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The Effects of Focused Meditation on Memory and Suggestibility in an Interrogative Design

by

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Honours Thesis

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Abstract

Eyewitness reports can be important evidence in police investigations, therefore obtaining accurate and detailed reports is essential. Hypnosis has been used as a technique to obtain more information from these reports, but has been found to be problematic. Research in the area of hypnosis and other similar techniques has led to using focused meditation as a tool to obtain more detailed and accurate eyewitness reports. Thus far, it has been found to facilitate memory and decrease suggestibility without the risks associated with hypnosis. This study explored the possible underlying mechanisms of focused meditation to see if relaxation could independently account for these effects, or if there is something unique about focused meditation. This study also explored the benefits and risks associated with using focused meditation as an interrogative tool. Measures of memory and suggestibility were compared between groups that received focused meditation, relaxation or control. No significant main effects or interactions were found, thus not finding any benefits associated with using FM in an interrogative setting, but also not finding any risks.

Focused Meditation in an Interrogative Design

Eyewitness reports can be important pieces of evidence in police investigations. They can influence the decisions of juries and can have an impact on convictions and sentences. One of the early techniques used in interrogations to attempt to generate more detailed reports is hypnosis. At first, hypnosis seemed to increase the number of details that a witness recalled from a crime, but further research found that this was due to an increased reporting of false information. There are many risks associated with hypnosis and the use of hypnosis in police investigations has ceased, but the search for a tool to increase accuracy and details reported by eyewitnesses continued. By integrating the benefits of hypnosis while attempting to avoid the risks, new techniques have emerged. One of these techniques is focused meditation (FM). This is a relaxation technique that involves deep breathing, and focusing on a neutral target (usually one's breath). Past research has shown that FM can increase one's memory for an event and decrease their suggestibility to misinformation without the risks that are associated with hypnosis. Focused meditation has also been shown to increase an individual's relaxation (Morse, Martin, Furst, & Dublin, 1977), and relaxation has been separately studied as a memory-enhancing technique (Nava, Landau, Brody, Linder, & Schachinger, 2004). Thus far, it is not known why FM increases the amount of information individuals can recall, or why it decreases their suggestibility. The relaxation that FM induces could potentially explain these effects, or there could be a unique aspect of FM that is causing these effects. FM has not yet been compared to a standard relaxation group in an interrogative design. In this study, our goal is to better understand the underlying mechanisms associated with FM and to further explore its effectiveness as an interrogation tool.

Hypnosis as an Interrogative Tool

As previously mentioned, eyewitness reports can be of importance in police investigations. The Innocence Project states that error in these reports is the leading factor in wrongful convictions, so finding ways to improve their accuracy and maximize the details recalled is essential. There are some factors that influence eyewitness reports that are situational or personal, such as the age of the eyewitness or the lighting at the time of the crime. There are also factors that are directly influenced by the investigator, such as the manner in which they ask interrogation questions. The latter of these factors are ones that we can use different techniques or tools to control.

One of the early tools used to try and improve details and accuracy was hypnosis. At first, hypnosis seemed to increase the number of details that a witness recalled from a crime, and there was once some consensus surrounding the effectiveness of hypnosis as an interrogation tool (Kebbell & Wagstaff, 1998). Further research found this increase in details was due to a number of false details that witnesses now included in their reports, thus decreasing the overall accuracy. The artificial confidence in these false memories was increased as well. Participants under hypnosis were also found to have increased suggestibility, thus increasing their susceptibility to misinformation received post-event. These all contribute to the risks associated with using hypnosis as an interrogative tool, and have lead to police ceasing the use of hypnosis in investigations.

Despite the failure of hypnosis to accurately increase eyewitness memory, there were some aspects of hypnosis that were thought to potentially draw benefits. In attempt to increase these benefits and decrease the risks, researchers identified some of the negative risks associated with hypnosis, such as the expectancy characteristics. The expectancy characteristics are

characteristics associated with hypnosis that lead witnesses to include more details in their reports because they expect that hypnosis will make them recall more details. Individuals develop a lax criterion for including information in their reports because they assume the information they recalled during hypnosis must be correct (Wagstaff, Wheatcroft, Anderton, & Madden, 2008). This can partially account for the increase of false information included by witnesses when hypnosis was used. By identifying risks such as expectancy characteristics, researchers attempted to integrate the positive benefits and discard the negative risks and create new interrogative tools. One of the first tools to come out of this process was the cognitive interview (CI).

