THE ROLE OF INDIVIDUAL DIFFERENCES IN FALSE MEMORY FORMATION FOR EARTHQUAKE-RELATED FAKE NEWS

ALEYNA TEMİZEL

BOĞAZİÇİ UNIVERSITY

2025

THE ROLE OF INDIVIDUAL DIFFERENCES IN FALSE MEMORY FORMATION FOR EARTHQUAKE-RELATED FAKE NEWS

Thesis submitted to the

Institute for Graduate Studies in Social Sciences

in partial fulfillment of the requirements for the degree of

Master of Arts

in

Psychology

by

Aleyna Temizel

Boğaziçi University

2025

The Role of Individual Differences

in False Memory Formation for Earthquake-Related Fake News

The thesis of Aleyna Temizel

has been approved by:

Assoc. Prof. İnci Ayhan _____
(Thesis Advisor)

Assoc. Prof. Yasemin Sohtorik İlkmen _____

Prof. Ali İzzet Tekcan _____
(External Member)

July 2025

DECLARATION OF ORIGINALITY

I, Aleyna Temizel, certify that

- I am the sole author of this thesis and that I have fully acknowledged and documented in my thesis all sources of ideas and words, including digital resources, which have been produced or published by another person or institution;
- this thesis contains no material that has been submitted or accepted for a degree or diploma in any other educational institution;
- this is a true copy of the thesis approved by my advisor and thesis committee at Boğaziçi University, including the final revisions required by them.

Signature……

Date……

ABSTRACT

The Role of Individual Differences

in False Memory Formation for Earthquake-Related Fake News

How individuals remember events can affect not only their memories of the past but also their decisions in the future. Fake news is found to be affecting how people recall events. Recent studies on false memory showed that people recall fabricated events that are mentioned in fake news that never happened, as if they had happened. Considering Istanbul's serious earthquake risk, misinformation about events and facts about earthquakes spreading via fake news is extremely dangerous for the public's safety. Thus, understanding how fake news about earthquakes affects false memory formation and which individual factors play a role in this process is important. This study examined the tendency of university students aged 18 to 25 (N = 139) to develop false memories when exposed to fake news about earthquakes. Participants were presented with a total of eight earthquake news stories, four real and four fake. Afterward, their memory of the news stories was assessed. The present study analyzed how individual differences in earthquake fear, cognitive thinking style, and earthquake knowledge play a role in the formation of false memories and how they affect the probability of developing false memories. 42% of participants reported at least one false memory for earthquake-related fake news. Analytical thinking significantly reduced false memory susceptibility and also mediated the relationship between earthquake knowledge and false memory. Fear of earthquakes had no direct effect, though it was positively associated with earthquake knowledge. The current study's findings can contribute to the literature by providing information that is necessary to create interventions for disaster awareness.

ÖZET

Depremle İlgili Yalan Haberlere Yönelik Yanlış Hafıza Oluşumunda Bireysel Farklılıkların Rolü

Bireylerin olayları nasıl hatırladığı, yalnızca geçmişe dair anılarını değil, aynı zamanda gelecekteki kararlarını da etkileyebilir. Sahte haberlerin, insanların olayları nasıl hatırladığını etkilediği bulunmuştur. Yanlış anı üzerine yapılan güncel çalışmalar, insanların sahte haberlerde geçen ve gerçekte hiç yaşanmamış olayları, yaşanmış gibi hatırlayabildiğini göstermektedir. İstanbul'un ciddi deprem riski göz önüne alındığında, depremle ilgili olaylar ve bilgiler hakkında sahte haberler yoluyla yayılan yanlış bilgilerin halk sağlığı açısından son derece tehlikeli olduğu söylenebilir. Bu nedenle, depremle ilgili sahte haberlerin yanlış anı oluşumunu nasıl etkilediğini ve bu süreçte hangi bireysel faktörlerin rol oynadığını anlamak önemlidir. Bu çalışma, 18-25 yaş aralığındaki üniversite öğrencilerinin (N = 139), depremlerle ilgili sahte haberlerle karşılaştıklarında yanlış anılar geliştirme eğilimlerini incelemiştir. Katılımcılara dördü gerçek, dördü sahte olmak üzere toplam sekiz deprem haberi sunulmuş ve ardından bu haberlerle ilgili bellekleri değerlendirilmiştir. Bu çalışmada, deprem korkusu, bilişsel düşünme tarzı ve deprem bilgisi gibi bireysel farkların yanlış anı oluşumundaki rolleri ve yanlış anı geliştirme olasılıklarını nasıl etkilediği analiz edilmiştir. Katılımcıların %42'si en az bir sahte deprem haberine dair yanlış anı bildirmiştir. Analitik düşünme tarzı, yanlış anı oluşumunu anlamlı düzeyde azaltmış ve aynı zamanda deprem bilgisi ile yanlış anı arasındaki ilişkiyi aracılık ederek açıklamıştır. Deprem korkusunun doğrudan bir etkisi bulunmamış, ancak deprem bilgisiyle pozitif yönde ilişkili olduğu görülmüştür. Bu çalışmanın bulguları, afet farkındalığına yönelik müdahalelerin geliştirilmesine katkı sağlayacak bilgiler sunarak literatüre katkıda bulunmaktadır.

ACKNOWLEDGMENTS

I would like to thank my supervisor Prof. Ali İzzet Tekcan for his guidance, support, and encouragement throughout this thesis. Working with him has been an invaluable learning experience, and I am very grateful for his patience and insights.

I am also thankful to my thesis committee members Dr. İnci Ayhan and Dr. Yasemin Sohtorik İlkmen for their helpful comments and thoughtful feedback, which have greatly contributed to the development of this work. I feel lucky to have shared this journey with many wonderful friends.

I would like to thank Batuhan Koçak for his support. I am especially grateful to Melike Belkıs Örs, who has shared this journey with me from the very beginning, making the process much lighter and more meaningful. I also thank Melis Usta for patiently listening to me talk about my thesis more times than I can count. In addition, I want to thank all of my semester friends who stood by me, motivated me, and made this challenging process much more enjoyable.

Most importantly, I want to express my deepest gratitude to my mom Asiye Temizel. Her endless love, patience, and belief in me have been my greatest source of strength, and this thesis would not have been possible without her.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION 1

1.1 Suggestive false memories and misinformation 2

1.2 Fake news, and suggestive false memories 6

1.3 Individual differences 9

1.4 Earthquake misinformation 13

1.5 The present study 15

CHAPTER 2: METHOD 18

2.1 Participants 18

2.2 Procedure 19

2.3 Measures 20

CHAPTER 3: RESULT 24

3.1 Descriptive statistics 25

3.2 False and true memory rates 26

3.3 Correlations between individual factors and memory outcomes 28

3.4 Predictors for false and true memories 29

3.5 Exploratory analysis: Mediator role of analytical thinking 33

CHAPTER 4: DISCUSSION 37

4.1 False memory formation for earthquake misinformation 37

4.2 The role of individual differences 41

4.3 Implications and contributions 47

4.4 Limitations and future directions 50

APPENDIX A: ETHICS COMITEE APPROVAL 52

APPENDIX B: INFORMED CONSENT (ENGLISH TRANSLATION) 53

APPENDIX C: INFORMED CONSENT (ORIGINAL TURKISH) 55
APPENDIX D: DEMOGRAPHIC INFORMATION 58
APPENDIX E: FAKE AND TRUE NEWS 59
APPENDIX F: FEAR OF EARTHQUAKE SCALE 67
APPENDIX G: COGNITIVE REFLECTION TEST 68
APPENDIX H: EARTHQUAKE ACHIEVMENT TEST 70
REFERENCES 77

