Author

Nilofar Becker followed a keen interest in the malleability of memory into her research in Professor Loftus' lab. She was particularly fascinated in the real-world implications of her work, discovering that therapists can unknowingly implant false memories in their patients' minds by using suggestive techniques. Nilofar considers the opportunity to participate in research to be a highlight of her undergraduate education and recommends it highly as a chance for students to deepen their education. After graduation, Nilofar will be pursuing graduate studies at the UC Irvine School of Law.

Motivation and False Autobiographical Memory

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Abstract

Research has shown that some types of motivation can increase the likelihood of false memory development. In therapy settings, patients might be presented with a theory that some negative event happened to them, and they might then be motivated to believe this event occurred because it would explain why they are experiencing current symptoms and shortcomings. This study sought to explore the role of motivation in the development of false autobiographical memories. Three conditions were used in this study: in the Suggestion-Plus-Motivation condition, participants were told (falsely) that they were bullied in middle childhood, and given a motivating consequence for believing this (individuals bullied at this age later develop poor flirting ability, which can explain why they are experiencing romantic shortcomings now). In the Suggestion-Only condition, participants were told they were bullied, but without the motivation information. Those in the Control condition were told nothing about bullying or flirting. Results showed that more people in the Suggestion-Plus-Motivation condition developed false memories/beliefs of being bullied compared to the other conditions. This suggests that this type of motivation does influence memory suggestibility. Understanding more about this relationship can help therapists reduce the chances of patients forming false memories.

Key Terms

- Autobiographical Memory
- False Memory
- Motivation
- Suggestion

Faculty Mentor

UROP is a fantastic opportunity for students who are interested in getting firsthand experience with the research process. Like others who have pursued this opportunity, Nilofar's experience was a successful one. Her results demonstrate that a motivation to explain one's current deficiencies can increase the likelihood that a person develops a false childhood memory. Such memories may be psychologically appealing in that they offer an external event that people can attribute as being the cause of their present shortcomings. While this influence on memory may occur organically in everyday life, these findings offer a caution to clinicians who may at times convey to their clients the idea that current symptoms likely stem from a non-remembered childhood event. This study suggests that conveying such a message would increase the risk of false memories.

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Introduction

Research has shown that memory is malleable and susceptible to a wide variety of errors. Sometimes, this even leads to the development of completely false autobiographical memories (Loftus and Pickrell, 1995). A complete or rich false memory is a recollection of an event that never actually happened (Loftus, 1999). Numerous studies have explored the potential reasons false memories occur, and this study was part of this research paradigm. Various factors play a role in a person's vulnerability to false memory. This study looked at one potential factor—the role of motivation. Simply put, does a motivation to explain current relationship difficulties increase the likelihood of developing false autobiographical memories about the past?

Hypotheses

I hypothesized that participants who received a suggestion that they were bullied during childhood would be more likely to develop false memories of this occurrence, relative to the participants in the control group who received no suggestion. In addition, I hypothesized that more people would develop false memories when given *both* a suggestion that they had been bullied and a motivation to believe that they had been bullied. The additional motivation would increase the participant's susceptibility to the suggestion, compared to those who received the suggestion alone. Lastly, I predicted that the effectiveness of the motivation manipulation would be moderated by participants' beliefs about their flirting ability: those who claim to have relationship shortcomings (inability to flirt) will be more likely to falsely remember being bullied since they could potentially attribute their current shortcomings to this past occurrence.

Memory and Therapy

One real-world situation where motivation and suggestion have led some people to develop false memories is in certain types of psychotherapy. A common practice among clinicians is to encourage people to search for past memories that might explain their current difficulties. This study was an analogy to this type of situation. For example, clinicians often use hypnosis as a means of uncovering painful, repressed memories of their patient—such as sexual abuse. However, controversy was spurred over the fact that many clients do not actually uncover true memories of their past, but rather create complete falsified memories (Perry and Gold, 1995). Suggestive techniques such as hypnosis, as well as many others used by clinicians, leave individuals more susceptible to forming false autobiographical memories (Loftus, 2005). Because these techniques are often used in today's society, it is critical to uncover the reasons why people unknowingly create false memories about themselves. Do false autobiographical memories allow people to attribute current failures to a past event outside of their control? Because people generally enter therapy searching for an explanation for why they are experiencing current life difficulties, understanding the role that this motivation plays in false memory development is important.

Motivation

Providing a motivation to believe something could further enhance the power of suggestibility and the influence it has on false memory development. People usually do not want to believe that they are responsible for the shortcomings they experience, so the ability to blame it on a past circumstance is very appealing. While having past events explain current shortcomings may be true for those who actually experienced those events, more research needs to be done to understand the role motivation plays in people who never experienced those past events.

