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SHORT PAPER

WILEY

Say it out loud: Does mental context reinstatement out loud benefit immediate and delayed memory recall?

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Abstract

Mental context reinstatement (MCR) is a key part of the cognitive interview. However, police face challenges delivering MCR in real-life situations. Over the years, modifications have been made to make MCR more user-friendly for officers and ensure witness engagement. The current study evaluates the impact of vocalizing MCR generations aloud on mock-witness's immediate and delayed recollections. Participants watched a staged multiple-car collision and were interviewed about it the next day. Half verbalized mental images aloud (aMCR), while the other half kept them silent in their minds (cMCR). After a week, participants took part in a delayed recall attempt. No significant differences in immediate recall performance were found. During the delayed recall, participants who engaged in aMCR previously recalled significantly more and more correct details than those who received cMCR. aMCR might lead to more coherent representations in working memory, resulting in improved consolidation and better future recall.

KEYWORDS
emotional event, eyewitness memory, investigative interview, mental context reinstatement, recall, verbalization

1 | INTRODUCTION

In criminal investigations, the testimony from an eyewitness often serves as a primary lead for investigators to solve the case. However, miscarriage of justice cases as well as laboratory and field research have repeatedly demonstrated that eyewitness memory is fallible (see https://innocenceproject.org/all-cases/; Loftus, 2003 for a review). Over the last four decades theory-driven and evidence-based investigative interviewing techniques have been developed to enable witnesses to provide the most accurate and complete memory accounts. The groundbreaking work by Ed Geiselman and Ron Fisher, who developed the cognitive interview (CI) in 1984, revolutionized the landscape of investigative interviewing. The key principle of the CI is that the witness has the key to all the information and that they should play an active part in the interviewing process (Fisher & Geiselman, 1992). The original CI encompassed four retrieval mnemonics: mental context reinstatement (MCR), reporting everything, recalling the event from a variety of orders, and recalling the event from a variety of perspectives (Geiselman et al., 1986). The two main theoretical principles that underly the CI are the notion that a retrieval cue is most effective when it matches the cues encountered during encoding (Encoding Specificity Principle) (Tulving & Thomson, 1973), and the idea that multiple retrieval pathways lead to the same memories and that memories are interconnected rather than isolated incidents (Multiple Trace Theory) (Bower, 1967).

Since its development, the CI has been revised several times to further enhance the quality of witness reports (i.e., revised CI and enhanced cognitive interview [ECI]; Fisher & Geiselman, 1992). Some modified versions of the CI no longer include the reverse order and changed perspective techniques due to reservations about the

potential for elevated confabulations stemming from these mnemonics (Boon & Noon, 1994). Additionally, research has shown that these techniques do not significantly enhance the elicitation of additional information (Roberts & Higham, 2002). In its current format, the CI promotes three psychological processes: cognition, social dynamics, and communication (Fisher & Geiselman, 2010). The CI mnemonics support these processes and include rapport building, report everything, MCR, and focused retrieval.

Developing rapport at the beginning of the interview is crucial to enable witnesses/victims to disclose personal experiences to the interviewer, especially when these experiences are intimate and distressing (Fisher & Schreiber, 2007). The report everything instruction encourages the interviewees to report everything that comes to their mind without omitting anything. During MCR the interviewee mentally reconstructs the physical and emotional context that existed at the time of the incident. It is based on the Encoding Specificity Principle, proposing that memory recall improves when the contextual features present during encoding are also present during retrieval, even if this occurs in an imaginary format. Focused retrieval involves prompting the witness to engage in multiple retrieval attempts and using witness-compatible questions aligned with the witness's unique memory organization (Memon & Gawrylowicz, 2018).

Köhnken et al. (1994) were one of the first to demonstrate the superiority of the CI compared to a standard control structured interview (SI) (not including the special mnemonics) with laypeople in the laboratory. The CI elicited an average of 52% more correct details compared to the SI. Similarly, field research found that CI-trained police officers elicited 63% more information from real eyewitnesses than CI-untrained officers (Fisher et al., 1989). A meta-analysis by Memon et al. (2010), comprising 46 published articles, showed that the CI robustly improves memory recall by increasing the number of accurately remembered details. Although this increase in recall is accompanied by a slight rise in incorrect details, it is important to note that the accuracy rates remained stable.

