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Denials in informal co-witness conversations do not affect memory for witnessed events

Charlotte A. Bücken^{1,2}  | Ivan Mangiulli^{1,2,3}  | Henry Otgaar^{1,2}

¹Leuven Institute of Criminology, Faculty of Law and Criminology, KU Leuven, Leuven, Belgium

²Forensic Psychology Section, Faculty of Psychology and Neuroscience, Maastricht University, Maastricht, The Netherlands

³Department of Education, Psychology, Communication, University of Bari Aldo Moro, Bari, Italy

Correspondence

Charlotte A. Bücken, Herbert Hooverplein 10, 3000 Leuven, Belgium.

Email: charlotte.buecken@kuleuven.be

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Abstract

Campus sexual assault constitutes a frequent crime witnessed by many. Among co-witnesses such assault is oftentimes denied. We examined how false denials during an informal co-witness conversation impacted memory for the conversation and witnessed assault. Ninety participants watched a trauma-analogue video with a co-witness. The next day, honest control dyads engaged in an honest, informal discussion about the film. In lying dyads one participant falsely denied (internal false denial group) details during this informal discussion with their co-witness (external denial group). One week later, participants' recognition memory for the video and conversation was tested. We did not replicate *denial-induced forgetting* in that participants who falsely denied did not forget details of the previous conversation, relative to honest participants. Moreover, memory for the film was not statistically significantly affected by our manipulation. Thus, informal false denials might not negatively affect memory, despite previous research showing such effects in formal settings.

KEYWORDS

Co-witness paradigm, false denial, forgetting, omission misinformation, social remembering

1 | INTRODUCTION

According to a European survey from 2023, 56% of students (Location 1: $n = 54/95$; Location 2: $n = 172/305$; Location 3: $n = 172/307$) across three locations in the Netherlands and Belgium report experiencing sexual assault (Boskovic et al., 2023). Such a sexual assault oftentimes occurs at campus or fraternity parties (Boyle & Walker, 2016), which are well attended, meaning that there is a high possibility of witnesses. However, attendees of such parties tend to deny assault and violence that might happen at campus parties (Boyle & Walker, 2016). Indeed, a study among students who have experienced campus sexual assault has shown that such denials are common among both victims and witnesses (Khan et al., 2018; also: Boskovic et al., 2023). Specifically, victims of campus sexual assault described several reasons to deny assault experiences such as feelings of shame or guilt, not wanting to identify themselves with the role of

a victim, and considering denial a “socially productive” (p. 432) strategy, since it would prevent potential conflicts in their friend circles (Khan et al., 2018).

A wealth of research shows that post-event discussions with co-witnesses can be detrimental for later memory reports, because details of one witnesses' accounts can slip into another's memory report, or be omitted (for a review: Hope & Gabbert, 2019; but see also: Gabbert et al., 2003, 2007; Merckelbach et al., 2007; Otgaar et al., 2016; Wright et al., 2009).¹ Moreover, false denials of events have also been tied to negative impacts on certain aspects of memory performance (e.g., forgetting) for those who executed a denial themselves (Otgaar et al., 2016).

Co-witnesses who talk to each other in an informal setting are oftentimes interviewed separately by authorities, for example during criminal investigations (Hope & Gabbert, 2019). Within these interviews or later in court when questioned by attorneys, witnesses might be asked to provide *conversational testimony* about previous instances

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during which they have talked about the witnessed events (Davis & Friedman, 2017; Lawson & London, 2015). An important question thus is how false denials executed during a discussion with a co-witness might influence memory of both witnesses for the witnessed events, and previous co-witness discussion(s).

1.1 | The memory effects of co-witness conversations

A plethora of research has shown that co-witnesses can influence each other's accounts (for a review: Hope & Gabbert, 2019). Indeed, a co-witness confirming or disputing information can affect whether or not a witness will later on report a piece of information (Merckelbach et al., 2007; Ost et al., 2006). There are different paradigms to study how co-witnesses can affect each other, but they all share similar core elements: (1) two people are exposed to a stimulus, (2) they discuss this stimulus with each other, (3) their memory for the stimulus is tested individually (Gabbert et al., 2003, 2007; Meade & Roediger, 2002; Wright et al., 2009; 2012). In these experiments, there are two ways to measure co-witness effects. First, by examining whether witnesses report false details that another witness mentioned to them (i.e., false post-event information of commission) in their own subsequent memory reports (Gabbert et al., 2007; Meade & Roediger, 2002; Peker & Tekcan, 2009). Second, co-witness effects can be measured by examining whether someone omits true details that another witness previously denied or discredited (i.e., misinformation of omission; Merckelbach et al., 2007; Schwartz & Wright, 2012).

Some (limited) work has looked at the mnemonic effects of a co-witness delivering discrediting information. Discrediting information is information which makes it seem as though the participant's original memory is incorrect, and can be delivered by falsely denying that certain correct details were presented. For instance, Merckelbach et al. (2007) studied the memory effects of a confederate explicitly falsely denying correct details from complex scenes which participants ($N = 90$) had previously viewed together with the confederate. In a later free recall test without the confederate, 72% of participants (21/29) omitted information that they had previously recalled, but that had been denied by the confederate. This shows that false denials by a co-witness can undermine memory (reports) for witnessed events. This phenomenon has since been replicated with children, and using other related co-witness paradigms (e.g., Hjelmsäter et al., 2012; Schwartz & Wright, 2012).

Thus, research on the effects of false denials within co-witness conversations has focused on the memory effects of the person who was confronted with the discrediting denial. How denial affects the memory of the person who executed a denial during an informal social setting has not been studied.

1.2 | Memory effects of internal false denials

A growing body of research has examined how false denials can affect memory of the denier (e.g., Battista et al., 2020, 2021; Bücken,

Mangiulli, & Otgaar, 2022; Bücken, Mangiulli, Uzun, & Otgaar, 2022; Li et al., 2022; Otgaar et al., 2014, 2020; Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019; Romeo, Otgaar, Smeets, Landström, & Jelicic, 2019). Such false denials are *internal* denials (e.g., see Otgaar et al., 2016), because they are executed by the person themselves. In a typical experiment examining the memory effects of internal false denials, participants are first exposed to a stimulus (e.g., a video, pictures, or word lists). Then, they answer questions about this stimulus in an interview in which they are either asked to (1) deny details of the stimulus or to (2) answer truthfully. After a delay, all participants are asked to respond truthfully in a source memory test in which their memory for the initial stimulus and interview is tested. A robust phenomenon is the *denial-induced forgetting* effect, showing that details from the interview are forgotten after internal false denials (Otgaar et al., 2016). The denial-induced forgetting effect has been replicated with a plethora of different stimuli and memory tests, and holds not just for the specific words that were denied but also other discussed details, and even non-discussed but related details (Battista et al., 2020, 2021; Otgaar et al., 2014, 2016, 2020; Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019; but see also: Li et al., 2022). Results are more mixed when it comes to the question of how internal false denials affect memory for the experienced event itself. Some experiments found that false denials can also undermine memory for the event (Battista et al., 2021; Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019; Vieira & Lane, 2013). However, most experiments have been unable to find such an effect (Bücken, Mangiulli, & Otgaar, 2022; Otgaar et al., 2014, 2016; Romeo, Otgaar, Smeets, Landström, & Jelicic, 2019), especially research using trauma analogue videos as the initial stimulus (Bücken, Mangiulli, Uzun, & Otgaar, 2022). It is possible that such trauma analogue events remain quite salient in memory, even for someone who has denied details about it, simply because negative events are typically well remembered (McGaugh, 2006; McNally, 2005). Another possibility is that the effect of false denials on event memory is so small, that most studies are not appropriately powered to detect the effect reliably.

Why might false denials lead to forgetting of details that participants talked about? One explanation is that false denials lead to inhibition in the memory network of details that have been discussed, thereby reducing retrieval of such items at the memory test (Otgaar et al., 2020; Otgaar & Baker, 2018). In line with this, two recent experiments reported by Otgaar et al. (2020) have provided some evidence that false denials inhibit not just details that were denied, or at least discussed during the denial conversation, but also associatively related but non-discussed words. It was argued that inhibition caused by denial could prevent the automatic spreading of activation in the memory network, in line with associative activation theory (Howe et al., 2009) thereby explaining the memory undermining effects of false denials (Otgaar et al., 2020).