Background

Two decades of study have created an abundance of false memory research. The literature demonstrates that researchers are able to reliably and consistently implant false memories in research participants. For example, a substantial amount of research has shown how false memories are induced by the Misinformation Effect, the Deese-Roediger-McDermott (DRM) paradigm, suggestive questioning, and false feedback. Research has also explored how various types of motivation cause false memories. Goal-driven motivation, social motivation, self-enhancement motivation, and motivation that reduces cognitive dissonance are all seen to cause memory distortion. However, what this literature fails to explore is how the motivation to explain one's current shortcomings increases the likelihood of false autobiographical memories. Thus, the relationship between motivation and false memory is understood; however, this specific aspect of it has not been examined.

False Memory Procedures

Misinformation and Suggestion. The Misinformation Effect is a powerful and robust experimental procedure that consistently leads to the development of false and distorted memories. It refers to the finding that misleading post-event information causes memory for an initially witnessed event to become less accurate. Additionally, suggestive questioning is the strategic formation of a sentence that probes the creation of a false memory by manipulative wording. One study conducted by Loftus and Palmer (1974) sought to explain how using misleading post-event information

through the specific use of suggestive questioning can lead to memory distortions. Subjects in this study viewed video scenes of automobile accidents, and then were asked, "About how fast were the cars going when they smashed into each other?" (Loftus and Palmer, 1974). They key manipulation was the verb "smashed." Those who received the "smashed" verb as opposed to "collided" or "hit" were likely to believe that the crash was *more* severe than it really was, and that there was broken glass in the video scene even when there really was not (Loftus and Palmer, 1974). Thus, this study shows how the suggestibility of questions as post-event information can lead people to misremember and reconstruct their memories. This is essential knowledge because suggestive questions are frequently used in therapy sessions and the legal system.

DRM Paradigm. The DRM paradigm is a manipulative word model that helps cue false memories of a non-presented word. This is shown when someone falsely remembers a word after studying a list of semantic associates of that word (Lee, 2009). A study conducted by Roediger and McDermott (1995) explored how a list-learning paradigm could induce false recall and recognition. In this experiment, participants studied lists of 12 words (*e.g.*, thread, pointy, sharp), with each list containing words that associated closely with one non-presented word called the "critical lure" (*e.g.*, needle). When given a recall test, 40% of them recalled, with high confidence, the closely associated non-presented word (Roediger and McDermott, 1995). Thus, the DRM paradigm is a powerful elicitor of false memories.

False Feedback. Research has demonstrated that it is not only possible to alter and reconstruct details about existing memories, but it is also possible to implant memories of completely false events as well. Researchers can accomplish this by providing false feedback with deceiving information, suggestive questioning, and manipulative writing exercises. Loftus and Pickrell (1995) used these techniques to implant a false memory that participants got lost in a shopping mall in childhood. The participants received a booklet containing three events that happened in their childhood, along with one event that was falsified. This false statement was a descriptive event about being lost in the mall. Participants were then asked to write and speak about their experiences of each event listed. Because of being misled and guided to believe that this false event happened to them, participants drastically increased their levels of confidence that they had become lost in a mall during their childhood (Loftus and Pickrell, 1995). Surprisingly, even showing a false photograph of participants in a hot air balloon and having them envision it resulted in the creation of false memories for this event (Wade and Gary, 2002).

False memories generated by false feedback not only can be implanted temporarily in someone's mind, but they can also persist, alter future behavior, and have real world consequences. For example, giving participants personalized false feedback that they enjoyed eating asparagus as a child causes them to believe this suggestion and consequently show more preference for eating *and* ordering asparagus at a restaurant (Laney, Fowler, Nelson, Bernstein, and Loftus, 2008). Thus, providing false feedback is an effective false memory manipulation tool commonly used by researchers.

Motivation and False Memory

Goal-Driven Motivation. Although there is a vast amount of false memory research, less is known about how motivation plays a role in the development of false memory. However, a few studies have addressed this connection by showing how certain types of motivation lead to false memories. A study conducted by Sharman and Calacouris (2010) examined whether people are motivated to remember false past experiences related to their current goals. In the study, participants were given a computer-generated profile that contained within it one false affiliation and one false achievement event. Results showed that if a person has high achievement and affiliation goals, they will be more influenced to believe a false memory about a goal-related past experience (Sharman and Calacouris, 2010). Similarly, Kunda (1990) examined the role that motivation plays in reasoning and biased processes. Essentially, people believe what they want to believe, and simply arrive at conclusions that they want to arrive at (Kunda, 1990). Therefore, people who want to believe that they will be academically successful will recall more of their academic successes, and be more susceptible to believing a false statement about their past in regards to academic achievement (Kunda, 1990).