Other Interrogative Tools

The CI includes methods that were used with hypnosis such as more open-ended questions, less interruption from the interviewer and building rapport, but does not include the process of hypnosis itself. Research surrounding the CI has shown that it has the potential to be an effective interrogative tool. For example, Geiselman, Fisher, MacKinnon, and Holland (1985) compared the CI to hypnosis and a control standard interview. Participants were shown a video of a violent crime and then a warning was given about the risks of hypnosis to control for the expectancy characteristics. Participants were then given either the CI, a hypnotic interview or a standard interview. The results showed that participants in the CI and hypnotic conditions produced more correct responses than those in the standard interview condition, and there were no significant differences in the amount of incorrect information provided. This suggests that both the CI and hypnosis techniques are effective in the enhancement of memory in police investigations when expectations are controlled for, and can yield a similar accuracy of responses. While the CI has been shown to increase the accuracy of eyewitness reports, it takes a

long time to train professionals on the CI as well as administer the CI. Due to its time-consuming nature, it has been found that police are not properly using the CI (Kebbell, Milne, & Wagstaff, 1990). This misuse of the CI could potentially create risks, such as threatening the accuracy of eyewitness reports.

Due to these findings, researchers believed there was merit in re-examining other aspects of hypnosis that may be less time-consuming than the CI. Researchers attempted to find another tool that borrows techniques from hypnosis that may offer the benefits without the risks. Some of the procedures involved in hypnotic induction are similar to the procedures involved in relaxation and meditation. For example, these procedures often involve a relaxed, passive mode of thinking and focusing on a neutral target such as breathing or the body. Wagstaff, Brunas-Wagstaff, Knapton, Winterbottom, Crean, Cole and Wheatcroft (2004) proposed that these procedures could create a more global mode of information processing and reduce distractions, which could result in memory facilitation. It was considered that since these relaxation-inducing procedures did not have the same expectancy characteristics as hypnosis, they could possibly gain some of the advantages associated with hypnosis (memory facilitation) without increasing errors or artificial confidence (Wagstaff et al., 2008). These techniques are also shorter and simpler to follow than the CI.

One of these proposed techniques is FM. FM is a technique that involves deep breathing, relaxation and focusing on a neutral stimulus, such as on one's breath and has been defined as "a broad category, covering any meditative practice that requires one to continually return to a single object of focus," (Baruss & Mossbridge, 2017, p. 163). Wagstaff has pioneered research surrounding the benefits and risks of using FM as an interrogative tool, and has found that this tool holds potential to be effective in police investigations.

It is worth noting that other techniques stemming from hypnosis were explored such as eye-closure (Wagstaff, Wheatcroft, Burt, Pikkington, Wilkinson, & Hoyle, 2011), eye movement (Wagstaff, Wheatcroft, Marshall, & Barsby, 2007) and context reinstatement (CR). CR is a technique where “participants are asked to describe in detail the context surrounding the critical event, including their thoughts and feelings at the time.” (Hammond, Wagstaff, & Cole, 2006, p.120). When these other techniques were compared to FM, it seems that FM holds the most benefits and poses the least risks. For example, some research has shown that CR increased artificial confidence in incorrect information, just as hypnosis had (Hammond et al., 2006). This research has supported FM over other techniques stemming from hypnosis, so researchers continued the exploration of it’s effectiveness as an interrogative tool.

Focused Meditation and Memory

FM has been shown to have many positive effects on individual’s memory, specifically for stimuli that are important in crimes (Wagstaff et al., 2004, Wagstaff, Cole, Wheatcroft, Marshall, & Barsby, 2007). Additionally, this technique has not been associated with an increased artificial confidence in false information that was found with hypnosis and CR.

FM has been shown to facilitate various types of memories. More specifically, it has been found to facilitate emotionally salient memories, which are important in a forensic context. A study by Wagstaff et al. (2007) compared the effects of FM, CR and a control condition on participants memory of an emotionally salient event (Princess Diana’s funeral). Results showed that those in the FM and CR conditions reported more correct responses than those in the control condition. These results were found with no increases in artificial confidence in the participants reports, and no increase in reporting incorrect information. These results suggest that an FM

procedure can reliably increase an individual's memory for an emotionally salient event without increasing incorrect information, or the individual's artificial confidence in their reports.

Another type of memory that is important in police investigations is facial recognition. A study by Wagstaff et al. (2004) compared the effects of FM to a control group on the recognition of five faces presented to participants. After being shown five faces, participants were given a filler task, and then given either 1.5 minutes of meditation or free time (control). Participants were then presented with a sheet containing 30 faces, 5 of which were the faces they had previously been shown. They were asked to choose the 5 faces they believed they had seen, and to rate their confidence of their choices. The results showed that participants that were in the meditation group chose significantly more correct faces than those in the control condition, without an increase in confidence. These results suggest that focused meditation can increase individual's accuracy for facial recognition without increasing their confidence, and provide further support for FM as an interrogative tool.