Another explanation is that false denials could affect memory reports of previous conversations by reducing participants' confidence that certain events were discussed (Bücken, Mangiulli, & Otgaar, 2022; Otgaar & Baker, 2018). That is, perhaps false denials do not affect the memory for the discussion itself, but how participants

choose to report on it. Such decreases in confidence might render it less likely that they claim to remember discussing something. Moreover, if participants are less confident, they might be more affected by social informational influences. Informational influences are social influences that can affect memory reports when someone is uncertain of their own memory, and believes another person or another information source, to have a better memory of something that happened (Blank, 2009; Goodwin et al., 2013). In fact, social factors could interplay with how false denials affect memory on several avenues, as can be derived from Blank's (2009) theory of social remembering. In this theory, Blank (2009) distinguishes the memory trace from the report of a memory. That is, when someone reports that they remember seeing something, this report and their actual memory do not have to be (exactly) the same. It is possible that informational influences (e.g., talking to a more credible second witness), or normative influences (i.e., such as beliefs about the importance of certain remembered details) affect the memory report (Blank, 2009). On the one hand, a detail might be omitted in a memory report because it is truly forgotten (i.e., affected memory trace) or because it might not be deemed important (i.e., normative social influence). On the other hand, a false detail might be reported because of a false memory (i.e., memory for an event that did not happen; Loftus, 2005), or because it was mentioned by someone else who is deemed to have a better memory or appears more confident (i.e., informational social influence). Non-experienced details can become false memories when a source monitoring error happens (Johnson et al., 1993). According to the source monitoring framework, every memory is tagged with a source (i.e., how we encountered the event). When a memory for something mentioned by another person shares many characteristics (e.g., phenomenological details) with a memory for an experienced event, then a person might mistakenly identify that the source of this memory is that they experienced it, forming a false memory (Johnson et al., 1993). Source monitoring errors can also happen when experienced events are misattributed to imagined events, and are therefore not reported.

Blank (2009) explains the relationship between a memory trace and eventual memory report by considering the interplay of such memory distortions and normative and informational social influences. He explains that the memory trace is accessed, providing yielding memory information. This step can be affected by retrieval cues such as talking to a co-witness might provide additional memory cues (Vredeveltdt et al., 2017). If the memory information is validated, it turns into a memory belief. However, social informational influences can affect this belief (Blank, 2009). Research shows that people generally expect that their memory would be worse after false denials (Riesthuis, Mangiulli, et al., 2022). Therefore, they might be more influenced by a confident witness to report post-event information his other witness mentioned. Alternatively, talking to a witness who is confidently denying that they saw something could also reduce the memory belief that something truly happened. Later on, the memory belief is expressed in a memory report, which can be affected by normative social influences (Blank, 2009).

A recent study has examined memory effects of false denials in a co-witness context. In this study, participants in the false denial condition falsely denied that they saw certain details from a trauma analogue video towards the experimenter, and later engaged in a discussion with a confederate whom they believed to be a co-witness (Bücken et al., [in revision](#)). This confederate included certain pieces of false information, namely commissions (i.e., false details which were not included in the original event narrative), in their joint discussion. At a later memory test, participants who had earlier denied information to the experimenter endorsed more false information from the co-witness compared to consistently honest participants (Bücken et al., [in revision](#)). While this study represents a first step for examining the memory effects of false denials in a social context, misinformation in this study was misinformation of *commission*, while misinformation of *omission* (i.e., denials *during* the co-witness conversation) was not examined. Yet, as we argue above, sometimes—such as in cases of campus sexual abuse—co-witnesses deny details they saw during a co-witness conversation.

No research to date has looked at how such *informal* (e.g., occurring *during* a co-witness discussion) false denials can influence the memory of the *denier themselves* when they eventually come forward with the truth. In fact, in the traditional denial-induced forgetting paradigm, participants deny details of an experienced stimulus to the experimenter, who is the same person who conducts the final memory test with them, when all participants come forward with what they experienced (for a review, see Otgaar & Baker, 2018). Thereby, this paradigm emulates a situation of a *formal* denial (i.e., in an interview setting).

However, we know that witnesses might talk to each other in more informal settings (Hope & Gabbert, 2019), and that denials therefore occur within these informal conversations (Boyle & Walker, 2016; Winters et al., 2020). Because social influences can affect memory and memory effects (for a theoretical overview: Blank, 2009), we must ask if effects such as denial-induced forgetting – which focus on the time at which the denial is executed – replicate if performed in an informal witness conversation, and how the memory of the receiver of such a denial is affected.

2 | THE CURRENT EXPERIMENT

Thus, the current experiment addressed this issue of denials among witnesses by examining the question of how false denials executed during a co-witness discussion affect memory reports of both the witness, who denies, and the co-witness faced with the false denial. To this end, we showed participants in pairs a trauma analogue video (James et al., 2016; Strange & Takarangi, 2012). Subsequently, both participants completed a baseline memory test. One day later, participants returned to the lab in their dyad and engaged in an informal discussion about the video. Participants received separate instructions (i.e., either to respond honestly, or to falsely deny in response to certain prompts) for this informal discussion. After a week delay, participants in all groups completed an individual source monitoring test

(in line with Otgaar et al., 2016), in which they were asked to rate their memory that certain items were (1) part of the video and (2) discussed with the co-witness. We made the following predictions;

2.1 | Hypotheses

First, we expected to replicate the denial-induced forgetting effect in a co-witness setting. Specifically, we expected that participants who executed a denial would correctly recognize less details from the co-witness discussion than participants in the honest paired condition who did not execute a denial and were not exposed to a denial, in line with previous research where denials were addressed to the experimenter (Hypothesis 1; e.g., Battista et al., 2020, 2021; Otgaar et al., 2014, 2020; Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019). However, it is also possible that the informal co-witness discussion would offer the denying individual retrieval cues, which can help consolidate memory traces (Blank, 2009) and thus perhaps decrease the strength of the expected denial-induced forgetting effect. Furthermore, we expected that true memory reports for the video would not be affected by the internal denial (Hypothesis 2; e.g., Bücken et al., *in revision*; Otgaar et al., 2014, 2016, 2018; Romeo, Otgaar, Smeets, Landström, & Jelicic, 2019), based on previous research on false denials using trauma analogue videos (Bücken, Mangiulli, & Otgaar, 2022). Hence, we expected no difference in video memory between participants in the internal false denial and honest control groups. However, we expected that being the receiver of false denials (i.e., *external false denials*) would be associated with increased omission errors for the memory for the video compared with participants in the honest control condition and internal false denial conditions (Hypothesis 3). This hypothesis was based, on the one hand, on Blank's (2009) model of social remembering. This model postulates that social interactions can affect our beliefs in whether or not certain events we remember really occurred. If another person seems confident that a detail did not occur (i.e., as it is falsely denied), this might influence participants not to report the detail later on. On the other hand, this hypothesis was based in previous research on memory effects of suggestions of non-occurrence (i.e., misinformation of omission) and external denials between co-witnesses (Merckelbach et al., 2007; Otgaar et al., 2016; Schwartz & Wright, 2012). This previous work has shown that external false denials can negatively affect memory reports by reducing the belief that the remembered events really occurred.

3 | METHODS

3.1 | Design and participants

The current experiment followed a between-subjects design with three groups: internal false denial, external false denial (i.e., receiver of the denial), and honest control group (i.e., co-witness conversation between two honest participants). However, our primary interest was

a comparison of the internal false denial with honest control group to assess whether the denial-induced forgetting effect could replicate for an informal denial.

