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Lost in the Mall Again: A Preregistered Replication and Extension of Loftus & Pickrell (1995)

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Abstract

The seminal Lost in the Mall study (Loftus & Pickrell, 1995) has been enormously influential in psychology and is still cited in legal cases. The current study directly replicated this paper, addressing methodological weaknesses including increasing the sample size fivefold and preregistering detailed analysis plans. Participants (*N* = 123) completed a survey and two interviews where they discussed real and fabricated childhood events, based on information provided by an older relative. We replicated the findings of the original study, coding 35% of participants as reporting a false memory for getting lost in a mall in childhood (compared to 25% in the original study). In an extension, we found that participants self-reported high rates of memories and beliefs for the fabricated event. Mock jurors were also highly likely to believe the fabricated event had occurred and that the participant was truly remembering the event, supporting the conclusions of the original study.

Keywords:

Autobiographical memory – false memory – misinformation – replication

The seminal 1995 paper "The Formation of False Memories" by Elizabeth Loftus and Jaqueline Pickrell (more commonly known as the "Lost in the Mall" study), was the first to demonstrate that "people can be led to believe that entire events happened to them after suggestions to that effect" (Loftus & Pickrell, 1995, p723). In the study, participants were presented with three true events from their childhood and one fabricated event, based on information provided by an older relative. After discussing their memories in a written survey and two interviews with a researcher, 25% of participants (*n* = 6) reported a false memory of getting lost in a shopping mall as a child. Loftus & Pickrell noted that they could not estimate the percentage of people who might be able to be misled in such a way, rather that this study provided "existence proof" for the possibility of false memory implantation (Loftus & Pickrell, 1995, p. 724).

Interest in the formation of false memories for autobiographical events was sparked by concerns that therapists may be unwittingly planting misinformation in clients' minds using suggestive therapy techniques, particularly memories of abuse (Lindsay & Read, 1994; Loftus, 2004). The so-called "memory wars" of the 1990s was a period of acrimonious debate between clinicians and memory scientists about the validity of repressed memories. The Lost in the Mall study made a highly influential contribution to this debate, demonstrating that suggestion, alongside social pressure and repeated imagination, can induce false autobiographical memories. There is evidence that the memory wars are not over (Otgaar et al., 2021; Patihis et al., 2014) and debate concerning repressed and false memories continues.

As noted by Crook & McEwen (2019), "It is difficult to name a study in psychology that has had more influence on our beliefs about sexual abuse allegations and memory than the lost-in-the-mall study. While the mall study may be one of the most-cited studies in the psychology of memory, it may also be one of the least examined." (p. 11). The major criticisms of the original study centre on the small sample size, the lack of a clear definition of "full" and "partial" memories, and lack of information about the coding process (Blizard & Shaw, 2019). Some have also criticised the practice

of experimenters rating the memories of participants, rather than participants self-reporting the nature of their own memories and beliefs (Brewin & Andrews, 2017). Despite these criticisms, many note that the study continues to play a major role in addressing child sexual abuse accusations, "despite Loftus' concession that the mall study results did not apply beyond the 24 [original] subjects, and the issue of such a small percentage of the subjects, if any at all, actually being convinced of a false memory" (Crook & McEwen, 2019, p. 15). These criticisms speak to the fundamental conclusions of the original study – that it is possible to plant a false memory for an event that never occurred, that participants will believe they are truly remembering a real event, and, it is implied, that these memory reports will seem convincing and authentic to observers. Critics have noted that without further data to evidence how real or convincing these implanted memories are (to both the individual reporting the memory and observers hearing about it), the support for the claims made in the original paper is weak (Blizard & Shaw, 2019).

The paradigm pioneered by Loftus and Pickrell—often referred to as "the Lost in the Mall paradigm" or "the familial-informant false narrative"—is recognised as the most powerful procedure for studying the implantation of false childhood memories (Scoboria et al., 2017). A great number of studies have since demonstrated the implantation of false memories in an experimental setting, including in children (Otgaar et al., 2009, Principe & Schindewolf, 2012), in adults remembering childhood (Hyman et al., 1995, Wade et al., 2002) and adolescence (Shaw & Porter, 2015), and in voters remembering political campaigns (Frenda et al., 2013; Murphy et al., 2019; Greene et al., 2021). False memories for unpleasant experiences with certain foods have even been shown to change eating behaviours (Bernstein et al., 2011). A mega-analysis of eight rich false memory studies estimated that approximately 30% of subjects are likely to form a false memory in any one study (Scoboria et al., 2017). In that analysis, 11% of participants reported a "robust" false memory, 11% reported a "full" false memory, and 9% reported a "partial" false memory. A further 23% of participants in those studies demonstrated some degree of acceptance of the false information.

Many of these recent studies address the methodological issues of the Lost in the Mall study, with larger samples, more methodological rigour, and greater transparency. However, despite this diverse body of evidence assessing distortions in autobiographical memory, the Lost in the Mall study is still central to our discussions and understanding of false memories. The original paper has been cited over 1700 times at the time of writing and is featured in the vast majority of introductory psychology textbooks. However, the study is also critiqued sharply by those who do not support the notion of false memories or their relevance in cases of abuse. Indeed, papers with the sole focus of critiquing the findings and implications of the original study emerged soon after publication (Crook & Dean, 1999) and are still published to this day (Blizard & Shaw, 2019; Sinason, 2021). The study has been cited by expert witnesses in many important legal cases, such as the recent trial of Harvey Weinstein (Newberry, 2020) and is often discussed in the media, particularly during high-profile disagreements over past events, such as the testimony of Dr Christine Blasey Ford concerning Justice Brett Kavanaugh (Mulshine, 2018; Thielman, 2018). When Loftus and others have testified in these cases, the Lost in the Mall study is often discussed in great detail – e.g. as noted by Crook & McEwen (2019), Loftus was deposed as part of a 2017 case and asked about the generalisability of the study's findings, beyond the small original sample (*"Q. So is it your testimony that the lost in the shopping mall study was not studying any population except for the 24 individuals in the study?"* E.M. vs. Los Angeles Unified School District, 2017, pp. 242).

Due to the enormous impact of this paper on the field, and its implications for our understanding of memory in both legal contexts and public debate, it is critical that we replicate this study using more rigorous and transparent methodology. In the current study, we replicated the original study as closely as possible with a larger sample and more detailed coding scheme, preregistering all methodological and analytical plans and making all data and materials available. We also extend upon the original study with the addition of two novel investigations, posing the questions, "How do these false memories feel to participants?" (measured via self-report) and "How do these false memories appear to observers?" (measured via a mock-jury study). The first of these

questions speaks to a common criticism of the Lost in the Mall study, where some have queried whether these false memories were really being remembered by participants (Crook & McEwen, 2019). The second question is whether these memories are convincing to lay observers. Evidence suggests that false memories can be indistinguishable from true memories (Shaw, 2020), but this hasn't been assessed with regard to the Lost in the Mall false memories. These additions significantly extend the ecological validity of the original study. As the original study relied only on the coding of interviews by psychological researchers, we cannot know if participants would have agreed that they remembered the event or believed it had happened, or whether these memories would have appeared to be truthful to lay observers. There can be significant legal and personal consequences of forming false memories of events that never occurred (e.g., deciding to report a crime, deciding to cut contact with family members). Most of these consequences rest on an individual coming to really believe that the event did occur, but we are lacking data on whether the Lost in the Mall procedure is likely to generate self-reported false memories, and whether these memories would be believed by others if they came forward. With these additions we hope to more accurately assess the quality of the false memories implanted using the Lost in the Mall procedure and more closely examine the conclusions drawn from the original study.