Focused Meditation and Suggestibility

Not only has FM been shown to effectively increase memory recall, but it has also been shown to decrease suggestibility associated with misinformation presented to witnesses. The misinformation effect is a phenomenon where individuals include false information received after they have witnessed an event in their reports of the event, believing that this information came from the original event. Misinformation presented to witnesses during a police investigation can be detrimental in the correct convictions of individuals, therefore it is important to find a technique that can reduce the misinformation effect. Wagstaff et al. (2008) studied the effects of hypnosis with a warning on the misinformation effect. Participants were given an audio recording, then further given another audio recording containing misinformation regarding

the first audio clip. Participants were then assigned to either a standard misinformation condition, hypnotic warning condition (hypnosis with a warning that it will help you distinguish between correct and incorrect information – thus changing the expectancy characteristics) or a control condition, which did not receive the misinformation at all. The results showed that the misinformation condition reported significantly more incorrect information than the hypnosis and control groups, which did not differ from one another. The results also showed that there was no increase in artificial confidence in the hypnosis condition. This suggests that the misinformation effect can be eliminated or reversed by hypnosis if a warning is given that it will aid in the discrimination of correct and incorrect information, to a level similar to if the misinformation were not present at all. This supports the idea that there are benefits that can be drawn from hypnosis if the risks are controlled for.

Since FM seems to integrate the benefits of hypnosis while controlling for the risks, Wagstaff, Wheatcroft, Caddick, Kirby and Lamont (2011) further studied the misinformation effect with FM and CR. Participants were given an audio clip, followed by another audio clip that included misinformation. They were then either given a briefing about misinformation (an audio clip explaining that misinformation sometimes occurs), FM and CR or control, which received nothing. Participants were then asked to complete a questionnaire regarding the first audio clip they received. Results showed that the participants in the FM and CR condition reported significantly more correct information than those in the briefing and control conditions, with no increases in reporting incorrect information. Those in the FM and CR group were more confident in their responses, but this was not found to be problematic since they reported more correct information. These results suggest that FM and CR techniques do not promote the susceptibility to misinformation, and can potentially reduce the misinformation effect.

FM alone, without CR, has also been shown to reduce the misinformation effect. A study by Wagstaff et al. (2011) presented the misinformation paradigm to participants who either received FM with eyes closed, FM with eyes open, eyes open with no FM or eyes closed with no FM. The results showed that those in the FM conditions reported significantly more correct details than those who did not receive FM, with no effect of eye-closure. This suggests that FM can enhance memory of correct information, despite the presentation of misleading details.

An individual's likelihood to report false information could also be linked to that individual's suggestibility. More specifically, it could be linked to an individual's interrogative suggestibility: when the misleading information is presented in questions in the interrogation. In a study by Wagstaff et al. (2011) it was found that the use of FM can decrease individuals scores on the Gudjonsson Suggestibility Scale (GSS), a scale measuring interrogative suggestibility. Participants who received FM produced higher memory recall scores and lower total suggestibility scores on the GSS. This decrease in interrogative suggestibility presents another benefit of using FM as an interrogative tool.

FM has also been shown to have a positive effect on the underlying mechanisms of misinformation. One of these underlying mechanisms is source monitoring: the ability to correctly identify what sources you received information from. If an individual can succeed in source monitoring (i.e., successfully identifying whether information came from the event they witnessed or information they received afterwards) then they will likely not report false information. Alberts, Otgaar & Kalagi (2017) looked at the impact of mindfulness (a technique similar to FM) on source monitoring and the misinformation effect. After hearing an audio recording and audio misinformation, participants were either assigned to a mindfulness condition in which they participated in a meditation or a control condition where they were not instructed

to do anything. They found that participants who received mindfulness were better able to identify the source of their information compared to a group that did not receive mindfulness. Since mindfulness is similar to FM and seems to have an effect on the underlying mechanisms of the misinformation effect, it supports the idea that FM can reverse or reduce the misinformation effect.

Relaxation

Thus far, research has shown that there is potential in using FM in an interrogative context. What remains unknown is the underlying mechanisms of FM that account for this increase in memory recall and decrease in suggestibility. One of these potential underlying mechanisms is relaxation. FM has been shown to promote relaxation in participants, and relaxation has been shown to promote memory – but only long term. A study by Nava et al. (2004) compared the effects of relaxation and a control group on short and long-term memory. The results showed that those in the relaxation condition performed poorer on the short-term memory test, but performed better on the long-term memory retention test. This suggests that the relaxation process assists individuals in the retention of memory in the long-term, but may hinder individuals in the short-term.