3.1.1 | Sample size calculation

Thus, the main analysis of interest, on which our sample size calculations were based, was a between subject *t* test (between data from the internal false denial and honest/ external false denial group). Because our hypothesis was directed, this test was planned as a one sided *t*-test. Based on previous research (e.g., Battista et al., 2021; Otgaar et al., 2014, 2016, 2020; Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019), we can expect an effect size of $d = 0.7$, which we could have used to guide the power analysis. However, we also want to take into account the smallest effect size of interest (SESOI, e.g., Riesthuis, Mangiulli, et al., 2022). Our SESOI was related to a one detail difference for the conversation memory score. Remembering or not remembering one full detail of the co-witness conversation might already have practical implications when memory (conversational) testimony is providedⁱⁱ in a legal context, which is how this smallest difference of interest was chosen. Based on extended calculations (see supplementary material on the Open Science Framework (OSF): <https://osf.io/vdh6g/>), a one detail difference in our planned experiment would translate this absolute SESOI into a Cohen's *d* (in proportions) of 0.645. With the established SESOI, we used G*Power (Faul et al., 2007; that is, test family: *t* test, difference between two independent means, $d = .645$, $\alpha = .05$, power = 0.80, one-sided test), which indicated that $n = 31$ participants would be needed in both the internal false denial and honest control group to detect such an effect. We matched the sample size for our external denial group, leading to a total sample size of $N = 93$ (i.e., $n_{\text{InternalDenial}} = 31 + n_{\text{ExternalDenial}} = 31 + n_{\text{HonestControl}} = 31$).

We received ethical approval to the current experiment at the Social and Societal Ethics Committee at KU Leuven (G-2022-5421-R2 (MAR)). All participants received either class credit or a 8€ Amazon voucher as compensation.

3.1.2 | Participant screening

Because of the explicit material of our video stimulus, we asked participants to complete a brief online Qualtrics pre-screening questionnaire similar to that used by Bücken, Mangiulli, Uzun, and Otgaar (2022). Specifically, participants first had to sign informed consent, then answer some questions regarding demographic information, and finally complete the short form Post-traumatic Stress Disorder (PTSD) Check List–5 (PCL-5; Zuromski et al., 2019). We used the short form PCL-5 to screen out participants who scored above a cut-off of 7 and therefore might be especially vulnerable to the trauma analogue video, which depicted both physical and sexual violence. We also asked if participants had seen the film “Irresponsible” by Gaspar Noé, which we used as our stimulus so that we could exclude participants

who were already familiar with the stimulus. However, no participants knew the movie prior to participating in the experiment. Participants who were not eligible to take part in the rest of the experiment were debriefed, those who were eligible were emailed to schedule the lab sessions.

In total, $N = 172$ participants completed the pre-screening questionnaire (Mage = 20.01, range = 18–35 years of age). Eligibility depended on participants age (participants had to be at least 18 years old) and their score on the short form PCL-5. Participants' average SF PCL-5 score was 3.83 (SD = 3.1) and scores ranged from 0 to 12. Of our 172 pre-screen participants, all met the age requirement to participate, but 28 participants scored above our cut-off on the PCL-5. Thus only 144 participants were eligible to take part in the next sessions of our experiment. Of the 144 participants eligible to take part in our experiment, 94 took part in the first lab session and 90 participants completed all three sessions. Our analyses were thus conducted on this final sample of 90 participants.

3.1.3 | Participant demographics

These final participants were on average 19.97 years old (SD = 3.32) with an age range of 18–35 years old. Our sample predominantly consisted of women (76.67%, 69/90), with 27.78% men (25/90) and one participant preferring not to disclose their gender. Participants indicated being proficient in English.ⁱⁱⁱ Of our final sample, $n = 28$ participants were randomly assigned to the honest control condition, $n = 31$ to the external denial condition, and $n = 31$ to the internal denial condition. Of the latter, $n = 16$ participants were instructed to deny only the sexual abuse they had witnessed in the video, and $n = 15$ participants were instructed to deny only physical abuse they had witnessed. Denial of all types of abuse witnessed might be suspicious to the co-witness, and reduce the credibility of the witness. We chose not to ask all participants to deny the physical or the sexual abuse, but to split this up, to increase generalizability of the results and test the effects of denial of the most critical elements of the trauma analogue video.

3.2 | Materials

3.2.1 | Short form PCL-5

The short form PCL-5 is a 4-item self-report questionnaire that screens for PTSD symptoms based on the diagnostic criteria of the DSM-5 (B-E; Zuromski et al., 2019). The short form PCL-5 can be used to screen participants for PTSD symptomatology, a procedure often used in research using trauma analogue stimuli (e.g., Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019). Responses are scored on a 5-point Likert scale, ranging from Not at all (0) to Extremely (4) and scores can range from 0 to 16. Diagnoses based on this short form PCL-5 have been shown to closely parallel ones obtained with the full PCL-5 (Zuromski et al., 2019). We used an

intermediate (i.e., not liberal or conservative) diagnostic cut-off score and a threshold of a summary score of seven or above to exclude participants. Sensitivity at this threshold is at 89.6%, specificity at 98.5, and the AUC is 0.94 (Zuromski et al., 2019).

3.2.2 | Trauma analogue video

The stimulus was a compilation of scenes from the French movie “Irreversible” by director Gaspar Noé. The compilation was 4:30 min long and has been used in previous research on cognitive processes as a trauma analogue stimulus (e.g., Lass-Hennemann et al., 2014; Rombold et al., 2016). It depicts a man and woman involved in a verbal fight in an underpass. A second woman appears and tries to pass them. While the first woman escapes the man attacks the woman who appeared in the underpass. The film depicts graphic scenes of physical and sexual violence.

3.2.3 | Positive and negative affect schedule

The positive and negative affect schedule (PANAS) measures positive and negative affect, either as a state or trait measure. It is comprised of two subscales with 10 items each: the positive and negative emotion subscales. Each of these mood-scales is made up of 10 items, which are rated on a five point Likert scale (1 = very slightly or not at all, to 5 = extremely; Watson et al., 1988). In the current experiment, we used the PANAS as a tool to measure the affective state (i.e., how participants feel ‘at the moment’), and as a trait measure (i.e., how they feel ‘generally’). For the current study the affective state (‘at the moment’) was measured. With a Cronbach's $\alpha = 0.89$ for the positive subscale and $\alpha = 0.89$ for the negative subscale for ‘at the moment’, the PANAS subscales both demonstrate good internal consistency. We used the PANAS state as a manipulation check—it was expected that participants would score lower on the positive subscale and higher on the negative subscale after compared to before watching the video. The PANAS trait was employed as a distractor questionnaire and not analyzed. The reason for using the PANAS trait as a distractor task was that participants were already familiar with this type of questionnaire. so that no additional explanations were needed. While doing so, the experimenter could quickly follow the cover story to deliver the denial instructions to participants in the internal denial group in a separate room.

3.2.4 | Revised impact of events scale

The revised impact of events scale (IES) was used to measure distress at the end of the experiment, to ensure that participants did not have lasting negative emotional impacts from taking part in our study, and to identify possibly vulnerable participants. It consists of 15 items that create two sub-scales: seven items converge into the intrusion and eight items into the avoidance subscale (Horowitz et al., 1979). Items

include statements such as “I thought about it when I did not mean to” and are scored on a four point Likert scale. There are 15 items in total, thus summary scores can range from 0 to 75 (0–35 on the intrusion scale and 0–40 on the avoidance scale). A review of the psychometric properties of the IES showed that it has strong validity and is internally consistent (Intrusions: $M \alpha = 0.86$; Avoidance: $M \alpha = 0.82$; Sundin & Horowitz, 2002).

3.2.5 | Baseline memory test

The baseline test included three general Yes/ No type questions about details that were in the video (i.e., true details) and three details that were not present in the video (i.e., false details). Correct responses received a score of 1, incorrect responses 0.

3.2.6 | Co-witness discussions

To guide the co-witness discussions and to ensure that enough details were discussed, participants received certain prompts from the experimenter (Cadavid & Luna, 2021). Participants were asked to discuss these prompt questions (e.g., *What happened before the third woman arrived on the scene? What happened when the couple was alone again? How did the fight end? What signs and types of violence did you witness?*) with their co-witness. All prompts can be found in the materials on OSF. On average, the co-witness discussions lasted 436.38 s (7 min 16 s) ($SD = 135.81$; 2 min 15.81 s). Co-witness discussions were audio recorded to allow for testing of the memory for the conversation later on.

