinforces prejudice towards the homeless. The victim-blaming that accompanies just world beliefs can be contrasted with values of compassion and care that appear stronger in countries like Scandinavia and Germany.

Each country has their own combination of cultural values that moderate stigmatization of the homeless. In Hungary, there is a strong need for hierarchy, security and stability, arguably corresponding to Hofstede's (1983) dimensions of power distance and uncertainty avoidance. These values coupled with the discussed sociohistorical conditions encourage prejudice. In the USA, valuing of individual rights and freedom may counteract prejudice, whereas valuing of individual responsibility and effort encourages blaming the homeless. Both aspects coexist and are related to Hofstede's individualism dimension. Finally, these different combinations of factors in both countries lead to a similar ambivalence of public opinion, whereby non-homeless people display both sympathy and a set of negative stereotypes towards the homeless.

Limitations of literature

I would like to note that it is very hard to find any scientific research on public opinions about the homeless in Hungary, either because it does not exist or is hard to access. When it does, it is usually written by foreign researchers. Most literature I found concerning Hungary came from governmental institutions or advocacy groups, which compromises its scientific objectivity. An example is the study of the discrimination of homeless people by The City is for All (2013). Homeless people themselves played a significant role in carrying out the project, which might have biased the results. According to sociologist Róbert Kovács, homelessness is a sensitive subject in Hungary even among scientists, and research focuses mainly on the situation of the homeless rather than society's attitude towards them, which is rather a subject for politicians (Kovács, personal communication, January 30, 2015). In contrast, for the USA, a

large amount of scientific literature on the subject can be found in psychological, sociological and other journals.

Philippot et al. (2007) already noted that in the USA, there are many scientific studies on homelessness, whereas in Europe, only half of the research on homelessness is actually carried out by academics. It is mostly funded by the government and directly policy-oriented. Many studies are qualitative and not widely available. This may also be the reason why, as reported by Toro (2007), American research tends to analyse homelessness at the individual and European research at the sociocultural level.

However, an advantage is that Hungarian sources were more recent. The literature about the USA is often dated: half of the sources are more than 15 years old. Furthermore, some empirical studies suffered from issues with representativeness of participants and various problems of methodology (oversimplifying by using a forced-choice question; suggestive wording of questions; using an unrepresentative story to assess opinion), which may have biased the results.

SUGGESTIONS FOR FURTHER RESEARCH

Future research in the USA should continue to monitor Americans' general attitudes to the homeless. Shifts of opinion over time could be tracked and linked to changes in policy, economic situation, or media attention. Hungarian psychologists, sociologists and other researchers should start carrying out systematic research on Hungarians' attitudes towards the homeless, since foreign researchers may be limited by lack of background knowledge and language skills, and advocacy groups lack neutrality. The latter could leave the task of research up to scientists and concentrate their efforts on help and advocacy, relaying accurate information to the public based on scientific study as well as their own experience. It would be interesting to review the relationship between societal factors and prejudice towards the homeless in other post-Communist countries, and observe which patterns found in Hungary are unique and which are common to those countries. In general, I would encourage further research into the interaction of contextual factors with prejudice, studying different marginalized groups and societies around the world.

CONCLUSION

The aim of this essay was to show how contextual factors in a society might affect the extent and expression of prejudice by public opinion towards a marginalized group. Public attitudes towards the homeless in Hungary and the USA were compared and similarities and differences explained from a sociocultural point of view.

Prejudice develops as a way of coping with negative feelings and making sense of the world in uncertain situations. Many reasons make the homeless an ideal target of prejudice. They are perceived as both unsympathetic and incompetent, their behaviour and appearance are disturbing, and they may evoke fear and contempt. Misconceptions include beliefs that the homeless are dangerous and alcoholic, that they are entirely responsible for their own situation and thus do not deserve much help, and that they are freeloaders: they do not want to work and live a relatively comfortable life, taking advantage of other people's efforts.

This prejudice towards the homeless is influenced by a complex interplay of cultural norms and values, societal history, political decisions and media portrayals. Even when they concern the same marginalized group, attitudes can differ across societies and change dynamically over time. On the other hand, despite very different context and background, a situation that is similar in many respects emerged in the two societies used as example.

I hope that the attempted analysis can contribute to a better understanding of the complex phenomenon of prejudice and add to already existing models and frameworks. Finally, I would like to emphasize that giving extensive and accurate information about the homeless to the public is crucial to address widespread negative stereotypes. Without this, the risk of stigmatization and unfair punishment of the homeless by a society will continue to exist.

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NINA WEINGARTEN (ET AL.)

The Effect of Frustration and Boredom on Self-Harming Behaviour

Original Paper

Despite the increasing attention on self-harming behaviour, research lacks evidence-based understanding of factors that can influence or cause this phenomenon. This study focuses on the influence of boredom and frustration on self-harming behaviour. This was done by measuring the amount and intensity of self-administered electrical stimulation amongst 63 undergraduate psychology students. Frustration was manipulated with an unsolvable computer task and boredom with a movie. Participants in the frustration condition were expected to harm themselves more intensely, whereas participants in the boring condition were expected to harm themselves more frequently. For the induced boredom, there was an effect on the frequency of self-harming behaviour. However, the frustration manipulation demonstrated no effect on either intensity or frequency of self-harming behaviour by the participants. We argue that the effects of the induced frustration did not last long enough to have an effect on the later self-harming.

Keywords: Boredom, self-harming behaviour, frustration, electrical stimulation, non-suicidal self-injury (NSSI)

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INTRODUCTION

Boredom is an emotion that is generally experienced as negative or unpleasant (Gerritsen, Toplak, Sciaraffa & Eastwood, 2014). Previous research has shown that it seems to have serious aversive consequences: Experiencing boredom is related to increased gambling behaviour (Blaszczynski, McConaghy & Frankova, 1990), psychopathology like anxiety and depression (Sommers & Vodanovich, 2000), and less attempts to stop smoking (Amos, Wiltshire, Haw & McNeill 2006). Moreover, there appears to be a positive correlation between self-reported boredom and mortality rates (Britton & Shipley, 2010). The negative consequences of boredom clearly show that it is not a trivial phenomenon. In a British survey, participants indicated experiencing approximately six hours of boredom in a week on average (Toohey, 2011), which demonstrates the prevalence of this possibly dangerous sentiment.

In order to escape this feeling of boredom, any form of distraction (or stimulation) is sought after; such as reading, watching television or increasing the amount of food that one eats (Koball, Meers, Storfer-Isser, Domoff & Musher-Eizenman, 2012). A possible explanation for distraction seeking could be that one aims to replace the feeling of nothing with the feeling of something good. However, there is evidence that stimuli which sought after can also be negative. In other words, the driving force behind stimulation seeking behaviour is not to experience positive affect, but to simply avoid monotony (Havermans, Vancleef, Kalamatianos & Nederkoorn, 2014). Havermans et al., (2014) demonstrated that in a state of induced boredom, there was an increase in the amount of chocolate eaten, as well as in the amount of electrical shocks self-administered, compared to the neutral condition. With reference to everyday life, boredom might therefore be seen as a trigger for self-administering aversive stimuli (such as self-harm) as a means to avoid monotony.

In general, it has been found that self-harming behaviour is correlated to the presence of negative affect, such as anxiety, frustration and sadness. It is suggested that self-harm might act not just as a distractor stimulus, but also as a coping mechanism to decrease negative feelings (Nock, 2009). This suggests being bored would allow for dwelling on negative thoughts, and self-harm would serve to distract from the numbness of lack of feeling, or to relieve stress from negative affect. This explanation is in line with Chapman's Experiential Avoidance Model (Chapman, Specht & Cellucci, 2006). This model states that deliberate self-harm, like scratching, burning, or cutting oneself (i.e. non-suicidal self-injury NSSI; Nock & Favazza, 2009), serves the purpose to avoid negative emotional experiences. The exact

prevalence of NSSI varies among different age groups. Among students 17%-41% (Whitlock, Eckenrode & Silverman, 2006; Aizenman & Jensen, 2007) reported to have performed self-harming behaviour at least once, whereas among adolescents the prevalence varies between 13%-23% (Jacobson & Gould, 2007; Muehlenkamp, Claes, Havertape & Plener, 2012). Among adults in the United States approximately 4% perform self-harming behaviour (Briere & Gil, 1998). NSSI is also related to the Borderline Personality Disorder, but it can also occur in the absence of a diagnosis (Briere & Gil, 1998). While at first glance boredom seems to play only a minor role in the act of self-harm, it has been found that boredom, or the need for stimulation, has been reported as a driving motive for self-harming behaviour (Nock, 2009).

Recently, Nederkoorn et al., (2016) tested whether self-harming behaviour serves the purpose of relieving negative feelings. The design was similar to that from Havermans et al., (2015), where movies served as mood induction and electrical stimulation was free accessible to participants. A third condition was added (sadness) to examine the effect of a different negative emotion on non-suicidal self-harming behaviour (electro shocks). They discovered that sadness did not increase self-administered electrical shocks, but boredom did. That supports the conclusion of Havermans et al., (2015) that experiencing boredom leads to an increased need to escape the monotony, instead of the need to relief negative feeling as argued by Nock et al., (2009).

The present study aims at further investigation of the role of negative emotions on self-harming behaviour, more specifically the role of boredom and frustration and the combination of both on self-harm. We expected that participants who are bored would shock themselves more frequently than participants who do not experience boredom, because of a need for stimulation. Furthermore, we hypothesized that subjects in the frustration condition would administer shocks at a higher intensity compared to the neutral and boredom condition. A more intense stimulation should serve to remove attention from the experienced negative feelings. In addition, we expected an interaction effect for both the intensity and frequency in the condition in which participants experience both boredom and frustration. In other words, people who are bored and frustrated were expected to shock themselves at a higher intensity and frequency than participants in other conditions. t>

METHOD

Participants

Sixty-three psychology students (37 women, M age = 21.35, SD = 1.54) from Maastricht University participated in return for “participant points” needed to fulfil a course requirement. The participants were recruited through flyers located in the University and shared on social media. Exclusion criteria were pregnancy, heart and vascular problems, history of self-harming behaviours, schizophrenia, memory deficits and other cognitive impairments, and neurological diseases including epilepsy. Schizophrenia was selected, because it is strongly associated with self-harming behaviour (Haw, Hawton, Sutton, Sinclair & Deeks, 2005). The study was reviewed and approved by the ethical committee of the Faculty of Psychology and Neuroscience of Maastricht University.

Design

The experiment was announced as a study testing the influence of cognitive performance on perception. The experiment had a 2 (frustration vs. neutral, i.e. unsolvable vs. solvable task) x 2 (boredom vs neutral, i.e. repeated clip vs. movie) between-subjects design. Participants were randomly assigned to one of four conditions: frustration & boredom (14 participants), neutral & boredom (15 participants), frustration & neutral (16 participants) and neutral & neutral (15 participants). The dependent variables in this study were the frequency and intensity of self-administered electrical stimulations and the levels of self-assessed boredom and frustration. The independent variable was the participant’s condition.

Materials

Mood Questionnaire

The mood questionnaire was designed by the authors and consists of a series of mood related questions (i.e. how happy are you right now?) that were answered in a traditional Likert scale ranging from 1 to 10 (see appendix). The mood questionnaires did not include information about participant’s demographics. We obtained information about gender and age from the participant based on the consent form.

Word salad task

The word salad task consists of 20 words whose letters have been rearranged differently in order to create a nonsense word. The participants were asked to find the original word (e.g. dnaicng = dancing). Participants in the neutral condition received a version that was easily solvable whereas participants in the frustration condition received a version of the word salad task that was unsolvable (4 out of 20 were solvable in order to avoid suspicion). In addition, to increase the levels of frustration, participants in the frustration condition were told prior to the task that they would receive a monetary reward if they could outperform their peers. Since the task was unsolvable it was impossible for them to do well and they therefore never actually received the reward. Moreover, participants in the frustration condition were told that they performed worse compared to other participants.

Film fragments

The film fragments used were taken from the movie “Good Will Hunting” (Bender & Van Sant, 1997). Participants watched the film fragments for a total of 30 minutes. In the neutral condition participants watched the beginning section of the movie. The movie portrays a janitor, who is very talented in math and chemistry but does not realize his potential. Certain high arousal sections were excluded from the movie in order to avoid eliciting any long lasting emotions in the control condition. Examples of scenes that were deleted are a heated discussion between the main character and his therapist or a scene in which the main character is talking to a girl in a bar. In the boring condition participants viewed a 30 second clip on repeat taken from the same movie. In this particular clip the main character is able to solve a very complicated mathematical problem. Watching someone solving a puzzle, should serve as a frustration cue to the participants in the frustration condition. More precisely, after being exposed to an unsolvable puzzle, we expected that seeing someone solving a “mathematical puzzle” would serve as a frustration cue.

Electrical stimulation

Electrical stimulations were administered through two electrodes placed on the medio posterior part of the left forearm. The size of one electrode is approximately 1 cm. The

stimulations were controlled through buttons on the keyboard that allowed the participants to increase or decrease the intensity at will. The range of intensities varied from a minimum of 1mA to a maximum of 20mA. The frequency and intensity of the administered stimulations were recorded by a computer.

Procedure

Participants were invited by email to the lab for a session that lasted about 60 minutes. When entering the lab, the participants were asked to read and sign an informed consent highlighting the procedure and the exclusion criteria (see 2.1). In addition, participants were instructed to remove any possible distractions or time telling devices such as watches, tablets, laptops, and/or phones. Then participants were accompanied to the testing room. During the following procedure, the participant was alone inside the room, but the experimenter could see the participants on a screen. At the beginning of the testing session, participants filled in the first mood questionnaire. Afterwards they were asked to perform a word salad task as well as they could. Our first mood manipulation took part during this task. Immediately after finishing the task, the participants filled in the second questionnaire to assess their mood. In the next part of the study the electrodes were placed on the participant's forearm and instructions for the electrical stimulation machine were given as well as a small sheet of paper that contained the written instructions. Then, one of the two film fragment was shown to the participant, to serve as the second mood manipulation. Only during this part of the study could the participants self-administer electrical stimulations. After watching the movie, participants filled in the third questionnaire. Additionally, we conducted a calibration test to determine participant's pain threshold. A series of electric stimulations were applied to the participants, starting with an intensity of 1mA and each time increasing it by 1 mA. After each stimulation, the participants were asked how it felt. If the participant indicated that the stimulation was experienced as painful (rather than feeling unpleasant or weird), the stimulation was stopped immediately and the intensity was noted as that participant's pain threshold. Finally, participants were fully debriefed and given a course credit and a small gift (an eraser). The procedure is visualized in figure 1.

Statistical Analysis

First, an ANOVA with repeated measures was conducted to see if the mood manipulation was successful. To test the first hypothesis a GLM Univariate Analysis was performed. To test the

first hypothesis, the number of shocks was the dependent variable. To test the second hypothesis, the maximum intensity of the shocks was used. To test the third hypothesis, the average intensity of shocks was compared between conditions.