When comparing relaxation to hypnosis, there seems to be similar effects. In a study by Green and Lynn (2005), they found no significant differences in memory retention for the dates of international news events in a relaxation group compared to a hypnosis group. So, it is possible that relaxation can facilitate memory, but it is unsure if relaxation could control for the risks associated with hypnosis, or if those risks are still present. A relaxation group has never been compared to an FM group to understand which has more benefits and less risks. It is also

unknown if relaxation can independently account for the effects of FM, or if there are other underlying mechanisms. The present study will address these questions.

Summary

The history of hypnosis shows that it has memory enhancing properties, but its use in a forensic setting is problematic due to the increase of false memories and artificial confidence. Due to the importance of eyewitness reports, finding a technique that includes the benefits of hypnosis while reducing the risks is essential. Different techniques have stemmed from hypnosis that could be helpful in facilitating eyewitness memory, without increasing false memories and artificial confidence. Some of these techniques include CR, eye-closure and eye movement, but FM seems to be the most effective out of these tools. Alongside its positive effects on memory recall, FM also seems to be able to decrease individual's suggestibility and reporting of false information presented in misinformation conditions.

The next logical step is to understand the underlying mechanisms of FM. Alberts et al. (2017) stated that "it is unclear whether and to what extent the effects of the mindfulness [FM] intervention may be attributable to relaxation". FM has never been explicitly compared to relaxation in an interrogative context. In the current study, we will be comparing a FM group to a relaxation and control group in an interrogative design. This will help us further understand the underlying mechanisms that generate the memory facilitating effects of FM, and if relaxation can independently account for those effects. This will also allow us to further explore the possible benefits and risks associated with using FM as an interrogative tool.

Hypotheses

Based on past research that shows support for the memory facilitating effects of FM, we predict that the FM and relaxation groups will have more correct responses and less susceptibility to the misinformation presented than the control group. This means that participants in the FM conditions will have higher memory recall scores, but lower suggestibility scores than those in the control condition. Due to research supporting relaxation's effects on long-term memory, but not short-term memory, we also predict that the participants in the FM condition will show more correct responses and less suggestibility than those in the relaxation condition. This means that those in the FM condition will have higher memory scores and lower suggestibility scores than those in the relaxation and control conditions.

Method

Participants

Participants were 38 undergraduate students from King's University College at Western University in London, Ontario (34 females, 4 males; $M_{\text{age}} = 20.5$ years; $SD = 3.0$ years). There were 13 participants in the FM condition (92% female, 8% male, $M_{\text{age}} = 19.4$), 13 in the relaxation condition (85% female, 15% male, $M_{\text{age}} = 21.8$) and 12 in the control condition (92% female, 8% male, $M_{\text{age}} = 20.3$). Participants were recruited through the SONA website or in-class recruitment. No prior experience with focused meditation or other relaxation techniques was required. If participants were Psychology 1000 students at Western University they were compensated with 3% added on to their grade by completing an assignment. If participants were not Psychology 1000 students at Western University, they were not compensated.

Measures

Memory. Memory was measured using free recall. After participants had heard an audio recording of a crime, had completed their filler task, and were given either focused meditation, relaxation or control, they were given a questionnaire. The first part of this questionnaire asked participants to write down everything they remembered about the audio clip. This was scored out of 40, and participants received one mark for each detail about the story they presented in their free recall. Gudjonsson (1984) has provided a version of the story that is separated by dashes, where each piece of information separated by a dash refers to a detail that could be scored as one mark if the participant correctly reported it in their free recall (Appendix A).

Relaxation. Relaxation was measured using a Likert scale. The scale ranges from 1 to 10 with 1 being not relaxed at all and 10 being extremely relaxed. This scale was presented to participants at the beginning of the questionnaire.

Interrogative suggestibility. Interrogative suggestibility was measured using the Gudjonsson Suggestibility Scale (GSS) (Gudjonsson, 1984). This scale consists of 20 questions based on the content of the story that the participants heard, 15 of which are considered suggestive, and five that are not. The participants received a yield score out of 15 which represents their suggestibility to the questions on the first trial of the questionnaire. If the participant yielded to the suggestion of the question (e.g., if the participant responded “two” to the question “Did the woman have one or two children?”, when this was a detail not mentioned in the story), this will be marked as a yield score. Participants also received a shift score which represents their suggestibility to the negative feedback that they received between trial 1 and trial 2 of the questionnaire. Shift scores were also scored out of 15, and a shift score was given when a participant significantly changed one of their answers from the first trial to the second trial

(e.g., if on the first trial they replied “she has two children” but on the second trial they replied “she has one child”). Previous tests for reliability on this scale show the inter-rater reliability to be $r=0.98$ for yield 1 scores, $r=0.95$ for shift scores and $r=0.99$ for total score (Richardson & Smith, 1993). Further, the internal consistency of the GSS has been found to be sufficient, with Cronbach’s alpha being 0.79 for yield scores, 0.75 for shift scores and 0.82 for total suggestibility scores (Merckelbach, Muris, Wessel, & Koppen, 1998). The questionnaire given to the participants including the free recall, relaxation Likert scale and the GSS can be found in Appendix B.