LIST OF TABLES

Table 1. Participants Demographic Characteristics 19

Table 2. Descriptive Statistics for All Variables.....25

Table 3. True and Fake News Memory Counts.....27

Table 4. Correlation for All Variables.....29

Table 5. Hierarchical Regression Results for False Memory 31

LIST OF APPENDIX FIGURES

Figure E1. Nuclear rumor fake news 59

Figure E2. Fish deaths fake news..... 60

Figure E3. River reversal fake news 61

Figure E4. Underground city fake news 62

Figure E5. Lanslide hill true news 63

Figure E6. Bent rails true news 64

Figure E7. Flooded coast true news 65

Figure E8. Sivas sinkholes true news..... 66

CHAPTER 1

INTRODUCTION

In recent years, the uncontrollable speed of misinformation spreading has become a significant concern for public safety, especially in situations like natural disasters where the concerning damage could be on a large-scale (Çağış et al., 2023; Yıldırım, 2023). Natural disasters such as earthquakes are emotionally intense, as people experience loss of loved ones, homes, and the places where they grew up. Therefore, during earthquakes, people are in need of urgent information, and this creates a ground for misleading or false information to spread, mostly in the form of fake, fabricated news. Most research about fake news and false memory focuses more on political events (e.g., elections, referendums, feminism) and health crises (e.g., the COVID-19 pandemic, vaccine debate and cancer) (Greene & Murphy, 2020; Mangiulli et al., 2022; Méndez-Muros et al., 2024), but there is yet no research that focused on the disaster-related aspects. False memory is a memory distortion that occurs when people remember events that never happened or that are very different from the events that actually took place (Brainerd & Reyna, 2005). Research reveals that these distortions in memory can be influenced by various factors such as emotion, prior beliefs, and exposure to misinformation. Having false memories of an earthquake can be dangerous especially in emergency situations. They can create confusion and wrong beliefs about earthquakes, which could create potentially dangerous situations. Among false memory research there are number of studies that specifically focused on and demonstrated the importance of individual differences on people's proneness to create false memories. These studies focus more on individual factors such as emotion, ideological belief, personal interest in the topic, objective

knowledge, cognitive skills, and conspiracy beliefs (Calvillo et al., 2023; Frenda et al., 2013; Greene & Murphy, 2020; Greene et al., 2021; King & Greene, 2024; Mangiulli et al., 2022; O'Connell & Greene, 2017; Schincariol et al., 2024; Scuotto et al., 2021). This thesis aims to contribute to the false memory literature by investigating how individual differences affect people's proneness to create false memories for earthquake-related fake news.

1.1 Suggestive false memories and misinformation

Memory is a cognitive process that enables the human mind to record, process, and recall past experiences (Eysenck et al., 2020). This process, however, is not perfect as it is vulnerable to errors. When recalling past experiences, people do not recall the exact same copy of the events that happened, but rather they rely on their past experiences, beliefs, and emotions (Loftus, 2005; Johnson et al., 1993). This reconstructive nature of memory makes it open to errors, which then potentially lead to the creation of false memories. False memories occur when people remember events that never happened or that are very different from the events that actually took place (Brainerd & Reyna, 2005). Mazzoni and Kirsch (2002) claim that belief and remembrance are two interconnected but distinct processes that contribute to the creation of false memories. In the literature, it has been shown that these two processes do not necessarily always occur together. To elaborate, it was found that people could believe events that never happened or remember events that they do not believe happened (Mazzoni et al. 2010; Otgaar et al. 2014). Nevertheless, it is more common for these two processes to happen together in which people recall an event they believe happened. Belief and recollection also align when people recall false

memories (Mazzoni et al. 2010). In another words, false memories form when people both believe the event happened and recall it simultaneously.

False memory research dates back to the 20th century as some researchers like Elizabeth Loftus began to question the accuracy of the traumatic memories that psychologists back then claimed to bring back using hypnosis techniques. She proposed that these traumatic memories (e.g., suddenly remembering being abused as a child) might be due to the unintentional creation of false memories that are caused by suggestive questioning (Loftus, 1993). Individuals who form false memories remember them very vividly with details that make it hard for them to distinguish from true memories. For example, Jean Piaget himself claims he remembered in very vivid detail getting kidnapped as a child until he learned later on that this event did not happen at all. Later on, Loftus's shopping mall study with Pickrell (1995) got a lot of attention as the study established that people could create false memories of being lost in a mall by suggestion. With growing attention on studying false memories, researchers began to use experimental methods like the Deese-Roediger-McDermott (DRM) paradigm. In this paradigm, they present participants with a list of conceptually similar words and then ask them to remember a word that is similar in concept but was not shown in the list, which causes people to falsely remember the word (Roediger & McDermott, 1995).

False memories that were caused by fake news are defined as suggestive false memories because they are caused by external misleading information (Mangiulli et al. 2022). The misinformation paradigm is one of the most widely used and impactful methods to study suggestive false memories (Loftus, 2005). Researchers have repeatedly used this paradigm and have shown that if you provide participants with wrong details about something that happened in the past, many will later incorporate

these false details into their memory, resulting in a misinformation effect. Misinformation effect was first shown in a research by Loftus and Palmer (1974). In this study, researchers showed participants a video about a car accident. After watching the video participants were asked leading questions about the car accident. When they were asked how fast the cars were going when they "smashed", participants reported more false memories for seeing broken glass compared to participants who were asked the same question with the change of word on "hit" rather than "smashed". From these findings it can be inferred that a simple word change could alter someone's memory of an event and memories are susceptible to subtle suggestions.

There are several theories that provide explanations to how and why individuals create false memories when exposed to fake news. Among them Source Monitoring Framework (SMF) is an influential and important theory (Johnson, 2001; Johnson et al., 1993). According to this theory, there are two cognitive systems that enable people to distinguish the source of their memories through judgment processes. These two judgment processes are described by the dual-process theory, and SMF applies this theory to explain how people determine the source of their memories (Johnson et al., 1993). The first system depends on a heuristic judgment process, which is fast, intuitive, and relies more on sensory experiences. On the other hand, the second system depends on a systematic judgment process, which is more time consuming, analytical, and effortful (Evans & Stanovich, 2013). According to previous studies, individuals that use heuristic processing are more prone to form false memories when they were presented with fake news because they are more likely to accept information that was presented to them without carefully assessing it. In contrast, people who use systematic processing are more likely to critically

examine incoming information and compare it to their existing knowledge, which makes them less likely to form false memories (Greene et al., 2021; Mangiulli et al., 2022).

In addition, fuzzy trace theory is an important cognitive theory that gives another explanation for false memory formation (Reyna & Brainerd, 1995). This theory, posits that the human brain stores two types of memory called verbatim traces and gist traces. Verbatim traces focus on the details of the memory such as words and dates, while gist trace focuses on the general idea and meaning of it. To give a specific example, when remembering a plane accident with verbatim traces people remember specifics like "Malaysian Airlines Flight MH370 went missing on March 8", while with gist traces they remember a general idea like "a plane went missing". Due to its nature, as time passes after an event, people tend to use gist traces more than verbatim traces when recalling the event. Additionally, it was found that false memory formation mostly happens when people use gist traces to recall the memory, especially if it is semantically similar (Reyna & Lloyd 2006). To elaborate, when people are exposed to fabricated news about earthquakes, it might trigger their past experiences and knowledge about it and create a sense of familiarity due to semantic similarity, and increase the likelihood of forming a false memory.

Lastly, the Nested model is a theory that aims to explain the relationship between memory, belief, and plausibility (Scoboria et al. 2004). According to this theory, when remembering an event, people are especially affected by the plausibility of the event. It proposes that false memory forms gradually through various stages of thinking about the event. There are three layers, nested within each other: the outer layer is plausibility, followed by belief, and then remembering. For example, based on the assumptions of this theory, when people are exposed to fake news, they first

evaluate the plausibility of the event in the news and think if there is a chance this event has happened. With repeated exposure to misinformation, they gradually start to believe the event happened. After believing the event has happened, they start to remember the event as if it actually occurred. This is how the theory explains the three layers of thinking works that ultimately leads to false memory.