To make the CI more effective for use by front-line police officers Dando et al. (2009) developed the sketch plan mental reinstatement of context (Sketch MRC). s. During Sketch MRC, interviewees draw sketches of what happened to self-generate cues, thereby reducing reliance on potentially suggestive retrieval cues from the interviewer. Several studies have shown that the Sketch MRC is less time-consuming and as effective as the original MCR with various witness populations (Dando et al., 2020; Mattison et al., 2018).

It should be noted that not all witnesses and victims might be comfortable drawing sketches, so an alternative way to reinstate context might be worth investigating. The current study explored the effectiveness of describing out loud the images that are mentally generated (aloud MCR). Geiselman and Fisher suggested in 1988 that in addition to picturing the event in their mind, children might benefit from describing feelings and surroundings aloud. Initial evidence that this suggestion could be effective was provided by Hayes and Delamothe (1997). They interviewed children (5–7-year-olds and 9–11-year-olds) with a CI or standard interview about a videotaped event. Both interview techniques began with developing rapport and included a free and cued recall. In addition, the CI included two mnemonics: context reinstatement and report everything instructions. All children in the CI condition were asked to describe the context reinstatement aloud to ensure they understood the instructions. CIs elicited significantly more correct information compared to standard interviews, particularly in older children. Dietze et al. (2010) went one step further and directly compared MCR with and without verbalization in children (6-year-olds and 12-year-olds) and found that while aloud MCR (aMCR) was not superior to conventional MCR (cMCR) in both age groups, it did not hinder participant's ability to recall. The current study aims to replicate Dietze et al.'s (2010) findings with adults and extend their research methodology by including an immediate and delayed recall session. Immediate testing captures fresh recollections, while delayed testing reveals the impact of time on memory recall, enhancing validity, and supporting a robust interpretation of eyewitness memory in real-world scenarios.

In line with Hayes and Delamothe's findings, we hypothesized that aMCR would lead to increased recollection, but accuracy rates would remain stable between MCR groups. Moreover, individuals may find it easier to organize and make sense of mental images when vocalizing them. Therefore, we expected participants to feel more comfortable and believe that engaging in aMCR is more beneficial for their recall performance than cMCR.

2 | METHODS

2.1 | Design

A 2 (MCR condition: aMCR vs. cMCR) × 2 (recall attempt: immediate and delayed) mixed design was employed. Participants were randomly allocated to the aMCR or cMCR group and then interviewed immediately and after a one-week delay. The dependent variables were the number of correct, incorrect, and confabulated items recalled and the accuracy rate. Participants also rated how comfortable they felt during MCR and how much it helped their recall.

2.2 | Participants

Eighty-two adults took part in this study. No demographic information was collected from this sample. There was a total of 109 sign-ups and 27 people either did not watch the video the day before or did not attend the interview. Data from two participants who completed all the sessions was not included in the final data set, as one participant revealed having previously watched the video, and the interview recording of the other participant was inaudible. During the delayed recall, we encountered attrition, resulting in only 69 participants completing the second recall attempt 1 week later. Recruitment was made via social media platforms such as Twitter and Facebook and the University's SONA recruitment system. It is estimated that less than five participants were students and received credits on the SONA system. Participants had to have a good understanding of the English language

to take part and be over 18 years old. The project received full ethical approval from the university's research ethics committee (REF: EMS4611). A post-hoc power analysis for a repeated measures ANOVA (within-between interaction) was conducted using G*Power version 3.1.9.7 (Faul et al., 2009) with a medium effect size ($f = 0.25$) and a significance criterion of $\alpha = .05$. Our obtained sample size of $N = 69$ (delayed recall) achieved a power of 0.99, which can be regarded as high.

2.3 | Materials

2.3.1 | To-be-remembered event

Unlike Dietze et al.'s study which used snippets of the family sci-fi movie D.A.R.Y.L, the present study utilized an emotionally charged to-be-remembered event: a simulated video of a car accident depicting severe injuries. The video was created for a public service announcement (PSA) addressing the issue of texting while driving. It contains vivid scenes portraying a staged car accident involving three young women. The women can be seen chatting and laughing in the car, while the female driver is texting. Suddenly their vehicle veers out of their designated lane and enters the opposite direction of traffic leading to a collision. The three females are severely injured including bleeding head injuries and blood streaming out of the female driver's nose. The video lasted 1 min and 12 s and was presented to participants using the Qualtrics platform.