Social Motivation. According to Brady (2013), social-motivational factors also play a role in false memory. Her study looked at how motivational factors might cause participants to lie about personal attitudes. In the first experiment, college-student participants filled out an attitude report, and then had to discuss it with a disagreeing opposite sex student (Brady, 2013). In the second experiment, the participants did the same thing except the disagreeing opposite sex student had the potential to reward them. Results found that those who were in the reward condition unknowingly misrepresented their attitudes because of the motivation to do so (Brady, 2013).

Self-Enhancement Motivation. Self-enhancement is a type of motivation that is driven by the need to feel positive about oneself and maximize feelings of self-worth (Brown, 1998). An example of the self-enhancement bias is when someone attributes positive outcomes to their disposition, and negative outcomes to their environment (Sedikides and Gregg, 2007). A study conducted by Croyle, Barger, Loftus, and Sun (2006), studied how self-enhancement biases can affect memory recall of health information regarding cholesterol screening. Participants completed a cholesterol test, and were then told their results. Over the next couple of months, they were asked to state their cholesterol number. Results indicated that a significant proportion of participants with high cholesterol recalled their cholesterol level as substantially lower than what it actually was (Croyle et al., 2006). This supports the hypothesis that self-enhancement motivation greatly increases memory distortion.

Cognitive Dissonance Motivation. Cognitive Dissonance is when an action and a belief, or two beliefs, are in contradiction with one another. Research has indicated that if someone's actions and beliefs are inconsistent, they will be more susceptible to believing a false memory that reduces this dissonance. Rodriguez and Strange (2014) conducted a study where participants read a survey about a tuition increase and reported their attitudes towards it. Then, they either chose or were forced to write a counter attitudinal essay favoring this tuition increase. Results showed that the participants who chose to write the essay were substantially more likely than those who were forced to misremember their initial negative attitudes as more positive, and actually claimed that they favored writing the essay the entire time (Rodriguez and Strange, 2014). Therefore, in order for participants in the study to justify the action of writing this tuition-increase essay and reduce the dissonance they feel, they unknowingly misremembered their initial attitudes.

Research Question

Based on this literature, the development of false memory is a robust phenomenon. There are many factors that play a role in a person's susceptibility and vulnerability to developing a false memory. What this literature fails to explore is how a particular type of motivation, namely the motivation to explain one's current shortcomings, might influence the likelihood of false autobiographical memories developing. A number of studies have been conducted on how motivation is generally related to false memory, but no studies have yet looked at this specific type of motivation. In this study, I sought to explore if the motivation to explain current relationship difficulties increases the likelihood of developing false autobiographical memories about the past.

Methods

Design

This study was an analogy to a situation commonly seen in therapy sessions where a clinician suggests something to their patient. An experiment with three conditions was conducted. The independent variable was the false feedback (no feedback; feedback alone; feedback plus motivation), and the main dependent variables were the presence of a false memory and confidence responses. A predicted moderator was participants' beliefs about their flirting ability.

Participants

The participants were 621 UCI students who were 18 and older and were recruited through the University's human subjects research pool. After removing those with incomplete data ($n = 243$), those who figured out the true nature of the study ($n = 35$), and those who started above the midpoint on the scale for the bullying item (*i.e.* those who indicated a pre-manipulation likelihood that they actually had been bullied while in middle school) ($n = 78$), 265 participants remained. Of the sample, 88% were female. The age range was 18–26, and the mean age was 20.56 years ($SD = 1.98$). The participants were randomly assigned to one of the three conditions leading to 87 people in the Control condition, 89 people in the Suggestion-Only condition, and 89 people in Suggestion-Plus-Motivation condition.

Materials

Participants completed Part 1 of this study online through a research program called Qualtrics. Part 2 took place in the lab and participants were provided paper packets and pens. Several questionnaires were used in this study: a Demographic Questionnaire, Past Experiences Questionnaire, School Experiences Questionnaire, Relationship Questionnaire, Social Desirability Questionnaire, Introvert/Extrovert Questionnaire, and a Creative Experiences Questionnaire. Additionally a "Memory or Belief" form, and a "One Last Step" form were used.