Method

We modelled the method closely on the original study. Where we have deviated from the original or added additional measures, we have highlighted the changes. The design and analyses for this replication study were preregistered at https://osf.io/krfpu/. The data, materials, interview schedule and coding manual are also available at this link. This project was conducted as a cross-institution collaboration involving multiple student researchers. In the interests of clarity and transparency, we preregistered all of the students' research questions in one document, but here we focus on the replication study (pages 3-10 of the preregistration document).

Participants

In the original study, University of Washington students recruited 24 participant pairs. In devising the target sample size for the replication study, we could not use power calculations as the primary outcome of the study is simply descriptive (the percentage of participants who form a false memory during the study). A larger sample provides more accurate representation of the population and will thus provide more accurate results (Andrade, 2020), as well as diluting the experimental noise we might expect in such an ecologically valid study (e.g., variation arising from informant forgetfulness, coding disagreements, etc.). Thus, we aimed to recruit the largest possible sample that we could. We preregistered our aim to recruit a sample of 150 participant pairs, as we felt that would be the maximum possible given resource constraints. However, as the study was conducted as part of a collaborative student project, we planned to conclude the study at the end of the academic year if we had recruited more than 100 participant pairs. Our final sample consisted of 123 participant pairs, consisting of the participant and their parent or older family member ("informant"). A further 63 participants began the study but were excluded at the first stage, as their informant reported that they may have once gotten lost in a shopping mall as a child. Post-hoc sensitivity analyses indicated sufficient power to detect a small effect in the supplemental within-subject inferential statistics (d = .25).

Participants were recruited by student researchers at University College Cork and University College Dublin, Ireland. The final sample consisted of 81 females and 42 males who ranged in age from 18 to 57 (M = 25.49, SD = 6.38). Over half the sample (55.7%) had completed at least a bachelor's degree and most were recruited through personal networks of the student researchers, including university students, though we did not recruit psychology classmates who may have known about the Lost in the Mall study.

Procedure & Materials

The original study was conducted using paper and pencil booklets and a mix of in-person and phone interviews. In our replication study, we adhered closely to the method used in the original study but utilised modern technology including online survey booklets and video interviews. No interviews were conducted in person due to the COVID-19 pandemic restrictions in place in Ireland at this time. Research has shown that online interviews are an effective alternative to in-person interviews, without negative effects on data quality (Shapka, 2016). Minor changes were made to the wording of the questions in the original study (e.g., changing "shopping mall" to "shopping centre") to reflect Irish colloquial terms. The eight student researchers on this project worked in pairs, whereby one researcher recruited a participant pair and once they had agreed to participate, the other researcher conducted all interviews and communication. This was to ensure the interviewer did not know the participant or their informant and particularly, that they didn't know anything about their childhood experiences. After the participant agreed to take part and provided details of their informant, the informant was asked to complete a brief survey.

Informant Survey

Participants' older relatives provided information about true events from the participants' childhood. Informants were asked to describe specific events that happened over the course of one day (e.g., a family car journey, a trip to the beach or the time someone got sick from eating too much ice cream). We specified that these events should not be "family folklore" – that is, they shouldn't be events that the family frequently discuss or reminisce about – nor should they be traumatic events that might be upsetting for the participant to recall. At a minimum, informants were asked to include details of how old the participant was during this event, where the event took place, and who else was present. Three examples of such stories were given to informants, one of which was *"When Sarah was 5 we went on*

holiday to Galway. We stayed in a caravan in a campsite, and one night it rained and the roof leaked. Sarah's shoes got wet and she was very annoyed".

Informants were also asked several questions about a typical shopping trip when the participant was a child. These details were then used to construct the fabricated event. Participants were asked to provide the name and location of a place the family used to shop when the participant was about five years old, who usually went along on shopping trips, and what kind of shops might have attracted the participant's interest at that age. Informants were asked if the participant ever got lost in a shopping centre or department store as a child (yes/no) and in an addition to the original method, we also asked "How confident are you in this answer? (that your family member did/did not get lost)" on a scale from 1 (not at all confident) to 10 (extremely confident). If the informant answered yes to this question, or answered no, but with a confidence rating below the midpoint, the participant was excluded from the study. Therefore, for all included participants, the informant confirmed they were confident they did not get lost in a shopping centre as a child. We requested that informants did not discuss these events or anything about the study with the participant until after the project was finished. Informants were told that the goal of the study was to assess how much participants could remember without any external prompts.

Participant Survey

Participants received an email invitation to complete a survey where they were presented with four stories from their childhood and asked to fill in details of their own memory. We refer to this as the 'booklet survey' for ease of comparison with the original study, in which participants recorded their responses in a paper booklet. Participants were told: *"The purpose of this study is to investigate childhood memories. We want to know why some events are remembered and others are not. As you know, we have asked an older relative of yours to provide details of some events of your childhood. Please read the description of each event below carefully, and in the box below it write as much as*

you can remember about the event. If you don't remember the event at all just write 'I don't remember this'." Each event was then presented along with a free text box and the participant had unlimited space to write as much as they wished. As in the original study, the fake event was always presented as the third story. An example of a false event created for the booklet using the information from an informant read:

"You and your mother went to Dunnes Stores in Charleville. You were 5 years old at the time. You ran ahead into the shop and went to the sweets aisle to pick out your favourite sweets. When you went to look for your mother you couldn't find her. You became very upset when you realised you were lost and started crying. An elderly lady found you and helped you return to your mother. Afterwards, you both went to the sweets aisle and you picked out a bar of chocolate."

An example of a true story presented to a participant read:

"When you were 5 years old your mother brought you and your siblings, Peter, Ian and Lucy, to Disneyland Paris. As you were the youngest and the smallest of your siblings you weren't able to go on the majority of the rides. You tried standing on your tippy toes to make yourself look bigger and reach the height requirements, but it didn't work and you were devastated. You spent most of the day crying when you were refused from the rides."

All of the stories were written in this format. Where an informant had written a true event in the third person ("When Elaine was 5..."), made reference to themselves ("Elaine and my other daughter Alana…") or where a description was notably long, we lightly edited their wording so all four stories were similar. Due to a technical error, one participant was presented with two true events rather than three, but as all other elements of the procedure were followed, we retained that participant for

analysis. This decision was made before their first interview was conducted and we chose to retain the participant because the true events were mostly necessary as filler, and we felt two true events was sufficient. The participant did report a false memory by the end of the study.