2.3.2 | Attention check questions

Three attention check questions were included to ensure that participants did watch the video and paid sufficient attention to it. The questions were about general aspects of the film, such as the key actors and the type of vehicles involved in the collision.

2.3.3 | Interview script

The script for the interview was adapted from Eastwood et al. (2019). The interview was divided into Introduction, Rapport, Explaining, cMCR/aMCR (depending on participants' condition), Free recall, Questioning, and Closure, to resemble closely the CI protocol.

The following instructions were provided to participants in the cMCR group:

> In a moment I am going to ask you to tell me what you remember about what happened in the video that you watched. Before you begin, I am going to ask you to try something that can often help people to remember more about what they have experienced. What I would like you to do is to close your eyes. Closing your eyes helps block out distractions in the room and helps you focus.
>
> Now please concentrate on the instructions I am going to give you. I would like you to listen to my instructions. I will pause between each instruction to give you time to think about what I am saying. You can take as long as you need. While keeping your eyes closed, I would like you to think back to the point and time to when you started watching the video. Think about what you saw … [5 second pause] … think about what you heard … [5 second pause] … think about all the people involved … [5 second pause] …think about all of the actions … [5 second pause] … think about how you were feeling while watching the video….[5 second pause]… think about what you were thinking while watching the video…[5 second pause].

Participants in the aMCR condition were provided with the following instructions:

> In a moment I am going to ask you to tell me what you remember about what happened in the video that you watched. Before you begin, I am going to ask you to try something that can often help people to remember more about what they have experienced. What I would like you to do is to close your eyes. Closing your eyes helps block out distractions in the room and helps you focus.
>
> Now please concentrate on the instructions I am going to give you. I would like you to listen to my instructions. I will pause between each instruction to give you time to think about what I am saying. Then, I want you to please tell me about anything at all that comes to mind after each instruction. You can take as long as you need. While keeping your eyes closed, I would like you to think back to the point in time when you started watching the video. Think about what you saw … [5 second pause, if they don't respond, prompt with "Tell me about what comes to mind"] … think about what you heard … [5 second pause] … think about all the people involved… [5 second pause] …think about all of the actions … [5 second pause] … think about how you were feeling while watching the video….[5 second pause]… think about what you were thinking while watching the video…[5 second pause].

Once the MCR was completed participants were asked to recall in as much detail as possible the content of the video that they watched. Once the free recall was exhausted the questioning phase commenced. Participants were asked four cued recall questions to elicit more specific information about the people depicted in the video and the location where the incident took place (e.g., "Please describe any witnesses or bystanders to the accident."). The four cued

questions were asked regardless of whether the participant had previously provided information related to people or the location of the incident.

The interviewer was trained by the first author who has received CI training, has published widely on the CI, and is training practitioners in its use.

2.3.4 | Experience questions

Two questions gauged the experience of the interviewee during the interview. On a scale ranging from 1 (*not at all*) to 10 (*very much*) participants had to rate how comfortable they felt during the MCR and how much they thought the MCR helped their memory recall.

2.3.5 | Delayed recall

The delayed recall took place after 1 week and involved the same free recall instructions and cued recall questions that were used during the questioning phase of the immediate interview. The delayed recall was delivered via the Qualtrics Survey platform and was therefore completed in writing.

2.4 | Procedure

Due to the COVID-19 pandemic and associated lockdown restrictions, all interviews were conducted online using Teams. Participants were provided with a Calendly (https://calendly.com/) link to access more information about the study and schedule an interview slot with the researcher. Calendly then automatically sent a Microsoft Teams invitation to participants. Initially, participants were given a 12-h window to watch the to-be-remembered video the day before, but this was later changed due to logistical challenges after the fifth participant. Instead, participants received an email at 9 a.m. with a link to the video and a reminder to watch it again at 5 p.m. the day before the interview. They were also given a unique participant code to access the video on the Qualtrics platform, allowing control over the timing of video watching and the time lapse until the interview the following day. The calculated mean time lapse between watching the video and the immediate interview was 19 h and 47 min (max = 32 h 11 min; min = 8 h 52 min).