The "Demographic Questionnaire" was used to assess the participants' gender, age, and type of elementary/high school attended. Participants chose their answers from a drop-down list on the computer. The "Past Experiences Questionnaire" was a scale developed for this study, and was composed of 17 statements about past experiences. Sample items included "I made the honor roll in high school" and "I once flirted with the bartender while out on a date." The critical item included in this questionnaire was "I was badly bullied during 4th and/or 5th grade." For each event, participants rated their choice on a 7-point scale

indicating how certain they were that the event did or did not happen to them. The scale ranged from -3 (*definitely did not happen*) to 3 (*definitely did happen*).

The "School Experiences Questionnaire" assessed what the participants experienced in school. It contained 32 statements about events that may or may not have happened to the participants. Sample items included "I cheated on a test in high school" and "I won a spelling bee in elementary school." The critical item included in this questionnaire was "I was badly bullied during 4th and/or 5th grade." For each event, participants rated their choice on a 7-point scale indicating how certain they were that the event did or did not happen to them. The scale ranged from 1 (*definitely did not happen*) to 7 (*definitely did happen*). The "Relationship Questionnaire" was used in this study for the purpose of assessing the participants' feelings about relationships and their flirting ability. It was composed of 15 statements, and had a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items included "I am uncomfortable meeting new people" and "I am extremely patient with romantic partners and loved ones."

The "Social Desirability Questionnaire" was used to see if the participants answered the survey questions in a manner that would be viewed favorably by others. Thus, this social desirability bias can be exposed when analyzing the participants' responses to this scale. The questionnaire consisted of 33 statements, and participants answered "true" or "false" to indicate their answer. Sample items included, "If I could get into a movie without paying and be sure I was not seen, I would probably do it" and "I like to gossip at times." The Introvert/Extrovert Questionnaire was used to evaluate which category better described the participant. The purpose of this was to cater the false feedback to match each participant's personality type, thus making it more credible and realistic. It was composed of 34 statements, six of which were used to calculate introversion or extroversion. Participants answered "true" or "false" to indicate their answer. Sample items included, "Are you a talkative person?" and "Can you easily get some life into a rather dull party?"

The "Creative Experiences Questionnaire" was used to measure the participants' fantasy proneness. This was used in this study because research has shown that it can influence memory suggestibility (Garaerts, Smeets, Jelicic, Heerden, and Merckelback, 2005). It consisted of 26 statements and participants answered "true" or "false" to indicate their answer. Sample items included "I often confuse fantasies with real memories" and "Many of my fantasies have a realistic intensity."

The "Memory or Belief" form was used to measure if, and to what extent the participants believed that they were bullied. It was composed of three statements: "I made a goal during a soccer game in a PE class," "I was badly bullied during 4th or 5th grade," and "I felt an earthquake during high school." Participants would state whether they had a distinct memory of the event, if they have a more general belief of the event, or if they were certain that they never experienced the event. To indicate a "specific memory" participants would write "M," "B" for a "general belief," and "P" to indicate "no memory or belief." Additionally, the instructions on this form stated to write as many details about the memory or belief as possible.

The "One Last Step" form was used to see if the participants figured out the true nature of the study. It mentioned that deception was used for the purposes of keeping participants from responding in a particular way, due to being aware of what the experimenters were looking for. It implored participants to give a best guess as to what the study was really about.

Procedure

This study took place over two sessions. The UCI Sona-System was used to recruit participants, and those who signed up were provided a link to the study website to complete Part 1. The title of the study was *Personality and Life Experiences: Part 1*. The cover story that participants saw stated that this was a two-part study where they would complete online surveys about their personality, and then schedule a time to come into the lab where they would complete several more questionnaires about their personality and life experiences. It also stated that Part 2 of the study would be scheduled through email, and that they would receive an email shortly after completing the online portion of Part 1. If the participants failed to respond to the scheduling email within a week, a follow up email was sent. Approximately 150 participants did not respond to the scheduling email. The title and cover story were used so participants would not know that the study was about false memory.

Part 1 took place completely online. Participants were asked to complete several questionnaires: a School Experiences Questionnaire, a Relationship Questionnaire, a Demographic Information Sheet, a Creative Experiences Questionnaire, an Introvert/Extrovert Questionnaire, and a Social Desirability Questionnaire. Session 1 took approximately 15 minutes to complete. Part 2 took place in the lab-

oratory between 1 day and 3 weeks after Part 1. Participants came into the Loftus Lab and were run in groups of up to six people per time slot. Additionally, a piece of paper was placed over the Loftus Lab sign outside as a precaution to prevent participants who may have been aware of Dr. Loftus' work from associating the study with a false memory experiment.