Procedure

Ethics approval was granted by the King’s University College research ethics board. Prior to recruiting participants, participants were randomly assigned to one of three conditions: FM, relaxation or control. This was recorded in an Excel document with the number of each participants (e.g., participant 1, participant 2 etc.) correlating with one of the three conditions. During the 2018 academic school year, participants were recruited through the SONA website or in person by classroom visits. The SONA website was available to all psychology 1000 students, and included a brief definition of the study describing it as a “memory study”. During classroom visits, the same brief definition was given of the study, describing it as a memory study that was looking at the effects of meditation and relaxation on memory. Once participants entered to the lab they were given a letter of consent with a brief explanation of the study. Once consent was provided, participants were given the instructions “I want you to listen to a short story. Listen carefully because when I am finished I want you to tell me everything you remember.” Then the participants were played an audio recording of a story about a robbery that was taken from the GSS. When participants finished listening to the story, they were given a 10 minute filler task,

which was various word searches. Participants were then given either focused meditation instructions or relaxation instructions, both facilitated by the researcher and research assistant, or they were given nothing (control) based on the condition they were randomly assigned. The focused meditation and relaxation instructions can both be found in Appendix C, along with the script that the researchers followed. Once the instructions were completed, participants were asked to fill out a questionnaire which consisted of the relaxation likert scale, free recall, and the GSS. This was considered trial 1. The GSS part of the questionnaire was given a yield score out of 15 that corresponded to how much the participants yielded to the 15 suggestive questions, and a free recall score which was scored out of 40. After the participants had completed this scale they were told, “You have made a number of errors. It is therefore necessary to go through the questions once more, and this time try to be more accurate.” The participants were then given the exact same GSS without the free recall or relaxation Likert scale portions, and this was considered trial 2. Any distinct changes that were made from the first trial were marked as shift scores and participants received a shift score out of 15. A total suggestibility score was then calculated by adding the yield and shift scores together. Once completed, participants were debriefed on the study, and thanked for their participation. The total time of the study was approximately 20 minutes. All data were then measured and recorded using SPSS data analyses and SuperANOVA software.

Design

The study had a mixed model experimental design, which investigated the relationship between which condition a participant will receive (FM, relaxation or control), their suggestibility as determined by their performance on the GSS and their memory which was determined by a free recall task on the GSS. The independent variable was the condition that the

participant is assigned to. The dependent variables were the participants ranking on the relaxation likert scale and their four scores determined by the GSS: free recall (memory), yield, shift and total suggestibility (yield + shift).

Results

Memory

First, we ran a one-way between-subjects ANOVA to test the effects that the conditions had on the participant's memory. This ANOVA was carried out on the free recall memory scores of the participants. The independent variable was which condition the participants were assigned (FM, relaxation, or control) and the dependent variable was their score on the free recall portion of the GSS. This analysis yielded no main effects or interactions $F(2,35) = 0.79, ns$. This is contrary to the hypothesis that those in the FM and relaxation conditions would perform better at the memory recall task than those in the control condition.

Suggestibility

To assess whether the condition influenced participant's suggestibility, we ran a 3x2 mixed model ANOVA with repeated measures on the yield and shift scores of the participants, which were combined to create a total suggestibility score. The independent between-subjects variable was the condition that the participants were assigned (FM, relaxation or control), and the dependent within-subjects variable was the yield and shift scores of the participants. There were no main effects or interactions $F(2,35) = 2.48, ns$. This is contrary to the hypothesis that participants in the FM and relaxation conditions would be less suggestible than those in the control condition, and suggests that those in the FM and relaxation conditions were just as suggestible as those in the control condition.

Manipulation Check

Finally, to check if the manipulation (the focused meditation and the relaxation) had an effect on participants levels of relaxation, we ran a one-way between-subjects ANOVA. The condition that the participants were in (FM, relaxation or control) was the independent variable, and their relaxation score on the Likert scale was the dependent variable. This analysis produced no significant results, $F(2, 35) = 0.168, ns$. This suggests that the manipulation used was not successful in making participants feel more relaxed. Since the manipulation of the FM and relaxation did not make participants feel more relaxed, a median split was carried out on participants relaxation scores which divided participants into high and low relaxation. This was done to see if participant's level of relaxation had an effect on their suggestibility. A 2x2 mixed model ANOVA was carried out with the relaxation group (high or low) as the independent between-subjects variable and the yield and shift scores as the dependent, within-subjects variable. This analysis produced no significant main effects or interactions, $F(1,36) = 2.57, ns$. This suggests that the level of relaxation of participants did not have an effect on their suggestibility. These results do not support the hypotheses.