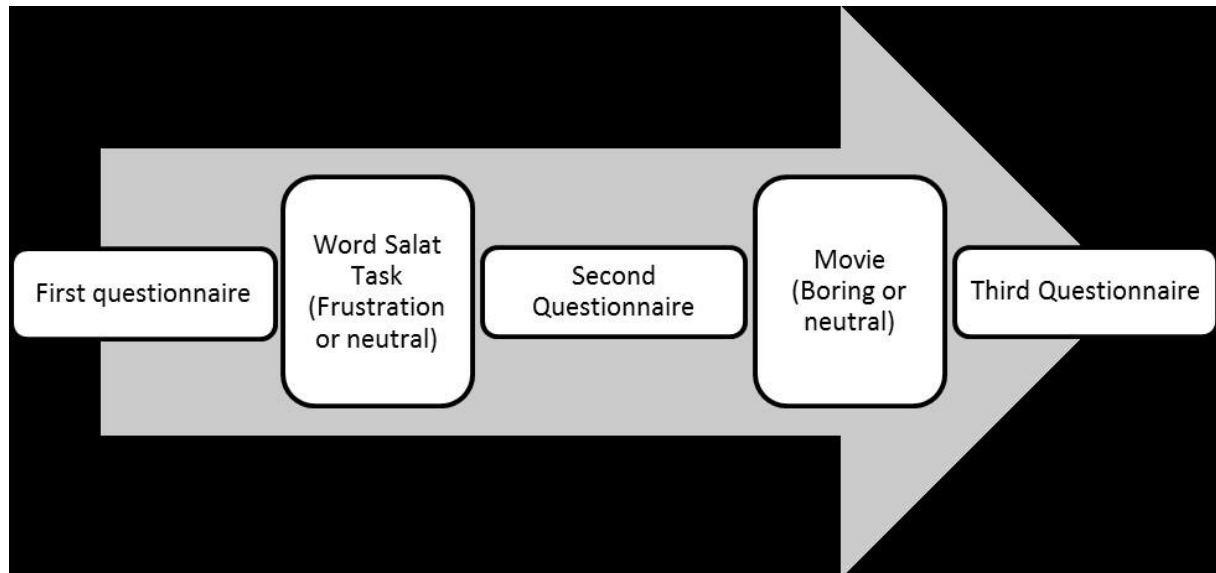


Figure 1. Timeline of Experimental Procedure

RESULTS

Manipulation check

The word salad task had a significant effect on frustration ($F(1, 61) = 21.53, p < 0.001$, figure 2). Participants in the frustration condition were more frustrated after doing the word salad task than before. However, after watching the movie, the frustration level returned to baseline (figure 2). The manipulation of frustration had no effect on boredom ($F(1, 61) = 0.996, p = 0.322$). In contrast, the boredom movie significantly increased boredom ($F(1, 59) = 46.701, p < .001$). These results suggest that our mood manipulation was immediately effective, though the induced frustration was not long lasting. In table 1 and 2, a summary of the changes in boredom and frustration levels in response to the different manipulations is provided. The overview is provided for every single condition.

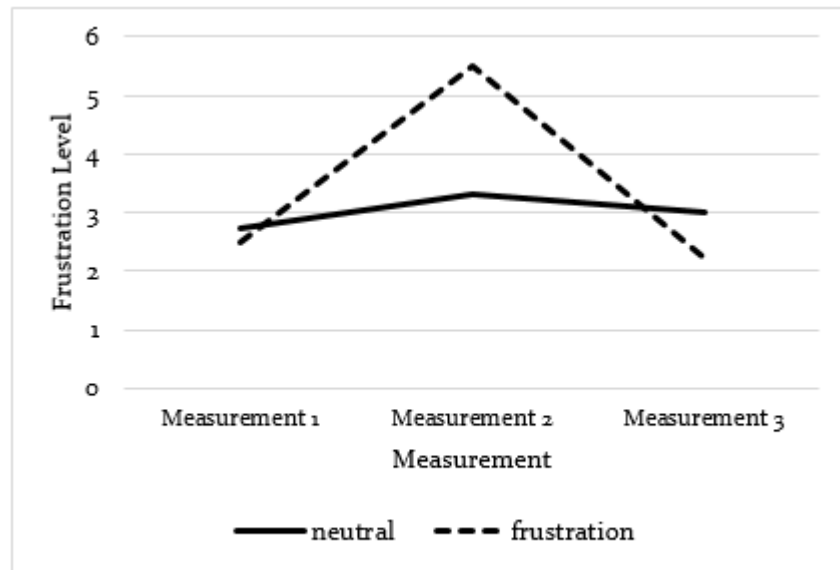


Figure 2. Frustration Level across all three Measurements.

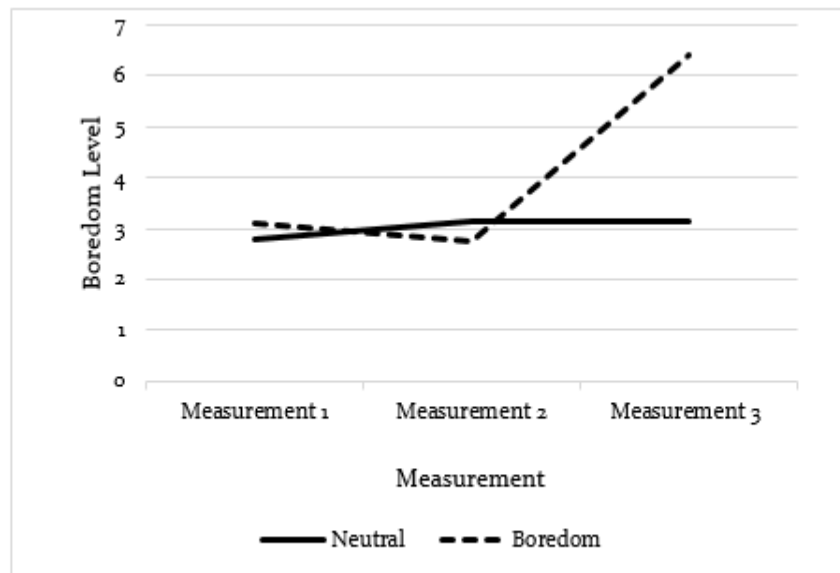


Figure 3. Boredom Level across all three Measurements.

Table 1. Results of Frustration Manipulation per Condition

	Frustration& Boredom	Boredom Only	Frustration only	Control
N	14	15	16	15
Mean (SD)				
1 st Measure	2.6 (1.76)	3.06(2.26)	2.63 (1.89)	2.38 (1.41)
2 nd Measure	5.07 (2.37)	3.25 (1.69)	6.13 (2.70)	3.25 (1.81)
3 rd Measure	3.53 (2.33)	3.75 (2.08)	2.19 (1.22)	2.00 (1.41)

Table 2. Results of Boredom Manipulation per Condition

	Frustration& Boredom	Boredom Only	Frustration only	Control
N	14	15	16	15
Mean (SD)				
1 st Measure	3.20 (1.78)	2.96 (1.54)	2.31 (1.30)	3.38 (1.71)
2 nd Measure	2.67 (1.17)	2.31 (1.30)	3.00 (2.28)	3.13 (1.78)
3 rd Measure	7.13 (3.18)	6.69 (2.30)	2.81 (1.80)	3.06 (1.48)

Effect of boredom and frustration on electric stimulation

Three of the 63 participants were excluded from the analysis. They were identified as outliers, because their number of self-administered electro shocks was 2.5 SD larger than the mean. One from the neutral-neutral condition, one from the neutral-boredom condition and one of the frustration-boredom condition. Mean and SD are provided in table 3.

Table 3. Analysis of the self-administered electro shocks per Condition

	Frustration& Boredom	Boredom Only	Frustration only	Control
N	14	15	16	15
Mean (SD)				
Number of				
Shocks	37.43 (40.69)	46.67 (39.03)	19.88 (28.18)	23.87 (24.87)
Maximum				
Intensity (mA)	7.57 (6.26)	9.40 (7.09)	6.56 (7.07)	7.07 (6.83)
Mean				
Intensity (mA)	3.19 (2.45)	4.85 (3.47)	3.25 (3.38)	4.05 (3.89)

Number of shocks, maximum intensity and mean intensity

In contrast to our hypothesis, there was no significant interaction effect between frustration and boredom on the number of shocks ($F(1,56) = 0.091$, $p = 0.764$). The interaction term was therefore, removed from the analysis. Boredom had a significant effect on the number of self-administered electric shocks ($F(1,57) = 5.477$, $p = 0.023$). People who were bored administered more shocks to themselves than people in the neutral condition, as can be seen in figure 4. In addition, frustration had no effect on the frequency of shocks ($F(1,57) = 0.573$, $p = 0.452$). There was no effect of boredom on the highest self-administered shock ($F(1,60) = 0.972$, $p = 0.328$). In addition, frustration had no effect on the maximum intensity ($F(1,60) = 0.524$, $p =$

0.472). There was neither an effect of boredom on the mean of shocks ($F(1,60) = 0.308, p = 0.581$) nor of frustration on the mean intensity of shocks ($F(1,60) = 2.526, p = 0.117$).

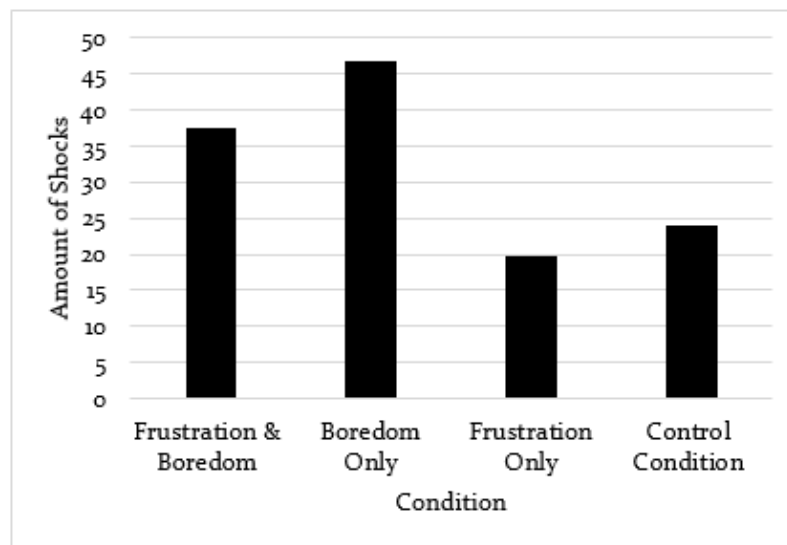


Figure 4. Number of Shocks per condition.

Pain threshold

The mean pain threshold was 9.556 mA, $SD = 4.623$. There were 17 participants (28.3%) who self-administered shocks above their pain threshold. Six of them were in the frustration-boredom condition, three in the neutral-neutral condition and four in each of the other two conditions. The chi-square test showed that this distribution did not differ between the frustration conditions ($\chi^2(1, N = 60) = 0.739, p = 0.390$), nor in the boredom conditions ($\chi^2(1, N = 60) = 1.045, p = 0.307$).

DISCUSSION

In our study we looked at the influence of boredom and frustration on self-harming behaviour and how they interact. We predicted that the induced state of boredom and frustration would both (independently) increase the amount of electrical stimulation that was self-administered. We also predicted an additive effect when boredom and frustration were experienced together and predicted this would lead to an increased tendency to harm.

The acquired mood ratings confirmed the effectiveness of both the boredom and frustration mood induction in participants immediately after the manipulation. It should be

noted that while participants were more frustrated after completing the unsolvable word puzzle tasks (compared to the solvable task), this frustration wore off after viewing the film for 30 minutes. Thus the effects of the frustration manipulation were effective but short lived.

For all conditions we measured the shock intensity and frequency that was self-administered by the participant. We did not find any interaction between frustration and boredom. However, the induced boredom increased the frequency of electrical stimulation but not the intensity. People in the boredom condition had a higher frequency of shocks compared to people in the non-boredom condition. This was in agreement with the hypothesis. Furthermore, we expected experiencing frustration would increase the intensity of electrical stimulation. However, this was not the case, where no effect of frustration on either intensity or frequency of shocks administered could be observed. In addition, there was no interaction effect between frustration and boredom.

The present study has some limitations, which are mainly based on the lack of effect frustration had on the intensity of administered shocks. This lack of effects could be due to several reasons, the first of which being that our induction of frustration was not effective and did not live up to real life standards. The unsolvable word puzzles might not have generated strong negative feelings, thus the induced frustration was not experienced to the same extent to which we experience frustration in stressful real-life situations. Not solving a puzzle was probably not important enough to the participants to evoke self-harming behaviour. In real-life, frustration arises due to more important events (e. g. being treated unfair, losing a phone, failing an exam...). It is therefore suggested to use a different method for manipulating frustration that better resembles a real-life situation.

Another explanation is that the feelings of frustration caused by the word salad task did not last long enough, which is can be supported by our data. At the second measurement, participants scored significantly higher on the frustration measurement. However, by the third measurement the levels of frustration were diminished, indicating that it was only a short-lasting immediately observable effect. Although participants were initially frustrated by their inability to solve the word problems, the feeling faded once the next task was introduced. Therefore, it would have less effect in causing self-harming behaviour. Due to the nature of the experiment, it was not possible to counterbalance the order of the frustration and boredom condition, because the dependent variable was the shocking behaviour. Therefore, we could not control for order effects, which is another limitation of the study. An additional limitation is that we used self-made questionnaires. They were not standardized and are therefore not

tested for reliability and validity. Possibly, the mood manipulation was successful, but the measurement instrument did not assess it correctly.

It is also possible that negative affect such as frustration does not influence self-harm, in contrast to what previous research suggested (Nock, 2009). However, in the current study, only healthy undergraduate students were tested and students with a history of self-harm were excluded. It is therefore possible that the participants could effectively regulate their emotions and did not need to revert to the electric stimulation. Perhaps people with less effective coping strategies might have more difficulty coping with anger and frustration. In a study performed by Nocks (2009), a common factor among many individuals who self-harmed regularly was having pervasive negative feelings. In turn, this might have an effect on how they develop their coping mechanisms.

In order to investigate the possible reasons explaining the absence of an effect of frustration on self-harming behaviour in this study, one should consider offering different stimuli to participants to perform self-harming behaviour. As mentioned earlier, NSSI can take many forms such as burning, cutting or hitting. One could do research on the relation of frustration/ boredom to other types of self-harming behaviour besides electro shocking. However, it is most important to prevent the participant from real harm. Therefore, one should carefully select stimuli that are offered to perform self-harming behaviour. Since electro shocking at a very low intensity is not dangerous, yet painful, more research is needed to define good alternatives. Moreover, it would be important to improve the induction and measurement of frustration on participants. Due to ethical reasons, inducing a more pervasive, long lasting feeling of frustration amongst the participants was not realistic. A possible avenue to pursue instead would be to conduct a quasi – experimental procedure, measuring the difference in experienced frustration in day-to-day lives between self-harmers and non-self-harmers. This additional information of the relevance of this emotion could help understand the impact negative affect has on such behaviour. It is especially important due to its high prevalence (especially among adolescents) and its relationship with a borderline personality disorder.

In conclusion, it is important to recall that while the effects of frustration did not seem to have an impact on self-harming tendencies – the influence of boredom did demonstrate significant effects. This is in accordance with the results of Havermans et al., (2015), where the search for stimulation leads to aversive as well as positive interactions. This non-discriminative search for aversive or approachable stimuli to relieve boredom suggests the potential risk boredom may play in many situations. It is important not to underestimate the role that lack

of stimulation or interest might have on the individual. The current results are relevant in understanding and dealing with self-harming behaviour. It gives insight into the mechanisms and factors of self-harm, which can help us to identify which therapies to use and how to improve therapies.

We hope further research aims to illuminate other factors that interact with the effects of boredom and search for stimulation.

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APPENDIX

Questionnaire 1

Participant: _____

Note your answer by circling the number on the ten-point scale.