During Part 2, participants were provided with packets and separated into one of three conditions: Control, Suggestion-Only, or Suggestion-Plus-Motivation. In the Control condition, participants were told nothing about bullying or flirting. In the Suggestion-Only condition, participants were told that they were bullied, but without the motivation information. In the Suggestion-Plus-Motivation condition, participants were told (falsely) that they were bullied in middle childhood, and given a motivating consequence for believing this information (specifically, that individuals bullied at this age later experience poor flirting ability, such that this experience of "being bullied" can be blamed for current romantic failings). Those who received a false feedback form were told that it was the result of a computer analysis of their questionnaire data. This was the manipulation of the study. This piece of paper falsely informed participants in the Suggestion-Plus-Motivation condition that, based on their questionnaire responses, the software determined that they were bullied when they were younger and that this event causes poor flirting ability later in life.

Next, participants were asked to fill out additional questionnaires contained in the packet—the Past Experiences Questionnaire and the Relationship Questionnaire. They were then asked to indicate on the Memory or Belief form whether they had a distinct memory, a more general belief, or no memory/belief at all that several events occurred during their childhood. Next, participants were asked on the One Last Step form if they had any hypotheses about the purpose of the study. Finally, they were debriefed about the true nature of the study since deception was used. Part 2 took approximately 30 minutes.

The primary outcome variables that were assessed were memory and confidence responses (*i.e.* How confident are you that you were bullied during childhood? If so, do you have a clear memory of being bullied, or do you merely believe that you were?), as well as self-reported responses about relationships (*e.g.*, "I would be unlikely to notice if an acquaintance started to flirt with me"). After the completion of both parts of the study, participants were granted 1 extra credit Sona-System point. If only Part 1 was completed, participants received .5 extra credit points.

Results

Data Analyses

Confidence. Figure 1 illustrates the confidence ratings given to the critical item: "I was badly bullied in the $4^{th}/5^{th}$ grade." Increases in confidence were determined by positive shifts on the memory scale for this critical item from Time 1 to Time 2. At Time 1, all three groups gave a low confidence rating to this item. At Time 2, after the manipulation, all three groups gave a higher confidence rating. In order to determine the confidence change in being bullied from Time 1 to Time 2, a separate paired *t*-test was run to compare Time 2 to Time 1 confidence for each condition.

Results indicated that participants in the Suggestion-Plus-Motivation condition increased their confidence in being bullied from Time 1 to Time 2, and this was statistically significant, $t(88) = 7.20$, $p < .001$. This significant confidence increase was also observed for those in the Suggestion-Only condition, $t(88) = 4.93$, $p < .001$, as well as for those in the Control condition, $t(86) = 4.66$, $p < .001$. To test the differences between the conditions, a repeated measures ANOVA was used. Although a visual examination of Figure 1 suggests that the confidence increase over time was greatest for those in the Suggestion-Plus-Motivation condition, the results of the ANOVA indicated that the differences between the conditions were not statistically significant: $F(2, 262) = 2.12$, $p = .12$.

Figure 1

Confidence increases in being bullied from Time 1 to Time 2

Another way to analyze the confidence change data is to examine the percentage of participants within each condition whose confidence decreased, stayed the same, or increased over time. As seen in Figure 2, those who received

a suggestion paired with motivational information were less likely to lose confidence (from Time 1 to Time 2) that they had been bullied during middle childhood, compared with those in the other conditions, and they were more likely to have their confidence increase over time.

The percentage of participants in the Suggestion-Only condition whose confidence decreased (10.1%) did not differ much from the percentage of participants in the Control condition (9.2%). The percentage of participants whose confidence decreased in the Suggestion-Plus-Motivation condition was lowest (2.2%). For those who stayed the same on the scale, the percentage of participants in the Control condition (54.0%) did not differ much from the percentage of participants in the Suggestion-Only condition (53.9%). The percentage of participants whose confidence stayed the same in the Suggestion-Plus-Motivation condition was lowest (46.1%). For those who increased on the scale, the Suggestion-Plus-Motivation condition had the highest percentage of participants (51.7%), followed by the Control condition (36.8%), and then the Suggestion-Only condition (36.0%).

Two-tailed z-tests were then used to determine whether the three conditions in the "up" proportion statistically varied from each other. Results indicated that the proportion of those within the Control condition whose confidence increased (36.8%) did not significantly differ from the proportion within the Suggestion-Only condition (36.0%), $z = 0.11$, $p = 0.45$. The proportion of those within the Control condition whose confidence increased (36.8%) was, however, significantly lower than the proportion within the Suggestion-Plus-Motivation condition (51.7%), $z = 1.99$, $p = .04$, and the proportion of those within the Suggestion-Only condition whose confidence increased (36.0%) was significantly lower than the proportion within the Suggestion-Plus-Motivation condition as well (51.7%), $z = 2.11$, $p = .03$.