Before watching the to-be-remembered event, participants received an information sheet to read and ticked a consent statement. They then watched the video, which only played once. The participants were instructed to pay full attention and ensure their setup was appropriate, including having the volume turned on and minimizing distractions. They were also informed that the video depicted an emotional scene of a staged car accident and had the option to withdraw. It is important to note, that participants were fully aware that their memory for the video was tested at later stages, so encoding during this study was intentional. Following the video, participants answered three multiple-choice questions to ensure they paid attention to the video (e.g., "What type of vehicle crashed in the accident?").

On the interview day, participants were given instructions on accessing the Microsoft Teams meeting. The interview followed the general CI protocol and started with rapport-building, followed by explaining the general procedure, and then the aMCR or cMCR was administered. Subsequently, in the free recall phase, participants were asked to provide detailed recollections of the video. Following that, participants answered the cued questions. Finally, the interviewer closed the interview, and the participants were thanked for their participation. After the interview, participants received a Qualtrics link to answer the experience questions and were reminded of the scheduled delayed recall 1 week later. After the one-week delay, participants received the link to the delayed recall survey. Lastly, participants were able to read a comprehensive debrief on Qualtrics and were thanked for their participation.

2.5 | Transcribing and coding

Interview recordings were downloaded and uploaded to Microsoft Stream to produce captions. The caption files were downloaded, and Microsoft VTT was used to clean the text. The interview recordings were then compared with the scripts to ensure that they matched. Scripts were stripped of all identifying information for complete anonymity. Final scripts only included participants' free and cued recall.

The coding scheme replicated the one used by Eastwood et al. (2019) and Dietze et al. (2010). It comprised 236 items listing visible video details. Details were coded as correct—when the description matched the detail in the video (e.g., driver with brown hair), incorrect—when the description mismatched the detail in the video (e.g., driver with blonde hair), or confabulated—when the description was not present in the video but made up by the participant (e.g., driver wearing a hat). Accuracy levels were calculated by dividing the number of correct items recalled by the total number of recalled items. Free and cued recall were coded together. Assumptions that could not be verified such as the driver's age were not coded. Any new details mentioned that were not in the coding list were subsequently added. Ten percent of the scripts were coded by a naive independent coder. Pearson's correlations were computed for all the measures and indicated good levels of agreement: total number of items ($r(7) = .990$, $p < .001$), correct items ($r(7) = .989$, $p = <.001$), incorrect items ($r(7) = .679$, $p = .047$), except for confabulated items ($r(7) = .143$, $p = .471$).

All participants answered the three attention check questions correctly after watching the video during the first session, so the final data set included data from 80 individuals.

3 | RESULTS

3.1 | Memory recall over time

A 2 (MCR condition: aMCR vs. cMCR) × 2 (recall attempt: immediate and delayed) multivariate analysis of variance (MANOVA) was conducted including all participants who completed both sessions

TABLE 1 Means and standard deviations for aMCR and cMCR conditions at the immediate (Time 1) and delayed (Time 2) recall attempt ($N = 69$).

	Time 1				Time 2			
	aMCR		cMCR		aMCR		cMCR	
	M	SD	*M*	SD	*M*	SD	*M*	SD
Correct items	43.19	13.731	38.09	12.55	35.27	12.85	29.16	11.09
Incorrect items	4.68	2.91	3.84	2.58	3.57	3.09	3.47	3.13
Confabulations	1.05	1.25	0.75	1.26	1.14	2.21	0.78	1.07
Total items	48.92	14.96	42.59	12.67	40.03	13.91	33.28	11.92
Accuracy (%)	0.88	0.06	0.89	0.08	0.88	0.1	0.88	0.1

Note: Correct items: a description or action that was recalled as seen in the video and in the correct order. Incorrect items: when a description did not match the video or the correct person or object. Confabulation: when an item or action was not present. Total of items: sum of correct, incorrect, and confabulated items recalled. Accuracy rate (%): division of the correct number of items recalled by the total number of items recalled.

($N = 69$) on the number of total, correct, incorrect and confabulated details provided and the accuracy rates.