3.2.7 | Final memory test

During the final memory test, participants received questions about whether they 1) remembered seeing certain details in the video the previous week (Yes/No) and (2) questions about whether they remembered talking about certain details with their partner in the previous week (Yes/No). This memory test included 21 details in total: 7 true details from the video which were not discussed in the conversation, 7 details which were not in the video and not discussed during the conversation, and 7 which were discussed in the co-witness conversation and also in the video. The latter were chosen from the conversation recordings to ensure that the details were truly discussed during the conversation. Thus, the exact details included here might differ per dyad. However, we aimed to include four details that were denied in denying dyads, when this was possible (i.e., depending on how many details were denied in the conversations of the previous week).

3.2.8 | Scoring of final memory test

“Yes” answers were scored as a 1, “No” answers as a 0. For questions for which the correct answer was “No”, we re-coded the data so that

correct rejections were scored as a 1, and incorrect endorsement as a 0. We calculated summary scores for (I) True details for the video: max score 7, (II) correct rejections for the video: max score 7, (III) true details for the conversation: max score 7, (IV) correct rejections for the conversation: max score 7. We additionally calculated a variable for (V) the total number of correct answers for the video: max 14 and (VI) the total number of correct answers for the conversation: max 14. These summary scores were converted into proportion scores.

3.3 | Procedure

The experiment was divided into an online pre-screen session, two lab-sessions which took part in dyads, and an individual follow-up session 1 week after the lab sessions. Participation in the entire experiment lasted around 1 h. A visual overview of the procedure is depicted in Figure 1.

Session 1. Session 1 took place in the lab, with a pair of participants and the experimenter. At the start of the first session, participants were assigned a participant number. Then, each dyad was randomly assigned to either being a false denial dyad (i.e., one participant in this dyad was in the false denial condition, one in the external denial condition) or an honest control dyad (i.e., both participants were in the honest control condition). We needed to test 31 participants in each group making 31 false denial dyads, and 16 honest control dyads (because here two participants of the same condition are paired). Therefore, in this random assignment the odds of being assigned to the false denial dyad were higher than the odds of being assigned to the honest control dyad (31:16). Participant “A” in the false denial dyad was randomly assigned to either the internal false denial or external denial group. Participant “B” then received the other condition (i.e., of internal or external denial). In the first session, participants again signed informed consent. Subsequently, they completed the PANAS state, and watched the trauma analogue video together. After watching the trauma analogue video, participants completed the PANAS-state one more time. As the last step of the first lab session, participants completed a short baseline-memory test to ensure the video was sufficiently encoded.

Session 2. The second lab session took part around 1 day after the first session, in person and in the same dyad as session 1. All participants engaged in a co-witness discussion during the second session. Participants received separate instructions to this end: Participants in the internal false denial group were asked to falsely deny some traumatic details depicted in the film (randomized: deny the physical abuse or deny the sexual abuse), but to honestly discuss the rest of the film.^{iv} For both physical and sexual abuse denials, there were several details that could potentially be denied by participants. For example, for physical abuse, denying participants could say that they did not see the offender kicking or punching the victim (among other details). For sexual abuse, denying participants could state that they did not see the perpetrator kissing the victim, or touching her under her dress (among other details). Denial participants were instructed to either deny *all* physical abuse that they witnessed, or *all* sexual abuse.

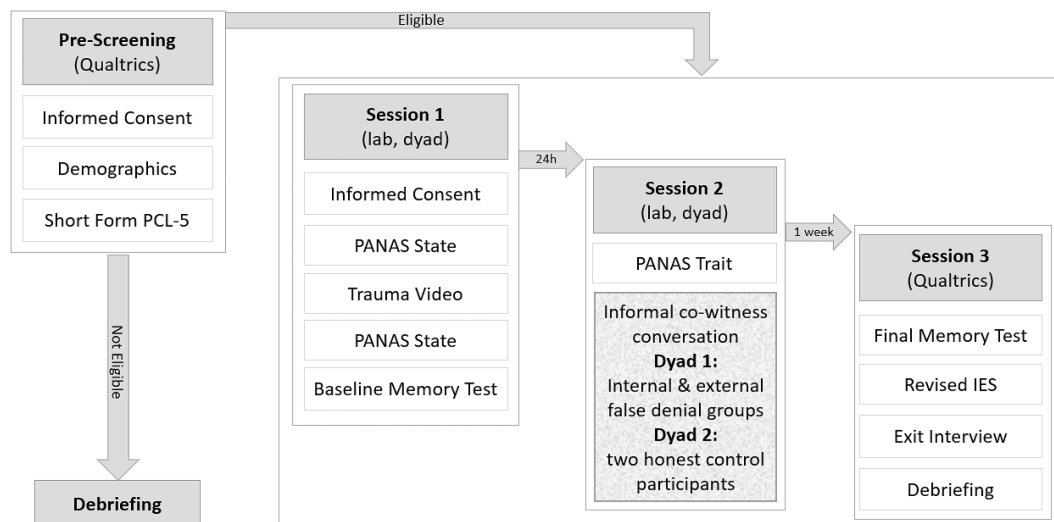


FIGURE 1 Procedure.

They did not receive additional instructions regarding which specific details to deny, in order to ensure that the conversation would go organically. Moreover, we would not suggest details to participants which they did not remember seeing in the first place. Participants in the honest control and external denial groups were asked to discuss the entire film honestly. This discussion was meant to be relatively informal, without much involvement of the experimenter.

In dyads in which external and internal denial participants were paired, the participant in the external denial condition (i.e., who did not deny details themselves) typically started the conversation. This ensured that certain details were discussed, and gave opportunity to the participant in the denial condition to deny certain details mentioned by the honest participant. In the honest control dyads, it was random who started the conversation. To ensure this structure was followed, participants were asked to think about a number between 1 and 10, and whomever would be closer to a number that the experimenter had picked would start. For the denial dyads, this process was rigged so that the participant who did not deny would start the conversation. To this end, we told the participant in the denial condition which number to choose while instructing them for the discussion. Specifically, to instruct denial participants, participants in false denial dyads were told that there was something wrong with the demographic questions filled in by one of the participants and that this participant should briefly step outside with the experimenter to discuss the problem, while the other participant could already fill in the first questionnaires (i.e., PANAS-T). This was a false disguise to allow the experimenter to instruct the false denial participants separately from their partner. Specifically, the experimenter took participants in the false denial condition outside into a separate room, and instruct them for the co-witness discussion. During this time, they were able to ask questions about what would be expected of them, and were also instructed about which number to pick when the discussion was structured. Upon returning to the room, participants in the internal false denial condition were asked to complete the

PANAS-T as well. Participants in the honest control condition both completed the PANAS-T.

Subsequently, participants were told that it can help some people to discuss negative events with each other, and they were instructed to discuss the video, guided by several question prompts from the experimenter. Participants were told that the discussion would be audio recorded. After the co-witness discussion was done, participants were thanked for their participation so far, and told that they would receive a link to the third session after 6 days.

Session 3. Session three took place individually, and online via Qualtrics, around 1 week after the first session. At the start of the third session, participants engaged in the final memory test, which was adapted per dyad. Specifically, all participants were instructed to respond honestly to questions of the final memory test. Following the final memory test, participants completed the revised IES, followed by a brief exit interview. At the end of the third session, participants were thanked and debriefed and received their preferred compensation.

4 | RESULTS

We used an alpha of 5% as a significance threshold for all confirmatory analyses.