On a scale from 1 to 10, in which 1 means not at all and 10 means very much:

- | | | | | | | | | | | |
|--|---|---|---|---|---|---|---|---|---|----|
| -How frustrated are you at the moment? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| -How bored are you at the moment? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| -How excited are you at the moment? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| -How happy are you at the moment? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| -How angry are you at the moment? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| -How anxious are you at the moment? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| -How curious are you at the moment? | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Questionnaire 2

Participant: _____

Note your answer by circling the number on the ten-point scale. _____

On a scale from 1 to 10, in which 1 means not at all and 10 means very much:

-How frustrated are you at the moment?	1	2	3	4	5	6	7	8	9	10
-How bored are you at the moment?	1	2	3	4	5	6	7	8	9	10
-How excited are you at the moment?	1	2	3	4	5	6	7	8	9	10
-How happy are you at the moment?	1	2	3	4	5	6	7	8	9	10
-How angry are you at the moment?	1	2	3	4	5	6	7	8	9	10
-How anxious are you at the moment?	1	2	3	4	5	6	7	8	9	10
-How curious are you at the moment?	1	2	3	4	5	6	7	8	9	10
-Did you find the word puzzle difficult?	1	2	3	4	5	6	7	8	9	10
-Do you like puzzling?	1	2	3	4	5	6	7	8	9	10
-How well do you think you did?	1	2	3	4	5	6	7	8	9	10

Questionnaire 3

Participant: _____

Note your answer by circling the number on the ten-point scale. _____

On a scale from 1 to 10, in which 1 means not at all and 10 means very much:

-How frustrated are you at the moment? 1 2 3 4 5 6 7 8 9 10

-How bored are you at the moment? 1 2 3 4 5 6 7 8 9 10

-How excited are you at the moment? 1 2 3 4 5 6 7 8 9 10

-How happy are you at the moment? 1 2 3 4 5 6 7 8 9 10

-How angry are you at the moment? 1 2 3 4 5 6 7 8 9 10

-How anxious are you at the moment? 1 2 3 4 5 6 7 8 9 10

-How curious are you at the moment? 1 2 3 4 5 6 7 8 9 10

-Did you find the movie interesting? 1 2 3 4 5 6 7 8 9 10

-Did you see the movie before? Yes / No

-Did you like the movie? 1 2 3 4 5 6 7 8 9 10

What did you think the experiment was about? Note your answer below.

BO ABEN

Another Piece to the Puzzle: Accounting for the Reminiscence Bump

Review

The reminiscence bump comprises an increase in the recollection of memories from adolescence and early adulthood in older adults and can be elicited by the use of the Crovitz-Shiffman cue word method. Furthermore, the reminiscence bump also comprises less vivid, emotive and significant memories. Multiple accounts provide explanations of this phenomenon, one of which is Fitzgerald's life-story account. This account entails that the increase in recollected memories is due to the fact that more memories from this period are associated with one's identity, which starts to develop in adolescence and early adulthood. Secondly, the reminiscence bump can be explained by a life script, which postulates that most of the events that are expected to prevail in one's life occur during adolescence and early adulthood. Thirdly, an increase in memory encoding during adolescence and early adulthood could explain the increase of recollected memories from this period. Furthermore, based on observed age-related differences in the prefrontal regions and the hippocampus, a new suggestion is put forward to explain the reminiscence bump. To further clarify, advanced age is associated with less episodic memory recall, as reflected by diminished activity in the prefrontal regions. Additionally, a predominantly left-lateralized pattern of activity in the hippocampus with advanced age is associated with the recall of more remote, detailed and emotional memories. Finally, all three accounts and a new suggestion will be discussed in terms of their ability to explain the reminiscence bump. Limitations, implications and suggestions for future research are discussed.

Keywords: reminiscence bump, life story account, life script account, memory encoding, age-related differences.

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INTRODUCTION

Whittlesea and Price (2001) claimed that there is only one memory system that is used in the execution of all tasks, such as remembering a doctor's appointment and learning how to drive a car. However, patients with lesions to different parts of the brain, showing qualitatively different memory loss, contradicted the existence of merely one memory system (Scoville & Milner, 1957). The famous case of H.M. had parts of the bilateral temporal cortex, including large parts of the bilateral hippocampus, removed to reduce epilepsy (Scoville & Milner, 1957; Squire, 2004). After the surgery, patient H.M. was not capable of learning and remembering new information, but was still capable of remembering events long before the surgery took place (Scoville & Milner, 1957; Squire, 2004). Furthermore, patient H.M. was able to learn new motor skills, such as drawing a mirror image. The case of patient H.M. is a clear illustration of the existence of multiple memory systems. Therefore, current definitions of memory take multiple memory systems into account (Baddeley, 1997; Lieberman, 2012; Squire, 2004). For instance, Baddeley (1997) asserted that memory comprises a multitude of systems that vary in the amount and type of information that is stored and how long this information is stored.

Throughout the years, there have also been ample attempts to subdivide memory (Baddeley, 2004; Lieberman, 2012; Squire, 2004). Examples include the division into short-term memory and long-term memory (Lieberman, 2012; Atkinson & Shiffrin, 1971). Short-term memory comprises the transient retention of data from different sensory modalities (Atkinson & Shiffrin, 1971; Lezak, 2004), while long-term memory entails the perpetual storage of data from which data loss is minimal (Atkinson & Shiffrin, 1971; Lieberman, 2012). For example, short-term memory is used to remember the items on a grocery list, while long-term memory is employed to remember the birth of your first child. Long-term memory can be further subdivided into semantic memory and episodic memory (Lieberman, 2012). Semantic memory equals the remembrance of facts and is used to, for instance, remember the capital of France (Lieberman, 2012; Squire, 2004). Episodic memory reflects the remembrance of personal experiences of bygone episodes (Lieberman, 2012; Roediger & Marsh, 2003; Squire, 2004), like remembering your partner proposing.

The term episodic memory is often interchangeably used with the term autobiographical memory, which overlaps with episodic memory but is distinguishable (Roediger & Marsh, 2003). Autobiographical memory comprises personal bygone episodes,

similar to episodic memory, but can additionally entail personal facts, like a birthdate (Conway, 2001; Roediger & Marsh, 2003). The retrieval of autobiographical episodes has led to a well-known and rather surprising phenomenon, named the reminiscence bump. This reminiscence bump entails an increase in the recollection of memories from adolescence and early adulthood in older adults (Berntsen & Rubin, 2002; Bohn, 2010; Rubin & Berntsen, 2003; Rubin & Schulkind, 1997, 1997a).

Many attempts have been postulated to explain the reminiscence bump (Berntsen & Rubin, 2002; Fitzgerald, 1988; Glück & Bluck, 2007; Rubin, 2002; Rubin, Rahhal, & Poon, 1998). Two accounts explain the reminiscence bump by referring to social and cultural aspects of a person's life. First of all, Fitzgerald (1988) explains the reminiscence bump by means of a life story, which states that memories from adolescence and young adulthood are related to the start of one's own identity. Secondly, according to the life script account more memories are retrieved from this period, since the most important events that are expected to happen during a person's life, occur during adolescence and young adulthood (Berntsen & Rubin, 2002; Bohn, 2010; Rubin & Berntsen, 2003). Besides, a postulated biological account- the cognitive account- comprises increased memory processes during the period of adolescence and young adulthood, causing more memories to be encoded for later retrieval. Finally, another biological suggestion- the retrieval account- will be presented based on theories that display age-related differences in retrieval-related structures, for example, the prefrontal regions and the hippocampus.

In conclusion, a multitude of theories have provided possible explanations for the reminiscence bump, which are either socially, culturally or biologically based. The present review will highlight these different accounts and, subsequently, a biological explanation will be postulated. This new suggestion could aid in elucidating the insights into the reminiscence bump and might also provide more insights into the working of memory functions and memory decline. Furthermore, it is important to emphasize that this suggestion is not meant to dismiss any of the already existing accounts, but rather to offer an additional explanation. The aim of this review is to provide an answer to the question: 'How is and can the reminiscence bump be explained?'

A brief overview of this review will now be presented. First of all, the reminiscence bump will be discussed and explained. Secondly, two theories that are based on social and cultural assumptions will be presented. Thereafter, some criticism of these theories will be stated. Eventually a biological approach is taken to describe the reminiscence bump. This

biological approach includes a cognitive account to the reminiscence bump and a suggestion based on age-related differences in retrieval. Finally, some implications, limitations and suggestions for future research will be presented.

THE REMINISCENCE BUMP

Autobiographical memory is the kind of memory that is involved in the verbal recollection of detailed events from an individual's past and is supplemented by the conviction that these events were personally experienced (Fitzgerald, 1999; Rubin, 1996; Tulving, 1985). This type of memory has been studied by multiple researchers using the 'Crovitz-Shiffman cue word method' (Jansari & Parkin, 1996; Janssen, Chessa, & Murre, 2005; Janssen & Murre, 2008). This method entails asking participants to respond with their first personal memory that is elicited by the presentation of a number of cue words (Jansari & Parkin, 1996; Rubin, 1996). Afterwards, the recollected personal memories are dated to determine from what point in the individual's life they originate (Jansari & Parkin, 1996; Rubin, 1996). The results from studies using this method, in older adults, reveal a phenomenon called the reminiscence bump. This reminiscence bump entails an increase in the recollection of positive autobiographical memories from adolescence or early adulthood in older adults (Berntsen & Rubin, 2002; Bohn, 2010; Rubin & Berntsen, 2003; Rubin & Schulkind, 1997, 1997a). Similar findings were published by Rubin and Schulkind (1997) who suggested that more autobiographical memories were recollected from adolescence and early adulthood in older adults. Besides, it has been stated that this increase of recollected autobiographical memories only applies to positive events (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003), but the memories from the reminiscence bump have also been characterized as being more vivid and significant in comparison with other life episodes (Rubin et al., 1998). For example, the memories from this reminiscence bump comprise the college years, the birth of a child, or marriage (Rubin, 1996). Negative events from this period do not display a reminiscence bump, but diminish in a monotonous manner when going further back in time (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003). Contradictory, Janssen and Murre (2008) stated that the retrieved memories from the reminiscence bump do not only comprise significant, vivid and positive memories, but are also assisted by increased recall of less vivid, insignificant and less emotive events. In conclusion, the reminiscence bump reflects an increase in the recollection of memories from adolescence

and early adulthood in older adults and can be elicited by the use of the Crovitz-Shiffman cue word method.

SOCIAL AND CULTURAL ACCOUNTS ON THE REMINISCENCE BUMP

Throughout the years, there have been many attempts to explain the reminiscence bump (Berntsen & Rubin, 2002; Fitzgerald, 1988; Rubin & Berntsen, 2003). First of all, the life story or narrative account, postulated by Fitzgerald (1988), explains the reminiscence bump by referring to the formation of life stories out of memories. This account states that individuals form a continuously developing self-narrative about their own life to comprehend the world around them. In addition, this self-narrative aids in the understanding of the temporal order of events in a person's life (Rubin et al., 1998; Rubin, 1996, 2002) and in the expression of a personal identity (Rubin et al., 1998). This formation of an identity has been shown to begin during early adulthood and adolescence (Rubin et al., 1998; Rubin, 2002) and is fabricated by transforming memories into narratives to constitute an identity (Berntsen & Rubin, 2002). More memories are therefore recollected from this period since they are more associated to one's identity and are perceived as more self-defining (Cohen & Taylor, 1998; Fitzgerald, 1996). A similar statement was postulated by Rybash (1999), who claimed that the majority of the recollected vivid and significant memories from adolescence and early adulthood mark the beginning of people's life narrative and aid in their own identification.

A second account on the reminiscence bump is the life script account (Berntsen & Rubin, 2002; Bohn, 2010; Rubin & Berntsen, 2003). This life script account directs the recollection of one's life story, since it entails general guidelines about what an idyllic life should consist of (Berntsen & Rubin, 2002; Bohn, 2010; Rubin & Berntsen, 2003). For example, marriage and having children are examples of events that are expected to occur during a person's life within a certain culture (Rubin, 1996). According to the life script account, many of the above mentioned examples occur during adolescence and early adulthood (Glück & Bluck, 2007). Furthermore, this life script is comprised of mostly positive events (Bohn, 2010). Negative events would not occur in the reminiscence bump, since these events lack a life script (Rubin & Berntsen, 2003). The life script account thus explains the reminiscence bump, in that most positive events that are expected to occur in a person's life happen during adolescence and early adulthood. This claim was further supported by a study of Bohn (2010), in which

participants were asked to recollect the seven most significant memories from their own life. In addition, they were asked to state the most significant events that would happen in an imaginary person's life and additionally mention the anticipated date at which these events would occur. The results of this study revealed that there was a greater overlap between when the recollected memories and the stated important events, for an imaginary person's life, would occur in older adults. That is, older adults were more inclined than younger adults to use a cultural life script in the recollection of significant life events (Bohn, 2010).

Glück and Bluck (2007) extended this life script account by taking a developmental perspective. They suggested that the period of adolescence and early adulthood is characterized by an increase in exercised control with regard to making decisions that have lasting impacts on people's life. For example, going to college and having another child are two examples of these consequential decisions. Therefore, Glück and Bluck (2007) predicted that the reminiscence bump would not only comprise positive events, as is assumed in the life script account (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003), but would also include memories characterized by high observed control. Glück and Bluck (2007) investigated this claim by asking participants to recall the most significant events in their life. Subsequently, these recalled events were rated, by the participants, on valence (positive or negative) and observed control. The results of this study reveal that the reminiscence bump did not only comprise more positive events, but that these recollections were also characterized as events on which they exerted more control. Furthermore, the recalled events in the reminiscence bump were shown to be perceived as highly significant to the participant's own development (Glück & Bluck, 2007).

The life script account differs from the life story account in that the former is focused on the expectations of how a typical life should look like according to norms within a certain culture, while the latter is solely focused on how an individual narrates about their own life by use of personal memories (Berntsen & Rubin, 2002). The life script focuses on the expected temporal order of certain goals, while life narratives often include reaching goals by overcoming challenges.

In sum, the life story account and the life script account provide an explanation for the presence of the multitude of significant, vivid and positive memories. In contrast, these theories also have some downsides. First of all, with regard to the life story account, Rubin and Schulkind (1997a) asserted that the memories from the reminiscence bump were not rated as more important and were not narrated about more than memories from other life episodes. Furthermore, the life story account does not provide an explanation for the diminished

recollection of negative events (Berntsen & Rubin, 2002). Finally, these theories do not agree with the findings from Janssen and Murre (2008), who stated that the reminiscence bump also comprises less emotive, less vivid and insignificant events.

BIOLOGICAL ACCOUNT ON THE REMINISCENCE BUMP

Autobiographical memory can be linked to different neural structures, reflecting activation necessary for the encoding and retrieval of memories (Maguire & Mummery, 1999; Nyberg, Habib, McIntosh, & Tulving, 2000; Schacter, Savage, Alpert, Rauch, & Albert, 1996). Cabeza et al. (1997) claimed that advanced age is characterized by alterations in the neural networks that are important for encoding and retrieval of memories. That is, both encoding and retrieval of events are associated with age-related differences. Therefore, two biological accounts are put forward, including the cognitive account and a new suggestion that is based on the age-related changes observed in the encoding and retrieval of information.