1.2 Fake news, and suggestive false memories

Over the last two decades, with the incredible increase in digitalization, social media and social networks have increased both the prevalence and impact of misinformation. Fake news is defined as intentionally created, emotionally charged, misleading information designed to influence public opinion, especially on important societal issues (Zimdars & McLeod, 2020). Historically, the concept of fake news has existed since ancient times, specifically through oral history telling to control the public. With the invention of the newspaper, fake news became more widespread within society, and it was used a lot in the World Wars as propaganda. From the 2010s to the present day, with the rise of the internet, fake news spread globally and enabled people to spread misinformation rather rapidly through social media platforms (Del Vicario et al., 2016).

Spreading misinformation through fake news can cause serious harm across many areas of life, such as politics, public health, environmental issues like climate change, and the economy (Chen et al., 2023). The Cambridge Analytica scandal is a fitting example of the implications of fake news on politics. The firm gathered data from Facebook users without their permission, and used this information to create targeted misinformation that reached millions of social media users. This situation ultimately affected public's opinion and behaviors of the voters in the favor of

candidate Donald Trump in the 2016 U.S. presidential election (Boxell et al., 2018).

Additionally, the spread of fake news had serious effects on public health during the coronavirus pandemic. For example, the fake news spread during the COVID-19 outbreak has became so widespread that it not only affected people's psychological health but also caused them to adopt ineffective measures to protect themselves from the virus causing them to refuse to get the vaccine and wear masks (Pian, Chi, & Ma, 2021). In response to the implications of this misinformation, World Health Organization (WHO) alerted the public about an "infodemic" and asked them to take caution against sharing misinformation (World Health Organization, 2020).

Furthermore, previous studies revealed the effects of fake news on memory processes. More specifically, they showed how misinformation caused people to create false memories about events that did not actually happen when they were presented with fake news. A meta-analysis study about fake news and false memory analyzed 13 studies with topics such as social, political, and health related issues and found that around 40% of people created at least one false memory when they were presented with fake news (Schincariol et al., 2024). For example, a false memory study demonstrated that fake news that was presented with edited images could lead to the formation of false memories (Frenda et al., 2013). In this study, researchers created edited images of political figures in situations that were not real, such as Barack Obama greeting Iranian president Mahmoud Ahmadinejad. These images were shown to approximately six thousand participants, and about 50% of participants later reported that they had seen these fake events, showing the importance of visual misinformation on memory accuracy.

Moreover, a study that investigated political aspects of false memory demonstrated how fake news about Ireland's 2018 abortion referendum, a highly controversial political issue, can alter people's memories. (Murphy et al., 2019) They showed true and fabricated news stories related to the abortion referendum to participants who varied in their political beliefs. Fabricated stories contained both ideological perspectives, so some of the news matched participants' political beliefs and some didn't. Consequently, 48% of participants reported false memories mostly for the fake news that match with their ideological beliefs. This study's results showed the critical role cognitive biases such as partisan bias play in memory distortion.

Additionally, another study about false memory examined false memory formation related to fake news about COVID-19 (Greene & Murphy, 2020). They showed participants both real and fake news about COVID-19 that included misinformation about symptoms, treatment methods and vaccine. Researchers created plausible news stories and presented them with non-probative images, which made them resemble real-world news stories. They found that 23% of participants who were presented with fake COVID-19 news reported remembering the event, creating false memories.

Continuing with the subject of COVID-19 misinformation, one false memory study wanted to examine the process of conspiracy beliefs influence in the creation of false memory (Mangiulli et al., 2022). They showed participants fake news about COVID-19 along with fake news about the same topic that had conspiratorial topic. According to the study's result, 55% of people created false memories for conspiratorial fake news and 47% of people reported false memories for non-

conspiratorial fake news. The study also highlighted that people who have higher levels of conspiracy beliefs are more likely to develop false memories for fake news.

Consistently, a study that also examined health-related misinformation's effect on false memory formation found similar results (King & Greene, 2024). They presented participants with fake news about cancer information, like treatment methods and myths. According to the study's result 41% of people formed false memory for cancer related fake news. They also found that participants who had a positive perspective on alternative medicine created more false memories for cancer related misinformation. These results show how misinformation about health could be encoded as a memory and potentially cause people to make risky health-related actions.

1.3 Individual differences

Individual differences are important factors that could influence people's tendency to form false memories. Every individual has different personal characteristics that make them not react the same way towards incoming misinformation and these characteristics affect how and why people form false memories (Zhu et al., 2010). That’s why it is important to understand these individual differences because this can help identify which people are more vulnerable to misinformation and what can be done to protect people from false memories. Previous research on false memory has focused on the importance of cognitive, neurological, and personality differences in determining an individual’s proneness to forming false memories (Straube, 2012; Zhu et al., 2010; Liebman et al., 2002). More specifically, there are relatively small numbers of recent studies on false memory research that focus on individual differences that make people more vulnerable to misinformation and ultimately more

prone to create false memories when presented with fake news. These studies focus more on individual factors such as emotion, ideological belief, personal interest in the topic, objective knowledge, cognitive skills, and conspiracy beliefs (Calvillo et al., 2023; Frenda et al., 2013; Greene & Murphy, 2020; Greene et al., 2021; King & Greene, 2024; Mangiulli et al., 2022; O'Connell & Greene, 2017; Schincariol et al., 2024; Scuotto et al., 2021).

Cognitive thinking style is one of the important individual factors that is found to be affecting the proneness to false memory (Nicholas & Loftus, 2019). As discussed before, the dual-process theory proposes two types of cognitive thinking styles, which are intuitive and analytical thinking (Johnson et al., 1993). Intuitive thinking depends on the heuristic judgment process, which is fast, intuitive, and relies more on sensory experiences. On the other hand, analytical thinking depends on a systematic judgment process, which is more time consuming, analytical, and effortful (Evans & Stanovich, 2013). According to previous studies, individuals who use intuitive thinking are more prone to form false memories when they are presented with fake news because they are more likely to accept information that was presented to them without carefully assessing it (Pennycook et al., 2020). In contrast, people who use analytical thinking are more likely to critically examine incoming information and compare it to their existing knowledge, which makes them less likely to form false memories (Greene et al., 2021; Mangiulli et al., 2022). For instance, Greene and Murphy (2020) found that participants scoring higher on analytical thinking, which was measured by the Cognitive Reflection test (CRT), were significantly less likely to develop false memories due to COVID-19 fake news. Following studies such as Greene et al. (2021) and Mangiulli et al. (2022) that also studied this effect on different topics found similar results. Additionally, a meta-

analysis study examined several studies on this topic and demonstrated that individuals with higher analytical thinking consistently showed less proneness to form false memories for fake news (Schincariol et al., 2024).