4.1 | Manipulation check

As a manipulation check, we coded how participants who were instructed to deny either the sexual or physical abuse depicted in the video followed this instruction. To this end, we examined 1) whether their co-witness brought up the to be denied abuse in response to our prompts. In 4 of 31 lying dyads, the honest co-witness failed to bring up to be denied information and any denials that they uttered were thus unprompted. In one of these, the participant who had been

instructed to deny denied the abuse-related information even without such prompt. Because participants were still instructed to deny—and thus in this mindset—we ran our memory-related analyses with all 31 lying dyads (see supplementary material on the OSF), but also without the six participants from the lying dyads in which no denials occurred at all. The latter are reported here. Among participants who did execute denials, 16/27 (59.25%) explicitly stated that they did not see details from the video, and 19/27 (70.4%) claimed that they did not remember seeing specific details that the other participant had mentioned. Participants ($n = 16$) who stated that they “did not see” details, uttered on average 1.25 ($SD = 1.6$) denials of specific abuse-related details and 1.12 ($SD = 1.46$) denials that generally, any (physical or sexual) abuse occurred. Participants who denied by stating that they “did not remember” details ($n = 19$), uttered on average 1.37 ($SD = 1.21$) denials of specific abuse-related details and 0.95 ($SD = 1.13$) denials that generally, any (physical or sexual) abuse occurred. On average, taking into account all participants in the internal denial condition ($n = 31$), participants denied 3 details ($SD = 2.15$), with number of denials ranging from 0 (as discussed above) to 8. More information on the specific denials and avoidances that participants executed can be found in the supplementary material (OSF). One participant also fabricated extra details within their denials.

4.2 | Positive and negative affect schedule

Using paired samples student t tests to compare positive and negative emotions before and after participants watched the trauma analogue video scene, participants rated their positive emotions statistically significantly higher before watching the video ($M = 2.84$, $SD = 0.65$) than after watching the video ($M = 2.1$, $SD = 0.59$), $t(89) = 11.849$, $p < .001$, $d = 1.25$. Additionally, participants' scores on the negative PANAS subscale were statistically significantly higher after exposure to the movie ($M = 2.48$, $SD = .75$) than before ($M = 1.49$, $SD = .44$), $t(89) = 13.61$, $p < .001$, $d = .16$. Thus, the trauma analogue video affected participants' emotional states in the expected direction.

4.3 | Baseline memory

On average, participants in the honest control group classified 5.86 (of 6, $SD = .59$) details from the baseline memory test correctly, participants from the external denial condition 6 (of 6, $SD = 0$), and participants in the internal denial condition 5.97 ($SD = .18$). This means that participants encoded the trauma analogue video quite well. Moreover, we found no statistically significant difference in baseline memory between the three groups, $F(87,2) = 1.36$, $p = 0.26$, $\eta^2 = .03$.

4.4 | Revised IES

On the intrusion subscale, scores in our sample ranged from 0 to 25 (of a possible score of 35), averaging on $M = 5.91$ ($SD = 5.74$). On

the avoidance subscale possible scores range from 0 to 40, and our participants scored from 0 to 26. On average, participants in our sample scored $M = 8.53$ ($SD = 6.4$) on the avoidance subscale. Last, looking at total scores our participants had an average total score of 14.44 ($SD = 10.65$) the revised IES with scores ranging from 0 to 48 (of a possible 75). These scores are comparable to scores in previous research using the trauma film paradigm (e.g., Bücken, Mangiulli, & Otgaar, 2022; Nahleen et al., 2021; Strange & Takarangi, 2012) and show a medium level of clinical concern, according to Horowitz et al. (1982).

4.5 | Memory for the co-witness conversation

For memory for the co-witness conversation, we compared memory in the internal false denial group with that in the honest control group using a one-sided Student's t test. Specifically, there was no statistically significant difference in both true memory scores, $t(57) = 0.39$, $p = .35$, $d = .1$, and in the total number of correct responses (i.e., correct recognitions and correct rejections) participants gave regarding the conversation, $t(57) = .36$, $p = .64$, $d = .09$ (see Table 1; Figure 2). Because our data was skewed, non-parametric Mann-Whitney tests were conducted which supported these results (true memory: $W = 443.5$, $p = .44$, $r = 0.02$; total correct responses: $W = 426$, $p = .55$, $r = 0.02$). Finally, we performed Bayesian analyses and found a Bayes factor of $BF_{01} = 2.78$ for true memory scores and

TABLE 1 Means and standard deviations for conversation memory in the internal denial and honest control groups.

	Group	<i>n</i>	<i>M</i>	<i>SD</i>
True memory	Honest Control	28	0.88	0.15
	Internal Denial	31	0.87	0.17
Total correct responses	Honest Control	28	0.88	0.09
	Internal Denial	31	0.89	0.08

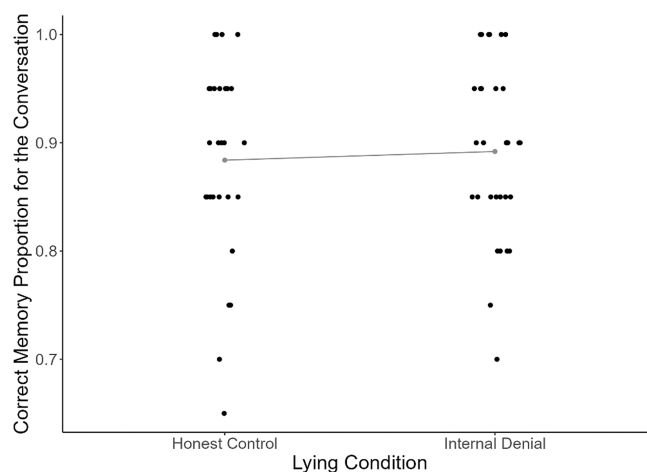


FIGURE 2 Failure to replicate denial-induced forgetting. Each dot represents one participant, means are indicated by grey dots.

$BF_{01} = 4.82$ for total correct responses for the co-witness conversation. This means that our data was 2.78 more likely under the null hypothesis than the alternative hypothesis that the honest control group remembers more true details for the conversation than the internal denial group for true memory, and 4.82 times more likely under the null hypothesis looking at all correct responses regarding the conversation.

4.6 | Memory for the event

4.6.1 | True memory

We performed a between subjects ANOVA to compare the number of true details participants in our three groups recognized from the video. We found no statistically significant difference in true memory for the video among the groups, $F(2, 87) = 0.61$, $p = .55$, $\eta^2 = 0.014$ (see Table 2; Figure 3). We also performed a Bayesian analysis and found a Bayes Factor of $BF_{01} = 6.173$. This Bayes Factor showed that

our data would be 6.17 times more likely under the null than alternative hypothesis.

4.6.2 | Correct rejections

We further tested whether correct rejections of details that were not truly in the video would differ among our three groups, but found no statistically significant difference when computing an ANOVA, $F(2, 87) = .27$, $p = .76$, $\eta^2 = 0.006$. Again we further calculated a Bayes Factor ($BF_{01} = 8.1$). This Bayes Factor demonstrated that our results are 8.1 times more likely under the null hypothesis that there is no difference in the amount of correct rejections for video details among participants in our three groups.

4.6.3 | Total correct responses

Finally, we also compared whether there were any differences in participants' memory for the video in terms of their total correct responses regarding the video on the source memory test using an ANOVA. We found no statistically significant difference between the three groups, $F(2, 87) = 0.27$, $p = .76$, $\eta^2 = 0.006$ (see Table 2). We also computed a Bayes Factor for the total number of correct responses ($BF_{01} = 7.33$), demonstrating that our results are 7.3 times more likely under the null than alternative hypothesis. Additional exploratory analyses can be found on OSF (linked above).

TABLE 2 Descriptive statistics for event memory.