First of all, according to the cognitive account, early adulthood and adolescence are characterized by many new events that are recollected better due to enhanced memory processes (Rubin et al., 1998; Rubin, 2002). Increasing effort to comprehend a novel event and the uniqueness of the event are two examples of memory enhancing processes. This view is in accordance with Rubin, Rahhal and Poon (1998) who put forward a cognitive account to explain the reminiscence bump in three possible ways. First of all, according to the cognitive account, new and distinctive events are encoded better when followed by a “period of relative stability” (Rubin et al., 1998, p. 639). That is to say, these new and distinctive events are processed more thoroughly due to their distinctiveness and newness in comparison with preceding events. Secondly, because these events are so distinctive from preceding periods, there is less proactive interference. Proactive interference entails the failure to recall events due to the interference of previously learned material (Jonides & Nee, 2006). Finally, due to the long period of stability in adulthood, adolescence and early adulthood are often used as reference points at retrieval (Berntsen & Rubin, 2002). In sum, the elaborate encoding of new and distinctive events, the small amount of proactive interference and the long period of stability in adulthood render the events from the period of adolescence and early adulthood more accessible for recollection later in life.

Furthermore, the finding of Janssen and Murre (2008) can be explained by this peak in

memory encoding during adolescence and early adulthood, which not only causes more significant, vivid and positive events to be encoded, but also more insignificant, not so vivid and less emotive events (Janssen et al., 2005; Janssen & Murre, 2008). Hence, the increase in memory encoding during adolescence causes more events to be encoded in general, regardless of whether they are more emotive, vivid or significant. Besides, with increasing age, memory encoding declines and only the more remarkable events are being rehearsed, causing the older adult to be more inclined to recall the memories from adolescence at the expense of other lifetime episodes (Grady et al., 1995). Thus memory encoding peaks during adolescence and decreases throughout the rest of the life span. This also became evident in a positron emission tomography (PET) study conducted by Grady et al. (1995), who examined the regional cerebral blood flow (rCBF) while participants were encoding and recognizing faces. The results of their study revealed a heightened activation, during encoding, of the right hippocampal and left prefrontal cortices in the young participants. In contrast, older participants displayed a lack of activation in the hippocampus and the prefrontal cortex. This finding was interpreted by Grady et al. (1995) as a deficiency in the encoding of stimuli in old age. It follows that memory encoding is associated with age-related differences, since in old age there is a reduction in stimuli encoding (Grady et al., 1995).

In sum, the cognitive account provides a thorough explanation of the reminiscence bump, since enhanced encoding processes during adolescence and early adulthood cause more memories to be encoded in general, regardless of the significance or vividness of the memories. Since the peak in memory encoding declines with advanced age, older adults might recollect more memories from the period of adolescence and early adulthood, compared to other life time periods, reflecting the reminiscence bump.

Age-related differences in the prefrontal regions and hippocampus as an additional explanation to the reminiscence bump

Age-related differences have been observed, not only in autobiographical memory encoding, but also in autobiographical memory retrieval (Cabeza et al. 1997; Rybash, 1999), which has been associated with activation in different neural structures. Examples of these neural structures include the prefrontal regions and the hippocampus, among others (Maguire & Mummery, 1999; Nyberg et al., 2000; Schacter et al., 1996; Viard et al., 2007). Two theories have been put forward to explain memory consolidation and retrieval (Nadel, Samsonovich, Ryan, & Moscovitch, 2000; Piefke, Weiss, Zilles, Markowitsch, & Fink, 2003).

First of all, the standard consolidation theory emphasizes the momentary role of the

hippocampus during the processing and storage of memories (as cited in Nadel et al., 2000; Piefke et al., 2003). The hippocampus is important in the transferral of memories to the neocortex. Also, the hippocampus links different neocortical regions during the storage of memories (Nadel et al., 2000). Once the memories are integrated in the neocortical regions, they are no longer dependent upon the hippocampus (Rosenbaum, Winocur, & Moscovitch, 2001). That is, after the memories are consolidated, the neocortex is capable of memory recollection without the involvement or support of the hippocampus (Rosenbaum et al., 2001). The standard consolidation theory is in good accordance with the results of a study by Piefke, Weiss, Zilles, Markowitsch, and Fink (2003). Piefke et al. (2003) performed a functional MRI study to investigate the neural underpinnings of autobiographical memory retrieval. Participants were presented with visual stimuli and were asked to read them out loud. The stimuli consisted of the participant's own childhood memories that were collected during an interview prior to the study. Also, these stimuli comprised of either a recent or a remote memory. The results of this study revealed that recent memories were accompanied by activity in the retrosplenial and hippocampal region, which was not the case for remote memories (Piefke et al., 2003). This finding supports the standard theory of memory consolidation, as the hippocampus has a 'time-limited' part in memory processing (Piefke et al., 2003).

Further support for this standard theory is found in a phenomenon called retrograde amnesia (Bontempi, Laurent-Demir, Destrade, & Jaffard, 1999). Retrograde amnesia is characterized by damage to the hippocampus and relatively intact remote memory, while recent memories are damaged (Bontempi et al., 1999). This loss of only the recent memories indicates that the hippocampus does have a temporary role in the retrieval and storage of memories (Bontempi et al., 1999). In contrast, Rosenbaum et al. (2008) stated that participants with retrograde amnesia and damage to the hippocampus also display loss of remote autobiographical memories. In their study, they analysed the autobiographical retrieval of four patients with retrograde amnesia. It was concluded that the extent of remote memory loss was dependent upon the amount of damage to the hippocampus (Rosenbaum et al., 2008). To further clarify, one patient, with extensive lesions to the hippocampus in comparison with the other patients, displayed most severe loss of memories (Rosenbaum et al., 2008). This contrasting finding contributed to the development of a second theory that accounts for memory consolidation and retrieval, named the 'multiple trace theory' (as cited in Nadel et al., 2000).

The 'multiple trace theory' (as cited in Nadel et al., 2000) emphasizes the consistent role of the hippocampus in memory retrieval irrespective of the age of the memories (Nadel et

al., 2000; Piefke et al., 2003; Ryan et al., 2001). That is, the hippocampus is always rendered important in the storage and recollection of very remote and recent autobiographical memories (Nadel et al., 2000), since the connection between the neocortex and the hippocampus lasts for as long as the memory does (Rosenbaum et al., 2001). This consistent role of the hippocampus in memory retrieval only holds for episodic memory, since semantic memory is said to become independent of the hippocampus because of its lack of contextual aspects (Rosenbaum et al., 2001). Furthermore, according to the multiple trace theory, every retrieved memory is followed by the creation of a novel memory trace that is represented by neurons in the hippocampus and neocortex (Piefke et al., 2003; Rosenbaum et al., 2001; Ryan et al., 2001). Over time, this accumulation of memory traces, which are repeatedly activated by the recollection of memories, induces the creation of new memory traces, causing more remote memories to be represented by a multitude of traces compared to recent memories (Piefke et al., 2003; Rosenbaum et al., 2001; Ryan et al., 2001). Therefore, more remote memories are rendered less vulnerable to hippocampal damage in comparison with more recent memories (Piefke et al., 2003).

The multiple trace theory is further supported by the findings of Maguire and Frith (2003), who found that the hippocampus was related to age-related differences and involved in autobiographical memory retrieval. In their study, younger and older participants were asked to recollect real life episodes during a functional magnetic resonance imaging (fMRI) brain scan. The results of this study revealed activation in the left hippocampus for the younger participants, while the older participants displayed bilateral hippocampal activation during autobiographical memory retrieval. Furthermore, upon comparison of younger and older participants, it was shown that older participants displayed higher activation in the right hippocampus. In addition, the findings of the study by Nadel, Samsonovich, Ryan, and Moscovitch (2000) and Ryan et al. (2001) displayed similar activation in the hippocampus during recall of very recent and very remote memories. That is to say, the hippocampus is always involved in the recollection of autobiographical memory.

In sum, two theories have been postulated to explain memory consolidation and retrieval (Nadel et al., 2000; Piefke et al., 2003), which differ from each other in the emphasis they place upon the role of the hippocampus in the process of autobiographical memory retrieval. It follows from the above mentioned theories that the hippocampus and the prefrontal regions are important in autobiographical memory retrieval (Maguire & Mummery, 1999; Schacter et al., 1996). This became evident even more, in an fMRI study of Maguire, Vargha-Khadem and Mishkin (2001), in which a patient with damage to both sides of the

hippocampus displayed activation in the connectivity between the remaining hippocampus and the frontal cortex. That is, this patient displayed activation in the remainder of his hippocampi and medial frontal cortex when retrieving autobiographical episodes he clearly remembered. Both structures will briefly be discussed below.

Age-related differences in the prefrontal regions

First of all, the prefrontal regions are involved in autobiographical memory retrieval (Cabeza et al., 1997; Maguire & Mummery, 1999; Rybash, 1999; Schacter et al., 1996). This involvement of the prefrontal regions in autobiographical memory retrieval predominantly has to do with strategic retrieval (Burgess, Maguire, Spiers, & O'Keefe, 2001). This strategic retrieval reflects supplementary and extensive processing to resolve homogenous episodes from autobiographical memory (Grady & Craik, 2000), for example deciding whether a memorized event happened just recently or a couple of years ago (Grady & Craik, 2000).

Besides, the prefrontal regions are also associated with age-related differences with regard to the retrieval of autobiographical memories (Anderson et al., 2000; Cabeza et al., 1997; Grady et al., 1995). For example, the areas that are activated by younger adults display diminished activity in older adults, whereas more activity has been shown in other prefrontal regions (Anderson et al., 2000). Therefore, the specific role of episodic memory in the prefrontal regions deteriorates with age (Anderson et al., 2000), starting halfway the second decade of one's life (Werkle-Bergner, Müller, Li, & Lindenberger, 2006). This deterioration of episodic memory in old age is partly due to the diminution of recollected contextual particulars (Piolino, Desgranges, Benali, & Eustache, 2002; Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002), which are said to render a memory as episodic (Piolino et al., 2002). An example of a contextual particular is recollecting who was present at your eight birthday or what they were wearing. Likewise, Levine, Svoboda, Hay, Winocur, and Moscovitch (2002) stated that autobiographical memory retrieval in old age was associated with less episodic details, while semantic particulars were still preserved. A study by Levine et al. (2002) offered further support for this statement. In this study, younger and older participants recollected episodes from five different periods of their life. The results of this study revealed that older adults were biased toward more semantic details during autobiographical memory retrieval. Semantic details, like having a relationship with someone for a couple of months, included factual information. In contrast, younger participants recollected episodic particulars, for example, beliefs and places that were associated with their memories. One explanation for this finding is compensation, by semantic memories, with advanced age (Piolino et al., 2002). That

is to say, deficiencies in episodic memory that are reflected by right prefrontal activation might be compensated for by semantic memory that is reflected by left prefrontal activation (Cabeza et al., 1997; Levine et al., 2004). Likewise, activation in the right inferior frontal gyrus was displayed during autobiographical retrieval, while activation in the left inferior frontal gyrus was apparent during semantic retrieval (Greenberg et al., 2005). According to Cabeza et al. (1997), this lateralization in prefrontal activation with advanced age reflects a shift in retrieval processes.

In a similar manner, age related changes have been documented in the study by Anderson et al. (2000), who stated that, among young adults, the prefrontal regions were bilaterally activated during retrieval, while the older adults displayed a left lateralized activation pattern. Finally, Cabeza et al. (1997) performed a PET study in which the rCBF was compared in young and old participants during the encoding, recognition and recollection of word pairs. This study revealed neural alterations with increasing age in the brain mechanisms responsible for recollection. For example, older adults displayed heightened bilateral activation in the prefrontal regions while recollecting memories.

In sum, the prefrontal regions are of importance to autobiographical memory retrieval. The deterioration of episodic memory recall with advanced age is reflected in a diminished activity in the right prefrontal regions. Due to semantic compensation, which is reflected by a predominantly left-lateralized pattern of activation in the prefrontal regions, the recollected memories of older adults comprise more semantic details than the memories of younger adults. Since semantic memory is less associated to the self than episodic memory (Conway, 2001; Roediger & Marsh, 2003), this finding is in accordance with the findings of Janssen and Murre (2008), who stated that the reminiscence bump also included less emotive, less vivid and less significant events.

Age-related differences in the hippocampus

A second important structure to autobiographical memory retrieval is the hippocampus (Maguire & Mummery, 1999; Maguire, Vargha-Khadem, & Mishkin, 2001; Viard et al., 2007). Heightened hippocampal activation is associated with the conscious retrieval of bygone episodes that are personally significant and time-specific (Maguire & Mummery, 1999; Eldridge, Knowlton, Furmanski, Bookheimer, & Engel, 2000), but is also involved in 'associative retrieval' of autobiographical memories (Rybash, 1999). Also, the hippocampus combines the qualities of a specific retrieved memory together to re-establish an episodic memory (Addis, Moscovitch, Crawley, & McAndrews, 2004; Werkle-Bergner et al., 2006).

These qualities of retrieved memories include the emotional valence, specificity or detail, and the subjective significance (Addis et al., 2004; Werkle-Bergner et al., 2006).

A PET study by Fink et al. (1996) also confirmed the importance of the hippocampus in autobiographical memory. Participants were either presented with no stimulation or auditory stimulation in the form of sentences. These sentences contained autobiographical information from an unknown person or from their own past. Furthermore, participants were requested to imagine the content of these sentences. For example, one sentence described a swimming contest of a 15-year old person. Changes in rCBF were either measured in the absence of auditory stimuli or during the presentation of the above mentioned auditory stimuli. More activation was displayed in the right hemisphere when listening to autobiographic sentences of their own past than from other participants. This right hemispheric region comprises the hippocampus, temporo-parietal cortex and prefrontal cortex, among others. However, it should be emphasized that this study measured activation after participants listened to auditory sentences and imagined the contents of the displayed autobiographical information from their own or someone else's past. Thus, listening to auditory stimuli might not be equal to the recollection of autobiographical information.

Besides, the involvement of the hippocampus in autobiographical memory retrieval has also been shown to change with age (Piefke & Fink, 2005; Maguire & Frith, 2003; Werkle-Bergner et al., 2006), and starts deteriorating later than the prefrontal regions (Werkle-Bergner et al., 2006). A similar statement was postulated by Piefke and Fink (2005), who suggested that there is deterioration in autobiographical memory with increasing age that goes along with a deterioration of the retrosplenial circuits and the hippocampus. These age-related differences manifest themselves in different ways. Firstly, the phenomenal experience associated with the recollection of memories changes with the lapse of time, as was suggested by Piolino et al. (2004). Namely, the results of an fMRI study revealed heightened quality of the mental images for recent, in comparison with remote, memories (Piolino et al., 2004). A possible explanation is a change in the lateralization of hippocampal activation. Namely, an fMRI study showed that left hippocampal activation is associated with the recollection of more detailed memories and memories that are high in emotional valence (Addis et al., 2004). Furthermore, right hippocampal activation correlated with the recency component of the retrieved memories (Addis et al., 2004). It follows that changes in the lateralization of hippocampal activation might account for the changes in phenomenal experience. Furthermore, it was stated by Piefke and Fink (2005) that the hippocampal hemispheric lateralization was dependent upon the participant's age and that of the retrieved memories.

Secondly, age-related differences are observed among participants, as was shown in the study by Maguire and Frith (2003) who showed that the hippocampus was influenced by age of the participants and involved in autobiographical memory retrieval. In their study, younger and older participants were asked to recollect real life episodes during an fMRI brain scan. The results of this study revealed activation in the left hippocampus for the younger participants, while the older participants displayed bilateral hippocampal activation during autobiographical memory retrieval. Furthermore, upon comparison of younger and older participants, it was shown that older participants displayed heightened activation in the right hippocampus.

