

Marta Kuczek*
Malwina Szpitalak**
Romuald Polczyk*

Anxious and distrustful – How do state anxiety and memory distrust influence the misinformation effect?

Abstract: The misinformation effect is influenced by many mnemonic and non-mnemonic factors. This article concerns the role of two of them: 1) state anxiety, defined as a situational experience of anxiety; 2) memory distrust, understood as a constant tendency to negatively evaluate one's memory. Both factors are relevant in the situation of being a witness and are believed to have a negative effect on the magnitude of the misinformation effect. In the present research, participants' state anxiety had an immunizing effect against misinformation. As for memory distrust, no relationship was found between negative evaluation of memory and susceptibility to misinformation. The results confirm the beneficial effect of anxiety on resisting misinformation and demonstrate a greater need for further explorations concerning memory distrust.

Keywords: *misinformation effect, memory, anxiety, memory distrust, witness testimony*

INTRODUCTION

The memory misinformation effect (ME), which is the topic of this study, may be defined as follows: “in a witness's account of an event, the inclusion of information from sources other than the event itself” (Polczyk, 2007, p. 17). The misinformation effect is an important phenomenon for researchers, mainly due to the consequences it entails for forensic examination. Its occurrence is associated with more frequent reporting by witnesses of event accounts that contain distorted or completely untrue information, thus falsifying what is sometimes the most important source of evidence in court cases (e.g., Brewer & Wells, 2011; Eisen, Gabbert, Ying, & Williams, 2017; Goodwin, Kukucka, & Hawks, 2013; Luna & Martín-Luengo, 2012; Skagerberg & Wright, 2008; Wade, Green, & Nash, 2010; Wright, Memon, Skagerberg, & Gabbert, 2009).

The misinformation effect is usually studied using a three-stage paradigm (e.g., Cohen & Harnick, 1980; Dalton & Daneman, 2006; Duncan, Whitney, & Kunen, 1982; Frost, Ingraham, & Wilson, 2002; Loftus, Miller, & Burns, 1978; VanOss Marin, Holmes, Guth, & Kovac, 1979). In a typical experiment using a three-stage procedure, the subjects in the first stage are presented with material depicting the original event, usually in the form of slides or film. Next, they are given materials

containing misleading information (often included in a text, questions, or woven into conversation). The experiment is followed by a memory test in which respondents are asked to answer questions about the original material that was presented at the beginning. Depending on the hypothesis tested by the experimenters, the form of the third stage of the study (final test) differed and a range of experiments was used to confirm the existence of the specific mechanisms responsible for the misinformation effect (see Ayers & Reder, 1998; Pickrell, McDonald, Bernstein, & Loftus, 2016; for reviews).

The occurrence and magnitude of the misinformation effect is determined by a number of factors related both to the experimental situation itself and to the subjects' characteristics (Zhu et al., 2010a, 2010b). The aim of the present article is to explore two factors that are related to the emotions experienced by respondents: anxiety and memory distrust, which is a trait that is related to how subjects assess their own memory. Below, we summarize the existing knowledge about these factors in the context of memory reports influenced by misinformation.

Anxiety and the Misinformation Effect

Anxiety influences cognitive processes in various ways, e.g. in the form of attention bias (tendency to pay more attention to potentially threatening stimuli; e.g., Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van

* Institute of Psychology, Jagiellonian University, Poland

** Institute of Psychology, Jagiellonian University, Poland; ORCID iD - 0000-0003-4928-5556

Ijzendoorn, 2007; Deryberry & Reed, 2002; Mogg, Mathews, & Eysenck, 1992), interpretation bias (tendency to interpret ambiguous signals in the environment as threatening; e.g., Constans, Penn, Ihen, & Hope, 1999; Derakshan & Eysenck, 1997; MacLeod & Cohen, 1993; Wilson, MacLeod, Mathews, & Rutherford, 2006), as well as greater uncertainty intolerance (e.g., Bensi & Giusberti, 2007; Boelen & Reijntjes, 2009; McEvoy & Mahoney, 2012).