	Group	n	M	SD
True memory	External Denial	31	0.64	0.13
	Honest Control	28	0.66	0.07
	Internal Denial	31	0.67	0.09
Correct rejections	External Denial	31	0.98	0.06
	Honest Control	28	0.96	0.1
	Internal Denial	31	0.97	0.08
Total correct responses	External Denial	31	0.74	0.09
	Honest Control	28	0.75	0.05
	Internal Denial	31	0.76	0.07

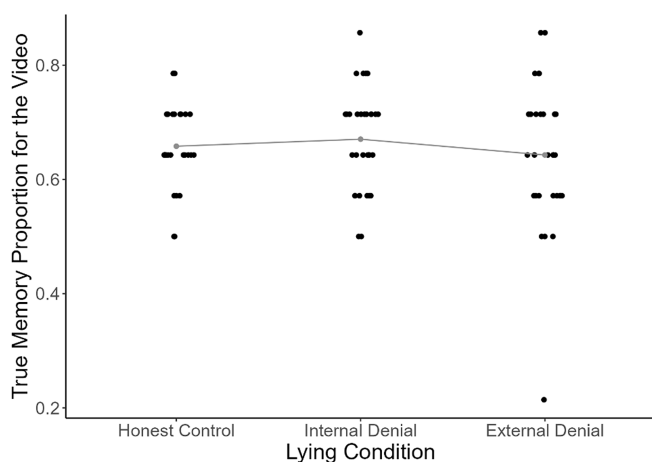


FIGURE 3 Memory for the video is similar across conditions. Each dot represents one participant, means are indicated by grey dots.

5 | DISCUSSION

The main aim of the present paper was to examine how informal denials, executed in a social setting (i.e., towards other co-witnesses), affect memory. Specifically, we investigated whether the denial-induced forgetting effect would replicate when denial takes place in a more informal conversation between co-witnesses rather than during a formal interview. Thus, we were interested in how such denials (i.e., misinformation of omission) might affect memory for the event for both the denying witness and the co-witnesses. Importantly, we found that in such social settings, false denials seem to have some of the same, but also different, mnemonic effects than we have found in other settings. Specifically, we found that denials executed during our rather informal co-witness discussion did not yield the typical denial-induced forgetting effect. Moreover, false denials from one co-witness did not affect memory for the video for (1) the denier, nor (2) the witness faced with this misinformation of omission. We elaborate more on these findings below.

First, we failed to replicate the denial-induced forgetting effect. This effect has been quite robustly found in the false denial and memory literature (for a review see Otgaar & Baker, 2018), even though there are also other studies which have failed to find denial-induced forgetting (e.g., Bücken, Mangiulli, & Otgaar, 2022; Romeo, Otgaar, Smeets, Landström, & Jelicic, 2019). An explanation for our inability to

replicate the effect is that denials were executed somewhat differently in this study compared with previous ones. Specifically, participants had much more leeway in how specific or general they executed their denials, and in the wording they would use. For example, some participants denied by claiming that “they did not see anything more than ___”—a quite general denial, in response to details remembered by their co-witness. However, in previous research participants were instructed to deny very specific details and to repeat the detail they denied in their lie (e.g., Bücken, Mangiulli, & Otgaar, 2022; Otgaar et al., 2014, 2020). Thus, it is also possible that denial-induced forgetting only arises in strictly controlled settings.

A second possible explanation could be that we found a boundary condition for the denial-induced forgetting effect. Indeed, in this experiment, for the very first time false denials were executed in a more informal conversation with a peer rather than in a formal setting towards a figure of authority (i.e., the experimenter, or a simulated police officer). Certainly, it might be the case that denials have different effects on conversational memory, depending on the setting in which denials take place. A possible reason for this could be that the goal of the two types of conversations differ. In formal interviews, the goal is to provide information to the person who is asking questions (or; if denying, the goal might be to withhold information). In natural conversations, however, a goal is oftentimes to create common ground with another person about a shared event (McKinley et al., 2017). Perhaps denials in informal conversations are perceived as more disruptive to the conversation, as they highlight where no common ground is found. Thereby, especially parts of the conversation where no common ground was established and where the parties thus might have argued about what happened could be especially memorable. It is therefore possible that the setting of the conversation during which false denials take place is a boundary effect for the denial-induced forgetting effect. This is interesting especially because denial-induced forgetting tends to occur for conversation memory (for a review: Bücken et al., 2023; Otgaar & Baker, 2018), and denials that are executed in a more informal setting might not affect memory as much as previously thought.

If the memory effects of false denials really do depend on the setting in which denials are executed, then this would have important practical implications. If one assumes that in certain situations (e.g., investigations of campus sexual assault crimes), denials often-times take place in more informal social settings, then the detrimental effects of false denials on conversation memory might be much less relevant in this setting. Thus, it is possible that when denials are executed in real social settings—which tend to be more informal—the effects of denials on memory might be less dangerous than previously thought (see Bücken et al., 2023 for a review). However, this is only the first experiment that has examined false denials in such a setting. Further research is needed to extend and replicate these results before any practical implications can be drawn.

Further, we found no evidence of a denial-induced forgetting effect for the event memory either, in line with our hypothesis. Previous research regarding whether internal false denials affect memory for the original stimulus has been mixed (e.g., Bücken, Mangiulli, &

Otgaar, 2022; Otgaar et al., 2014, 2016, 2020; Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019; Romeo, Otgaar, Smeets, Landström, & Jelicic, 2019). While some studies do find that internal false denials induced forgetting of an experienced and denied event (e.g., Battista et al., 2020, 2021; Otgaar et al., 2020 Experiment 1; Romeo, Otgaar, Smeets, Landstrom, & Boerboom, 2019), there are other experiments which did not find any differences in event memory among participants who denied versus participants who were consistently truthful (e.g., Li et al., 2022; Otgaar et al., 2014, 2016, 2018; Romeo, Otgaar, Smeets, Landström, & Jelicic, 2019). Especially also experiments using trauma-analogue videos (Bücken, Mangiulli, & Otgaar, 2022; Bücken, Mangiulli, Uzun, & Otgaar, 2022; in revision), in line with the current experiment, have found no difference in memory for the event among participants who denied details from this video compared with ones who did not.

Moreover, we found that participants who were directly faced with denial responses from their co-witnesses (i.e., those in the external denial condition) and thus with misinformation of omission, were not affected by this misinformation of omission in their final memory test. Specifically, these external denial participants' memory reports for the video (nor for the conversation) were not affected by receiving negative feedback from their co-witness. This is in contrast to previous research which found that misinformation of omission lead to increased omission errors regarding the studied material (Merckelbach et al., 2007; Otgaar et al., 2016; Schwartz & Wright, 2012). A possible explanation might relate to the type of stimulus we used, compared to previous literature; previous research has used neutral or somewhat negatively valenced stimuli. However, in the current experiment we used a trauma analogue video. Memory for very critical, trauma-central events have in past experiments been remembered robustly, despite previous denials performed by participants (e.g., Bücken, Mangiulli, & Otgaar, 2022; in revision). It is possible then, that we did not find an effect of the omission misinformation on memory because the misinformation surrounded trauma central details (i.e., abuse depicted in the video).

5.1 | Limitations and future directions

There are certain limitations to our studies that should be mentioned. First, we used a very highly emotional video for our experiment. While this video has been used in trauma analogue research before and translates well into the situation of campus sexual abuse, it is possible that the video was so distinctive that people would not forget critical details related to it, even if someone else claims not to have seen them. Perhaps using less emotional stimuli, the denial-induced forgetting effect could still come about in more organic rather than formal conversations. However, this is an empirical question that could be addressed in future research. Another limitation relates to how participants executed denials: although participants were all instructed the same way, they had a certain freedom in how they executed the instructed denials. Participants used a mix of techniques, including also feigning amnesia (e.g., “I don't remember anything else”).

Moreover, co-witnesses in our experiment were predominantly strangers. However, effects on memory have been found to be bigger when co-witnesses have a pre-existing relationship (Paterson & Kemp, 2006).

Furthermore, another limitation is that recognition memory test we used as final memory test. While witnesses might be asked about certain details in investigative interviews using direct questions, it is unclear whether details would have been reported if participants had not been prompted about them. Yet, of note, denial-induced forgetting has also been found in recall memory tests in past research (e.g., Otgaar et al., 2018). A final limitation is that our 'informal' co-witness discussion was still somewhat formal given that the experimenter was present in the room.