Thirdly, age-related differences are present with regard to the age of the memories. To further clarify, the hippocampus was shown to be asymmetrically involved in the retrieval of remote autobiographical memories (Maguire & Frith, 2003). Another, slightly different, fMRI study was conducted by Maguire and Frith (2003) to enlarge the insight in the neural underpinnings of remote memory. The participants in this study were interviewed prior to the experiment to collect personal and detailed memories. These memories formed the basis of assembled sentences that were presented auditorily to the participants. The participants were asked to attend to each sentence and indicate if the sentence was correct or untruthful. The results revealed that the hippocampi were active during the recollection of these autobiographical events. Furthermore, the left hippocampus displayed activity regardless of the age of the memories. In contrast, the right hippocampus displayed diminished activity as the memories became more remote (Maguire & Frith, 2003). For example, the right hippocampus was still active for memories extending back ten years, but decreased in activation with regard to memories from 30 years ago. Furthermore, the right hippocampus displayed no activity during the retrieval of memories from 40 years ago (Maguire & Frith, 2003). Viard et al. (2007) also investigated the neural underpinnings of autobiographical memory recollection in elderly. The results of their study revealed activity in the left hippocampus for the recollection of all episodes, while the right hippocampus displayed activity during the intermediate periods (Viard et al., 2007).

In sum, the hippocampus is important for autobiographical memory retrieval, since it binds together the particulars of a bygone episode that re-establishes the phenomenal experience of an episodic memory (Piolino et al., 2002). Also, age-related differences have been displayed with regard to hippocampal activation. First of all, the phenomenal experience changes and is reflected by a predominantly left-lateralized pattern of activation for the recall of remote, detailed and emotional memories (Piolino et al., 2004). Secondly, age-related

differences were observed in advanced age, since old age was characterized by a bilateral pattern of activation. Furthermore, left hippocampal activation reflected the retrieval of remote memories, while right hippocampal activation reflected intermediate and recent periods of recollection (Piolino et al., 2004). This change in hippocampal activation with advanced age therefore posits an explanation for the presence of the more significant, novel and positive emotions present in the reminiscence bump, since old age is characterized by a predominantly left-lateralized pattern of hippocampal activation reflecting the retrieval of detailed, emotional, and remote memories. In sum, differential activation in the prefrontal regions and the hippocampus represents less episodic memory recall, and recall of more remote, detailed and emotional memories, respectively. That is, older adults recollect memories that are less well characterized by time and place and more by factual or semantic information (Levine et al., 2002). The reminiscence bump comprises an increase in the recollection of positive, vivid and significant memories from adolescence and early adulthood in older adults, but also comprises less vivid, emotive and significant memories, as stated by Janssen and Murre (2008). This differential activation in the prefrontal regions and the hippocampus may therefore explain in part the findings as stated by Janssen and Murre (2008). It is unclear, however, if the change in hippocampal activation also reflects a compensatory function. Furthermore, this suggestion, regarding the retrieval-based structures, cannot explain the multitude of memories recollected during the period of adolescence and adulthood compared to other time periods or the presence of less emotive, insignificant and less vivid events. It remains unclear up to the present day, if left hippocampal activation also displays a compensatory function and could explain the presence of semantic particulars just as good as the prefrontal regions do.

DISCUSSION

This review set out to answer how the reminiscence bump is and can be explained. The reminiscence bump comprises an increase in the recollection of memories from adolescence and early adulthood in older adults (Berntsen & Rubin, 2002; Bohn, 2010; Janssen & Murre, 2008; Rubin, 1996; Rubin & Berntsen, 2003; Rubin & Schulkind, 1997, 1997a). The life story and life script account provide two possible explanations for this increase in recollection, based on the life stories of people and the implementation of life scripts (Cohen & Taylor, 1998;

Fitzgerald, 1988, 1996; Glück and Bluck, 2007; Rubin et al., 1998; Rubin, 2002; Rubin & Berntsen, 2003). Furthermore, two biological accounts provide explanations for the reminiscence bump. First of all, the cognitive account proposes increased memory enhancing processes during adolescence and early adulthood (Rubin et al., 1998; Rubin, 2002). Secondly, a new suggestion is put forward that is based on age-related differences in prefrontal and hippocampal regions (Anderson et al., 2000; Cabeza et al., 1997; Maguire & Frith, 2003; Maguire & Mummery, 1999; Piefke & Fink, 2005; Rybash, 1999; Schacter et al., 1996).

The above mentioned accounts are complementary and non-exclusive. Furthermore, they can be evaluated on the basis of three criteria. Certainly, other criteria might apply as well, but the focus will be on the following criteria. First of all, an important criterion is the competence of the account to explain why a multitude of memories are recollected from the period of adolescence and early adulthood compared to other lifetime periods (1). Another important criterion regards the capability of the account to explain the presence of mainly positive, vivid and significant events in the reminiscence bump (2). Furthermore, the theory should account for the presence of less emotive, less vivid and insignificant events in the reminiscence bump, to explain the findings of Janssen and Murre (2008) (3). All four accounts will be discussed according to these three criteria.

First of all, the life story account by Fitzgerald (1988) is competent in explaining the positive, vivid and significant memories from the reminiscence bump, but does not explain the less emotive, vivid and significant events nor the many recollected memories. For example, Rubin and Schulkind (1997a) have stated that the recollected memories from the period of adolescence and early adulthood were not narrated about more or rated as more important. Furthermore, the life script account does explain the presence of significant and vivid events in the reminiscence bump, by referring to this period as the start of a life story and identity. Also, the life script account does explain the multitude of recollected memories and the presence of positive, vivid and significant events. For instance, more positive and significant events are recollected during the period of adolescence and early adulthood because this period comprises many events expected to occur during a person's life. However, this life script account lacks an explanation for the presence of the not so emotive, significant and vivid events. In contrast, the cognitive account can satisfy all three criteria. That is to say, memory enhancing processes explain the multitude of the memories and the presence of memories in general, regardless of their emotional valence, vividness of significance. Finally, the retrieval account has been put forward in this review as a suggestion and additional explanation to the reminiscence bump, which may prove to be fruitful in the future. Based on the stated evidence

in this review, it can only be concluded that there is some evidence at present to indicate that the retrieval account is capable of explaining the presence of memories characterized as significant, novel and positive. It does not explain the multitude of the memories in the reminiscence bump or the presence of less emotive, less vivid and insignificant events, based solely on the observed age-related differences in prefrontal and hippocampal regions. This account can be used to complement already existing evidence and vice versa. For instance, the cognitive account might augment the retrieval account by explaining the multitude of the recollected memories. Also, the retrieval account could augment to the life story and life script account since it is based on observed neural activation patterns in the brain. Furthermore, even the cognitive account could be expanded to include the areas responsible for memory enhanced processing. In conclusion, considering the amount of evidence displaying a correlation between age-related retrieval differences at the cerebral level and differences in the reminiscence bump, it would be interesting to further explore this in the future. Eventually, the retrieval account is just another piece to the puzzle.

There are several limitations to this review. First of all, design limitations of studies cited hamper the interpretation of the reminiscence bump. That is, the majority of the above mentioned studies elicited the reminiscence bump by means of the Crovitz-Shiffman cue word method. Even though this is a well-known and widely used instrument to elicit the reminiscence bump, it is not regarded as representative of natural recollection (Cohen & Taylor, 1998). Additionally, the cue word method might facilitate the use of a strategy during autobiographical memory retrieval. For example, participants might choose a certain episode as a baseline to explore all other retrieved memories (Janssen et al., 2005). The use of such a strategy would then bias the autobiographical memory recollection, since the memories that are recollected are more associated to each other than would be the case during free recall. Secondly, the above mentioned accounts are not thorough explanations of the reminiscence bump. Interestingly, some deviations from the reminiscence bump have been reported. For example, Janssen, Chessa and Murre (2005) stated that the reminiscence bump was influenced by the nationality of the participants in their study. That is, American participants revealed a tendency to recall older memories than the Dutch participants. Another example of a deviation, with regard to the reminiscence bump, was a second reminiscence bump in older adults that reflected a national conflict in the life of the participants (Conway & Hague, 1999). Finally, the reminiscence bump has also been observed in younger participants. This finding became evident in a study by Jansari and Parkin (1996), in which the reminiscence bump was elicited by means of the Crovitz-Shiffman cue word method. Participants were allocated to a

recency or no-recency condition. In the no-recency condition the participants were asked not to recollect memories from the past two-and-a-half years, while this was not prohibited in the recency condition. Therefore, one should keep in mind that there are irregularities in the characterization of the reminiscence bump that prevent any account from providing a thorough explanation of the reminiscence bump. Furthermore, the hemispheric lateralization of the hippocampus with advanced age is not exclusive to the left and right parts of the hippocampus. That is, differences in relation to the recency component of autobiographical memories have been observed with regard to the anterior and posterior regions of the hippocampus (Gilboa, Winocur, Grady, Henevor, & Moscovitch, 2004; Lepage, Habib, Tulving, 1998). Also, autobiographical memory retrieval is not only limited to the involvement of the hippocampus and the prefrontal regions. Other neural structures have shown to be implicated in autobiographical memory retrieval, for example the parahippocampal gyrus (Tsukiura et al. 2002).

With regard to future research, it would be interesting to further examine the association of semantic compensation with the prefrontal regions and the hippocampus. This could be done by investigating if the recollected memories of older adults are indeed characterized by more semantic particulars in comparison with younger adults. Furthermore, the brain activity could be measured during the recollection of these memories. Also, lesions studies could provide insight in the workings of the right prefrontal and hippocampal regions. Finally, it might be interesting to explore the above mentioned suggestions by using methods other than the Crovitz-Shiffman cue word method. For example, Janssen et al. (2005) alternated the use of the cue word method with the dating of news events to prevent participants from using a certain episode as a starting point for the retrieval of subsequent memories. Additionally, it would be of interest to examine the specific conditions that elicit the variations in the reminiscence bump to see if these variations are mere exceptions to a general phenomenon. For instance, do all people who have experienced a national conflict display a second reminiscence bump? Also, it would be interesting to find out if the differences between nationalities can be explained by differences in gender or personality. Finally, research with regard to the different lateralization patterns and the surrounding brain structures might provide fruitful for further understanding in this phenomenon. For instance, the association of the parahippocampal gyrus might reveal more about the nature of the reminiscence bump than is known at present. Again, lesions studies might be beneficial to explore this suggestion. It is of great importance to further elucidate the above mentioned suggestions, since the reminiscence bump has not been explained thoroughly up to the present

day. Furthermore, gaining more insight into the reminiscence bump might provide more insight into the workings of memory retrieval and encoding. Overall, exploring the reminiscence bump, and memory retrieval and encoding, might give us more insight in healthy memory decline in older adults. Since there are currently no records to support these suggestions, future research is needed to further clarify them.

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CRISTINA MILEV

Hungry or Stressed? Relationship between Stress and Attention for Food-related Words

Original Paper

Obesity is a major health problem in western society and caused by different factors. Stress-induced eating is widely thought to increase the risk for obesity. The purpose of this study was to investigate the influence of stress on attention for food. We hypothesized that stress creates an attentional bias for high-caloric food, which can be assessed by an adapted Stroop task. This is measured by comparing reaction times for food-related words and non-food related words before and after stress. Against our expectations, we found that stress had no significantly different effect on the food word list compared to the neutral word list. Stressed and non-stressed participants turned out to be significantly slower on the food-word list than on the neutral-word list and participants were generally faster on both lists after stress. Taken together, our results show that the attentional bias for high-caloric food is not influenced by stress.

Keywords: MAST, attentional bias, food, Stroop task, POMS.

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INTRODUCTION

Obesity is a serious and growing health problem in today's Western society. In the last 30 years, the prevalence of obesity has increased considerably. In 2008, up to 50% of the European population was overweight and over 20% of the population was obese (WHO Regional Office for Europe). Obesity does not leave people without consequences. Besides the physical consequences, such as an increased chance of cardiovascular diseases (WHO Regional Office for Europe, 2008), obesity may also lead to psychological problems such as low self-esteem and exposure to stigmatization and prejudice (Myers & Rosen, 1999). Excessive weight gain occurs when a person's energy intake is greater than one's energy consumption. In this way, the excess calories will be converted and stored in our bodies, which will cause an increase in body weight (Torres & Nowson, 2007). Why do we tend to eat more than we need?

Different genetic and environmental factors have been found to contribute to the development of obesity. Among these factors, stress is found to correlate with an increased desire for high caloric food (Torres & Nowson, 2007). Stress can be defined as an aversive state, which requires resources from the individual to leave this unpleasant state. As described by Adam and Epel (2007), stress is linked to activity of the hypothalamic-pituitary-adrenal (HPA) axis, which in turn influences the endocrine regulation of appetite. Eating high-caloric food while being stressed may serve as a compensation leading to the release of substances related to reward. Consequently, this release of opioids decreases the activity of the HPA axis, which reduces the stressful experience. Eating while being stressed may turn into a habit and this can contribute to the development of obesity (Greeno & Wing, 1994).

Oliver, Wardle and Gibson (2000) investigated the influence of stress on food choice during a meal. Although stress had no influence on the total amount of food intake, it did increase the desire for high-fat foods among participants. First, participants had to prepare a presentation in order to induce stress. Afterwards, participants could choose between several types of food to eat. The results showed that the desire for high-caloric food was greater in the stressed group compared to a control group.

In the study of Wardle, Steptoe, Oliver & Lipsey (2000), the association between work stress and nutrition was measured in a cross-sectional and longitudinal study. The load of work stress was determined by the averaged hours of work per week. The highest work stress session was compared with the lowest work stress session. The results showed that the high-

caloric food intake of restrained eaters increased after stress, however this effect was not visible in unrestrained eaters.

The relationship between psychological factors and changes in food intake were investigated by Weinstein, Shide and Rolls (1997). Participants were divided in two groups based on their changes in food intake (increased or decreased) during stress. No differences were found between men and women. However, females with a less inhibited personality style ate more while being stressed compared to more inhibited women. In contrast, for men no differences were found related to personality.

In the past, various studies were conducted to detect a relationship between attentional bias for food and overeating. Werthmann (2015) investigated an attentional bias for food as a possible cognitive factor in the development of obesity in healthy weight and obese children. They tested whether children with obesity had a higher attentional bias for food in comparison to healthy-weight children. Further, it was tested whether an attentional bias has a predictive value in weight-change after three and six months. In contrary to the expectations, no difference between obese children and the control group was found. However, directing attention towards food lead to a reduced weight loss, which was measured after six months.

Additionally, the study by Schmitz, Naumann, Trentowska and Svaldi (2014) studied attentional biases for food cues in binge eating disorder (BED) in contrast to a control group. Attentional bias was tested with a clarification task and a spatial cueing paradigm. The results showed that food stimuli were detected in both groups. However, this effect was more apparent in BED patients. Further, an initial orienting bias towards food (stimulus engagement effect) was found in BED patients. This effect can be explained by different stimulus processing in BED, which is manifested in slower disengagement of attention from food stimuli. Both effects were correlated with severity of BED symptoms.