Moreover, emotional states such as fear, anxiety, and depression are other important individual factors that were found to have an important effect on memory processes and false memory formation. In previous findings in the literature, it was highlighted that memory enhancement occurs for events that are emotionally arousing. In other words, individuals are found to be recalling emotional events more vividly. However, this does not ensure the memory's accuracy (Kensinger, 2009). Also, it was found that stress hormones in the brain make emotional memories stronger and make them last longer, ultimately preventing false memory formation (McGaugh, 2004). Furthermore, it was demonstrated that negative emotions such as fear and anxiety increase the potential to process incoming information carefully and in detail, ultimately reducing the potential formation of false memories (Bless, 2000; Kensinger, 2009). For example, Scuotto et al. (2021) found that people who reported high fear toward COVID-19 reported significantly less false memory to fake news, making them more resilient towards fear-related misinformation. Another study by Greene and Murphy (2020) similarly demonstrated that individuals with high fear levels related to COVID-19 reported reduced false memory formation. It is important to note that research on this specific topic that focuses on fear's role in misinformation’s effect on false memory, showed how fear acts as a protective potential. In addition to the studies that examined the relationship between emotional states and false memory in a fake news context, there are studies that also looked at this relationship with different paradigms like Deese-Roediger-McDermott (DRM). For instance, Storbeck and Clore (2005) used the DRM paradigm to examine false

memory and found that negative moods, such as sadness, increased accuracy and reduced false memories in participants. These results also align with the hypothesis that when people are in a negative emotional state, they are more likely to pay attention to specific details of an experience, and this helps them avoid relying too much on general meanings or schematic heuristics, which are often the source of false memories. Consequently, it was hypothesized in numerous studies that negative emotion might actually help prevent false memories from forming by promoting detailed cognitive processing.

Knowledge about the subject is another important individual factor affecting proneness to false memory induced by fake news. More specifically, objective knowledge that is factual and without individual biases was found to make individuals more resistant to incoming misinformation (Frenda et al., 2013). Previous studies demonstrated that more perceived knowledge on a topic could cause people to become overconfident about their knowledge, and therefore report more memories, ultimately causing them to form more false memories (Mehta et al., 2011; Greene & Murphy, 2020; Greene et al., 2021). For example, Scuotto et al. (2021) examined false memories that were caused by COVID-19 related fake news and looked at the effects of objective and perceived knowledge on false memory creation. While they used factual questions to assess objective knowledge, they used Likert scales and self-report to assess perceived knowledge. According to the study's results, people who had high objective knowledge reported more true memories and less false memories while perceived knowledge had no effect on memory. Similarly, Greene et al. (2021) demonstrated that participants who had higher knowledge about Brexit referendum were able to distinguish between fake and true news and created less false memories. Overall, research on this topic highlights the importance of

evidence-based education as a defense against misinformation, showing how high objective knowledge protects people from forming false memories (Atir et al. 2015; Pennycook & Rand 2020).

1.4 Earthquake misinformation

Natural disasters are major crises that could potentially affect the whole nation. In situations like these panic rises within the public due to the lack of information and uncertainty of the potential damage. As a result of this uncertainty, people search and share any news they could find, increasing the spread of information as well as accelerating the spread of misinformation (Chen et al., 2023). This issue has been getting worse with the growing digital scene because people can spread information rapidly to a wide range of people without the obligation to check facts first (Méndez-Muros et al., 2024). Fake news such as these could cause misinformation to lead individuals to either underestimate or overestimate the risks of earthquakes, which could potentially risk rescue efforts and emergency management (Méndez-Muros et al., 2024).

To continue with the possible implications of earthquake misinformation, there are significant societal and psychological consequences of spreading misinformation about disasters on both individual and common well-being. To give an example, one study examined the effect of misinformation about earthquakes on public perception towards earthquakes in Romania (Mărcău et al., 2023). Their study showed that people who believed in fake news about seismic activity reported increased fear and reduced psychological well-being. In addition, they found that fake news mainly spread through social media platforms and mostly included edited or unrelated images and videos that got a lot of attention from the public due to their

emotional content. The most common example for this type of manipulated images are from past earthquakes or unrelated disasters that circulates through social media platforms, misleading the public and causing unnecessary panic.

As an earthquake prone country, Turkey also experienced a lot of earthquakes that shaped the public's memory of it. Two years ago, in February 2023 one of the most influential earthquake in Turkey's earthquake history happened in Turkey's southeastern region. The public in that region experienced two strong disastrous earthquakes that caused extensive destruction in various cities and cost many lives. During this time, misinformation spread fast in the form of fake news and it resulted in confusion and distress among the public. According to studies, fabricated news spread mainly through social media platforms like X (former Twitter), WhatsApp, and Instagram (Aydın, 2023; Bilişli et al., 2024). In addition to causing panic and confusion to people, fake news also misled people during emergency responses and weakened trust in institutions (Özdemir, 2023). Research conducted following the 2023 earthquake shows that people who experienced economic losses and engaged in social comparison experienced a decrease in life satisfaction and an increase in depression and anxiety symptoms (Güler et al., 2024).

As a further example of this, another research refers to the potential effects of collective memory on misinformation within the context of the 2023 Turkish earthquake (Aldamen & Abdul Jaleel, 2024). Based on their findings, the Turkish media outlets brought back and exposed collective memories of the disastrous 1999 earthquake that influenced the collective memory of the nation (Aldamen & Abdul Jaleel, 2024). Collective memory is the way groups of people with shared culture remember their past (Wertsch et al., 2008). When presenting the news about an earthquake, media outlets often reference the 1999 earthquake disaster, creating

continuity between past and present crises. Constant reminding of the past devastating earthquakes could cause the public to have a high risk perceptions towards future earthquakes as well as creating fear and anxiety towards earthquakes considering the emotional intensity of the past (Gülüm, 2024; Çaki & Uzun, 2023). In this context, false memories of past earthquakes like the 1999 earthquake could affect people's perception and influence their recollection and future response to information related to earthquakes.

1.5 The present study

The present study examined individuals' susceptibility to forming false memory for fake earthquake-related news and the potential individual differences in fear, cognitive thinking style, and objective knowledge that may affect these formations. There are various previous studies that investigated false memory formation and how fake news affects this formation. However, there is a gap in the literature on how these processes work in situations like natural disaster, specifically earthquakes. Previous studies about fake news and false memory focused more on topics such as political events (e.g., elections, referendums, feminism) and health crises (e.g., the COVID-19 pandemic, vaccine debate and cancer) while, there is yet no research that focused on the disaster related aspects (Greene & Murphy, 2020; Mangiulli et al., 2022; Méndez-Muros et al., 2024). This study aims to fill this gap by investigating this process in the context of İstanbul, which is a high-risk city for earthquakes due to its location on the North Anatolian Fault Line. The city's high-risk location causes people living there to be frequently exposed to earthquake related content and making it relevant to study the earthquake-related fake news effect on false memory formation. Additionally, the present study examines individual differences,

specifically fear of earthquake, cognitive thinking style and earthquake knowledge. The findings from previous research demonstrated that these differences showed significant influence on the formation of false memories (Greene et al., 2021; Mangiulli et al., 2022; Scuotto et al., 2021). On the other hand, influence of individual differences is not looked at in earthquake context, which is an event that can potentially cause high emotional responses such as fear, anxiety and uncertainty.

In order to investigate these gaps in the literature, the present study proposes several research questions. First of all, at a descriptive level, it aims to determine the frequency of false memory formation in response to fake news. Additionally, it aims to investigate whether having different kind of cognitive thinking style (analytical vs. intuitive) would effect the false memory formation. It also plans to understand whether having objective earthquake knowledge affects the ability to differentiate true news from fake news. Finally, the study examines how an emotional factor such as earthquake fear could affect the false memory formation for earthquake related fake news. Consequently, the present study proposes several hypotheses based on previous research findings and theories on these topics.

- H1: Participants with higher levels of analytical style rather than intuitive style are predicted to report fewer false and true memories, as analytical thinkers are expected to have higher threshold for reporting a memory due to their skeptical nature (Greene et al., 2021).

- H2: Participants with higher objective knowledge about earthquakes predicted to report more true memories and fewer false memories. Participants with higher earthquake-related knowledge are more likely to

assess and detect misinformation, therefore able to distinguish true and fake news stories (Greene & Murphy, 2020, Scuotto et al., 2021). In support of this, a meta analysis findings show that individuals with higher objective knowledge were significantly more likely to recall true information (Greene & Murphy, 2020; Mangiulli et al., 2022; Scuotto et al., 2021).