An avenue for future research could be to investigate whether the memory effects of false denials on the receiver of this denial could be affected by the amount of people who are denying information. That is, previous research has shown that false post-event misinformation from co-witnesses is especially powerful and likely to be included in someone's own memory report when it is provided by more than one other person (Mojtahedi et al., 2018; Walther et al., 2002). Moreover, further research might focus on examining how false denials affect memory reports for previous conversations or experienced events. That is, they might examine whether false denials affect the memory trace itself, as was suggested by Otgaar et al. (2020), or whether denials perhaps simply bias the person who denied into being less likely to claim that they had discussed something. For instance, this could be the case if denials decreased confidence, relative to the person someone denied to. Future studies might delineate this by asking participants to indicate their confidence in their responses and using ROC curve analysis.

6 | CONCLUSION

Past research has shown us that when denials take place in formal conversations towards an authority figure, participants who falsely deny information appear to forget some of the things they discussed in conversations during which they falsely denied. However, it seems that perhaps denials that take place among peers, in more informal settings, might not have this same detrimental effect on memory. More research is needed, but this would have important implications for denials that occur in the area of campus sexual abuse, for example: Even if a student, under peer pressure, might have denied that they previously saw something when talking to their friends or other witnesses, their memory for what they saw—and discussed with the other witnesses—might not have been affected by this informal denial.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

We preregistered the experiment to the Open Science Framework (OSF; <https://osf.io/w7agf>) where also all data, meta-data, analysis code, and materials are publicly available (<https://osf.io/vdh6g/>). Reference number DOI [10.17605/OSF.IO/VDH6G](https://doi.org/10.17605/OSF.IO/VDH6G).

ORCID

Charlotte A. Bücken  <https://orcid.org/0000-0001-5128-8348>

Ivan Mangiulli  <https://orcid.org/0000-0002-5409-7325>

ENDNOTES

- ⁱ Of note, some research shows that having a co-witness can also be beneficial for memory, for example when they are a couple (Vredeveltdt et al., 2017).
- ⁱⁱ One detail difference is practically relevant; Conversational testimony (i.e., testimony about previous conversations with attorneys, the police, or other witnesses) might be given, and whether or not someone remembers a detail such as discussing the perpetrator's clothing with a co-witness would allow the court to understand co-witness influences on testimony.
- ⁱⁱⁱ Further information is reported in the supplementary material on OSF.
- ^{iv} The reason we did not ask participants to falsely deny *all* traumatic details is that such comprehensive denial might disrupt the flow of the co-witness discussion. Specifically, the participant in the external denial condition might find such consistent denial odd, and suspect that the denial is an experimental manipulation. A second concern is that such comprehensive denial could cut the co-witness discussion very short.

REFERENCES

- Battista, F., Curci, A., Mangiulli, I., & Otgaar, H. (2021). What can we remember after complex denials? The impact of different false denials on memory. *Psychology, Crime & Law*, 1-18, 914–931. <https://doi.org/10.1080/1068316x.2020.1865956>
- Battista, F., Mangiulli, I., Herter, J., Curci, A., & Otgaar, H. (2020). The effects of repeated denials and fabrication on memory. *Journal of Cognitive Psychology*, 32(4), 369–381. <https://doi.org/10.1080/20445911.2020.1767626>
- Blank, H. (2009). Remembering: A theoretical interface between memory and social psychology. *Social Psychology*, 40(3), 164–175. <https://doi.org/10.1027/1864-9335.40.3.164>
- Boskovic, I., Orthey, R., Otgaar, H., Mangiulli, I., & Rassin, E. (2023). # StudentsToo. Prevalence of sexual assault reports among students of three European universities and their actions post-assault. *PLoS One*, 18(4), e0283554. <https://doi.org/10.1371/journal.pone.0283554>
- Boyle, K. M., & Walker, L. S. (2016). The neutralization and denial of sexual violence in college party subcultures. *Deviant Behavior*, 37(12), 1392–1410. <https://doi.org/10.1080/01639625.2016.1185862>
- Bücken, C. A., Mangiulli, I., & Otgaar, H. (2022). Simulating denial increases false memory rates for abuse unrelated information. *Behavioral Sciences & the Law*, 40(3), 433–451. <https://doi.org/10.1002/bsl.2566>
- Bücken, C. A., Mangiulli, I., & Otgaar, H. (in revision). Sharing traumatic memories—Earlier denial increases endorsement of misinformation from a co-witness.