A specific way to measure attentional biases is the Stroop task (Stroop, 1935). In the original Stroop task, interference between the content of a word and the colour of the ink in which that word has been printed can be measured. The stimulus is a colour word printed in a conflicting colour. Naming the colour of a colour word is supposed to take longer than reading the letters of a word, because this is a conflicting stimulus. Dealing with a non-conflicting stimulus (consistent word and colour) takes less time and effort. The colour-naming Stroop task has consistent validity and has been a reliable research method for measuring attentional biases. In the past, this paradigm was used in different domains in psychological research and can be adapted to different contexts (Penner et al., 2012). For instance, emotional Stroop tasks measure automatic attentional biases towards emotional word stimuli. A longer reaction time

for negative emotional content in contrast to neutral content reflects emotional distraction (Wentura, Bermeitinger, Englert, & Frings, 2009). Further, the Stroop task can be used in various clinical conditions, for instance to assess attentional bias for addiction-related stimuli (drugs, alcohol, cigarettes) (Cox, Fadardi & Pothos, 2006).

Ben-Tovim, Kay Walker, Fok and Yap (1989) adapted the Stroop task to measure food and shape concerns in patients with eating disorders. They compared the reaction time on a neutral, non-food and non-shape related word list against a food and shape related word list. Persons with psychopathological eating disorders showed an increased attention to food- and shape-related words in comparison to the control group. This is manifested in a significant longer reaction time to food related words than to non-food related words. In a similar study conducted with people with obesity an enhanced attentional bias towards food related stimuli was found. This was manifested in longer reaction times on a food related Stroop task (Nijs, Franken & Muris, 2010).

While previous studies investigated attentional biases for food in patients with eating disorders, we want to investigate how stress can influence the attention for food in healthy people, measured by an adapted Stroop task. Consequently, the research question is: Does induced stress cause an attentional bias for food-related words on an adapted Stroop task? We hypothesize that there is a potential link between stress and attention for high caloric food. We expect to find a significant difference between the reaction times on our adapted Stroop task, in which people show how an increased reaction time for food related words after stress.

METHODS

Participants and Design

Forty-one sophomore psychology students of the Maastricht University participated in this study. They were recruited via e-mail, Facebook, flyers, and the university platform. At the beginning of the experiment, subjects signed a consent form for their participation in the study. Furthermore, they were informed about their privacy and the possible option to quit without consequences. A within-subjects design with a before and after stress condition was used in this study. Stress and word-category were considered as independent variables and reaction time on the Stroop task was the dependent variable. After completing participation in the research, subjects received one participation credit as compensation. Also, they were

debriefed on paper immediately after participation in the research. One session took approximately 45 minutes. From the forty-two participants, one dropped out due to feeling uncomfortable.

The standing ethical committee of the faculty of Psychology and Neuroscience approved the experiment.

Materials

The Stroop Task

Beside the original Stroop test (Stroop, 1935), two versions of the Stroop test were created exclusively for this research. One of the lists contains control words that are not related to food (e.g. photo, card, boss); the other list contains words that are related to high caloric foods (e.g. chips, pizza, cake). Each Stroop task consists of 100 words. We used 25 unique words that are repeated four times. In the selection of the words for both lists frequency, length, and similarity of the words to each other has been taken into account. The neutral and food-related words were matched in terms of number of syllables, pronunciation, and the letters that comprise a word. Moreover, the Stroop task was developed in Dutch for the Dutch native speakers and in German for the German native speakers. This is done in order to create the most pronounced Stroop effect as previous studies have pointed out that people showed the greatest interference on a Stroop task in their native language (Magiste, 1984). All Stroop task performances were recorded with a voice recorder. The original Stroop task is used for practice in order to reduce the differences in skill between participants. It is possible that not all students are familiar with this test, but it is necessary that all the participants have the same level of knowledge of the Stroop task in order to create a homogeneous sample.

Mood

The POMS questionnaire (Profile Of Mood States) is a standard validated psychological rating scale used to assess transient, fluctuating affective mood states (McNair et al., 1992). The original version contains 65 words or statements that describe feelings people have. Five affective states are identifiable: 1) Tension-Anxiety, 2) Vigour-Activity, 3) Depression-Dejection, 4) Fatigue-Inertia and 5) Anger-Hostility. In this study an adapted version of 30 words (e.g. panicky, energetic, sad, listless, angry) was used to measure five different moods concerning the five subscales cited above.

Maastricht Acute Stress Test

The MAST is an effective and well-validated laboratory stress test capable of inducing subjective, autonomic and glucocorticoid stress responses (Smeets et al., 2012). It consists of two minutes of preparation phase and ten minutes of acute stress phase that includes both physical, mental, and social stress. Physical stress is initiated by a cold pressure task (holding your hand in ice-cold water (4°C) for 45 seconds). Mental stress is triggered by the instruction to count backwards from 2043 in steps of 17. Moreover, subjects were visibly videotaped and able to see themselves on a screen to enhance the feelings of stress amongst participants. In total, the stress test lasted for 12 minutes. The preparation period served to seat participants in front of a computer screen and instruct them about the task using a PowerPoint presentation (Smeets et al., 2012). The researcher started reading the presentation. In this way, participants were informed about the hand immersion task; that they would be monitored by the experimenter as well as videotaped in order to later analyze their facial expressions; that they had to provide written consent to the videotaping; and that they had the right to withdraw at any time during the task. They were informed that there would be multiple trials in which they had to immerse their hand in ice-cold water and the computer would randomly choose the duration of these trials yet never would exceed 90 seconds. In between the hand immersion trials, they were immediately engaged in the mental arithmetic test, which consisted of counting backwards in steps of 17 starting at 2043 as fast and as accurate as possible. Each time participants made a mistake, they were given negative feedback and they had to start over at 2043. They were told to continue with the mental arithmetic until the computer would signal the start of the next hand immersion trial, which would take at least 45 seconds. According to Smeets' and colleagues protocol (2012), in reality, the duration of the various trials was set in a fixed order and duration for all participants.

Procedure

Each participant performed the set of Stroop tasks and the POMS in a no stress condition and in a stress condition, in order to obtain a comparison between paired samples. Participants started with the POMS questionnaire (Profile Of Mood States) in order to determine their current mood state. Subsequently, the subjects performed three versions of the Stroop task. All participants started with the original Stroop task, as a means of practice. The neutral and food-related word lists were counterbalanced in order to counteract possible practice or fatigue effects. Afterwards, the recordings were analyzed regarding errors and reaction time.

Next, subjects were exposed to stress by undergoing the Maastricht Acute Stress Test. After participants finished the MAST, they filled out the POMS once more. The repetition of this questionnaire served as an indicator of mood change as a result of the stress test undergone. Participants were still in the illusion of being only in the intermission of the MAST while doing the second measurements. The Stroop tests were performed again in order to find a possible delay in reaction times because of being stressed. The research ended with informing the subjects that they did not have to perform the MAST another time and with the debriefing.

Data analysis

A two-way repeated measures ANOVA is conducted in order to test our hypothesis. Our primary interest and expectation is an interaction between stress and word content on the reaction time of the adapted Stroop task. Differences in reaction time between the Stroop tasks before and after stress served as our dependent variable. Condition (no stress vs. stress) and word category (neutral vs. food-related) served as independent variables. There was an a priori prediction for the direction of the interaction effect, so a 0.05 level of significance has been used. We have used the POMS as a manipulation check. The POMS is divided in 5 different subscales each governing a different mood state. Total points on every subscale were compared before and after stress by a paired-sample t-test.

RESULTS

Main analysis reaction time

In this study, no gender or age distinction between participants was made. Reaction times on the food-related and neutral Stroop task are displayed in Table 1. A main effect of stress was found $F(1, 40) = 13.45, p = .000$, indicating that reaction times on colour naming after stress ($M = 65.33, SD = 8.73$) were generally lower than the reaction times on colour naming before stress ($M = 62.87, SD = 9.03$). In addition, there was a main effect of word category $F(1, 40) = 31.30, p = .001$, indicating that the reaction times for food related words are higher. No significant interaction between stress and word-category was found $F(1, 40) = 2.03, p = .165$, as

can be seen in Figure 1. This suggests that the effect of stress and word content on the RTs of the adapted Stroop task are independent of each other.

Table 1
Mean Reaction Times on Stroop Lists in Seconds

	M Food Words (SD)	M Neutral Words (SD)
Before Stress	66.95 (9.34)	63.71 (8.58)
After Stress	64.25 (10.21)	61.49 (8.64)

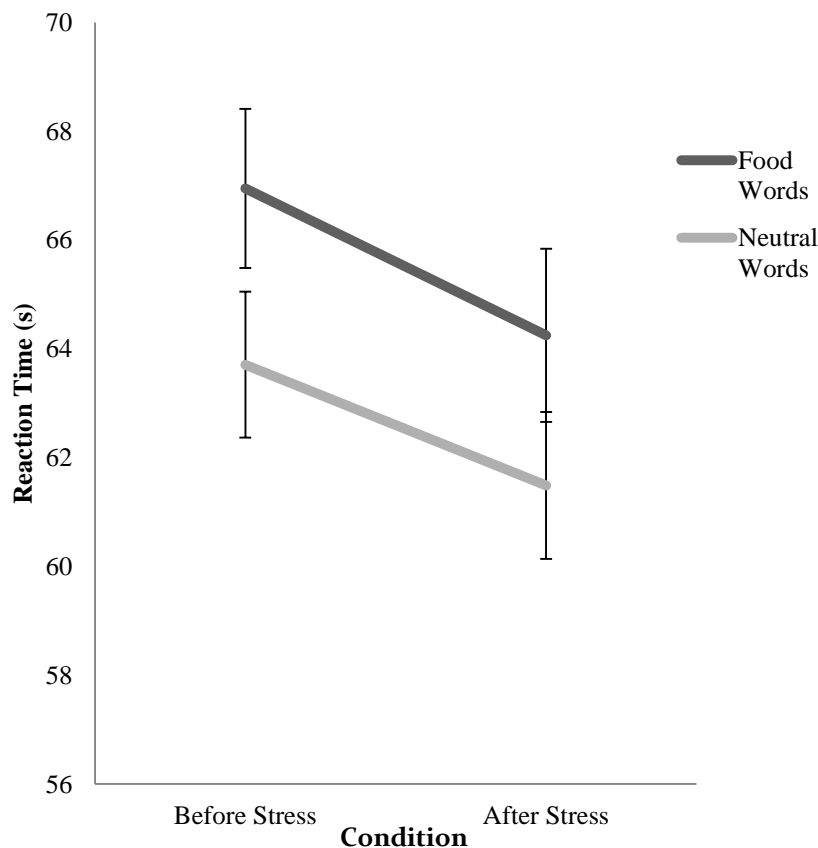


Figure 1. Reaction Times on Stroop Lists in Seconds.

Graphic shows mean reaction times on the two different Stroop tasks (neutral words and food-related words) before and after stress. The error bars represent the SD.

Manipulation check on stress

A manipulation check on mood change after stress confirmed an increase in negative mood. There was an increase in all of the subscales (Table 2) except on the Vigor scale, which showed a decrease. This indicates an actual increase of stress among participants due to the MAST and it thereby served as an effective method to induce stress in subjects.

Table 2
Negative Mood Reactivity

	Before Stress M	After Stress M	Paired <i>t</i> -tests
Anger	1.29	5.10	$t(40) = -5.65, P = 0.000$
Anxiety	1.83	4.41	$t(40) = -6.05, P = 0.000$
Depression	1.88	4.37	$t(40) = -3.38, P = 0.002$
Vigor	11.20	8.17	$t(40) = 4.59, P = 0.000$
Fatigue	4.44	6.05	$t(40) = -2.93, P = 0.006$

Measured with POMS

DISCUSSION

The purpose of this study was to find out what the influence of stress is on the attention for food words compared to neutral words in healthy people. Previous studies have demonstrated, by using an adapted Stroop task, that an attentional bias towards food words is present in patients with eating disorders (Ben- Tovim et al. 1988). In the current research, we intended to investigate if the same attentional bias for food-related words, in comparison to neutral words, in a Stroop task exists for healthy people after they have encountered/experienced stress. Participants performed an adapted version of the Stroop task containing food-related words and one Stroop task containing control words, before and after stress. It was hypothesized that people would show a greater attentional bias to food related cues when stressed and therefore require more time to complete the food-related Stroop list compared to the neutral word Stroop list.

In contrast to our expectations, the results showed that participants in general were faster at the Stroop task in both the food and neutral word lists after stress, in comparison to before stress. It is possible that this effect is caused by a learning effect, by a higher level of adrenaline induced by the MAST or possibly also another unknown factor which could be very important for further investigations. Moreover, in both states, stressed and non-stressed

participants turned out to be significantly slower on the food-word list in comparison to neutral-word list. One possible explanation for this effect could be that there is a general attentional bias for food-related cues. In our study, we did not find stress an influential factor in creating an attentional bias for food-related cues, perhaps because of our methodology. It could be possible that the Stroop test is not the appropriate tool to measure this attentional bias, or that the kind of stress induced by the MAST is different from daily real life stress (i.e. stress for an exam) and it only aroused the participants causing them to be faster in the Stroop Test.

We were the first to measure an attentional bias for food cues after stress in healthy people. Although we did not find the hypothesized effect, our results are relevant for the analysis of the relationship between attention and food cues.

Further research

One shortcoming of our experiment is the sample population. All participants were selected from a similar group, i.e. healthy, second year, Western psychology students, meaning that there could be a smaller external validity to other groups of the society. Our findings suggested that stress makes people perform faster on the Stroop task, but it is not certain that stress is the factor that causes this quicker performance. It could be hypothesized that a learning effect played a role in the relation between reaction time and the Stroop task. Further research could look deeper into the relationship between stress and the attention towards food cues in order to investigate multiple influential factors.

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MORITZ KRUSCHE ET AL.

Investigating the Influence of a Time-based Incentive on Choice Blindness Detection Rates

Original Paper

Choice blindness is the striking failure to notice mismatches between intention and outcome in decision-making. This counterintuitive phenomenon has proven itself robust against a range of external influences and, despite numerous investigations, the underlying mechanism remains unknown. In the present study, we hypothesized that the occurrence of choice blindness would decrease if detection is facilitated through the provision of a time-based motivational incentive (i.e., “leaving early”). Participants (N=72) were randomly allocated to incentive or no-incentive conditions. All participants performed a computer-based general knowledge quiz with binary answer options, in which their answers were reversed for four questions. Detection rates were generally high and varied greatly between questions (range: 23-67%, M=44.7% concurrently; range: 32-88%, M=64.0% retrospectively). However, contrary to our expectations, the motivational incentive appeared not to affect detection rates. Possible interpretations, implications and limitations of our findings are discussed, including the possibility that high intrinsic motivation of our sample population overshadowed the incentive.

Keywords: choice blindness, decision-making, incentives

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INTRODUCTION

Human life is continuously shaped by countless decisions of varying impact, such as what to wear on a particular day, whether to date someone, or which career to follow. Choice blindness (CB) entails that the majority of people are often unaware of manipulations to the outcome of decisions they made, as long as these changes are made secretly (Johansson, Hall, Sikström, & Olsson, 2005). In a typical CB experiment, participants are presented with a binary decision task and are asked to choose which of the two options they prefer. Afterwards, they are presented with their choice and asked to rationalize the reasons for their decision. However, on a few critical trials, the participants are presented with the opposite of their original preference. The inability to detect the reversal of their choice is hence called ‘choice blindness’. In the original demonstration of the phenomenon, in which participants were asked to choose the more attractive of two faces, only 20-40% of the manipulations were detected (Johansson et al., 2005). Thus the majority of participants were ‘choice-blind’. Participants’ insight into their decision-making process appears poor, as they often confabulate reasons for a decision they never made.