However, it turns out that despite its potentially negative consequences for cognitive functioning, anxiety can be a protective factor against misinformation in the context of memory reports. The influence of anxiety induction on susceptibility to misinformation was examined by Ridley and Clifford (2004), who showed that anxiety reduces the magnitude of the misinformation effect, regardless of when anxiety is induced. Similar results were obtained in a study on a population of children aged 9–10 (Ridley, Clifford & Keogh, 2002). Ridley and Clifford (2006) also analysed the impact of anxiety on the misinformation effect using a source-monitoring paradigm in which subjects in the final memory test identify the source of the information presented to them (e.g. Lindsay & Johnson, 1989; Zaragoza & Koshmider, 1989; Zaragoza & Lane, 1994). It turned out that people with a higher level of state anxiety were less likely to misidentify the source of the misleading information compared to people with lower state anxiety, but they were also less sure of their answers.

The obtained results have been considered, among others, in the context of Eysenck and Calvo's processing efficiency theory (1992). This theory assumes a distinction between performance effectiveness and processing efficiency. Performance effectiveness (performance quality) displays itself, for example, in the accuracy of responses. By contrast, processing efficiency is defined as the relationship between performance effectiveness and the amount of effort expended on a given task. According to researchers (Eysenck and Calvo, 1992), anxiety usually has a more negative effect on the efficiency of information processing than on its effectiveness. These assumptions were investigated in the attention control theory (Eysenck, Derakshan, Santos, & Calvo, 2007), according to which worry and other negative phenomena associated with anxiety do not necessarily affect the performance effectiveness of a given task negatively. Anxiety that occurs while completing a task is often a kind of aversive signal for an individual who is not coping with the task very well. In order to try to eliminate anxiety, this individual may take various compensatory measures that will result in, among others, putting more effort into the task, thereby compensating for the deficits in cognitive resources caused by the anxiety. According to Ridley and Clifford (2004), misleading information could be perceived as threatening by people exposed to anxiety induction because it causes a sense of ambiguity and vagueness that can lead to its suppression.

In a similar vein, Nitschke, Chu, Pruessner, Bartz and Sheldon (2019) found that acute psychosocial stress

induced after exposing participants to a misleading narrative summarizing an event presented *via* a slideshow reduced subsequent yielding to the misinformation in the narrative. Interestingly, this effect was still present even after several days. Also, Hoscheidt, LaBar, Ryan Jacobs, and Nadel (2014) found that anxiety during encoding reduced the endorsement of misinformation from the post-event narrative. In addition (and in contrast to the results obtained by Ridley and Clifford (2004, 2006) and Ridley *et al.* (2002)), in Hoscheidt *et al.*'s research, anxiety was beneficial for memory accuracy concerning items that were not misleading.

It should be mentioned that these results were obtained in experiments using the three-stage experimental paradigm. Somewhat different effects were present in another paradigm related to memory suggestibility, namely interrogative suggestibility (IS), which is defined as 'the extent to which, within a closed social interaction, people come to accept messages communicated during formal questioning, as a result of which their subsequent behavioural response is affected' (Gudjonsson & Clark, 1986, p. 84).

The difference in the results between both paradigms (negative correlations of anxiety with ME and positive ones with IS) can be explained in terms of important dissimilarities between these paradigms. Namely, in the case of ME, the influence of misinformation is usually rather impersonal, while in the case of IS it is more similar to social influence. Also, the direct presence of the interrogator may make anxious participants comply with suggestions and pressure from the interrogator. In contrast, the rather impersonal influence of misinformation included in an anonymous description of original material that is free of any direct social influence may invoke different mechanisms.