Discussion

Although the results yielded no significant main effects or interactions, the present study informed us of the risks and benefits associated with using focused meditation as an interrogation tool. There were no significant effects of condition on the suggestibility scores of participants, which suggests that relaxation and FM do not have a suggestibility decreasing or increasing effect on participants. It was also found that condition did not have a significant effect on the free recall memory of participants, which is contrary to our hypotheses. These results may be partially explained by the manipulation check that was carried out. Since participants in the FM

and relaxation conditions did not rate themselves as feeling significantly more relaxed than those in the control condition, it is suggested that the manipulations of FM and relaxation did not work to make participants feel more relaxed. Since the manipulation was unsuccessful, we split the participants into high vs low relaxation, so the effect of relaxation on suggestibility and memory could be analyzed. It was found that there were no significant effects of participant's relaxation score on either their suggestibility or memory. Although this study showed no benefits associated with using focused meditation as an interrogation tool, it also showed that there seems to be no risk associated with it either. Despite the results being contrary to our hypotheses, they still hold merit, have practical implications and can lead to future research.

The first hypothesis of this study was that those in the FM condition would perform better on measures of memory and suggestibility than those in relaxation and control conditions. As mentioned, this hypothesis was not supported by the results, with no significant differences being found between conditions. One explanation of these results could be that the participants were not engaged in the meditation. It was observed that participants did not seem to be paying attention or engaging in the meditation. For example, some participants were observed on their cellphones during the meditation instructions. This suggests that there are limitations to the use of FM as an interrogative tool – one of those limitations being the effort of the participants. Perhaps meditation requires active engagement and effort from participants to have a significant effect on memory and suggestibility. Another explanation of this may be that FM does not increase memory or decrease suggestibility, despite past research. Although those in the FM condition did not perform better than those in the relaxation and control conditions, they also did not perform worse. So, FM may not increase memory and decrease suggestibility, but it also does not increase suggestibility.

The second hypothesis of the present study was that those in the relaxation condition would perform better on measures of memory and suggestibility than those in the control condition. Results did not support this hypothesis, showing no significant differences on memory scores between those in the relaxation condition and those in the control condition. As previously mentioned, one explanation of why this result was non-significant is that the manipulation of relaxation did not induce participants to feel more relaxed. Another explanation of why those in the relaxation condition performed the same as those in the control condition could be that the tool used to produce relaxation was not one that has been shown to improve working memory. A study done by Hudetz, Hudetz and Klayman (2000) found that working memory increased after relaxation produced by guided imagery, but not after relaxation produced by music. Since the present study used nature sounds as a manipulation for relaxation, this could be why memory was not improved and suggestibility was not decreased. Future studies may use different tools to induce relaxation, such as guided imagery.

Despite the unsuccessful manipulation, no significant results were found on analyses comparing high relaxation vs low relaxation on measures of memory and suggestibility. This suggests that relaxation alone may not have an effect on memory or suggestibility. Another interesting explanation could be that participants who were more relaxed from the techniques used are also more suggestible. A study by Rickard, Crist and Barker (1985) showed a significant relationship between the suggestibility of an individual and their response to relaxation. Those who were more suggestible were more relaxed after different types of relaxation. This suggests that perhaps participants who were more influenced by the FM and relaxation, were already more suggestible to begin with.

In general, no significant results were found to support our hypotheses. There seemed to be no effect of FM or relaxation on measures of memory and suggestibility. This may be due to an unsuccessful manipulation check, the effort of the participants, the type of relaxation used or the baseline suggestibility of the participants. These results do not show any benefits arising from using FM as an interrogative tool, but they support the idea that there are no associated risks.

Limitations

Some of the limitations of this study include the sample size, the ecological validity and the effort of the participants. The sample size of 38 participants provided this study with fairly weak power. Since participants who were not in psychology 1000 classes were not compensated, there was little motivation to participate in this study. The ecological validity of this study was also weak. Witnessing a crime can be an emotional event, so the emotional state of the eyewitness could effect their memory and suggestibility. These same emotions were not present in this study, because listening to an audio recording of a crime does not produce the same emotional reactions as witnessing a real crime. Additionally, eyewitnesses are usually motivated to help the police – they want to provide as much detail as possible to the police so that they are able to help. In the present study, participants were not highly motivated to provide immense detail or accuracy in their responses. The effort of the participants was another limitation of this study. As previously mentioned, while being given the manipulations (either relaxation or focused meditation), many participants were observed to be on their cellphones, or not paying attention to the instructions of the meditation. This could have had an effect on their relaxation. It is possible that if the participants had been more effortful, the manipulation may have had an

effect, thus possibly producing different results. In future studies, it may be effective to ask participants to shut their phones off, or any other distractions off during the study.