There was a significant main effect of recall attempt on the total, correct, and incorrect number of details reported ($F(1,67) = 55.846$, $p < .001$, $\eta^2 = .455$; $F(1,67) = 55.702$, $p < .001$, $\eta^2 = .454$; $F(1,67) = 4.691$, $p = .034$, $\eta^2 = .065$). There was also a significant main effect of MCR condition on the total number of details recalled ($F(1,67) = 4.678$, $p = .034$, $\eta^2 = .065$). The main effect of MCR condition on the number of correct details recalled was marginally significant ($F(1,67) = 3.906$, $p = .052$, $\eta^2 = .055$). Although the MCR condition x recall attempt interaction was non-significant for the total and correct number of details recalled ($F(1,67) = .030$, $p = .863$, $\eta^2 < .001$; $F(1,67) = .203$, $p = .653$, $\eta^2 = .003$, respectively), Bonferroni post hoc tests indicated that, while at the immediate recall attempt there was no significant difference between the two MCR conditions for the total and the correct number of details reported (total: $p = .065$; correct: $p = .114$), at the delayed recall attempt there was a significant difference between aMCR and cMCR for the total and correct number of details recalled (total: $p = .036$, $d = .518$; correct: $p = .040$, $d = .507$).

To summarise, unsurprisingly delay reduced participants' recall completeness. Specifically, participants recalled fewer correct and incorrect details during the delayed compared to the immediate recall attempt leading to less complete recall overall. Furthermore, participants' recall was superior when they engaged in aMCR beforehand compared to cMCR. This difference between MCR conditions was driven by a significant difference in performance at the delayed recall attempt where participants who engaged in aMCR recalled significantly more total and correct details compared to those who did the cMCR. See Table 1 for a full representation of means and standard deviations for both MCR conditions at the immediate and delayed recall attempt.[1]

3.2 | Experience survey

Sixty-nine participants completed the experience questions. An independent samples t-test revealed no significant difference between cMCR and aMCR conditions regarding how comfortable participants felt while engaging in the MCR mnemonic ($t(67) = -.844$, $p = .201$, $d = -.205$) (aMCR: $M = 7.87$, $SD = 2.07$; cMCR: $M = 8.30$, $SD = 2.12$). No significant difference was found between MCR conditions and how much participants felt it helped their memory recall ($t(67) = .516$, $p = .304$, $d = .125$) (aMCR: $M = 6.95$, $SD = 1.81$; cMCR: $M = 6.73$, $SD = 1.56$).

4 | DISCUSSION

Enhancing the range of evidence-based techniques accessible to police officers for investigations can ultimately lead to improved experiences for witnesses and victims, as well as more complete and accurate memory accounts. In recent years, research has accumulated on developing and evaluating modifications of the traditional MCR, such as the sketch MRC, to make it more versatile to use with different witness populations by frontline police officers (Hope & Gabbert, 2019). The current study has tested the aMCR technique with adult mock witnesses during an immediate and delayed interview. Our hypothesis that aMCR would lead to more complete accounts without negatively impacting accuracy has been partially supported. aMCR led to the recollection of more correct details without an associated increase in errors compared to the cMCR but only during the delayed recall attempt 1 week later. There was no difference between MCR conditions during the immediate recall attempt. Participants felt equally comfortable during both MCR conditions and did not feel one was superior in terms of improving their memory recollection. Our study replicates the findings by Dietze et al. (2010) with adults and extends the methodology as our participants all engaged in two retrieval attempts: immediate and delayed. We found that administering aMCR just before the initial recall attempt significantly enhanced memory performance during a subsequent delayed retrieval attempt. However, when the first recall attempt was preceded by cMCR, this delayed memory enhancement effect was not observed. While these findings are promising, we acknowledge that the inter-rater reliability agreement was low for errors and confabulations and more research is needed before firm conclusions can be drawn about

the impact of aMCR on the recall of incorrect and confabulated details.