Even though the effect is counterintuitive, it has proven to be robust to replications across various modalities. CB has been shown for visual (Johansson et al., 2005), gustatory and olfactory (Hall, Johansson, Tärning, Sikström & Deutgen, 2010), auditory (Sauerland et al., 2013) and even haptic stimuli (Steenfeldt-Kristensen & Thornton, 2013). Furthermore, the CBparadigm has been extended to applied settings such as consumer behaviour (Hall et al., 2010), eyewitness decision making (Sagana, Sauerland, & Merckelbach, 2013, 2014b), opinion polling (Hall, Strandberg, Pärnamets, Lind, Tärning, & Johansson, 2013) and financial decision making (McLaughlin & Somerville, 2013). The full impact of the effect is perhaps best demonstrated by the fact that even moral principles (e.g., integrity vs. welfare or harm to the innocent) or beliefs about moral issues (e.g., government surveillance or prostitution) can be subject to CB manipulations. Hall, Johansson, & Strandberg (2012) used a trick of stage magic to reverse participants’ initial rating on a range of moral issues and principles on a questionnaire on two out of seven items, with detection rates of only 44% and 50% respectively.

Despite some initial scepticism (e.g., Moore & Haggard, 2006), CB has been accepted as an important addition to decision making within cognitive psychology (Macknik, King, Randi, Robbins, Thompson & Martinez-Conde, 2008). Finding the underlying mechanisms or

moderators of CB may allow to specify the situations in which CB diminishes. Making sound decisions is inherently associated with the outcome of those decisions, which is exactly what “blind” participants do not seem to notice. If people apparently do not seem to mind a reverse of their choices, they may have never been sure of them, or worse even, never have made these decisions consciously. Indeed, the notion that we are not consciously in charge of our decisions is a popular one in Psychology. (see Custers & Aarts, 2010 for a perspective). Thus, understanding the factors that moderate CB may lead to better decision making in practical settings for which CB has been shown to exist. For instance, opinion polling could be made more ecologically valid, and eyewitness statements more reliable. Furthermore, it may add a new perspective into moral decision making and could thus assist in discouraging moral inconsistencies.

So far, detection rates have been shown to increase with prolonged inspection time (Johansson et al., 2005) and greater dissimilarity between stimuli (Johansson, Hall & Sikström, 2008; Sagana, Sauerland & Merckelbach, 2013; Sauerland, Sagana, & Otgaar, 2013). A single mechanism that would significantly moderate CB however, has to our knowledge, not yet been discovered. For instance, Sagana, Sauerland & Merckelbach (2014a) ruled out memory distortions as a causal factor. Participants were asked to give sympathy ratings on a 10-point scale for female faces, which were occasionally manipulated by 3 points. Memory for the original rating was not significantly different across detected and non-detected manipulations, suggesting that suppression of the memory of the original choice through the manipulated rating is not sufficient to explain choice blindness phenomena. Further, in an effort to meet the criticism by Moore & Haggard (2006), that CB may be caused by a lack of relevance of the choice made, Sauerland, Sagana, Otgaar & Broers (2014) investigated the influence of self-relevance on CB in child and adolescent populations. To induce self-relevance, participants were either told that they may keep the stimulus (a toy; child sample) or that the stimulus would be implemented in their school (a chair; adolescent sample). No effect of self-relevance on CB for the adolescent sample was found, while the effects of the children sample were mixed. Hence, it was suggested that self-relevance may have a diminishing effect on CB only when self-relevance is high or personal. However, the self-relevance condition that had the greatest impact on CB was the prospect of keeping a toy in the child sample. Hence, it could be argued that in this case the effect of self-relevance was confounded by the incentive of this reward.

The influence of result-based motivational incentives has been extensively studied and it has been shown that they can enhance the ability to reorient attention and ignore task-

irrelevant information (Veling & Aarts, 2010), improve working memory capacity (Beck, Locke, Savine, Jimura, & Braver, 2010) and have a positive impact on performance on cognitive tasks such as problem solving (Wieth & Burns, 2006). Striking effects of incentives have been documented among a vast number of domains. It has been well-established that drug addiction can at least temporarily be overcome with relatively small monetary incentives (Sindelar, 2008). Additionally, children who suffer from disorders of attention such as ADHD have been shown to perform indistinguishable from a control group on a behaviour-inhibition task when rewarded with a points system (Slusarek, Velling, Bunk & Eggers, 2001). Finally, Moore & Johnston (2013) established the effect of monetary incentives in an unfamiliar face matching task. Participants had to simultaneously inspect two unknown faces and decide if they were the equivalent. In the incentive condition, participants received monetary rewards for achieving a higher accuracy, which led to significantly better performance. Thematically, this is similar to the original CB study in using unfamiliar faces as stimuli (Johansson et al, 2005). Despite this promising theoretical background, an investigation into the effect of incentives on CB has, to our knowledge, not yet been published.

The present study aims to replicate the CB effect and to investigate the effect of motivational incentives on detection rates. Specifically, we reasoned that when an incentive was given for performing well, participants would more closely monitor the outcomes of their decisions, and would thus be more likely to detect mismatches with their intentions. Considering that this research was conducted as part of an undergraduate research practical, no funds for monetary incentives were available. However, inspired by non-monetary incentives such as the above mentioned points system, and considering that our participants would be students, who have to take part in multiple time-intensive research projects, we decided that “leaving early” could serve as a motivational incentive for this group of participants. It was reasoned that most students would be glad and try their best when given the opportunity to leave an experiment earlier than expected, and that this effect would be even stronger, when some aspects of the experiment were highly unpleasant by eliciting boredom. Therefore, half of our participants were informed that, depending on their performance, they would be able to leave the lab much earlier while the other half (i.e., the control group) received no such instruction. Boredom was induced by a filler task between blocks of questions that was allegedly going to reappear if participants performed poorly.

We hypothesised that a time-based incentive would moderate CB in our sample population. It was expected that participants who had been instructed that they could leave the lab earlier would be more likely to detect a reversal of their choice compared with

participants who received no such instructions. Additionally, feedback on the manipulated questions could be either negatively framed (“That was wrong!”) or, positively framed (“That was “correct!”). Because a supposedly wrong answer would be associated with a lowering of the accuracy rate, and thus interfere with the participants’ objective, it seems plausible that a manipulation framed in this way would be detected more often. Thus, our secondary hypothesis was that detection rates would be higher for those manipulated questions for which feedback was always negatively framed, as compared to positively framed ones.

METHODS

Participants

In total, 72 (51 female, $M_{age} = 20.8$, $SD_{age} = 1.4$, range: 19-24) second year psychology students from Maastricht University participated in our study. All participants were taking part in a second year research practical course and were rewarded with course credit for their participation. Participation was voluntary and each participant was tested individually. Participants that had previously taken part in similar (i.e. CB) studies were excluded, as the CB effect would diminish. Six participants (5 experimental, 1 control) had to be excluded from the analysis because they either misunderstood instructions, took defiantly long time to complete the task, or their data files were lost. Thus, the analysis included $N = 66$ participants (47 female, $M_{age} = 20.8$, $SD_{age} = 1.4$, range: 19-24). Of these, 31 (23 female) were assigned to the experimental and 35 (24 female) to the control condition. The study was approved by the standing ethical committee of the Faculty of Psychology and Neuroscience at Maastricht University..

Materials

General knowledge quiz

To provide a basis for choice blindness manipulations we implemented a general knowledge quiz. The quiz consisted of a total of 60 questions and each question had two answer options. We deliberately chose questions that were thematically familiar to our participants, yet to which they would be highly unlikely to know the right answer (e.g. “For which country was the

statue of Liberty originally intended? Egypt or Algeria?"; "Birds cannot pee. True or false?"). To ensure this, we conducted a pilot study where students ($N = 41$, 26 female, $M_{age} = 23.1$) were asked to answer a larger list of questions to their best knowledge and guess wherever appropriate. Of this larger list, we systematically selected only those questions that were answered correctly on about 40-60% of trials. Questions could be true/false, yes/no or with two given answer options. The main experiment was computer-based and implemented in 'Open Sesame' (Mathôt, Schreij & Theeuwes, 2012).

Conjunctive Continuous Performance Task (CCPT)

This task (Shalev, Ben-Simon, Mevorach, Cohen, & Tsal, 2011) was implemented as a filler task. Sustained attention tasks have been empirically established to elicit boredom in participants (Malkovsky, Merrifield, Goldberg & Danckert, 2012). We reasoned that the desire to escape having to do this comparatively unpleasant task for a second time would further strengthen our incentive to perform well in the subsequent set of questions. Specifically, in this task participants were presented with short presentations of various simple visual stimuli and had to press the space bar every time a red square appeared.

Post-experiment questionnaire

A questionnaire considering whether participants noticed any of the manipulations during the experiment but refrained from revealing them. The questionnaire contained a brief description of all 20 questions used in the third part of the experiment. Participants could tick the questions they were certain to have been manipulated and additionally the questions they thought felt odd, thus encouraging reporting of detections. In the analysis, both ratings of certainty and oddness were counted as detections when the selected question was manipulated, or as false positive when it was not. Unlike the main experiment, the questionnaire was administered on paper.

Design

This study employed a 2 (condition: incentive vs. no incentive, between subject factor) \times 2 (feedback: negatively framed vs. positively framed, within-subjects factor) mixed design. Participants were randomly divided into conditions. The detection rate of the manipulated questions was the dependent variable. Two different measures of detection rate were used, namely concurrent and retrospective detection. Concurrent detection included the instances

of detection that took place immediately after the presentation of the manipulated outcome as indicated in the written comments of the participants when asked to justify their choices. In line with approaches used in previous CB experiments (Johansson et al., 2005), retrospective detection was handled as an upper bound of possible detection rates, and thus included all concurrent detection and additionally instances of detection as indicated on the post-experimental questionnaire.

Procedure

The day before arriving at the lab, participants received an email with instructions for the study depending on the condition they were assigned to. The experimental group received an email in which it was stated that, depending on their performance (meeting an accuracy of 70%), they could leave the lab 20 minutes earlier or later. Participants in the control group were solely informed that the duration of the study was approximately 50 minutes (i.e., the true duration of the study).

Upon arriving at the lab, participants were told that we were interested in investigating the effect of cues and heuristics on decision making. This cover story was necessary as the effect of choice blindness would diminish if participants knew about the real purpose of the study. After signing the informed consent form, they were informed about the procedure of the study. Specifically, they were instructed that they will be confronted with a series of factual questions and that each question has two possible answers. To select an answer options they could press the 'z' and 'm' keys on a keyboard. They were also told that the questions may be specific and difficult, but that they should stay confident throughout the test. Additionally, participants in the incentive condition were reminded that in order to leave the lab earlier, a performance of at least 70% accuracy was required. If the accuracy rate was below the 70%, they would have to do a filler task after every set of questions, followed by another set of questions. However, the true duration of the test did not depend on the actual performance. This deception was necessary to make the incentive believable.

Beginning with the test, the program started with the first series of 40 questions. The order of all questions was random within sub-blocks of 10 questions. After every question, participants saw a masking stimulus for 200ms and after the mask they were presented with their choice and were informed whether their answer was 'correct' or 'wrong'. Additionally, for 8 of these 40 questions, participants were asked to explain the reason for their choice by typing a short statement immediately after the answer was given. Furthermore, after every sub-block of 10 questions, participants were wrongfully and consistently informed that their performance

was below 70%. This information was only relevant to the experimental group as the control group was told to ignore their performance rate.

Upon completion of the first series of questions, participants were instructed by the program to contact the experimenter. The experimenter then either informed participants that due to their insufficient performance they would now have to do a filler task (experimental) or that they could simply proceed with the next task (control). Subsequently, participants in both conditions were required to do the CCPT filler task for about 10 minutes.

After completing the CCPT filler task, participants had to complete a second series of 20 questions. The procedure was analogous to the first series of questions except for one crucial detail: we manipulated the outcome of 4 of the 8 questions for which participants had to justify their answers (see Table 1 for the manipulated questions). The manipulation was such that participants were presented with the opposite of their original decision. Furthermore, for these four manipulated questions, the feedback participants received was fixed to be either positive ("That was correct!") or negative ("That was wrong!"), regardless of the actual answer given. Note that, although the order of questions was random, two of the manipulated questions (one 'wrong', one 'correct') always appeared in the first sub-block of 10 questions, and the other two in the second sub-block of 10 questions (one 'wrong', one 'correct').

After finishing the second series of questions, the experimenter entered the room and informed the participant some questions may have been manipulated, but did not offer any clues whether or for which questions this could have been the case. The participant was then asked to indicate whether she noticed any such manipulation by filling in the post-experimental questionnaire. Thereafter, participants were debriefed, and received their course participation credit. As part of the debriefing, participants were asked not to share any information regarding the experiment, this was also marked on the debriefing sheet which they received.

Analysis

Data was analysed using MS Excel 2010 and statistical tests were performed in IBM SPSS version 21. Statistical analysis was conducted employing a significance level of .05. Concurrent detection rates were scored by rating the justifications that participants gave after a manipulated choice as detection or non-detection. This was done by two experimenters, who were blind to the subject's condition. Conflicts were resolved through discussion. Detection rates from the questionnaire were scored as detections whenever participants noticed the question to be certainly manipulated, or felt them to be odd. Previous studies of CB have been

mostly limited to exploring the strength of the phenomenon through descriptive statistics. In this instance, a between subjects design was used with the intention to generalise group effects. Thus, inferential statistical tests for binary variables were conducted.

RESULTS

Independent of the condition, the average concurrent detection rate was 44.7% ($N=66$). Including retrospective detection in the post-experimental questionnaire, 64.0% ($N=66$) of manipulations were detected. Hence, a total CB rate of 36.0% ($N=66$) was found.

Table 1. *The four manipulated questions and their respective detection rates. While the order within a block of 10 questions was randomised, questions appeared only in that block.*

Original question	Feedback (regardless of answer)	Block of Appearance	Concurrent detection	Retrospective detection
1. When did Rudolf Diesel introduce the first engine named after him? 1897 or 1886	That was correct!	Block 1	23%	32%
2. Where does the Bagel come from? Europe or America	That was wrong!	Block 1	67%	79%
3. What TV show is more successful? Big Bang Theory or Friends	That was correct!	Block 2	53%	88%
4. Pepsi light is more often sold than Cola Zero.	That was wrong!	Block 2	36%	58%

Effect of Incentive

Firstly, we compared detection rates for questions that always appeared among the first 10 questions (1. & 2. in Table 1) with those that always appeared among the last 10 questions (3. & 4. in Table 1) to test for a possible order effect. 30.3% of participants did not detect any manipulation in the first block of questions, compared with a slightly

higher non-detection rate of 33.3% in the second block of questions. A related-samples Sign Test was not significant ($Z=0$, $p=1$, $r=0$). To test whether the incentive time moderated CB detection rates, two Mann-Whitney U Tests were performed, one for concurrent and one for retrospective detection. The two conditions did not differ with regard to either concurrent ($U(1, 66)=501.5$, $Z = -.54$, $p = .59$, $r = .07$) or retrospective detection rates ($U(1, 66)=466$, $Z = -1.04$, $p = .30$, $r = -.13$). On average, the amount of concurrently detected manipulations was $M=1.71$ in the experimental and $M=1.86$ in the control condition. Similarly, for retrospective detection the amount of detected manipulations was $M=2.45$ in the experimental condition and $M=2.66$ in the control condition. These results do not support the idea time-based incentives can moderate CB (Figure 1). As participants had the possibility to both concurrently and retrospectively (via the post-experimental questionnaire) wrongly detect manipulations on in fact non-manipulated questions, there was potential for false positive detections. A Mann-Whitney U Test between the incentive conditions and the false positive detection rate was performed. As there were no concurrent false positive detections, only retrospective detections were analysed. However, no significant differences between the conditions were found ($U(1, 66)=524.50$, $Z = -.25$, $p = .80$, $r = .03$).