- H3: Participants with higher levels of earthquake fear expected to report fewer false memory. This is because it is expected that people who are experiencing a high level of fear about specific topic tend to pay more attention to important and accurate information about that topic (Scuotto et al., 2021).

In general, what the present study aims to investigate and its practical implications are important for psychological well-being of the people who are living in high risk earthquake zones. Understanding what are the factors that affect the formation of false memory for earthquake related fake news could help to develop interventions that lessen misinformation’s harmful effects and to improve individuals' resilience to misinformation.

CHAPTER 2

METHOD

2.1 Participants

Power analysis was conducted using G*Power (Faul et al., 2007) to estimate the number of participants needed for sufficient statistical power. According to the analysis, 92 participants were needed to achieve statistical power with $\alpha = 0.05$, $f^2 = 0.15$, and power = 0.80. Considering the number of potential participant losses, data were collected from 154 bachelor's psychology students. Participants were recruited through Bogazici University Research Participation System (RPS) via convenience sampling. Participants who participate in the study were rewarded with 1 credit for the psychology course of their choice by this system. Dropouts and participants who do not reside in İstanbul were excluded. Consequently, 139 participants from İstanbul between the ages of 18 and 25 (*M* = 20.42 years, *SD* = 1.54) were included in the study. The demographic characteristics of the participants are summarized in Table 1.

Table 1. Participants Demographic Characteristics

Variable	Category	*N* (139)	%	M	SD
Age				20.42	1.54
Gender	Female	101	72.1		
	Male	38	27.9		
Education Level	Freshman	117	84.2		
	Sophomore	11	7.9		
	Junior	6	4.3		
	Senior	5	3.8		
Perceived Economic Status	Low-income	3	2.2		
	Low-middle income	26	18.2		
	Middle income	75	54.0		
	Middle-upper income	36	25.2		
	Upper income	0	0		

Note. *N* = Sample size, % = Percentage, *M* = Mean, *SD* = Standard Deviation

2.2 Procedure

This study received ethical approval from the Bogazici University Social and Human Sciences Human Research Ethics Committee (see APPENDIX A). Data was collected online via Qualtrics. The experimental procedure is summarized in Figure 1. After participants read and confirmed their voluntary participation in the study (see APPENDIX B), they completed the demographic questions, including age, gender, city of residence, and education levels (see APPENDIX D). Participants were then presented with eight earthquake-related news items (i.e., four true, four fake) in a random order. News items were randomized across participants to counterbalance order effects. Every news item was accompanied by a memory rating of the event that was presented in the news. After reading the news, participants had to answer questions about whether they had heard or seen the event. Later in the

study, they completed questionnaires and tests about earthquake fear, cognitive thinking style, and earthquake knowledge, in this order. At the end of the study, participants were informed about the purpose of the study and which of the news items were fake, and they were thanked for their participation.

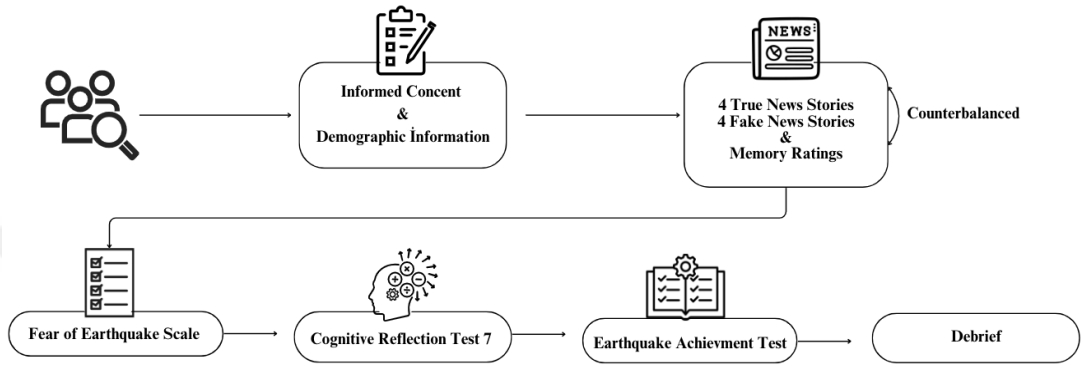

Figure 1. Flowchart of the experimental procedure

2.3 Measures

2.3.1 True and fake news

In the study, eight news items (four true, four fake) about the February 6, 2023 Turkey earthquakes was presented to the participants in random order. Real news items were selected from real news channels (e.g., TRT Haber, BBC Türkçe, Anadolu Ajansı) that were also verified using teyit.org. In line with previous literature, the researchers created the fake news items after carefully examining the nature of the existing fake news in the media (see APPENDIX E). Non-probative photographs are images that are not directly related to the events in the news, so they do not prove the accuracy of the news. However, these images create more realistic news exposure, which has been shown to increase false memory for fake news stories (Strange et al., 2011). Thus, non-probative photographs that were royalty-free

were added to each news item. One fake news item and one true news item are shown as examples in the figure 2. The fake news items ranged from 58 to 88 words (M = 79.00, SD = 13.30), while the true news items ranged from 57 to 80 words (M = 66.00, SD = 9.85). All stories included factual elements such as location, event characteristics, and outcomes to ensure structural similarity across conditions. Each news item is later accompanied by questions that aim to evaluate their memories of these events. They were presented with the question, "Do you remember the event described in this news?" and asked to choose from responses: "I have a clear memory of seeing/hearing about this event", "I have a vague memory of this event happening", "I don't remember this event, but it seems familiar", "I remember this event differently", and "I don't remember this event". The responses were coded in line with previous literature (Greene & Murphy, 2020). For fake news, if the participant selected one of the options "I have a clear memory" or "I have a vague memory", it means that a false memory occurred and therefore was coded as 1 point. If the participants selected the other responses, it was considered as not forming a false memory and received 0 points. The responses given by each participant for the four fake news are added to obtain the false memory count. The total score range is from 0 to 4 for each participant, and a higher score indicates higher false memory formation for fake news. The same method was also applied to the true news, which determined the participant's true memory accounts. It is important to note that in this study what is defined as true memory refers to memory reported for true news stories, not necessarily accurate memory, as they are self-reported. As demonstrated by previous studies a person could still create false memories for true news hence, what study measures is reported memory (Schacter & Loftus, 2013). Therefore,

findings in the current study interpreted not as direct measures of memory accuracy, but as indicators of susceptibility to misinformation.

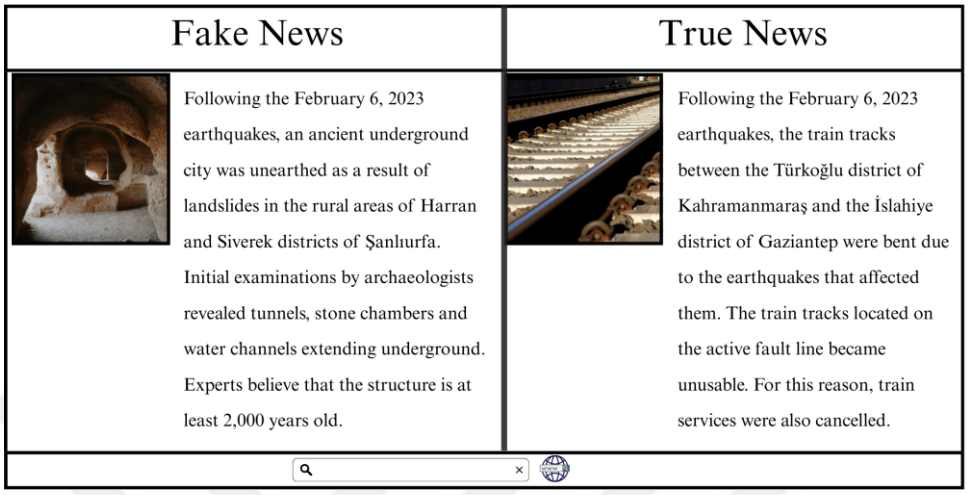

Figure 2. Example of fake and true news

2.3.2 Fear of earthquake scale

In order to asses participants' earthquake-related fear, the Turkish Adaptation of the Fear of Earthquake Scale (Usta et al., 2023), which was originally adapted from Prizmić-Larsen et al. (2023), was used. This scale was developed and use for adult population. Turkish version of the scale showed internal consistency with Cronbach's α of .91. The scale contains seven items and items are rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) (e.g., "When I think about an earthquake, my hands sweat", see APPENDIX F). Total score ranges from 7 to 35, with higher scores indicating greater fear of earthquakes. In this study, Fear of Earthquake scale had a Cronbach's α of .89.