Two-tailed z-tests were also used to determine whether the three conditions in the "down" proportion statistically varied from each other. Results indicated that the proportion of those within the Control condition whose confidence decreased (9.2%) did not significantly vary from the proportion within the Suggestion-Only condition (10.1%), $z = .0.20$, $p = .84$. The proportion of those within the Control condition whose confidence decreased (9.2%), however, was significantly higher than the proportion within the Suggestion-Plus-Motivation condition (2.2%), $z = 2.01$, $p = .04$, and the proportion of those within the Suggestion-Only condition whose confidence decreased (10.1%) was also significantly higher than the proportion within the Suggestion-Plus-Motivation condition (2.2%), $z = 2.20$, $p = .02$.

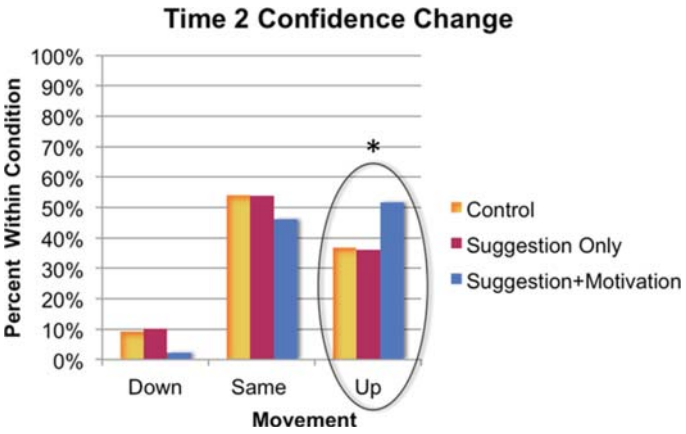

Figure 2
Time 2 Confidence Change

False Memory. Participants were coded as having a false memory if they met the following three criteria: 1. They started below the midpoint on the School Experiences confidence scale for the critical item (those that indicated in Time 1 that they did not have any memory of being bullied); 2. They had confidence ratings that increased from Time 1 to Time 2; and 3. They indicated having, at Time 2, a memory or belief of been bullied during middle childhood. The percentage of people in each condition that developed a false memory was calculated and is shown in Figure 3. Participants in all three conditions formed false memories: 26.4% in the Control condition; 29.2% in the Suggestion-Only condition; and 42.7% in the Suggestion-Plus-Motivation condition.

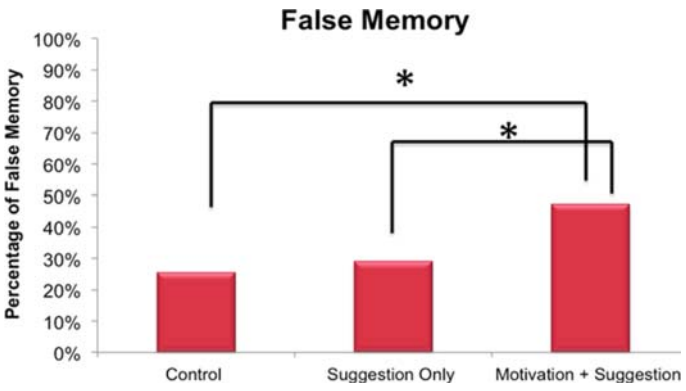

Figure 3
False Memory development across conditions

A Chi Squared test was used to determine if there was a significant difference between the conditions in the percentage of false memory development. Results indicated that there was a significant difference: $\chi^2 = 6.07$, $p = .048$. A z-test was then used to determine exactly where this difference was. A one-tailed z-test indicated that there was no significant difference between Control vs. Suggestion-Only: $z = 0.41$, $p = .34$, there was a significant difference between Control vs. Suggestion-Plus-Motivation: $z = 2.27$, $p = .01$, and there was a significant difference between Suggestion-Only vs. Suggestion-Plus-Motivation: $z = 1.87$, $p = .03$. A two-tailed z-test also indicated a significant difference between Control vs. Suggestion-Plus-Motivation: $z = 2.27$, $p = .02$, but showed only marginally significant results for the other comparisons.

Flirting. A correlation was used to determine if responses on the flirting item in the Relationship Questionnaire, "I would be unlikely to notice if an acquaintance started to flirt with me," would influence confidence responses and false memory from Time 1 to Time 2 on the critical bullying item for those in the Suggestion-Plus-Motivation condition. The higher the score indicated for this flirting item, the more dissatisfied the participants were of their flirting ability. Results indicated that there was a significant positive correlation between responses on the flirting item scale in the Relationship Questionnaire and the likelihood that participants' confidence would increase ($r = .23$, $p = .03$). There was also a trending association between the responses on the flirting item scale in the Relationship Questionnaire and false memory development ($r = .17$, $p = .10$).