Interview 1

As in the original study, all participants were invited to an interview 1-2 weeks after completing the booklet survey. Interviews were conducted using online video conferencing software and both participant and interviewers had their cameras on during the interviews. Each interview lasted approximately 20-30 minutes. As in the original study, the events were discussed in the same order as the booklet, with the fake event always in third place. Extensive training was provided to the student researchers conducting the interviews, with guidance on following the interview schedule and developing rapport with participants. This included workshops where students practiced interviewing one another and the PIs, as well as pilot interviews with friends, which were recorded and shared with the whole research team for discussion and critique.

In the interview, the interviewers did not read the booklet description aloud to the participant, but used snippets to prompt discussion. Interviewers remained friendly but pushed for details and asked open-ended questions until they felt participants had recalled as much as possible. The interview schedule (available in supplementary materials) provided example prompts to the interviewers such as *"Can you remember anything else about that event?", "Think about it a bit more, it might come back to you"* and *"What happened after that?".* If necessary, interviewers also provided small prompts using snippets from the event as presented in the survey (e.g., *"I think your sister might have been there with you, is that right?").* After discussing each memory, participants were asked to rate the clarity of the memory ("*Can you tell me how clear this memory is, where 1 is not at all clear and 10 is very clear?"*) and their confidence in their ability to recall more *("How confident are you that, if given*

more time, you would be able to remember the event in more detail? Here, 1 means not at all confident and 10 means very confident"). These questions were identical to those asked in the original study.

Interview 2

The second interviews took place 1-2 weeks after the first interview and followed the same format. Participants were asked some additional phenomenology questions about their memory for each event, immediately after the clarity and confidence questions that were repeated from interview 1. These questions were novel and not included in the original study. Participants were asked to rate from 1-10 how true the following statements were; "My memory for this event involves sound", "This memory evokes a feeling/reaction from me (i.e., this memory triggers a thought, emotion or image)", "This memory has made me think of another event/memory from my life", "I can easily access this memory without much effort".

At the conclusion of the interview, participants were asked whether they remembered each event (yes or no). If they said no, they were then asked whether they believed the event had occurred. Those who said they did remember the event were not asked if they believed it had really occurred, as we didn't want to arouse suspicions about the true purpose of the study. Prior studies have used detailed memory self-assessments such as the Autobiographical Belief and Memory Questionnaire (AMBQ) by Scoboria et al., (2004), a five-item measure that assesses general and personal plausibility, autobiographical belief, memory, and the believed frequency of an event's occurrence. In the current study though, mindful of ecological validity and allowing participants to define their own memories on their own terms (Shaw, 2018), we selected a simple yes/no response format. While this format does not allow us to assess participants' perceptions of the richness of their memories, it does give us a clear indication of whether they perceive themselves to be remembering the event or not. Participants were also asked whether they would be willing to testify to the event in court *("Imagine*

you had to testify in court that this event really happened. How willing would you be to do this, on a 1-10 scale where 1 is not at all willing and 10 is completely willing?"). These questions were not included in the original study and are included here as self-reported memory appraisals, where participants could tell us whether they felt they remembered/believed in the event, before they learned about the purpose of the study. Participants were then told about the true purpose of the study and asked to guess which of the four stories was fabricated *("In fact, only three of these were events from your childhood that your [informant] told us about. We made up the fourth one for this study. Can you tell me which one you think was fake?").* Participants were pushed to make a guess if they were unsure. Because this measure was recorded after debriefing and all participants had a 25% chance of randomly selecting the correct event, it is distinct from the previous self-report measures. Next, participants were debriefed about the fake event and given further details about the aims of the replication study. Participants were invited to discuss how they felt about the study and were given the option to withdraw their data (none chose to do so). At no point during the study did any participant raise suspicions that we were trying to plant a false memory, nor did any participants claim to have known the true purpose prior to debriefing.

Follow-Up Survey

Participants and informants were sent follow-up surveys via email one week after the second interview. These surveys contained questions on their perceptions of the ethics of the study, the debriefing procedure and any residual false memories or beliefs. These were not part of the original study and are not described here but have been preregistered as separate research questions. Participants were once again given the opportunity to withdraw their data and/or to speak to one of the principal investigators about any concerns they may have. No participants wished to do so.

Ethics

Ethical approval for this study was given by the School of Applied Psychology Ethics Committee in University College Cork. As deception was necessarily used in this study, participants in the main study were told about the true nature of the study at the end and given the option to withdraw their data during the second interview and once again during the follow-up survey. We also preregistered a separate investigation of participant and informant perspectives on the ethics of the Lost in the Mall paradigm, reported in Murphy et al. (2023). Generally participants and informants were very positive about the procedure and the vast majority had no objections to the deception used.

Mock-Jury Study

In an extension to the original study, we obtained judgements of participants' recollections of the fake event from a separate set of 'mock jury' participants. This was conducted as part of a separate study assessing mock jury decisions, in which online jurors were exposed to interview extracts relating to both true and false events. In the present paper, we report data relating to the fake event only, for comparison with judgements obtained via self-report and the coding scheme. This study received ethical approval from the School of Applied Psychology Ethics Committee at University College Cork.

We extracted sections of the transcripts from the second interview where participants discussed the events with the interviewer. Extracts were obtained from 111 participants, excluding 12 participants because in the second interview one interviewer had posed the question 'Can you remember anything new since last week?' rather than 'Tell me everything you can remember, even if you told me before'. We considered it likely that responses elicited using this phrasing would differ in the level of detail provided, so we excluded these extracts from the mock jury study. We recruited 1024 mock jurors from Prolific, 18 were excluded for failing an attention check. The final sample thus

consisted of 1006 mock jurors (mean age = 26.22, SD = 8.96, range 18-77), including 690 females, 296 males, 19 who selected other gender, and 12 who preferred not to say. All recruited participants were Irish, to ensure they were familiar with the colloquial terms used by participants in the interviews.

Mock jurors were told that the purpose of the study was to see how memories are perceived by others. They were told they would be asked to read extracts from interviews with people speaking about their childhood. They were not warned that some memories may be false, in order to mirror the experience of real jurors listening to a witness describe events from their past. Each participant saw extracts relating to one true and one false event (from different individuals) and they were shown the memory extracts as they appeared in the anonymised transcript, like so:

INT: So then moving on to the third event, this was the time that you got lost in Market Cross Shopping Center so, can you tell me what you remember about this event?

R: Yeah because the last time I said I didn't remember anything but thinking on it, I feel like I remember running down there in. Downstairs in the shop, in the shopping Center. Ahm running down the stairs, there's like a stairs and then you can run straight into Penney's, and I feel like I ran down those stairs straight into Penney's and ehm there was… It's weird because, last week I didn't remember any of this, but now I'm.. there was an old.. there was an old woman who was like, she was there, and she was like it's okay, but I, I don't think I was upset or anything I was just fine and I just feel like I can envision it. I have like photos, like snapshots of it in my head, but yeah I feel like I ran down the stairs it was me and my Mom, just two of us, ran down the stairs straight into Penney's, and then I was kind of like "oh no Mom's not in here". And there was a lady there. And I stayed with her. But I don't remember anything else from it.