Practical Implications

This research could have many implications in the forensic field. Firstly, it may caution professionals against using FM or relaxation as interrogation tools until more research has been conducted, and the effects and underlying mechanisms are better understood. At this point, there is more research supporting the cognitive interview as an interrogation tool than FM or relaxation. This study also suggests that there are limitations to the use of FM and relaxation as an interrogation technique. This is not a perfect tool to use during interrogations, and these limitations should be explored further before application in the forensic field. Although no significant effects were found for the effects of FM or relaxation on suggestibility and memory, participants still had highly suggestible scores. This supports research that states that individuals are susceptible to misinformation in an interrogative design. This also supports the use of the GSS as a suggestibility measure, since participants did yield to the suggestible questions. This study cautions professionals against using suggestible questioning in interrogations, because witnesses are suggestible to that information and will yield to the suggestible nature of the question. Professionals must be cautious of the wording of their questions in interrogations and should keep in mind the suggestibility of witnesses. This also shows that although there may not be benefits associated with using FM as an interrogative tool, FM does not seem to pose any risks. The present study opens up this area to future research.

Future Research

There are many different paths that future research in this area could take. Firstly, other underlying mechanisms of FM could be explored. Some of these mechanisms may include the effects of FM on affect, working memory, attention or visuospatial processes. It has been found that these variables are all influenced by meditation (Zeidan, Johnson, Diamond, David & Goolkasian, 2010), but it is unaware if these effects of meditation on the individual can also have effects on their memory and suggestibility. Secondly, future research could take on a similar design as this study, but measure relaxation of participants physiologically rather than with a Likert scale. Some ways to do this measure could be biofeedback, or an EEG measuring alpha waves. This would provide researchers with a more valid measure of relaxation and would allow them to see how much the manipulations relax the participants. Finally, different types of meditation could be explored. Although focused meditation has been explored in a forensic setting, other types of meditation may produce different effects on memory and suggestibility. These other types of meditation may include a body scan, or observing-thought meditation (Kok & Singer, 2017). These meditations have been shown to produce unique physiological changes in individuals, so they may also have different effects on memory and suggestibility.

Conclusion

In conclusion, this study showed no significant main effects or interactions of focused meditation or relaxation on individual's memory and suggestibility. This was the first study to compare FM to relaxation in attempts to further understand the underlying mechanisms of FM in an interrogative design. This study successfully explored the benefits and risks associated with using FM as an interrogative tool, and the results showed that there seem to be no benefits, nor

any risks. This opens up paths for future research in the area and provides insight into some of the limitations and effectiveness of FM as an interrogative tool.

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Appendix A

Anna Thomson/of Northwest/London/was on holiday/in Spain/when she was held up/outside her hotel/and robbed of her purse/which contained \$200 worth/of travellers cheques/and her passport. She screamed for help/and attempted to put up a fight/by kicking one of the assailants/in the shins./A police car shortly arrived/and the woman was taken to the nearest police station/where she was interviewed by Detective/Sergeant/Delgado./The woman reported that she had been attacked by three men/one of whom she described as oriental looking./The men were said to be slim/and in their early twenties./The police officer was touched by the woman's story/and advised her to contact the Canadian Embassy./Six days later/the police recovered the lady's purse/but the contents were never found./Three men were subsequently charged/two of whom were convicted/and given prison sentences./Only one/had had previous convictions/for similar offences./The lady returned to Canada/with her husband/Simon/and two friends/but remained frightened of being out on her own.

Appendix B

Memory Study

#

Age: _____

Sex: _____

This booklet has several questions about the audio story that you heard earlier.

Please answer these questions in turn; please do not flip back and forth through the booklet.

On a scale from 1 – 10 (with 1 = not at all relaxed, 10 =extremely relaxed), how relaxed do you feel right now?

1 2 3 4 5 6 7 8 9 10

Please write down everything you remember from the story.

1. Did the woman have a husband called Simon?
2. Did the woman have one or two children?
3. Did the woman's glasses break in the struggle?
4. Was the woman's name Anna Wilkinson?
5. Was the woman interviewed by a detective sergeant?
6. Were the assailants black or white?
7. Was the woman taken to the central police station?
8. Did the woman's purse get damaged in the struggle?
9. Was the woman on holiday in Spain?
10. Were the assailants convicted six weeks after their arrest?
11. Did the woman's husband support her during the police interview?
12. Did the woman hit one of the assailants with her fist or her purse?
13. Was the woman from Northwest London?
14. Did one of the assailants shout at the woman?
15. Were the assailants tall or short?
16. Did the woman's screams frighten the assailants?
17. Was the police officer's name Delgado?