The aforementioned considerations concerning IS are to some extent corroborated by other research that focused on direct social influence (Wright, London, & Waechter, 2010), in which a somewhat more complicated picture emerged as regards the relationship between misinformation acceptance and anxiety. Wright *et al.* (2010) studied social anxiety and found that participants who believed that the cost of disagreeing was higher than the cost of making a mistake were more likely to accept misinformation, whereas social avoidance was associated with greater resistance to it. Wright *et al.* (2010) used a modification of the classic three-stage misinformation paradigm: they presented their participants with a large collection of photos and analysed whether correct recognition of them was influenced by the answers of the second participant. Thus, it is difficult to compare these results to those obtained in the classic misinformation paradigm, in which no direct social pressure is usually present.

Memory Distrust and the Misinformation Effect

The way in which respondents evaluate their memory is important in terms of the impact on the occurrence of the misinformation effect. Gudjonsson & MacKeith (1982)

were the first to describe the “memory distrust syndrome” in the case of witness testimonies. This phenomenon manifests itself in the fact that an individual develops profound distrust and scepticism considering the functioning of their own memory as a result of the accuracy of their memories being undermined. This results, among others, in a tendency to rely on external cues when recalling facts; difficulties in source monitoring of information; and increased susceptibility to suggestions (Gudjonsson, 2003). The occurrence of the memory distrust syndrome is mainly associated (Gudjonsson, 2003) with long and intense interrogation, during which subtle manipulation techniques are sometimes used against the person being interrogated, thus causing them to be uncertain about the validity of their memories.

Van Bergen, Jelacic and Merckelbach (2008; 2009) distinguished between memory distrust understood as a state and as a trait. In the first case, individuals who evaluated their memory in a possibly positive way begin to doubt its proper functioning due to external factors, e.g. pressure from third parties. In the case of trait memory distrust, a person has a constant tendency to negatively evaluate their own memory.

Special interest was directed towards the relationship between memory distrust, susceptibility to suggestion and the tendency to give false confessions. Gudjonsson et al. (Gudjonsson, Kopelman, & MacKeith, 1999; Gudjonsson, Sigurdsson, Sigurdardottir, Steinthorsson & Sigurdardottir, 2014) gave examples in which the systematic use of techniques that undermine suspects’ faith in the truth of their memories led to these people to doubt their innocence, thus resulting in guilty verdicts – despite significant doubts about the guilt of the tried suspects. Therefore, it can be assumed that the memory distrust that occurs in a certain situational context can lead to false confessions. In the case of the misinformation effect, experimental data was obtained showing that memory distrust increased the susceptibility to respond according to misinformation in the final memory test.

Van Bergen *et al.* (2009) also examined the relationship between memory distrust on one hand and interrogative suggestibility, compliance, the tendency to generate false memories, and objective memory performance on the other hand. Subjects who had negative opinions about their memory turned out to be more compliant and reported a greater number of problems related to cognitive functioning. Interestingly, memory self-assessment was not related to interrogative suggestibility and false memories. The authors explained the differences in suggestibility results between their research and the results obtained by Gudjonsson (2003) by pointing that in the case of the court cases analysed by Gudjonsson (e.g., Gudjonsson et al., 1999) the pressure exerted on the subjects during interrogation was much greater, which could have increased susceptibility to suggestion in people experiencing memory distrust. The discrepancy between the results could also have occurred because Gudjonsson et al. (1999) mainly focused on state memory distrust,

while the SSMQ Scale (Squire, Wetzel, & Slater, 1979) that was used in the study of van Bergen et al. (2009) captures this phenomenon in terms of a trait.