INT: Hmm and do you remember what the lady looks like?

R: I felt she was old with grey hair. She has a skirt on, a navy skirt. Mmhm, which is weird I'd remember that, um, but yeah.

INT: And do you remember what your Mom's reaction was when you were reunited with her?

R: No, I don't remember being reunited with her, but I mean I obviously was.

INT: Hmm and do you remember what age you were when this happened?

R: No idea. Not like... I really don't know.

INT: Yeah no that's fine and do you remember, like the lady just being nice or like was she kind of cross like "why are you by yourself?" or...?

R: Yeah. I feel like the lady was nice, she didn't give me any sort of like weird vibe I was comfortable with her, like I knew she was safe.

INT: Hmm so you're kind of, I think you said, your memory kind of goes blank after meeting the elderly lady is it?

R: Yeah yeah.

After reading the extract, the mock juror was asked three forced-response questions that all had to be answered Yes or No; "Do you believe this event really happened?", "Is this person describing something they remember happening? (The person has a memory of this event happening)" and "Is this person describing something they believe happened? (The person accepts this event really happened)". Although jurors had very little information to work with, we forced them to make a response here as we wanted to know how they would respond if they had to decide whether this was a real account of a true event (as they might on a real jury). Jurors were also asked to rate the clarity, detail, emotion, and plausibility of the memory on a scale from 1 (not at all) to 100 (extremely).

Analysis:

All interviews were recorded via Zoom/Microsoft Teams. Automated transcription was used and each interviewer then hand-checked the transcription and corrected any errors. Each interviewer pair then sent their transcribed interviews to another pair of researchers on the project for coding, so no researchers coded their own interviews (though all coders were authors on the paper and aware of the study hypotheses). The student researchers were trained in coding interview data and used a detailed coding manual (available on OSF). To maintain data quality, all data were double-coded and all discrepancies were resolved by a third coder. The third coder was always one of the two principal investigators on the project (Gillian Murphy & Ciara Greene). In addition to this double-coding by researchers who were not involved in the interviews, we appointed a Data Champion to check students' record keeping. This was a visiting student intern from another university, who was not involved in the coding process, but checked that all files were available, everything was appropriately anonymised, and that the protocol was followed correctly (e.g. that the dates of interviews aligned with the preregistered timelines).

Participant responses to the questions asked in the interviews (memory clarity, confidence, etc.) were coded by two researchers independently (kappa = 0.97), with discrepancies resolved by a third coder. Likewise, participants' self-report data (where they indicated whether they remembered or believed an event had occurred, whether they would testify, etc.) were transcribed by two researchers (kappa = 0.93) and any discrepancies were resolved by a third coder.

In the original study, participants' descriptions of the events from the interviews were coded as representing a full memory (participant remembers the whole event), a partial memory (participant remembers parts of the event/speculates about how it might have happened), or no

memory. No details were provided about how this coding scheme was applied (e.g., how a full or partial memory was defined). In the current study, we revised this Loftus & Pickrell (1995) coding scheme using pilot data to provide more specific information for the coders:

Full memory: participant substantially remembers the event, and may speculate about some peripheral details. For this category, it should be clear that the participant actually remembers the event, even if they can't remember some minor details.

Partial memory: Participant remembers parts of the event (e.g., recalls some features of the event or peripheral details); participant may also speculate about how the event might have happened. Note: some element of memory (however minor) is required for this code. Speculation alone is not enough if there is no indication of any memory.

No memory: Participant clearly does not remember the event. They may speculate about some details in response to questions (e.g., "yeah, we used to go to that shop a lot" or "I suppose my mam would have been upset if I was lost") but do not remember any details of the event.

Examples of participant booklet responses in each category can be seen in Table 1. Two researchers independently coded each memory (kappa = 0.60) and discrepancies were resolved by a third coder. Though the discrepancies between coders persisted even after extensive training, most inconsistencies were between neighbouring categories (i.e. no memory vs. partial memory, or partial memory vs. full memory). For example, one true event from the booklet went as follows: *"When you were around four and a half years old, you went to Belfast. It was your first time away on a family holiday of 4. It was very exciting for you and you really enjoyed it. You did an open top bus tour around Belfast. You also met up with your aunty who was in Belfast at that time."*

The participant responded, *"I loved this holiday and still remember bits and pieces from it. I definitely remember meeting my aunty in the hotel lobby. She was working in the university at that time and living in Belfast. It was one of my first times on an open top bus."*

One coder coded this as a full memory and one coded this as a partial memory. A third coder resolved this and coded it as a full memory, as although the participant describes themselves as remembering 'bits and pieces' of the trip, they clearly report substantially remembering the trip including the primary details listed in the description (the bus, the aunt, the named city).

Table 1: Examples of participant responses to the fake event in the booklet survey.

Full Memory	Partial Memory	No Memory
I remember this event quite well. I remember going through the aisles myself to look for something to buy. I then started to look for my mum and whoever else was with her, I don't recall it being Aidan even though it is mentioned but I know a sibling was with her. I walked up and down the aisles and when I did one round of this and couldn't find them I remember starting to feel anxious. I repeated the same and again couldn't find them. I remember feeling fearful and angry that maybe I had been left behind by mistake. I don't remember the lady who helped me but I do remember when I found my mum and I started crying. I was overwhelmed by relief. I saw she had been worrying. I don't remember picking out my favourite sweets but remember leaving the shop then.	*I only vaguely remember this memory – I only remember that the elderly lady was really nice, and the relief of being reunited my mam.*	*I can't recall that incident at all. But, I would imagine that I would have been really upset not knowing where my mum was. I guess getting a new dress made me forget about the incident maybe?*

Results

Replication analyses

The 123 participants were asked to recall 368 true events in total. Participants succeeded in remembering 75% of these events at the booklet stage (99 partial memories, 177 full memories), 82% of these events at the first interview stage (91 partial memories, 211 full memories), and 87% of these events at the second interview stage (98 partial memories, 223 full memories). Notably, in our replication study we saw an increase in true memory reports at each stage of the study, while in the original study the rate of true memories reported in the booklets (68%) stayed relatively consistent throughout.

In the booklet surveys, 15% of participants reported a false memory for the fake event (16 partial memories, 2 full memories). In the first interview, the false memory rate increased to 19% (19 partial memories, 5 full memories). In the second interview, the false memory rate further increased to 35% (33 partial memories, 10 full memories). This final false memory rate of 35% compares favourably with Loftus & Pickrell's original estimate of 25% (see Figure 1). Once again, we saw an increase in reported memories at each stage of the study, whereas the original study found the rates reported at the booklet stage stayed consistent across the other waves of the study.