2.3.3 Cognitive reflection test (CRT)

The Cognitive Reflection test is a test that measures participants' reflective thinking style (intuitive or analytic), which was initially developed by Frederick (2005). The test consists of three mathematical problems that have intuitive incorrect answers, participants need to use analytical thinking to get the correct answers. The Turkish adaptation of this test, developed by Yılmaz & Sarıbay (2016) was used.

The CRT-2 (Thomson & Oppenheimer, 2016), which was developed to address the limitations of the original CRT and adapted into Turkish (Yılmaz and Sarıbay, 2018), was used in this study. The CRT-2 consists of four questions that measure analytical thinking that includes verbal reasoning skills. Higher scores correspond to higher analytical thinking. A 7-item updated combination of CRT 1 and CRT 2 test, known as the "analytic cognitive style" (ACS) was used (Toplak et al., 2014) (see Appendix G).

2.3.4 Earthquake achievement test

In order to assess the level of knowledge of the participants about earthquakes, the Earthquake Achievement Test developed by Aydın, Haşiloğlu & Kunduracı (2016) was used. This test was developed to measure adult's knowledge about earthquakes and earthquake preparation. The test includes 20 multiple-choice questions about earthquake causes, effects, risk factors and protection measures (e.g, How many major fault lines Turkey have in total, see APPENDIX H). The Spearman-Brown adapted reliability coefficient was reported as 0.97. The total score from the test ranges from 0 to 20, with higher scores indicating higher knowledge and preparation levels. In this study, the Spearman-Brown adapted reliability coefficient was found to be 0.80.

CHAPTER 3

RESULTS

This chapter presents the results of the study, including descriptive statistics, correlation analyses, hierarchical regression models and exploratory mediation models. These analyses were conducted to investigate the predictive roles of earthquake fear, analytical thinking, and earthquake knowledge in memory performance for true and false earthquake-related news. The aim was to determine how these individual differences variables contribute to susceptibility to false memories. In addition to analyzing raw memory scores, signal detection theory (SDT) metrics were used to provide a more detailed understanding of memory performance. SDT suggests that memory decisions occur under uncertainty and can be decomposed into two components, which are sensitivity, and response bias. Sensitivity, also known as d-prime (d'), shows participant's ability to distinguish true from fake news. Response bias, represented by the criterion (c), shows to a participant's general tendency or threshold for deciding whether a memory is true. D' was computed by subtracting the *z*-transformed false alarm rate (false items incorrectly remembered) from the *z*-transformed hit rate (true items correctly remembered). Criterion was computed as the negative average of those two z-scores. Higher d′ values indicate better discriminability, while higher criterion values indicate a more conservative response style. A lower, more liberal criterion indicates a tendency to say, "I remember" more freely, while a higher more conservative criterion shows caution and a greater reluctance to report memories without certainty.

3.1 Descriptive statistics

Descriptive statistics were computed for all key variables, including participant's scores on the false memory and true memory tasks, fear of earthquakes, CRT, and earthquake-related knowledge. Table 2 shows the descriptive values for each variable. To check normality, we examined the skewness and kurtosis values of each variable. All values were within acceptable ranges (±1.5), suggesting that the distributions were approximately normal (Tabachnick & Fidell, 2001). Therefore, the data met the assumptions for using parametric analyses.

Table 2. Descriptive Statistics for all Variables

Variables	M	Median	SD	Min.	Max	Skewness	Kurtosis
Earthquake Fear	24.39	25	6.38	7	35	-.35	-.23
CRT	5.85	6	1.40	2	7	-1.24	.64
Earthquake Knowledge	14.82	15	2.38	8	19	-.69	-.02
False Memory Count	0.65	0	0.90	0	3	1.27	0.66
True Memory Count	1.60	2	1.17	0	4	.18	-.80
D-prime	0.59	0.52	0.76	-1.30	2.56	0.17	-0.45
Response Bias	0.54	0.64	0.53	-0.90	1.30	-0.37	-0.31

Note. CRT = Cognitive Reflection Test, *M* = Mean, *SD* = Standard Deviation, Min = Minimum, Max = Maximum.

3.2 False and true memory rates

Participant's memory responses were recorded for four true and four fabricated earthquake-related news stories. Their memory responses for each item are summarized in Table 3. The option “I remember this differently” was removed from analysis, as no participants selected it. For fabricated news stories, a false memory was recorded when participants chose either “I have a clear memory” or “I have a vague memory,” which received 1 point, all other responses were coded as 0. The same method was applied to the true news stories to determine memory count for true news. Each participant could score between 0 and 4 in both categories. Of the 139 participants in total 59 participants (42.45%) reported a false memory for at least one fabricated story, while 108 participants (77.70%) reported a memory for at least one true story. A paired-samples t-test revealed that they reported recalling more true stories (M = 1.60, SD = 1.17) than fake ones (M = 0.65, SD = 0.90), t (138) = 9.02, $p < .001$, d = 0.77.

In terms of individual story recall, the proportion of participants reporting any memory clear or vague for the fabricated stories was 11% for Nuclear Rumor, 22% for Fish Deaths, 19% for River Reversal, and 15% for Underground City. Most participants indicated no memory of these fake stories, with “no memory” responses ranging from 78% to 88%. Clear memories for false stories were rare, while vague memories accounted for almost all of false memory reports with 96%. In contrast, true stories showed more frequent recall as 48% of participants reported some memory of Landslide Hill, 43% for Bent Rails, 38% for Flooded Coast, and 31% for Sinkholes Sivas. Among those who remembered true stories, vague memories were again most commonly reported with 99%.

To further examine reported memory by news type, a chi-square test of independence was conducted using binary memory responses (remembered vs. not remembered) across true and fake stories. The test revealed a significant association, $\chi^2(1, N = 1112) = 77.30$, $p < .001$. The odds ratio was 0.29 (95% CI [0.22, 0.39]), indicating that participants were over three times more likely to report remembering a true story than a fake stories.

Table 3. True and Fake News Memory Counts

Response	True news			
	Landslide Hill	Bent Rails	Flooded Coast	Sinkholes Sivas
I have a clear memory	0% (*n* = 0)	1% (*n* = 2)	1% (*n* = 1)	0% (*n* = 0)
I have a vague memory	46% (*n* = 64)	42% (*n* = 59)	37% (*n* = 52)	31% (*n* = 43)
I do not have a memory, but it feels familiar	0% (*n* = 0)	0% (*n* = 0)	0% (*n* = 0)	0% (*n* = 0)
I do not remember this	54% (*n* = 75)	56% (*n* = 78)	62% (*n* = 86)	69% (*n* = 96)
% Reporting Memory[a] (n/Total)	46% (n = 64)	43% (n = 61)	38% (n = 53)	31% (n = 43)
	Fake news			
	Nuclear Rumor	Fish Deaths	River Reversal	Underground City
I have a clear memory	1% (*n* = 1)	1% (*n* = 2)	1% (*n* = 1)	0% (*n* = 0)
I have a vague memory	10% (*n* = 14)	21% (*n* = 29)	18% (*n* = 25)	15% (*n* = 21)
I do not have a memory, but it feels familiar	1% (*n* = 1)	0% (*n* = 0)	1% (*n* = 1)	1% (*n* =1)
I do not remember this	88% (*n* = 123)	78% (*n* = 108)	80% (*n* = 112)	84% (*n* = 117)
% Reporting Memory[a] (n/Total)	11% (*n* = 15)	22% (*n* = 31)	19% (*n* = 26)	15% (*n* =21)

Note. The labels (e.g., Landslide Hill, Nuclear Rumor) refer to shortened titles or nicknames given to each news item for display purposes.