Social Desirability. A correlation was used to determine if social desirability—answering questions in a way that makes one look good—had any association with memory outcomes. Results indicated that there was no overall association between social desirability and confidence increases ($r = -.01$, $p = .94$), or social desirability and development of false memory ($r = -.02$, $p = .80$).

Introversion/Extroversion. A correlation was used to determine if an introverted or extroverted personality type had an influence on confidence responses or the development of false memory. Results indicated that there was no difference between introverts and extroverts on confidence increases ($r = .04$, $p = .47$), or the development of false memory ($r = .07$, $p = .29$).

Discussion

Findings

Confidence. Members of all three conditions significantly increased their confidence of being bullied from Time 1 to Time 2, although the differences between the conditions were not statistically significant. The results were as hypothesized: the Suggestion-Plus-Motivation condition had the highest confidence ratings at Time 2, followed by the Suggestion-Only condition and then the Control condition. Regarding the Time 2 Confidence change for the critical item, the Suggestion-Plus-Motivation condition had the smallest percentage of participants who went down on the scale, the smallest percentage of participants who stayed the same on the scale, and most importantly, the highest percentage of participants who went up on the scale. Thus, the motivation did influence memory change in terms of confidence in being bullied.

False Memory. False memory was operationalized with three criteria: starting below the midpoint on the confidence scale for the critical item (those who indicated at Time 1 that they had not been bullied), having confidence ratings that increased from Time 1 to Time 2, and having indicated a memory or belief of being bullied in Time 2. Results indicated that participants in all three conditions formed false memories. The results were as hypothesized, with the Suggestion-Plus-Motivation condition having a significantly higher percentage of people forming false memories than the other two conditions. The Suggestion-Only condition had the next highest percentage, followed by the Control, but the differences between these two conditions were not significant. Because people in the Suggestion-Only condition formed false memories, it further supports the notion of how powerful simple suggestion can be. However, this cannot be said for certain because those in the Control condition also formed false memories, and this was not significantly different from those in the Suggestion-Only condition. Thus, the results show that when paired with a motivational reason to believe it, suggestion that an event happened in one's past, even when it really didn't, can influence one's memory.

Surprisingly, false memories were seen in the Control condition. A potential explanation for this is that those in the Control condition really were bullied in the past, but simply did not remember in Part 1 of the study. Thus, these participants were still included in the primary sample. When they filled out the same questionnaire with the critical item in Part 2, they actually remembered a true event of their past, and thus indicated having a memory of being bullied.

Essentially, over time, these participants just remembered a true event. Another possible reason for this result is that by seeing the same critical item twice, the event became more familiar and the participants had more time to imagine the situation of being bullied. This, therefore, made their memories more suggestible.

Flirting. Participants who initially believed that they were bad at flirting before given the suggestion and motivation were more likely to report a confidence increase in being bullied. Additionally, the trending association between responses on the flirting item scale and false memory development show that those who initially believed that they had relationship shortcomings (bad at flirting) were more susceptible to distorting their memories and forming false memories. A possible reason for this is because the motivation that was provided was actually true for them, and not just an ambiguous statement. This would make the computer analysis more accurate for these participants and easily allow them to attribute their true poor flirting abilities to being bullied in the past.

Social Desirability. Since there were no associations between social desirability and confidence increases/false memory development, the findings support the notion that it was the motivation that was causing memory distortion and false memory. If the social desirability bias were present, participants would not have indicated having a memory of being bullied since this is not a desirable characteristic. Therefore, the findings rule out the theory that participants answered the survey questions in a manner that would be desirable to the experimenters and that would portray them in a positive way. This shows that participants most likely responded to the questions in a manner that was consistent with their actual personality and beliefs.

Introversion/Extroversion. The findings show that having an introverted or extroverted personality type does not influence confidence responses or susceptibility to false memory development. This is beneficial because it suggests that personality variables may not play a substantial role in this type of memory paradigm. Thus, this makes it easier to attribute the confidence increases and significant false memory development to the motivation participants received rather than their various personality variables.

Implications

The motivation to explain one's current shortcomings does influence memory suggestibility and make people more susceptible to believing a false autobiographical memory about their past. It is important that clinicians and patients alike recognize that motivations, like the one explored in this experiment, are likely at play during therapy sessions. After all, most people seek out therapy because they are experiencing difficulties in their lives. The results of this experiment suggest that people are motivated to seek explanations for their problems. This motivation contributes to an increased susceptibility to developing false memories for past events that could potentially explain one's shortcomings.