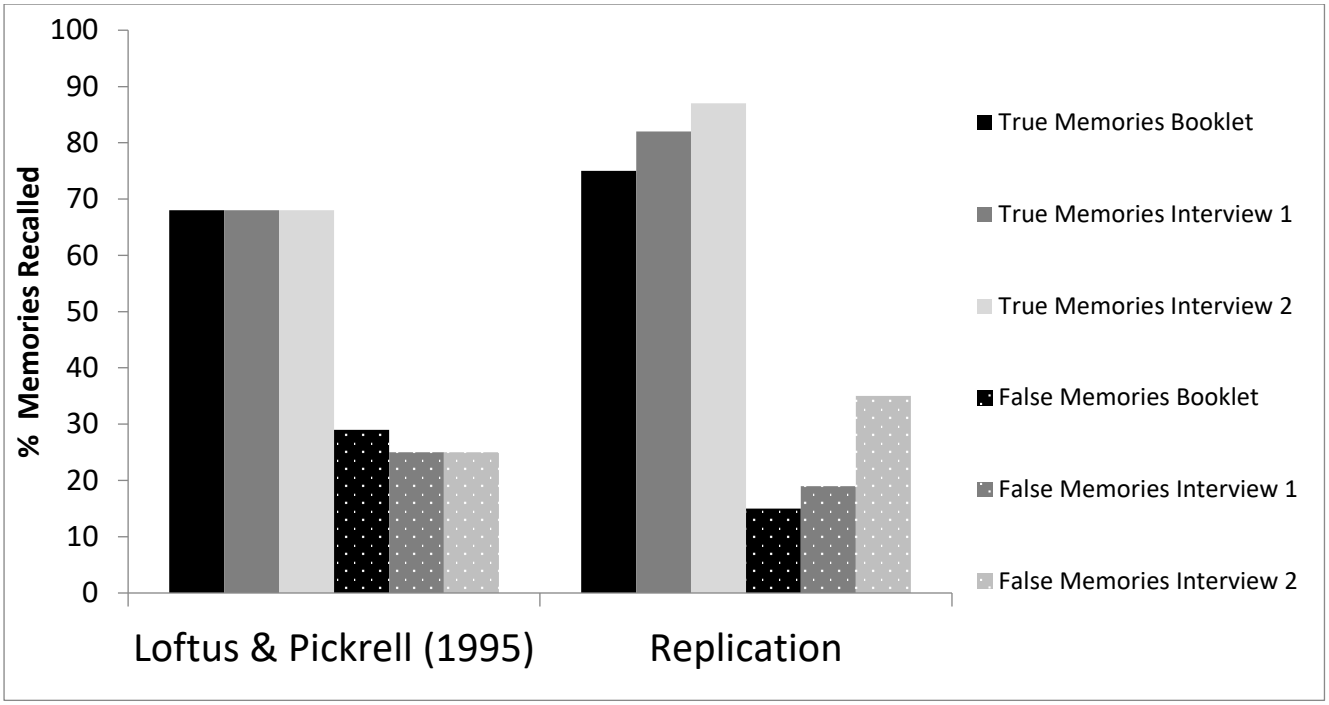


Figure 1: True and false memories reported in each stage of the original study and in the current replication.

We replicated the inferential statistics from the original study, comparing features of the true events with the false event. We calculated the mean number of words used by those who reported a full or partial memory for each event. On average, participants used more words to describe true events (M = 54.99 words, SD = 43.47) than the fake event (M = 14.22, SD = 24.47), t(122) = 12.27, p <.001, *d* = 1.11 (95% CI: 0.88 - 1.33). Restricting our analyses to those who were coded as reporting a false memory, fewer words were used to describe the fake event (M = 44.44, SD = 32.37) than the real events (M = 83.19, SD = 46.39), t(17) = 4.43, p <.001, *d* = 1.04 (95% CI: 0.46 - 1.61).

For those who reported a full or partial memory in interview 1 or 2, we compared clarity ratings over time. We conducted a two-way within subjects ANOVA with the IVs of time (interview 1, interview 2) and memory type (true, false). There was a statistically significant main effect of memory type, with true events recalled with greater clarity (M = 6.14, SD = 1.57) than fake events (M = 3.20, SD = 1.47), F(1, 42), = 93.99, p = <.001, η_p^2 = 0.69. There was also a statistically significant

effect of time, with clarity ratings increasing from interview 1 (M = 4.42, SD = 1.23) to interview 2 (M = 4.92, SD = 1.40), F(1, 42), = 6.40, p = .02, η_p^2 = 0.13. There was no significant interaction effect, F(1, 42), = 3.53, p = .07, η_p^2 = 0.08). We ran an identical analysis on participant ratings of confidence that they could remember more about the event if given time and found a statistically significant effect of memory type with true events associated with greater confidence (M = 4.48, SD = 1.92) than fake events (M = 3.51, SD = 1.62), F(1, 42) = 20.12, p = <.001, η_p^2 = 0.32. There was no significant effect of time (F(1, 42) = 0.16, p = .70, η_p^2 = 0.04) and no significant interaction effect (F(1, 42) = 0.54, p = .47, η_p^2 = 0.01).

Notably, the true event means used in these analyses are an average of three events, whereas the false event is just a single measure and therefore likely less precise. In exploratory analyses, we confirmed that these differences remained if we assessed each true event individually (all *p*'s < .05).

At the end of the second interview, when informed that one of the stories was fake and asked to select the fake story, 85% of participants correctly selected the lost in the mall event. This is similar to the 79% rate observed in the original study.

Additional Pre-Registered Analyses

At the end of the second interview, just prior to debriefing and selection of the fake story, participants were asked whether they remembered each event. Using this self-report measure, the true events were recalled at an average rate of 75% (this compares to an interview 2 memory rate of 87% using the coding scheme). When asked whether they remembered the fake lost in the mall story, 14% of participants reported that they did (this compares to an interview 2 coded false memory rate of 35%). A further 52% reported that though they did not remember the fake event,

they believed it had occurred. Overall then, when measured via self-report, 66% of the sample reported remembering or believing the fake lost in the mall event.

We assessed whether those who reported a false memory for the fake event at the booklet stage were the same participants who self-reported a false memory at the end of the study – if this were the case, it might suggest that our implantation procedures had not greatly affected self-reported memory. In total, 18 participants reported a memory for the false event at the booklet stage. Of these, 8 self-reported a memory for the false event at the end of the study and 10 did not. Or to assess this question from another angle; 105 participants did *not* report a memory for the false event at booklet stage. Of these, 9 self-reported remembering the event at the end of the study and 96 did not.

As it is possible that some participants really did get lost in a mall as children and their informant didn't know or didn't recall the incident, we assessed how many participants reported a persistent memory throughout the entire study. These were participants who reported a memory for the mall event at the booklet stage, and self-reported remembering the event at the end of the second interview, and claimed they still remembered the event post-debriefing. There were 3 participants who met these criteria, and might possibly have been remembering a true event. We would note though that even if they were excluded from the study entirely, the false memory rate would decrease only slightly, from 35% to 33%.