18. Did the police give the woman a lift back to her hotel?

19. Were the assailants armed with knives or guns?

20. Did the woman's clothes get torn in the struggle?

Appendix C

Script - Relaxation Condition

1. Once the participants have signed the informed consent sheet, read them the following:

You will now listen to a short audio recording of a story. Listen carefully because when it is finished, I want you to tell me everything that you remember.

2. Play the audio.
3. Once the audio has finished, read the following:

Please work on these word searches. I will call you into the other room when it is time for the next step.

Please do not talk amongst yourselves. Please do not discuss details about the audio recording.

4. Invite them into the other room.
-

5. Read the following:

Sit down in the chair however you please, get comfortable. I'm going to play you some sounds and I just want you to try and relax.

Play the relaxation sounds for **1 minute and 30 seconds**.

6. Give them the questionnaire and ask them to complete it.
7. Once they have completed the questionnaire, pick it up, look at their responses and state the following:

You have made a number of errors, so I'll ask you to please go through the questions one more time. Please try to be more accurate this time.

8. Give the participants the second questionnaire and allow them to complete it.

9. Once they have completed it, thank them for their participation and give them a debriefing sheet.

Script - Control Condition

4. Once the participants have signed the informed consent sheet, read them the following:

You will now listen to a short audio recording of a story.

Listen carefully because when it is finished, I want you to tell me everything that you remember.

5. Play the audio.

6. Once the audio has finished, read the following:

Please work on these word searches. I will call you into the other room when it is time for the next step.

Please do not talk amongst yourselves. Please do not discuss details about the audio recording.

10. Invite them into the other room.
-

11. Have participant sit down. Time 90 seconds for them to sit there before the questionnaire.

Ok, one moment, please.

12. Give them the questionnaire and ask them to complete it.

13. Once they have completed the questionnaire, pick it up, look at their responses and state the following:

You have made a number of errors, so I'll ask you to please go through the questions one more time. Please try to be more accurate this time.

14. Give the participants the second questionnaire and allow them to complete it.

15. Once they have completed it, thank them for their participation and give them a debriefing sheet.

Script - Focused Meditation Condition

7. Once the participants have signed the informed consent sheet, read them the following:

You will now listen to a short audio recording of a story. Listen carefully because when it is finished, I want you to tell me everything that you remember.

8. Play the audio.

9. Once the audio has finished, read the following:

Please work on these word searches. I will call you into the other room when it is time for the next step.

Please do not talk amongst yourselves. Please do not discuss details about the audio recording.

16. Invite them into the other room.
-

17. Read the following:

Please sit comfortably; placing both feet on the floor; keep your spine straight; keep your back straight; and focus your attention now on your breathing. As you breath in and out in a natural manner, focus on your breathing; breathing in and out in a natural manner. Tense all your muscles and hold it for a deep breath, then release that tension. Let all the tension flow from your body. Take a few deep conscious

breaths, but don't strain. Just focus on your breathing, breathing in and out in a natural manner. If you notice any areas of tension, let them soften. Let the eyes and face be soft, let the shoulders drop and the hands rest easily. Let the belly be soft and the breath natural. Let yourself just rest for a moment, being aware of what is here as you feel your body, as you rest on the earth. As you sit quietly, you'll notice there are different thoughts and feelings that arise and pass. Let these thoughts and feelings arise and pass easily, like waves in the ocean. Let your mind and heart be soft, open and at peace. Now let yourself become aware of the fact of your breathing, in the midst of the thoughts, sounds and feeling that come and go, you can sense the feeling or sensation of your breath. Notice the breath, and rest your attention in it. As you feel each breath, let there be a sense of relaxation. After several breaths, you may notice that your mind wanders. A wave of thought or feeling will come and carry you. As soon as you notice this wave, you can acknowledge it and then release it when you notice it, coming back gently and directly to feel the breath again. Let the flow of your breath settle into its own natural rhythm; keep focused and aware during the whole process but concentrate on your breathing, breathing in and out in a natural manner. Allow your focus attention to focus on the changing rhythms of your breathing; and if your attention begins to wander, gently but firmly bring it back to your breathing. Now keep focusing on your breathing as you listen to the following instructions. Throughout

the following questionnaire continue focusing on your breathing, breathing in and out in a natural rhythm.

18. Give them the questionnaire and ask them to complete it.

19. Once they have completed the questionnaire, pick it up, look at their responses and state the following:

You have made a number of errors, so I'll ask you to please go through the questions one more time. Please try to be more accurate this time.

20. Give the participants the second questionnaire and allow them to complete it.

21. Once they have completed it, thank them for their participation and give them a debriefing sheet.