Clinicians can reduce the chances of having their patients form false memories by becoming more aware of the underlying motivations that lead to heightened suggestibility. For example, clinicians should take great care in asking about their clients' pasts without introducing suggestions about events they think may have occurred. By altering these current methods and mechanisms of therapy, memory distortion can be avoided and patients can receive the proper assistance they need. Furthermore, patients should also be more aware of the susceptibility of memory and the power of suggestive questioning. Having this knowledge will allow them to be cognizant that false memories have the potential to develop, and thus work hard towards finding the accurate causes of their problems. By recognizing the true reasons for their tribulations, patients can adequately heal and make long-lasting recoveries. Thus, because of these therapy benefits, it was important to explore the role that this motivation plays in false memory.

In addition to contributing new knowledge to clinicians and patients, the findings of this study also cast new light on the accuracy of eyewitness testimony in the legal field. Jurors and legal decision makers should be aware of these motivational memory influences, particularly when evaluating eyewitness memories obtained through suggestive therapy techniques such as hypnosis and guided imagery. Relying on testimony of this nature allows for the possibility of distorted, and even false, details of a witnessed crime. This would be detrimental in the case that an innocent person is convicted based on these faulty memories. This study thus provides beneficial knowledge to both therapy settings and legal settings.

Limitations

A potential limitation in this study is that there was a large range in the timespan between Time 1 and Time 2 for all the participants. The results might have come out differently if there had been a set number of days between each part. For example, waiting for more time to pass between Time 1 and Time 2 could have made the false feedback seem more

accurate and authentic to the participants because they were told a computer analyzed their surveys, and that usually takes time. A larger amount of time in between could have also made participants less aware of what exactly was being tested; most people guessed that the study was about memory since they answered the same questionnaires twice within a short timespan. However, having more time between Part 1 and Part 2 might also leave more time for imagination inflation (confusion between imaginary experiences and real experiences) of the critical item—thus causing memory distortion. Finally, this broad range in time interval possibly made it harder to detect individual difference personality variables. These personality variables might interact with the time delay such that they affect false memory development more under a short delay vs. a long delay or vice versa.

That being said, the large range in time intervals does not invalidate the findings that motivation and suggestion together interact to increase false memory development. This is because scheduling of the Time 2 appointment occurred prior to random assignment, and thus we would expect an equally large range of time intervals across each of the conditions. The fact that we were able to detect differences across conditions under these circumstances speaks to the power of the effect.

Future Research

This study focused primarily on negative motivation and how it can influence the development of false memory. It would be interesting, therefore, for future research to look at how positive motivation plays a role in susceptibility to false memory, and to compare the size of the effects between the two. Additionally, future research can look at other motivation scenarios in relation to false memory, such as the motivation to explain one's current academic failures.

Conclusion

The motivation to explain one's current shortcomings does influence memory suggestibility and make people more susceptible to believing a false autobiographical memory. This research makes patients and therapists more knowledgeable about techniques that may cause memory distortion. This is beneficial because it allows patients to become more aware of the malleability of memory, and thus more critical about the recollections they bring up in therapy. If patients were to form false memories about their past, it could potentially exacerbate their conditions and hinder their ability to recover. For example, a false memory of sexual abuse could be formed as a reason to explain why a patient is experiencing their current shortcomings. Patients forming these false memories could develop more problems and further obscure the true causes for their difficulties.

Clinicians can also greatly benefit from this knowledge by making use of more reliable techniques that uncover true autobiographical memories. Avoiding methods such as hypnosis, suggestive questioning, and guided imagery can prevent distorting their patients' memories. Understanding the limitations of these techniques can spur the development of new, innovative therapy methods as well. This can improve the future structure of how therapy is administered by clinicians, and can enhance the experience that patients receive. Thus, understanding how the motivation to explain one's current shortcomings heightens suggestibility can lead to significant improvements in therapy settings.

The knowledge that this study brings to the legal field is also crucial to consider. The reliability of eyewitness testimony can diminish when memories of the crime have been produced by suggestive techniques. In some circumstances, eyewitnesses may be so traumatized from the crime that their memories of the event are ambiguous and vague. Thus, suggestive methods such as guided imagery are sometimes used as aids to help recover crucial details. Methods such as these leave vast potential for memory distortion and can detrimentally affect the outcome of trials.

This study provides insight into a new type of motivation paradigm that is seen in both therapy sessions and the legal field. The results can be beneficial in regards to the methods clinicians use on their patients, as well as how eyewitnesses are asked to recall their memories of a crime. Importantly, it brings to light a new mechanism that influences the development of false memory.

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