When asked whether they would be willing to testify about each event on a scale from 1-10, those who were coded as reporting a false memory were less willing to testify to the false event ($M = 3.49$, $SD = 2.42$) than the true events ($M = 6.66$, $SD = 1.92$), $t(36) = 7.88$, $p < .001$, $d = 1.30$. This difference persisted when we restricted the analysis only to those who self-reported a memory for the fake event in the interview, with individuals reporting less willingness to testify to the fake event ($M = 5.27$, $SD = 2.49$) than the true events ($M = 7.24$, $SD = 1.69$), $t(15) = 2.95$, $p = .011$, $d = 0.76$.

Participants were also asked to rate certain features of their memories at the end of the second interview, prior to debriefing. For those who were coded as having a false memory using the

original coding scheme, we compared the responses to these phenomenology questions for true and false events via paired t-tests. On every measure, the true events produced richer memories, though the differences were rather small. Participants reported that their memories for the true events were more likely to involve sound (M = 3.36, SD = 1.78) than the fake event (M = 2.72, SD = 1.81), t(42) = 2.64, p =.011, *d* = 0.40. The true events evoked more feelings (M = 5.86, SD = 1.49) than the fake event (M = 4.72, SD = 2.25), t(42) = 4.20, p <.001, *d* = 0.64. The fake event was less likely to remind participants of other events from their life (M = 4.56, SD = 2.81) than the true events (M = 6.04, SD = 2.10), t(42) = 3.46, p = .001, *d* = 0.53. Finally, participants reported accessing the true events with greater ease (M = 5.92, SD = 2.16) than the fake event (M = 3.21, SD = 2.19), t(42) = 7.27, p <.001, *d* = 1.11.

We computed agreement between the self-reported memories and our coding of responses as full/partial/no memory, finding a kappa of .46. We also combined self-reported memories and self-reported beliefs and calculated agreement between this measure and the coding scheme, finding a kappa of .23.

As part of a follow-up study on participant experiences of the study (Murphy et al., 2023), we contacted participants a week after the final interview, and they completed a follow-up survey. In that survey, we asked if participants had spoken to their informant during the study and discussed the lost in the mall event (though we had asked both parties not to discuss the study until after the second interview). Just four participants indicated that they had done so. One of these participants reported a partial memory for the fake event in the second interview and two participants self-reported believing the event had occurred at the end of the study. As we only asked participants if they had discussed the event with their informant, we don't have further detail on the nature of the discussion, though it seems at least for two of them, the discussion was not enough to prevent them believing that the event had occurred. Nevertheless, we conducted additional analyses, excluding those 4 participants. We found our conclusions were unchanged and the overall false memory rate remained at 35%.

Mock Jury

For the sample of 111 false event extracts that was shown, the jurors judged that participants were reporting a memory in 39% of cases. This compares to a self-reported false memory rate of 12% and a coded false memory rate of 32% (24% partial memories, 8% full memories), suggesting that members of the public were more liberal in classifying reports as memories than either the coding scheme or participants' own evaluations. Jurors classified many of the remaining reports as beliefs (41%), as did participants themselves (54%). Taken together, jurors perceived participants to be remembering or believing in the event 80% of the time, while participants reported remembering or believing in the event 66% of the time.

As shown in Table 2, when shown a false memory report taken from the second interview, jurors were generally inclined to believe the event did happen and that the participant did have a memory for the event. Jurors were more likely to believe the fabricated event really did occur when shown an extract from a participant who had self-reported a memory, relative to those who did not, X^2 (1, N = 1005) = 6.99, p = .008, V = .08. Likewise, jurors were more likely to believe the event really did occur when shown an extract that we had coded as a memory (full or partial), compared to those that were not classed as a memory, X^2 (1, N = 1005) = 6.22, p = .013, V = .08. This suggests that the false memories planted in this study generally do appear real and convincing to outside observers and can lead observers to believe that the fabricated event did in fact occur. When comparing whether mock jurors perceived participants to be remembering the false event (yes/no) with self-reported false memories, agreement was moderate (70%). Our collapsed coding scheme (memory/no memory) had poorer agreement with mock jurors' perception of whether participants remembered the event (55%).

Jurors perceived descriptions of the false event that were self-reported as memories as clearer (M = 39.42, SD = 21.89) than non-memories (M = 25.83, SD = 20.39), t(1003) = 6.55, p <.001, d = 0.66, more detailed (M = 41.81, SD = 26.03) than non-memories (M = 27.87, SD = 22.64), t(1003)

= 5.69, p <.001, *d* = 0.60, and more emotional (M = 42.97, SD = 31.80) than non-memories (M = 42.97, SD = 25.64), t(1003) = 4.55, p <.001, *d* = 0.44 – though note that the average for the memories did not cross the mid-point on the 0-100 scale, suggesting that jurors generally felt that the extracts did not provide a lot of rich detail. The remembered fake events were also rated as more plausible (M = 51.55, SD = 25.82) than the non-remembered fake events (M = 40.63, SD = 26.47), t(1003) = 4.33, p <.001, *d* = 0.41.

Similarly, jurors perceived descriptions of the false event that we coded as full memories as richer than those we coded as partial memories, on every measure. They rated full memories as clearer (M = 44.31, SD = 22.46) than partial memories (M = 27.17, SD = 19.57), t(117.04) = 6.04, p <.001, *d* = 0.84, more detailed (M = 50.59, SD = 24.79) than partial memories (M = 27.61, SD = 21.02), t(114.82) = 7.38, p <.001, *d* = 1.05, and more emotional (M = 46.74, SD = 27.93) than partial memories (M = 35.29, SD = 25.93), t(318) = 3.33, p <.001, *d* = 0.43. The full memories were also rated as more plausible (M = 52.28, SD = 27.73) than the partial memories (M = 43.23, SD = 25.37), t(318) = 2.68, p = .008, *d* = 0.35.

	Mock Juror: Event Happened	Mock Juror: Participant Remembers Event	Mock Juror: Participant Believes in Event
Self-Reported Memory	70%	70%	85%
Self-Reported Belief	60%	34%	80%
Self-Reported No Memory or Belief	58%	35%	64%
Coded as Full Memory	70%	73%	90%
Coded as Partial Memory	63%	50%	86%
Coded as No Memory	56%	31%	69%

Table 2: Crosstabulation of mock juror perceptions of the interview extracts with both self-reports from the participants themselves and the coding scheme derived from Loftus & Pickrell (1995) that we applied to the interviews.

Discussion

Replication

Our findings are broadly in line with those of Loftus & Pickrell (1995). The main finding of the original study was that 25% of participants reported a false memory for getting lost in a shopping mall by the end of the study. In our preregistration, we noted that we would class a false memory rate between 15% and 35% as a successful replication. Our observed rate of 35% supports the primary claims of

the original paper, with a much larger sample size and more detailed coding scheme. Though the breakdown of full vs. partial memories was not included in the original paper, most of the false memories reported at the end of the current study were partial memories (27%) and a smaller portion were full memories (8%). We also observed very similar rates of recall for true events (average of 68% in the original study, 75% in our replication).