[a] % Reporting Memory" reflects the percentage of participants (out of total n=139) who selected either "clear memory" or "vague memory.

3.3 Correlations between individual factors and memory outcomes

Pearson correlation analyses were then conducted to examine the relationships among key study variables. This provides a preliminary understanding of the strength and direction of associations between predictors and outcome variables before conducting more complex analyses. The bivariate relationships among all study variables are summarized in Table 4. Analytical thinking (CRT) showed the strongest associations among others. Higher CRT correlated with fewer false memories ($r = -.60$, $p < .001$), with a more conservative response criterion ($r = .46$, $p < .001$), and with greater discriminability (d'; $r = .24$, $p < .05$). Earthquake knowledge showed a similar protective pattern, being associated with fewer false memories ($r = -.29$, $p < .001$) and slightly higher d' ($r = .21$, $p < .05$), and it correlated positively with CRT ($r = .38$, $p < .001$) and earthquake fear ($r = .24$, $p = .004$). As implied by SDT, memory for true news correlated positively with d' and negatively with criterion, whereas false memory exhibited the opposite pattern. These correlations are consistent with the mathematical definitions of signal detection metrics, which are directly derived from true and false memory responses. Among demographics, perceived economic status showed a small negative association with d' ($r = -.20$, $p < .05$), while gender related to earthquake fear but not to memory outcomes.

Table 4. Correlation for All Variables

Variable	1	2	3	4	5	6	7	8	9
1.Gender	1.00								
2.Economic Status	0.05	1.00							
3.False Memory	-0.01	0.11	1.00						
4.True Memory	-0.14	-0.14	.30 ***	1.00					
5.CRT Score	0.04	-0.11	–.60 ***	–.20 *	1.00				
6.Earthquake Fear	-0.18*	-0.13	–.07	.12	.15	1.00			
7.Earthquake Knowledge	-0.03	-0.08	–.29 ***	.03	.38 ***	.24 **	1.00		
8.D-prime	-0.13	-0.20*	-0.46**	0.70**	0.24*	0.16	0.21*	1.00	
9.Response Bias	0.11	0.04	-0.76**	-0.85**	0.46***	-0.06	0.12	-0.22**	1.00

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

3.4 Predictors for false and true memories

In this section, a series of hierarchical regression analyses were conducted to investigate how individual differences predict memory performance in the context of earthquake-related news. The primary focus was on understanding the role of analytical thinking, fear of earthquake, and objective knowledge in shaping participants' memory for true and false information. To examine memory performance comprehensively, four key outcome variables which were false memory count, true memory count, discriminability (*d'*), and response bias analyzed. For each outcome variable predictors were entered into each regression model in four steps in the following order; gender and perceived economic status to control for possible effects of these demographic variables, followed by fear of earthquake, earthquake

knowledge, and finally analytical thinking. This order allowed for testing the unique contribution of analytical thinking after accounting for demographic, emotional, and knowledge-based factors. The assumption of no multicollinearity was met, as all tolerance values ranged from .82 to 1.00 and all VIF values ranged from 1.00 to 1.22, indicating no concerns regarding multicollinearity among the predictor variables. See Table 4 for correlations among variables.

3.4.1 Predicting false memory

Hierarchical regression analyses were conducted to examine the predictors of false memory formation for earthquake related fake news. A four-step hierarchical linear regression was conducted to examine the predictive value of gender, perceived economic status, earthquake fear, earthquake knowledge, and analytical thinking on false memory scores. Table 5 presents the results of the hierarchical regression analyses. At Step 1, gender and economic status were entered as predictors and did not significantly predict false memory, $R^2 = .013$, $F(2, 136) = 0.85$, $p = .814$. In Step 2, earthquake fear was added, but the model remained nonsignificant, $\Delta R^2 = .004$, $\Delta F(1, 134) = 0.56$, $p = .454$. However, the model became significant at Step 3, with the inclusion of earthquake knowledge, $\Delta R^2 = .074$, $\Delta F(1, 133) = 10.91$, $p = .001$, indicating that earthquake knowledge significantly predicted lower false memory scores. In the final step, analytical thinking (CRT) was added, which led to statistically significant increase in explained variance, $\Delta R^2 = .29$, $\Delta F(1, 133) = 62.28$, $p < .001$. The overall model at Step 4 was statistically significant, $F(5, 133) = 16.34$, $p < .001$, and accounted for 38% of the variance in false memory scores ($R^2 = .38$). In the final model, CRT was the only significant predictor of false memory, $B = -.38$, $SE = .048$, $\beta = -.585$, $t = -7.88$, $p < .001$. Although earthquake knowledge was

initially a significant predictor at Step 3, its effect became nonsignificant after CRT was included, suggesting that the variance accounted for by earthquake knowledge overlapped with that explained by analytical thinking. Gender, perceived economic status, and earthquake fear were not significant predictors at any step.

Table 5. Hierarchical Regression Results for False Memory

Variable	*B*	*95% CI for B*		*SE B*	β	R^2	ΔR^2
		LL	UL				
Step 1						.013	.012
Constant	0.29	-0.47	1.06	0.39	—		
Gender	-0.03	-0.37	0.28	0.17	-0.02		
Economic Status	0.14	-0.07	0.35	0.11	0.11		
Step 2						.017	.004
Constant	0.58	-0.49	1.66	0.54	—		
Gender	-0.06	-0.39	0.27	0.17	-0.03		
Economic Status	0.13	-0.08	0.34	0.11	0.10		
Earthquake Fear	-0.01	-0.03	0.02	0.01	-0.07		
Step 3						.091	.074**
Constant	2.00	0.66	3.34	0.68	—		
Gender	-0.07	-0.39	0.25	0.16	-0.04		
Economic Status	0.11	-0.09	0.32	0.10	0.09		
Earthquake Fear	0.01	-0.02	0.02	0.01	0.01		
Earthquake Knowledge	-0.11**	-0.17	-0.04	0.03	-0.28**		
Step 4						.381	.290***
Constant	2.67	1.55	3.79	0.57	—		
Gender	0.02	-0.24	0.29	0.13	0.01		
Economic Status	0.13	-0.04	0.30	0.09	0.10		
Earthquake Fear	0.01	-0.01	0.03	0.01	0.05		
Earthquake Knowledge	-0.03	-0.08	0.03	0.03	-0.07		
CRT	-0.38***	-0.47	-0.28	0.05	-0.58***		

Note. *p < .05. **p < .01. ***p < .001 R^2 = R Square, ΔR^2 = R Square Change.

3.4.2 Predicting true memory

In the analysis of true memory, the overall regression model was statistically significant, $F(5, 133) = 3.002$, $p = .013$, accounting for 10.1% of the variance in true memory scores ($R^2 = .101$). Only analytical thinking emerged as a significant predictor in the final step of the model. Specifically, higher CRT scores were associated with lower true memory scores, $B = -0.20$, $SE = 0.07$, $\beta = -0.24$, $t = -2.68$, $p = .008$. This likely shows a more conservative response tendency of the participants with higher analytical thinking skills. Analytical thinking contributed a significant

increase in explained variance in the final step, $\Delta R^2 = .049$, $\Delta F(1, 133) = 7.20$, $p = .008$. Prior steps of the model were not statistically significant.