Aims of the present study

The aims of the present study are to confirm the impact of anxiety as a factor that protects against the acceptance of misleading information and to establish how one’s assessment of one’s own memory influences the occurrence of the misinformation effect. Based on current reports on anxiety and misinformation (among others Ridley & Clifford, 2004; Ridley & Clifford, 2006; Ridley *et al.*, 2001) and all the above considerations, the following hypotheses were formulated:

1. The misinformation effect will be present: the number of correct answers will be lower in the misled group compared with the non-misled one.
2. Yielding to misinformation will be negatively related to anxiety: the number of correct answers will be positively correlated with anxiety.
3. Yielding to misinformation will be positively related to memory distrust: the number of correct answers will be negatively correlated with memory distrust.

METHOD

Participants

One hundred and fifty-five participants were tested (109 women and 46 men); their mean age was 17.11 ($SD = 1.33$; range 15–20). One hundred and twenty participants were students at a public upper-secondary school (high school and technical secondary school); thirty-five were students at a private bilingual high school in Kraków. Students took part in the experiment during their classes. No compensation was given for participating.

Materials

The original material was a five-minute sound recording that had been prepared for the study; it contained information on anorexia and a case report. To introduce the misinformation, two summaries of the recording were created: one contained misinformation (eight false details); the control summary did not contain misinformation and did not mention the correct original information. The memory test consisted of sixteen closed-ended questions, eight of which were critical and referred to the misleading details; the remaining eight were buffers.

In order to induce anxiety, half of the participants were given information written in bold which stated, “The task of the worst performers will be to prepare and deliver an oral presentation on eating disorders”. We decided to use anxiety induction related to public speaking because fear of this is particularly common among young people (Graeff, Parente, Del-Ben, & Guimarães, 2003). Experimental procedures of this kind have been described as simulated public speaking (SPS, McNair et al., 1982). To better conceal the real purpose of the study and to confirm the cover story, a questionnaire consisting of ten closed yes/no questions was created; these questions concerned

teenagers' knowledge of eating disorders and previous school activities on the subject.

The following questionnaires were used:

State and Trait Anxiety Inventory (STAI – X1 Spielberg, Gorsuch, & Lushene, 1970; Polish adaptation: Wrześniewski & Sosnowski, 1996). This tool consists of 20 items for assessing trait anxiety and 20 for state anxiety, all of which are rated on a 4-point Likert scale. Higher scores indicate greater anxiety. For the purpose of this study, only the state anxiety subscale was used. Internal reliability as measured by Cronbach alpha in the present research was 0.82.

Visual Analogue Scale (VAS) is a response scale that is usually applied in the form of a horizontal line (10 cm) that is anchored by word descriptors at each end. The person marks the point on the line that represents their current state (Cline, Herman, Shaw, & Morton, 1992). In the present study, the left end of the scale was described as “no anxiety” and the right end as “extreme anxiety”.

The Memory Assessment Scale (SSMQ; Squire *et al.*, 1979; Polish adaptation: Kuczek, Szpitalak, & Polczyk, 2018). This tool consists of 18 statements concerning memory distrust, which is defined as the tendency to evaluate one's own memory negatively (van Bergen *et al.*, 2009; van Bergen *et al.*, 2010). Each statement is rated on a 9-point Likert scale. Lower scores indicate greater memory distrust. This scale's Cronbach alpha in the present research was 0.86.

Procedure

The experiment was run during classes in high schools or in the institute laboratory. The participants were randomly assigned to one of four groups according to the 2×2 design: misinformation (present *vs.* absent) \times anxiety (with *vs.* without the induction of anxiety). The experimenter introduced herself as a Jagiellonian University psychology student who was testing young people's knowledge and beliefs concerning eating disorders. Next, the students listened to the recording and were then given the STAI-XI and VAS tools as the pretest of anxiety, as well as the SSMQ. They then read the

summary of the recording, which did or did not contain misinformation, depending on the experimental condition. To maintain the faked anonymity, the students signed the questionnaires with their class journal number. This was necessary in order to maintain the credibility of the ‘threat’ contained in the anxiety induction. After the questionnaires had been collected, the second phase of the study took place, in which the students were given the final test (with or without anxiety induction), as well as the STAI-XI, VAS (as the post-test), and the fake questionnaire.