- Bücker, C. A., Mangiulli, I., Uzun, S., & Otgaar, H. (2022). False denials increase false memories for trauma-related discussions. *Memory*, 30(9), 1158–1171. <https://doi.org/10.1080/09658211.2022.2094964>
- Bücker, C. A., Otgaar, H., London, K., Riesthuis, P., Battista, F., & Mangiulli, I. (2023). ‘Nothing happened’: Legal implications of false denials among abused children. *Child Abuse Review*, 32(2), e2791. <https://doi.org/10.1002/car.2791>
- Cadavid, S., & Luna, K. (2021). Online co-witness discussions also lead to eye-witness memory distortion: The MORI-v technique. *Applied Cognitive Psychology*, 35(3), 1–11. <https://doi.org/10.1002/acp.3785>
- Davis, D., & Friedman, R. D. (2017). Memory for conversation: The orphan child of witness memory researchers. In *The handbook of eyewitness psychology* (Vol. 1, pp. 3–52). Psychology Press.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. <https://doi.org/10.3758/bf03193146>
- Gabbert, F., Memon, A., & Allan, K. (2003). Memory conformity: Can eye-witnesses influence each other's memories for an event? *Applied Cognitive Psychology*, 17(5), 533–543. <https://doi.org/10.1002/acp.885>
- Gabbert, F., Memon, A., & Wright, D. B. (2007). I saw it for longer than you: The relationship between perceived encoding duration and memory conformity. *Acta Psychologica*, 124(3), 319–331. <https://doi.org/10.1016/j.actpsy.2006.03.009>
- Goodwin, K. A., Kukucka, J. P., & Hawks, I. M. (2013). Co-witness confidence, conformity, and eyewitness memory: An examination of normative and informational social influences. *Applied Cognitive Psychology*, 27(1), 91–100. <https://doi.org/10.1002/acp.2877>
- Hjelmsäter, E. M. M. A., Granhag, P. A., & Strömwall, L. A. (2012). Co-witness influence on children's memory reports: The difference is in the details 1. *Journal of Applied Social Psychology*, 42(2), 320–339. <https://doi.org/10.1111/j.1559-1816.2011.00886.x>
- Hope, L., & Gabbert, F. (2019). Memory at the sharp end: The costs of remembering with others in forensic contexts. *Topics in Cognitive Science*, 11(4), 609–626. <https://doi.org/10.1111/tops.12357>
- Horowitz, M. J. (1982). Stress response syndromes and their treatment. In L. Goldberger & S. Bresnitz (Eds.), *Handbook of stress. Theoretical and clinical aspects* (pp. 711–732). https://doi.org/10.1007/978-1-4615-2820-3_4
- Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of event scale: A measure of subjective stress. *Psychosomatic Medicine*, 41(3), 209–218. <https://doi.org/10.1097/00006842-197905000-00004>
- Howe, M. L., Wimmer, M. C., Gagnon, N., & Plumpton, S. (2009). An associative-activation theory of children's and adults' memory illusions. *Journal of Memory and Language*, 60(2), 229–251. <https://doi.org/10.1016/j.jml.2008.10.002>
- James, E. L., Lau-Zhu, A., Clark, I. A., Visser, R. M., Hagenaars, M. A., & Holmes, E. A. (2016). The trauma film paradigm as an experimental psychopathology model of psychological trauma: Intrusive memories and beyond. *Clinical Psychology Review*, 47, 106–142. <https://doi.org/10.1016/j.cpr.2016.04.010>
- Khan, S. R., Hirsch, J. S., Wambold, A., & Mellins, C. A. (2018). I didn't want to be that girl: The social risks of labeling, telling, and reporting sexual assault. *Sociological Science*, 19(5), 432–460. <https://doi.org/10.15195/v5.a19>
- Lass-Hennemann, J., Peyk, P., Streb, M., Holz, E., & Michael, T. (2014). Presence of a dog reduces subjective but not physiological stress responses to an analog trauma. *Frontiers in Psychology*, 5, 1010. <https://doi.org/10.3389/fpsyg.2014.01010>
- Lawson, M., & London, K. (2015). Tell me everything you discussed: Children's memory for a dyadic conversation after a 1-week or 3-week delay. *Behavioral Sciences & the Law*, 33(4), 429–445. <https://doi.org/10.1002/bsl.2184>
- Li, Y., Liu, Z., & Liu, X. (2022). Who did I lie to that day? Deception impairs memory in daily life. *Psychological Research*, 86, 1763–1773. <https://doi.org/10.1007/s00426-021-01619-x>
- Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. *Learning & Memory*, 12(4), 361–366. <https://doi.org/10.1101/lm.94705>
- McGaugh, J. L. (2006). Make mild moments memorable: Add a little arousal. *Trends in Cognitive Sciences*, 10(8), 345–347. <https://doi.org/10.1016/j.tics.2006.06.001>
- McKinley, G. L., Brown-Schmidt, S., & Benjamin, A. S. (2017). Memory for conversation and the development of common ground. *Memory & Cognition*, 45, 1281–1294. <https://doi.org/10.3758/s13421-017-0730-3>
- McNally, R. J. (2005). Debunking myths about trauma and memory. *The Canadian Journal of Psychiatry*, 50(13), 817–822. <https://doi.org/10.1177/070674370505001302>
- Meade, M. L., & Roediger, H. L. (2002). Explorations in the social contagion of memory. *Memory & Cognition*, 30(7), 995–1009. <https://doi.org/10.3758/bf03194318>
- Merckelbach, H., Van Roermund, H., & Candel, I. (2007). Effects of collaborative recall: Denying true information is as powerful as suggesting misinformation. *Psychology, Crime & Law*, 13(6), 573–581. <https://doi.org/10.1080/10683160601160679>
- Mojtahedi, D., Ioannou, M., & Hammond, L. (2018). The dangers of co-witness familiarity: Investigating the effects of co-witness relationships on blame conformity. *Journal of Police and Criminal Psychology*, 33(4), 316–326. <https://doi.org/10.1007/s11896-018-9254-4>
- Nahleen, S., Strange, D., & Takarangi, M. K. (2021). Does emotional or repeated misinformation increase memory distortion for a trauma analogue event? *Psychological Research*, 85, 2453–2465. <https://doi.org/10.1007/s00426-020-01409-x>
- Ost, J., Hogbin, I., & Granhag, P. A. (2006). Altering false reports via confederate influence. *Social Influence*, 1(2), 105–116. <https://doi.org/10.1080/15534510500480273>
- Otgaar, H., & Baker, A. (2018). When lying changes memory for the truth. *Memory*, 26(1), 2–14. <https://doi.org/10.1080/09658211.2017.1340286>
- Otgaar, H., Howe, M. L., Mangiulli, I., & Bücker, C. (2020). The impact of false denials on forgetting and false memory. *Cognition*, 202(104322), 1–9. <https://doi.org/10.1016/j.cognition.2020.104322>
- Otgaar, H., Howe, M. L., Memon, A., & Wang, J. (2014). The development of differential mnemonic effects of false denials and forced confabulations. *Behavioral Sciences & the Law*, 32(6), 718–731. <https://doi.org/10.1002/bsl.2148>
- Otgaar, H., Howe, M. L., Smeets, T., & Wang, J. (2016). Denial-induced forgetting: False denials undermine memory, but external denials undermine belief. *Journal of Applied Research in Memory and Cognition*, 5(2), 168–175. <https://doi.org/10.1016/j.jarmac.2016.04.002>
- Otgaar, H., Romeo, T., Ramakers, N., & Howe, M. L. (2018). Forgetting having denied: The “amnesic” consequences of denial. *Memory & Cognition*, 46(4), 520–529. <https://doi.org/10.3758/s13421-017-0781-5>
- Paterson, H. M., & Kemp, R. I. (2006). Comparing methods of encountering post-event information: The power of co-witness suggestion. *Applied Cognitive Psychology*, 20(8), 1083–1099. <https://doi.org/10.1002/acp.1261>
- Peker, M., & Tekcan, A. I. (2009). The role of familiarity among group members in collaborative inhibition and social contagion. *Social Psychology*, 40(3), 111–118. <https://doi.org/10.1027/1864-9335.40.3.111>
- Riesthuis, P., Mangiulli, I., Broers, N., & Otgaar, H. (2022). Expert opinions on the smallest effect size of interest in false memory research. *Applied Cognitive Psychology*, 36(1), 203–215. <https://doi.org/10.1002/acp.3911>
- Rombold, F., Wingenfeld, K., Renneberg, B., Hellmann-Regen, J., Otte, C., & Roepke, S. (2016). Influence of the noradrenergic system on the formation of intrusive memories in women: An experimental approach with a trauma film paradigm. *Psychological Medicine*, 46(12), 2523–2534. <https://doi.org/10.1017/s0033291716001379>
- Romeo, T., Otgaar, H., Smeets, T., Landstrom, S., & Boerboom, D. (2019). The impact of lying about a traumatic virtual reality experience on

- memory. *Memory & Cognition*, 47(3), 485–495. <https://doi.org/10.3758/s13421-018-0885-6>
- Romeo, T., Otgaar, H., Smeets, T., Landström, S., & Jelicic, M. (2019). The memory-impairing effects of simulated amnesia for a mock crime. *Applied Cognitive Psychology*, 33(6), 983–990. <https://doi.org/10.1002/acp.3508>
- Schwartz, S. L., & Wright, D. B. (2012). Memory conformity for new and old items with immediate and delayed testing. *Applied Cognitive Psychology*, 26(4), 508–515. <https://doi.org/10.1002/acp.2820>
- Strange, D., & Takarangi, M. K. (2012). False memories for missing aspects of traumatic events. *Acta Psychologica*, 141(3), 322–326. <https://doi.org/10.1016/j.actpsy.2012.08.005>
- Sundin, E. C., & Horowitz, M. J. (2002). Impact of event scale: Psychometric properties. *The British Journal of Psychiatry*, 180(3), 205–209. <https://doi.org/10.1192/bjp.180.3.205>
- Vieira, K. M., & Lane, S. M. (2013). How you lie affects what you remember. *Journal of Applied Research in Memory and Cognition*, 2(3), 173–178. <https://doi.org/10.1016/j.jarmac.2013.05.005>
- Vredeveltdt, A., Groen, R. N., Ampt, J. E., & van Koppen, P. J. (2017). When discussion between eyewitnesses helps memory. *Legal and Criminological Psychology*, 22(2), 242–259. <https://doi.org/10.1111/lcrp.12097>
- Walther, E., Bless, H., Strack, F., Rackstraw, P., Wagner, D., & Werth, L. (2002). Conformity effects in memory as a function of group size, dissenters and uncertainty. *Applied Cognitive Psychology*, 16(7), 793–810. <https://doi.org/10.1002/acp.828>
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Winters, G. M., Colombino, N., Schaaf, S., Laake, A. L., Jeglic, E. L., & Calkins, C. (2020). Why do child sexual abuse victims not tell anyone about their abuse? An exploration of factors that prevent and promote disclosure. *Behavioral Sciences & the Law*, 38(6), 586–611. <https://doi.org/10.1002/bsl.2492>
- Wright, D. B., Busnello, R. H. D., Buratto, L. G., & Stein, L. M. (2012). Are valence and social avoidance associated with the memory conformity effect?. *Acta Psychologica*, 141(1), 78–85. <https://doi.org/10.1016/j.actpsy.2012.06.008>
- Wright, D. B., Memon, A., Skagerberg, E. M., & Gabbert, F. (2009). When eyewitnesses talk. *Current Directions in Psychological Science*, 18(3), 174–178. <https://doi.org/10.1111/j.1467-8721.2009.01631.x>
- Zuromski, K. L., Ustun, B., Hwang, I., Keane, T. M., Marx, B. P., Stein, M. B., Ursano, R. J., & Kessler, R. C. (2019). Developing an optimal short-form of the PTSD checklist for DSM-5 (PCL-5). *Depression and Anxiety*, 36(9), 790–800. <https://doi.org/10.1002/da.22942>

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