The original study found that the recall rates for true and fake events observed in the booklet stage stayed relatively consistent throughout the two interviews. In our replication study though, participants' recall rates for both true and fake events increased from the booklet stage to interview 1, and again from interview 1 to interview 2. This increase in false memories after spending more time imagining the event and responding to prompts concerning the event is in line with the "imagination inflation" literature. In these studies, participants are asked to imagine that they had previously done something (like breaking a window as a child) and often become more confident that they actually did perform the act (Garry & Polaschek, 2000; Hyman & Pentland, 1996). The act of answering repeated questions about the details of getting lost in the mall, of speculating about how things would have happened, etc. may have increased the rates of false memory across the study. We trained our interviewers to ask open-ended questions and to encourage participants to imagine and speculate if they couldn't recall an event. While the interview schedule for the original study is not available, our focus on encouraging imagination may explain the increase in memories over time in the current study that was not observed in the original study.

Though the rate of false memories observed was high, the data suggest that the false memories were not as rich or vivid as the memories for true events that were discussed during the interviews. Memories for the fake event were rated as less clear and less rich from a phenomenological standpoint, participants used fewer words to describe the fake event, and participants were less willing to testify that the fake events had occurred. In addition, when the purpose of the study was revealed, many of those who reported a false memory successfully

identified the mall story as fake – though notably, 15% of participants selected one of the true events instead. These findings replicate the original study and suggest that while a substantial minority of participants may report a false memory at the conclusion of the Lost in the Mall paradigm, for some, the implanted false memory is not as rich as the true memories. Though previous work has suggested phenomenological differences between true and false memories (Marche et al., 2009), our observations are limited to the memories discussed in the current study. While we asked familial informants to think of events from the participants' childhoods that were not 'family folklore', responses from both participants and informants suggested that this was a difficult task. Many of the true memories did indeed seem to be events that were frequently discussed as a family, which may have impacted the richness of participant recollections. The use of well-rehearsed true events in the study may also have helped participants to correctly select the fake event after they were debriefed, by a process of elimination. That may partially explain why, despite 35% of participants reporting a memory for the mall event at the end of the second interview, just 15% of participants chose one of the true events when prompted to guess which event had been fabricated.

Extension

The results indicate that though a substantial proportion of participants formed a false memory for getting lost in a mall as a child, most that did so only formed a 'partial' false memory, according to the coding scheme (remembering part of the event). It is interesting that this paradigm did not result in many 'full' memories (substantially remembering the entire event) and given that the original study did not report the breakdown of partial to full memories, this is a novel finding. However, these results ought to be considered alongside the novel measures we included in this study. Participants' self-reported false memory rates (14%) were substantially lower than the rates generated by our coding scheme (35%) but substantially more than those who were coded as having

a full memory (8%). Some have argued that participants are best placed to define their own memories (Shaw, 2018) and thus it could be argued that the false memory rate observed in this study may be closer to 14%. However, it is also worth noting that when questioned about their *belief* that the fake event had occurred, a further 52% reported believing they were lost in a mall as a child by the conclusion of our study. While there is considerable research suggesting that false memories and false beliefs are qualitatively different (Otgaar et al., 2017), it has been noted that this difference is difficult to reliably detect (Johnson & Raye, 2000). Furthermore, applied studies have suggested that believing an event has occurred is sufficient to change attitudes and behaviours. Bernstein and colleagues (2015) found that believing that a positive or negative experience had happened with a certain food was sufficient to change eating intentions, whether or not participants also remembered the event had occurred.

The poor agreement between participants' self-declared memories and beliefs and the coding scheme underscores the need for detailed, evidence-based coding strategies in future false memory studies (Scoboria et al., 2017; Shaw, 2018), as well as the importance of simply asking individuals about the nature of their memories, where appropriate. We would argue that most, if not all, of the consequences that may occur as the result of real-world false memories (changes in attitudes, beliefs, behaviours) will closely correlate with participants' own appraisal of the event; i.e. whether they have a self-reported memory or belief that the event occurred. Given the importance of participants' own perceptions, we would recommend including self-report measures in future studies of rich false memories. This recommendation is also informed by a limitation of our study: despite extensive training in applying the adapted Loftus & Pickrell coding scheme to our data, the level of inter-rater agreement was not high. This reflects the difficulty of coding false memories, which has been discussed elsewhere (Scoboria et al., 2017; Wade et al., 2018) and further underscores the importance of including self-report data, where appropriate.

We also expanded on the original study by assessing what these memories look like to observers. We found that when a participant self-reported a false memory for the fabricated mall event, jurors who read the interview transcripts were likely to believe the event had really happened and to agree that the participant was indeed remembering an event from their past – in fact they were more liberal in classifying a memory than participants' own self-reports. Similarly, reports that we coded as a memory (using an adapted form of the Loftus and Pickrell (1995) coding scheme) were likely to be perceived as a memory by members of the public – though jurors were once again slightly more liberal and classed more reports as memories than the coding scheme did. This is in line with prior work that has suggested that jurors are not skilled at recognising rich false memories or distinguishing them from true memories (Shaw, 2020). Criticisms of the original study include suggestions that the memories may not have been rich or detailed and thus the claims regarding false memory rates were somewhat inflated (Blizard & Shaw, 2019). The results of our replication and extension suggest that in fact the previously-reported false memory rate is preserved with a more detailed and transparent coding process, and that this high rate of false memories is apparent even to members of the public, who judged that more than one third of participants were indeed reporting something they had come to remember. This has applied implications for the ongoing 'Memory Wars' (Otgaar et al., 2021; Patihis et al., 2014) and confirms that implanted false memories may cause both participants and observers to believe that an entirely fabricated event really did occur.

Conclusion

There are some additional criticisms of the original study that could not be addressed in this replication project. The most prominent of these is whether memories of getting lost in a mall can really be compared to memories of abuse, and whether the use of a familial informant is comparable to a therapeutic setting (Blizard & Shaw, 2019). These criticisms cannot be addressed here and are

beyond the scope of a replication project. Further potential weaknesses of this study are that getting lost in a shopping mall is quite a common event; it is possible that some participants really were lost as children, but it was the informant who suffered a memory error. We confirmed that only a very small percentage of participants had a persistent memory of the mall event that lasted from the booklet survey through the debriefing, indicating that they may have actually been lost as a child. In addition, we would note that a wealth of existing research has demonstrated that it is possible to plant memories of other, less common childhood events, such as taking a hot air balloon ride (Wade et al., 2002) or spilling punch on a bride at a wedding (Hyman et al., 1995) - though the plausibility of these events may affect the false memory rate (Pezdek et al., 1997).

Overall, the current study successfully replicated the findings of Loftus & Pickrell (1995). This study continues to have significant impact on the field of psychology, legal proceedings, and public understanding of memory. Our findings support the primary conclusions of the original study; individuals can be convinced through suggestion that they got lost in a shopping mall as a child. We also further conclude that these false memories may appear convincing to observers, who may also come to believe that the fabricated event truly did occur.