RESULTS

Preliminary Analyses

Manipulation check. First, the manipulation check was performed in order to verify the efficacy of the anxiety induction by means of a two-factor ANOVA with one between-subjects factor (anxiety induction) and one repeated-measures factor (pre- *vs.* post-test on anxiety measures). The manipulation proved unsuccessful in the case of both measures of anxiety: for STAI-XI, the change in the anxiety level was not significantly higher in the group for which anxiety had been induced compared with the control group (ANOVA for interaction: $F(1, 152) = 0.42, p = .519, \eta^2 < .01$), and for VAS: ($F(1, 153) = 2.48, p = .117, \eta^2 = .02$).

Because of the ineffectiveness of the state anxiety manipulation, verifying the hypotheses concerning the *induced* state of anxiety was impossible. However, it was still possible to analyse the participants' varying levels of trait anxiety and its impact on other variables. All four indices of anxiety (VAS and STAI at pretest and post-test) were used in these analyses, as well as their total index, which was computed as the mean of the standardized results on the four indices.

Differences between schools. As described above, the sample consisted of two rather heterogeneous samples. Therefore, all the important variables of the two subsamples were compared by means of Student *t* tests. The results are presented in Table 1.

Table 1. Differences between subsamples for the number of correct answers, anxiety, and memory distrust

| | <i>Mean</i> | | <i>SD</i> | | <i>t</i> | <i>df</i> | <i>p</i> |
|-----------------|-------------|--------|-----------|-------|----------|-----------|----------|
| | S1 | S2 | S1 | S2 | | | |
| Correct answers | 5.28 | 4.54 | 1.85 | 2.11 | 1.99 | 153 | .048 |
| VAS1 | 28.86 | 46.97 | 35.03 | 37.69 | -2.65 | 153 | .009 |
| VAS2 | 27.59 | 47.20 | 32.45 | 39.58 | -2.99 | 153 | .003 |
| STAI1 | 38.26 | 43.63 | 8.16 | 12.72 | -2.99 | 153 | .003 |
| STAI2 | 37.45 | 43.47 | 8.80 | 12.91 | -3.15 | 152 | .002 |
| Mean anxiety | -0.12 | 0.42 | 0.79 | 1.09 | -3.26 | 153 | .001 |
| Memory distrust | 129.66 | 122.73 | 12.29 | 21.21 | 2.41 | 151 | .017 |

S1 – public upper-secondary school; S2 – private bilingual high school

As can be seen, there were rather large and consistent differences between the subsamples. Sample 1 scored more correct answers and had higher results on all indices of anxiety. Given these results, this grouping variable was controlled for in all subsequent analyses.

Main Analyses

First, the analysis concerning the first hypothesis, i.e. the existence of the misinformation effect, was performed, as without it all planned analyses would be meaningless. It turned out that misled participants had a significantly lower number of correct answers than non-misled ones (means and *SDs*, respectively: 4.37 vs. 6.25 (1.98 and 1.14), $F(1, 153) = 44.82, p < .001, \eta^2 = .23$); thus, the misinformation effect was replicated with a large effect size.

The second hypothesis in this study stated that anxiety would be negatively related to the misinformation effect. The third hypothesis stated that memory distrust would be positively related to the misinformation effect.

In order to verify Hypotheses 2 and 3, the correlations of anxiety and memory distrust with the correctness of answers on critical questions were computed. Such an analysis is only meaningful in a group of misled participants, as one cannot study the misinformation effect without misinformation; however, for comparison, the correlations were also calculated in the control group.