Effect of Feedback

Regardless of condition, all participants received positive or negative feedback on the manipulated questions, indifferent of their actual answer. To test the hypothesis that negatively framed feedback would lead to a higher detection rate, a related-samples Sign Test was performed. The findings confirmed our hypothesis for concurrent detection only ($z(1, 66)=-2.11$, $p = .03$, $r = .26$). Participants detected the manipulation more often for negatively framed feedback questions ($M=1.03$) than for positively framed feedback questions ($M=.76$). However, this effect diminished retrospectively with $M=1.2$ for positive and $M=1.36$ for negative feedback, respectively ($Z=-1.74$, $p = .08$, $r = -.21$). Thus, the secondary hypothesis can only be supported for concurrent detection (Figure 2).

Finally, hoping to gain insight into lack of difference between our conditions, the four manipulated questions were considered separately. In doing so, considerable differences in concurrent as well as retrospective detection rates across the questions were observed (Table 1.). This indicates that CB was moderated by differences between the question types.

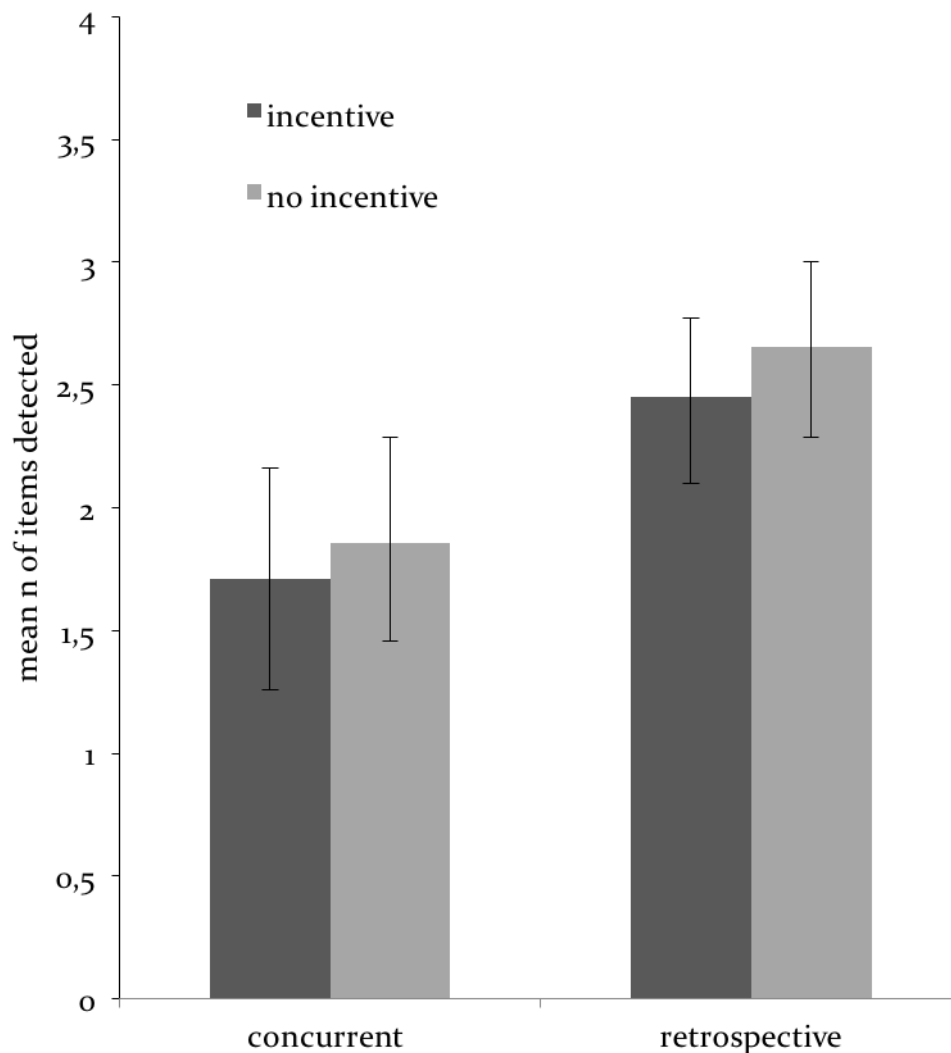


Figure 1. Mean concurrent and retrospective detection rates (+/- SEM) by condition. Participants in the incentive condition were repeatedly told they could leave much earlier, when performing well, while those in the no incentive condition were told that the experiment lasted 50 minutes. The prospect of leaving early was strengthened by making parts of the experiment deliberately boring

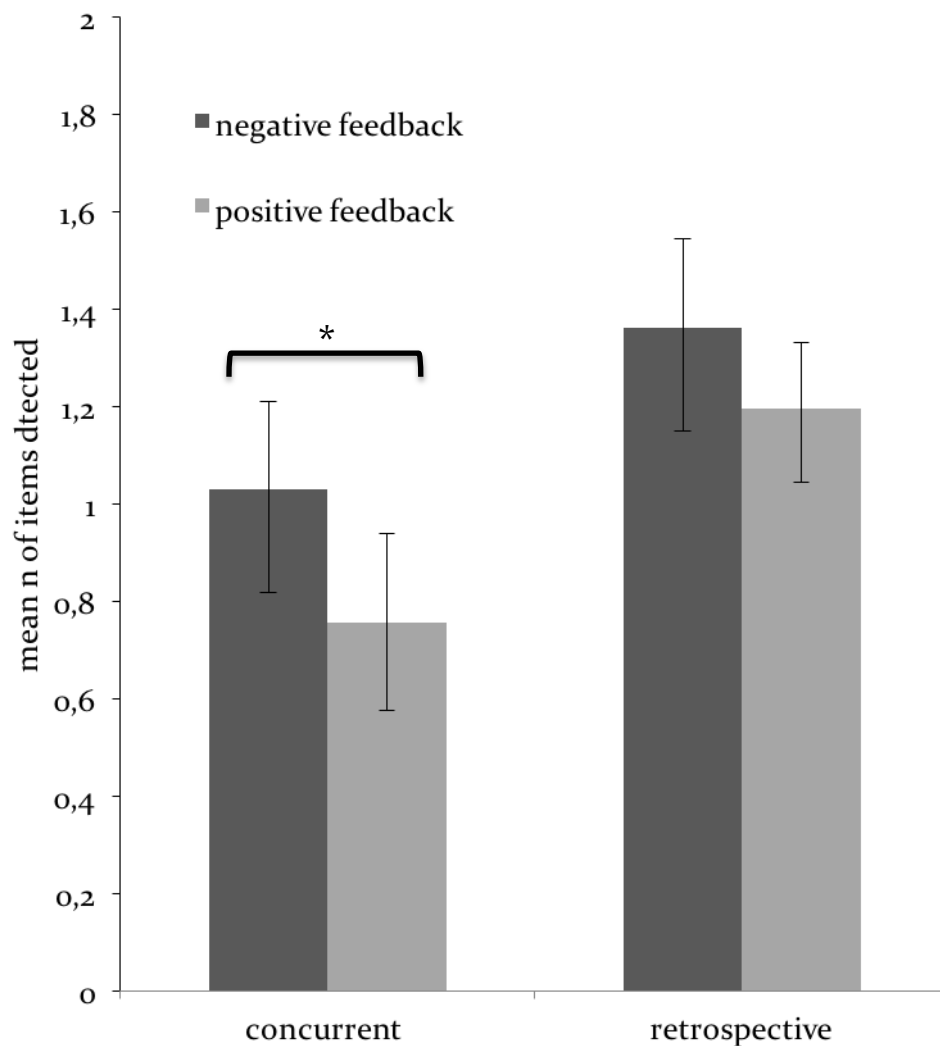


Figure 2. Mean concurrent and retrospective detection rates (\pm SEM) by feedback framing. Feedback could be either positive (“That is correct!”) or negative (“That is wrong!”). This is important in so far, as “wrong” answers seemingly lowered participants accuracy rates, and thus diminished the opportunity to leave early for participants in the incentive condition. In contrast a “correct” manipulated question seemingly gave participants credit towards this incentive.

DISCUSSION

The purpose of the present study was to investigate the impact of motivational incentives on detection rates in CB manipulations, which we operationalized as a time-based incentive (“leaving early”) in a student sample.

First, the hypothesis that time-based incentives would moderate CB and increase detection rates of manipulations, could not be supported in our sample population (Figure 1). Furthermore, we expected that detection rates would be higher for manipulated questions with negatively framed feedback (“That was wrong!”) than for positively framed feedback (“That was correct!”). The findings support this hypothesis with regard to concurrent detections only, as the effect diminished retrospectively. Additionally, no order effect was found. Further analysis revealed unexpected and large differences in detection rates between the four manipulated questions concurrently as well as retrospectively.

Due to the fact that a novel paradigm was used in this experiment for eliciting the motivational incentive to perform well, and no effect was found, no preliminary evidence concerning the broad influence of motivational incentives on detection rates can be supported by the evidence. Anecdotal evidence supports the interpretation that many participants in the experimental group thought that they had performed poorly and that this would have been the reason for the unexpectedly long duration of their participation; a formal manipulation check was not included however, as we reasoned that a question “did you believe the incentive was real” would have been too suggestive to ask. Thus, we argue that the time-based incentive used in this study likely worked to some degree, although this cannot be proven.

Another possible explanation for this non-significant result might be that participants both in the control and the experimental condition got frustrated due to the boring filler task and their insufficient accuracy rate they received as feedback. This may resulted in an increase in intrinsic motivation to perform well in the quiz, meaning that both groups had the same motivation while performing the task. As a result, our extrinsic incentive for the experimental group to leave the lab earlier was overruled by a stronger intrinsic motivation to perform well that equally affected both groups, thus accounting for generally rather high rates of detection. Intrinsic motivation is in general defined as “doing something for its own sake,” while extrinsic motivation refers to the performance to achieve a desired outcome (Ryan & Deci, 2000). According to Deci and Ryan’s (1985) self-determination theory, extrinsic incentives undermine intrinsic interest. Thus, a detrimental effect of the incentive would have been expected. Hence, it is more likely that extrinsic motivation (i.e. incentives) does not moderate CB, while intrinsic motivation in fact does. This could explain the relatively high detection rates, as our consistent impression that participants were enthusiastic about the experiment and tried to do well in their own interest. Additionally, the elicited intrinsic motivation may have been further facilitated by our cover story (“Do you think you know everything”) which implied that participants in our study have to undergo a knowledge quiz. This might have challenged

participants additionally to perform as well as they can at the task regardless of how time consuming that would be. In future research it might be better not to present the control group with the accuracy rate to rule this possible confounder out, and better control for how the study is advertised.

Regarding Sauerland and colleagues (2014), it appears likely that a high or personal degrees of self-relevance can noticeably diminish CB rates. Such an interpretation is intuitively plausible. After all, it would be hard to imagine that a convinced iPhone-user would buy the newest Samsung device purely by accident. Further, as it has been considered in the original demonstration of the phenomenon (Johansson et al., 2005), people simply do not expect such manipulations as there is no experimenter that swaps the outcome of their decisions in everyday life. Our vulnerability to CB may thus be comparable to other effects that give insights into the inherent limitations of human cognition. Especially the literature on decision making is rich with such phenomena as it has been well-established that decisions can be predictably irrational (Kahneman & Tversky, 1979) and influenced by seemingly meaningless information through framing effects (Tversky & Kahneman, 1981). Moreover, it has been suggested that the idea of stable underlying preferences may be an illusion, because preferences are made up on the spot (Ariely, Loewenstein & Prelec, 2003; Ariely & Norton, 2008). This is suggested to be the result of stable underlying anchor effects that empirically have been proven to elicit stable demand curves similar to the curves presumably resulting from underlying preference.

It has also been hypothesized that detection rates would be higher for manipulated questions for which feedback was always negatively framed ("That is wrong!") than for positively framed ones ("That is correct!"). This effect was shown to be significant only for concurrent detection rates and diminished when including retrospective detection (Figure 2). An explanation could be that, as expected, participants did not object to positively-framed feedback because they wanted to leave the lab early. But when the feedback was negative-framed, it meant that they had to stay longer and therefore they reacted. Another reason for this effect could be that participants in both groups felt the urge to perform well during the task. When the manipulated feedback was positive they potentially simply felt pleased that it was correct. They possibly even did notice the change, but they did not make note of it during the justification. However, regarding the manipulated questions with the negative feedback, participants may have written a justification when the manipulation was noticed, because their actual performance was better. Therefore, the objective to leave earlier was hindered. In

conclusion, participants presented with negatively framed feedback may be more likely to check their performance once again to get insight in their failure.

Turning to the difference in detection rates across the four manipulations, the highest retrospective (88%) and a high concurrent (53%) detection rate were observed for the question regarding the most successful TV show (see Table 1). Almost all participants noticed that they were presented with the opposite of their choice in the end. A plausible explanation could be the high self-relevance that answer to this question has for participants. Watching TV is popular in the age group of our participants so it would be reasonable that the participants knew both TV shows and were interested in the correct answer. However, this explanation assumes a high or personal interest of participants, according to Sauerland et al. (2014). The question concerning the bagel had also a high overall detection rate (67% concurrent, 79% retrospective; see Table 1). Again, students might have been highly interested to find out where it does indeed come from, or suspected a particular answer. Moreover, they received negatively framed feedback to the question, which had a significant effect on concurrent detections. The other two manipulated questions were different in nature. While the question about the first Diesel motor asked to indicate a year (1897 vs. 1886), the question about Coca Cola and Pepsi concerned if the statement is true or false (see Table 1). Alternatively, one could argue that some questions may have been suggestive, for instance because “Friends” is no longer aired, while the “Big Bang Theory” still is. We would at this point, however, like to stress that all questions were selected after conducting a pilot study, and that said pilot, participants were unable to know the correct answer to the selected questions.

While it is still plausible that motivational incentives do not have any influence on CB detection rates, the effect has to be investigated in more detail. For instance, Veling & Aarts (2010), who investigated monetary incentives in a Stroop paradigm, found significant effects only for relatively high monetary rewards. In the present task, the time-based incentive likely was too weak to have a measurable effect. Thus, further investigations into different levels and kinds of motivational incentives will be necessary to gain definite insight in their influence on CB manipulations.

In conclusion, further research on CB could lead to more insight into this phenomenon. People seem to be unaware of manipulations to the decisions they made most of the time. Efforts to lower CB rates have not been successful and the underlying mechanism of CB is still unknown. This work extends the existing literature on CB insofar as, for the first time, an effect of motivational incentives on detection rates was investigated. Future research should address the effect of stronger, and more established, incentives such as large monetary

rewards. The fact that detection rates vary starkly between specific questions gives hope that a mechanism can be found, as does the possibility that intrinsic, not extrinsic motivation moderates CB. Practical implications could touch upon the reduction of blindness rate in the context of eyewitness identifications, polling and moral decision making. This could be a relevant branch of research considering that eyewitness statements can have profound effects on sentencing in the justice system, while opinion polls are directly related to a number of relevant research applications and politics. Thus, it remains relevant to continue the investigation of mechanisms that could moderate or diminish the occurrence of CB.

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AUTHOR CONTRIBUTION

All authors designed & conducted the study, MK & CK analysed the data, MK, CK & RM wrote the manuscript.