Open Practices Statement

The study was preregistered, including the analysis plans. The preregistration, data and materials for this project are publicly accessible at https://osf.io/krfpu/.

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References

Andrade, C. (2020). Sample size and its importance in research. *Indian journal of psychological medicine*, *42*(1), 102-103.

Bernstein, D. M., Pernat, N. L., & Loftus, E. F. (2011). The false memory diet: False memories alter food preferences. In *Handbook of behavior, food and nutrition* (pp. 1645-1663). Springer, New York, NY.

Bernstein, D. M., Scoboria, A., & Arnold, R. (2015). The consequences of suggesting false childhood food events. *Acta Psychologica*, *156*, 1–7. https://doi.org/10.1016/j.actpsy.2015.01.001

Blizard, R. A., & Shaw, M. (2019). Lost-in-the-mall: False memory or false defense?. *Journal of Child Custody*, *16*(1), 20-41.

Brewin, C. R., & Andrews, B. (2017). Creating memories for false autobiographical events in childhood: A systematic review. *Applied Cognitive Psychology*, *31*(1), 2-23.

Crook, L. S., & McEwen, L. E. (2019). Deconstructing the lost in the mall study. *Journal of Child Custody, 16*(1), 7-19.

Frenda, S. J., Knowles, E. D., Saletan, W., & Loftus, E. F. (2013). False memories of fabricated political events. *Journal of Experimental Social Psychology*, *49*(2), 280-286.

Garry, M., & Polaschek, D. L. (2000). Imagination and memory. Current Directions in Psychological Science, 9(1), 6–10.

Greene, C. M., Nash, R. A., & Murphy, G. (2021). Misremembering Brexit: Partisan bias and individual predictors of false memories for fake news stories among Brexit voters. *Memory*, *29*(5), 587-604.

Hyman Jr, I. E., Husband, T. H., & Billings, F. J. (1995). False memories of childhood experiences. *Applied cognitive psychology*, *9*(3), 181-197.

Hyman, I. E., & Pentland, J. (1996). The role of mental imagery in the creation of false childhood memories. Journal of Memory and Language, 35(2), 101–117.

Johnson, M. K., & Raye, C. L. (2000). Cognitive and brain mechanisms of false memories and beliefs. In S. M. Kassin, D. Bogart, & J. Kerner (Eds.), *Memory, brain, and belief* (pp. 35–86). Harvard University Press.

Lindsay, D. S., & Read, J. D. (1994). Psychotherapy and memories of childhood sexual abuse: A cognitive perspective. *Applied cognitive psychology*, *8*(4), 281-338.

Loftus, E. (2004). Dispatch from the (un) civil memory wars. *The Lancet*, *364*, 20-21.

Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric annals*, *25*(12), 720-725.

Marche, T. A., Brainerd, C. J., & Reyna, V. F. (2009). Distinguishing true from false memories in forensic contexts: Can phenomenology tell us what is real? *Applied Cognitive Psychology*, *24*(8), 1168–1182. https://doi.org/10.1002/acp.1629

Mulshine, P. (2018, , September 27th). The Kavanaugh hearing: Perfect memory? Fuhgeddaboudit, says an expert. *NJ.com.*

Murphy, G., Loftus, E. F., Grady, R. H., Levine, L. J., & Greene, C. M. (2019). False memories for fake news during Ireland's abortion referendum. *Psychological science*, *30*(10), 1449-1459.

Murphy, G., Maher, J., Ballantyne, L., Barrett, E., Cowman, C. S., Dawson, C. A., ... & Greene, C. M. (2023). How do participants feel about the ethics of rich false memory studies?. *Memory*, 1-8.

Newberry, L. (2020, , February 7th). Harvey Weinstein trial: Memory expert and UC Irvine professor Elizabeth Loftus testifies for defense. *Los Angeles Times.*

Otgaar, H., Candel, I., Merckelbach, H., & Wade, K. A. (2009). Abducted by a UFO: Prevalence information affects young children's false memories for an implausible event. *Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition*, *23*(1), 115-125.

Otgaar, H., Howe, M. L., Dodier, O., Lilienfeld, S. O., Loftus, E. F., Lynn, S. J., ... & Patihis, L. (2021).

Belief in unconscious repressed memory persists. *Perspectives on Psychological Science*, *16*(2), 454-460.

Otgaar, H., Scoboria, A., & Mazzoni, G. (2017). Theoretical and applied issues regarding autobiographical belief and recollection. *Memory*, *25*(7), 865–868. https://doi.org/10.1080/09658211.2017.1305094

Patihis, L., Ho, L. Y., Tingen, I. W., Lilienfeld, S. O., & Loftus, E. F. (2014). Are the "memory wars" over? A scientist-practitioner gap in beliefs about repressed memory. *Psychological science*, *25*(2), 519-530.

Principe, G. F., & Schindewolf, E. (2012). Natural conversations as a source of false memories in children: Implications for the testimony of young witnesses. *Developmental Review*, *32*(3), 205-223.

Scoboria, A., Mazzoni, G., Kirsch, I., & Relyea, M. (2004). Plausibility and belief in autobiographical memory. *Applied Cognitive Psychology: The Official Journal of the Society for Applied Research in Memory and Cognition*, *18*(7), 791-807.

Shapka, J. D., Domene, J. F., Khan, S., & Yang, L. M. (2016). Online versus in-person interviews with adolescents: An exploration of data equivalence. *Computers in human behavior*, *58*, 361-367.

Shaw, J. (2018). How Can Researchers Tell Whether Someone Has a False Memory? Coding Strategies in Autobiographical False-Memory Research: A Reply to Wade, Garry, and Pezdek (2018). *Psychological Science*, *29*(3), 477–480. https://doi.org/10.1177/0956797618759552

Shaw, J. (2020). Do false memories look real? Evidence that people struggle to identify rich false memories of committing crime and other emotional events. *Frontiers in psychology, 11*, 6 50.

Shaw, J., & Porter, S. (2015). Constructing rich false memories of committing crime. *Psychological science*, *26*(3), 291-301.

Sinason, V. (2021). Re-examining the "Lost in the Mall" study: Were "false memories" created to

promote a false defence? In conversation with Ruth Blizard. In *Trauma and Memory* (pp. 36-43). Routledge.

Thielman, G.W. (2019, October 5th). It's Well-Established In Psychological Research That Memories Are Unreliable. *The Federalist.*

Wade, K. A., Garry, M., & Pezdek, K. (2018). Deconstructing rich false memories of committing crime: Commentary on Shaw and Porter (2015). *Psychological Science*, *29*(3), 471-476.

Wade, K. A., Garry, M., Don Read, J., & Lindsay, D. S. (2002). A picture is worth a thousand lies: Using false photographs to create false childhood memories. *Psychonomic bulletin & review*, *9*(3), 597-603.