The results are presented in Table 2, which also contains the moderation analyses that were performed in order to ensure that the correlations were indeed different in the misled and non-misled groups. This is important as the fact that an effect is significant in one group and not significant in another is only a weak argument for a real difference (Hayes, 2018). In the moderation analyses, which were performed by means of PROCESS software (Hayes, 2018), anxiety indices and memory distrust were set as predictors; the number of correct answers were set as the dependent variable; and the ‘misinformation’ grouping factor was set as the dichotomous moderator. Given the above-mentioned differences between the subsamples, this factor, as well as the gender of the participant, were

entered in the analyses as covariates in order to control for them. The ‘anxiety induction / no induction’ grouping factor was also controlled for as it might have influenced the results in an unknown way, despite the fact that it apparently did not affect anxiety. The results are presented in Table 2.

As can be seen in Table 2, the results were quite clear. In the misled group, all correlations (as well as coefficients from the moderation analysis) of anxiety indices with the number of correct answers were significant and positive, thus indicating that the higher the anxiety, the lower the tendency to accept misinformation. In the non-misled group, none of the correlations were statistically significant. The interactions between misinformation and anxiety were all significant except for one; even in the case of the non-significant one, the relationship was significant in the misled group but not in the control group. This confirms the hypothesis concerning anxiety. However, no significant correlation or interaction was found in the case of memory distrust, thus leaving the related hypothesis without confirmation.

In sum, the hypotheses concerning the replication of the misinformation effect and the negative impact of anxiety on it were confirmed, but no support was found for the prediction concerning the positive relationship between memory distrust and misinformation.

DISCUSSION

The present study was performed in order to verify three hypotheses: (1) the existence of the misinformation effect; (2) a negative relationship between anxiety and the misinformation effect (that is, the higher the anxiety, the lower the vulnerability to misinformation); and (3) a positive relationship between memory distrust and the misinformation effect (that is, the higher the memory distrust, the higher the vulnerability to misinformation). The first two hypotheses were confirmed, but the third was not.

As for the misinformation effect, the present results are another demonstration of it. The ease with which it can

Table 2. Correlations between anxiety and memory distrust; the number of correct answers, and results of moderation analyses

| | Pearson <i>r</i> s | | <i>p</i> _{int} | Moderation | |
|-----------------|--------------------|------------|-------------------------|-----------------------|------------------------|
| | Misled | Non-misled | | <i>b</i> _M | <i>b</i> _{NM} |
| VAS1 | .38** | .11 | .003 | 0.02** | < 0.01 |
| VAS2 | .39** | .10 | .003 | 0.02** | < -0.01 |
| STAI1 | .35** | .10 | .022 | 0.07** | < -0.01 |
| STAI2 | .27** | .13 | .127 | 0.05* | 0.01 |
| Anxiety | .38** | .13 | .010 | 0.85** | <0.01 |
| Memory distrust | -.07 | -.24 | .777 | -0.01 | 0.02 |

***p* < .01

*p*_{int}: *p* for interaction of a given predictor with the moderating misinformation manipulation

*b*_M: regression coefficient between a given predictor and the number of correct answers in the misled group

*b*_{NM}: regression coefficient between a given predictor and the number of correct answers in the non-misled group

be elicited (comp. Zaragoza & Lane, 1994) should be a warning for all engaged in justice systems. Due to the sample of participations in the present study, which mostly consisted of people in late adolescence, the obtained results may contribute to knowledge concerning populations in which the misinformation effect can be obtained.