Baddeley's (2000) model of working memory might explain the aMCR superiority effect at the delayed retrieval attempt. According to Baddeley's model, working memory consists of several components: central executive, phonological loop, visuospatial sketchpad, and episodic buffer. Saying out loud the mental images in response to the MCR instructions may lead to verbal-phonological and visual–spatial representations held in parallel. The episodic buffer then integrates the visual and verbal elements and creates a more coherent episodic memory representation, which may facilitate transfer into long-term memory and ultimately lead to improved memory output in the future. Indeed, research has shown that vocalizing word list items instead of silently encoding them improved item recall (Gathercole & Conway, 1988). Likewise, participants who verbally rehearsed previously learned novel words demonstrated superior recognition performance compared to those who silently rehearsed the words (Kaushanskaya & Yoo, 2011).

The current study does not come without limitations. Although we used an emotional mock-crime video that potentially elicited negative feelings in participants given the depiction of severe injuries and distress, it does not elicit the same emotions as experiencing a live event. It could be argued that this is problematic when testing MCR as it relies amongst others on the generation of sensory cues, which might not be present when watching a video compared to experiencing a life event (Wright & Holliday, 2007). Moreover, in real life, MCR may prompt witnesses to bring up intimate aspects that they feel less comfortable disclosing out loud. So, depending on the crime under investigation and the experiences of the witness aMCR might not be the most appropriate form of MCR to employ.

The collection of demographic data is essential for ensuring the robustness and validity of findings, as it enables researchers to analyse and contextualize results within the broader socio-cultural landscape. The omission of such data in the current study does pose challenges to the comprehensiveness and generalizability of the study's findings.

Furthermore, the second recall attempt was completed online individually and in writing by all participants without the interviewer being present. Although some research suggests that written and spoken recall conditions elicit information that is similar in quantity and quality (McPhee et al., 2014), future research should examine the impact of aMCR on repeated recall attempts under similar conditions.

It was noted that during the interviews, two participants in the cMCR condition, started to verbalize their mental images out loud. This anecdotal observation suggests that for some individuals aMCR might come easier and intuitively. The current study has demonstrated that there is no apparent detrimental effect of aMCR on memory recall. Therefore, giving witnesses and victims the option to choose from various MCR types might facilitate their recall performance and empower them. Future research should test the idea that providing witnesses with choices during the investigative interview will have a positive impact on their memory recall and mental well-being. After all, a successful investigative interview should fulfill two primary objectives. First and foremost, it should extract the maximum amount of accurate information. Equally important is the consideration that the interview should not distress the interviewee or evoke negative feelings.

TABLE 2 Means and standard deviations for aMCR and cMCR conditions at the immediate recall attempt ($N = 80$).

	aMCR		cMCR	
	M	SD	*M*	SD
Correct items	41.90	13.92	39.05	12.79
Incorrect items	4.55	2.86	4.46	2.94
Confabulation	1.00	1.25	.95	1.54
Total of items	47.45	15.22	44.08	13.74
Accuracy (%)	0.88	0.06	0.88	0.08

Asking witnesses to verbalize their MCR output out loud may have several benefits for the interviewee and the interviewer: First, it provides the interviewer with some control over whether the interviewee engages in the process or not. Second, it enables the interviewer to provide the interviewee with enough time to complete each mental context generation before prompting the next mental image. Finally, aMCR might serve as an alternative to the sketch MRC, particularly for witnesses with visual or motor capacity deficits or those who simply find sketching challenging.

To conclude, the current study examined the effectiveness of aMCR during mock investigative interviews with adults. The aMCR technique led to more complete recollections during a delayed recall attempt, without differences in immediate recall compared to traditional MCR. The positive outcomes observed in this study suggest that aMCR could be a promising addition to investigative practices, potentially offering practical advantages such as more interviewer control and a valuable option for witnesses with different capacities or preferences.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in OSF at https://osf.io/wdyjf/?view_only=d8c99e6a9e1142faa2e340825d84cd37.

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ENDNOTE

[1] For completeness, additional independent sample *t*-tests were carried out to include the full data set ($N = 80$) at the immediate recall attempt. There was no significant difference between MCR conditions for correct ($t(78) = .951$, $p = .172$, $d = .213$), incorrect ($t(78) = .600$, $p = .275$, $d = .134$), confabulated ($t(78) = .168$, $p = .433$, $d = .037$), or total number of items recalled ($t(78) = 1.037$, $p = .152$, $d = .232$). Accuracy rates (%) did also not differ between MCR conditions, $t(78) = -.168$, $p = .433$, $d = -.031$. The means and standard deviations for these measures are presented in Table 2.

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