The second hypothesis, which concerns the impact of anxiety on the misinformation effect, was planned to be analysed by means of a manipulation that induced anxiety. However, this was impossible due to the ineffectiveness of the anxiety induction. The reason for the ineffectiveness of the anxiety induction may be that it differed slightly from the standard procedures used for simulated public speaking. In experiments using SPS, respondents are usually informed that their statements will be recorded, which is an additional factor that induces anxiety (e.g. Graeff *et al.*, 2003; Phillips & Giancola, 2008). A situation in which students were faced with the possibility of recording their statements would definitely be more effective in causing anxiety, but it would also be less plausible in the eyes of subjects, given that the study lasted 45 minutes, i.e. the duration of a single lesson in Poland. In the study by Ridley and Clifford (2004), participants were tested individually, which also increased the credibility of the anxiety induction applied by the researchers. It is also possible that the authority of the experimenter (who was a university student) was not high enough for the students, which could have affected the induction efficiency and the level of anxiety. Despite the failure of the anxiety-inducing manipulation, the analyses concerning the relationship between anxiety and the misinformation effect were still possible when they were based on anxiety measured as a situational emotional state that characterizes the participants at the time of the study (regardless of the anxiety induction). It turned out that the higher the level of anxiety, the *lower* the vulnerability to misinformation. These results are congruent with the studies of Ridley *et al.* (2002), Ridley and Clifford (2006), and Hoscheidt *et al.* (2014), in which anxiety was measured, as well as with those in which it was induced (Ridley & Clifford, 2004; Nitschke *et al.*, 2019). In terms of the processing efficiency theory (Eysenck *et al.*, 2007; Eysenck & Calvo, 1992), it seems that in the case of anxious participants the increased on-task effort outweighed the negative consequences of the reduction in storage and processing capacity caused by worrying. It is possible that anxious participants who strive to perform well were better able to detect discrepancies between the original and post-event materials. Although discrepancy detection by no means guarantees resistance to misinformation (Blank, 1998; Polczyk, 1997; 2017), it nevertheless reduces it (Tousignant, Hall, & Loftus, 1986).

The present study did not confirm the hypothesis postulating a positive relationship between memory distrust and the tendency to yield to misinformation. This result is not consistent with that obtained by van Bergen *et al.* (2010). One explanation for this discrepancy may be the fact that only young adolescents took part in the present study, while the experiment by van Bergen *et al.*

(2010) also included adults. Commissaris, Ponds and Jolles (1998) found that younger people were more vulnerable to memory distrust as a state, which can be associated, for example, with experiencing a stressful situation. In turn, memory distrust as a relatively stable individual trait (as measured by SSMQ) is more common among older persons, as well as among people with a lower level of education. To some extent, this may explain the differences in results between the present study and that of van Bergen *et al.* (2010).

There were also some procedural differences between both studies. In the experiments by van Bergen *et al.* (2010), after encountering the original material (video footage of a robbery) the participants were asked to give a free recall of what they remembered. The recall was then shown to them in a written form containing some misleading information. Such a procedure on its own has great potential to elicit memory distrust as participants are seemingly confronted with their own testimonies. In such a situation, detecting discrepancies caused by misinformation inevitably leads one to doubt one's own memory (or suspect being tricked by the investigator). This is a big difference in comparison to the procedure used in the present study, in which the participants' belief in the functioning of their own memories was not undermined at any moment.

Another reason for the lack of correlation between memory distrust and vulnerability to misinformation may simply be the low variability of doubting one's memory in the present sample, which consisted only of young people, who are less prone to experiencing memory distrust (Commissaris *et al.*, 1998). It is possible that greater variance of memory distrust would cause it to start to show a significant relationship with the misinformation effect.

Limitations and future directions

The main limitation of the present study is the failure to confirm the efficacy of the anxiety manipulation. As elaborated above, it was still possible to confirm the relevant hypothesis, but this would certainly be more convincing if substantiated with experimental manipulation. In future research of this kind, better methods of inducing anxiety need to be developed, but this is a technical and ethical challenge.

Second, the lack of a significant relationship between believing in the quality of one's own memory and vulnerability to misinformation is still intriguing. As mentioned above, it is possible that this relationship could not be confirmed in the present study because it only included young participants, who usually do not doubt their memories very much. This gives scope for further exploration which would include different age groups, including elderly people. It may also be useful to preselect samples of participants who for whatever reason differ considerably as regards memory distrust and to compare vulnerability to misinformation between them.

Finally, the proportion of male subjects was rather small in the present research. This warrants a replication on a larger male sample.

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