3.4.3 Predicting discriminability (*d'*)

To gain a more nuanced understanding of memory performance, a hierarchical linear regression analysis was conducted to evaluate the predictors of *d',* a signal detection measure of participants' discriminability between true and false earthquake-related news. Overall, the final regression model was statistically significant, $F(5, 133) = 4.11$, $p = .002$, and accounted for 13.4% of the variance in *d'* scores. In Step 1, gender and perceived economic status were entered into the model and accounted for a significant amount of variance in *d'* scores, $R^2 = .06$, $F(2, 136) = 4.20$, $p = .017$. Perceived economic status significantly predicted *d'* ($\beta = -.20$, $p = .018$), indicating that individuals who rated their economic situation more negatively tended to have lower *d'* scores. Gender was not a significant predictor ($\beta = -.13$, $p = .133$). Inclusion of earthquake fear at Step 2 did not significantly enhance model fit, $\Delta R^2 = .014$, $\Delta F(1, 135) = 2.06$, $p = .154$, and earthquake fear was not a significant predictor ($\beta = .122$, $t = 1.43$, $p = .154$). At Step 3, adding earthquake knowledge significantly increased explained variance, $\Delta R^2 = .029$, $\Delta F(1, 134) = 4.30$, $p = .040$, suggesting that higher earthquake knowledge was associated with better discriminability ($\beta = .175$, $t = 2.07$, $p = .040$). In the final step, inclusion of analytical thinking further significantly improved the model, $\Delta R^2 = .033$, $\Delta F(1, 133) = 5.00$, $p = .027$. In this final model, perceived economic status remained significant ($\beta = -.181$, $t = -2.22$, $p = .028$), and CRT emerged as a significant positive predictor ($\beta = .196$, $t = 2.24$, $p = .027$), suggesting that higher analytical thinking was associated with improved discriminability between true and false news. Gender ($p = .150$), earthquake fear ($p =$

.453), and earthquake knowledge (p = .245) were not significant predictors in the final model.

3.4.4 Predicting response bias (criterion)

To explore participants' general response tendencies in memory judgments, a hierarchical regression analysis was conducted using criterion as the dependent variable. The final model was statistically significant, F (5, 133) = 8.14, $p < .001$, explaining 23.4% of the variance in response bias ($R^2 = .234$). Gender, perceived economic status, earthquake fear, and earthquake knowledge were entered in the first four steps and did not significantly predict response bias across these models (all ΔR^2s < .02, all ps > .10). In the final step, the inclusion of CRT score significantly improved the model, $\Delta R^2 = .201$, ΔF (1, 133) = 34.97, $p < .001$. CRT emerged as the only significant predictor ($\beta = .487$, $p < .001$), with higher scores associated with a more conservative response bias. This suggests that participants with greater analytical thinking ability were generally less likely to report memories, adopting a higher threshold before endorsing a news item as remembered. None of the other variables, including economic status, fear, or knowledge, significantly predicted response bias.

3.5 Exploratory analysis: Mediator role of analytical thinking

Following the results from hierarchical regressions, current study decided to conduct mediation analyses. In the hierarchical regression models, earthquake knowledge significantly predicted false memory in the initial steps, but this effect became non-significant when analytical thinking was added to the model. This pattern suggested that the influence of earthquake knowledge on false memory might be explained in

part by its relationship with analytical thinking. Therefore, study conducted an exploratory mediation analysis to test whether analytical thinking mediates the relationship between earthquake knowledge and memory performance using bootstrapping. The aim was to investigate whether this relationship operates through analytical thinking. Specifically, to understand whether having more knowledge about earthquakes affects susceptibility to false memory by leading to more analytical thinking. And if so, does this analytical thinking help people avoid reporting memories for fake news or does it also affect how they report memory for accurate information? Study also explored how this pathway may influence more nuanced aspects of memory performance like d' and c.

Starting with false memory, the mediation analysis showed that earthquake knowledge significantly predicted analytical thinking, $b = 0.22$, $SE = 0.06$, $p < .001$, 95% CI [0.11, 0.33]. In turn, analytical thinking negatively predicted false memory, $b = -0.37$, $SE = 0.06$, $p < .001$, 95% CI [-0.49, -0.25]. The total effect of earthquake knowledge on false memory was significant, $b = -0.11$, $SE = 0.03$, $t(137) = -3.51$, $p = .001$, 95% CI [-0.19, -0.03]. The direct effect of earthquake knowledge on false memory was not significant, $b = -0.03$, $SE = 0.03$, $t(136) = -.93$, $p = .353$, 95% CI [-0.08, 0.03]. The indirect effect of earthquake knowledge on false memory through analytical thinking was statistically significant, $b = -0.08$, $SE = 0.02$, $p < .001$, with a 95% bootstrap confidence interval of [-0.13, -0.04]. These results suggest a full mediation, indicating that the relationship between earthquake knowledge and false memory is explained through increased analytical thinking. This mediation model is visually presented in Figure 3.

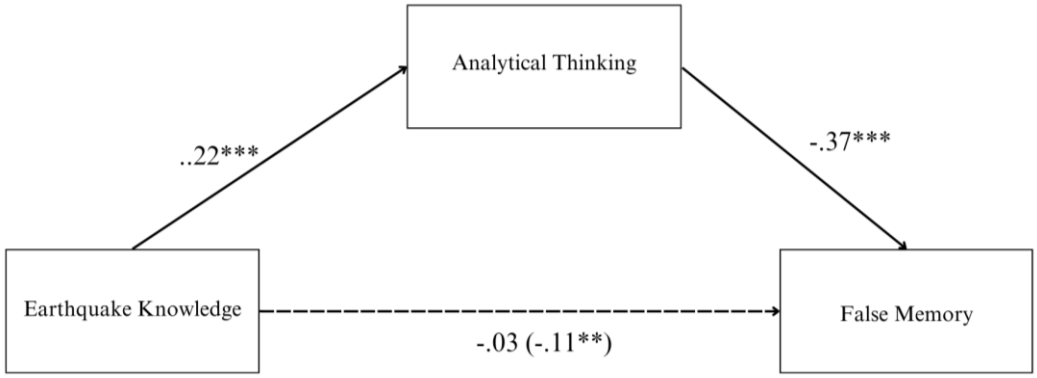

Figure 3. Mediation model of the effect of earthquake knowledge on false memory via analytical thinking

For true memory, the total effect of earthquake knowledge was not statistically significant, $B = 0.02$, $SE = 0.04$, $t(137) = 0.37$, $p = .713$, 95% CI [−0.07, 0.10], indicating no evidence of a relationship between earthquake knowledge and true memory performance.

Additionally, CRT significantly predicted better discriminability $b = 0.10$, $SE = 0.04$, $p = .018$, 95% CI [0.02, 0.19]. The total effect was significant, $b = 0.07$, $SE = 0.03$, $t(137) = 2.55$, $p = .010$, 95% CI [0.02, 0.12]. The direct effect of earthquake knowledge on d′, was not significant ($p = .111$, 95% CI [-0.01, 0.10]). However, the indirect effect of earthquake knowledge via analytical thinking was statistically significant, $b = 0.02$, $SE = 0.01$, 95% CI [0.004, 0.051]. This indicates that participants who differ in earthquake knowledge by one point also differ in their d′ scores by approximately 0.02, with this difference occurring because greater earthquake knowledge is associated with higher analytical thinking ($b = 0.22$), which in turn predicts better discrimination ability ($b = 0.09$). Although the effect is small, it suggests that analytical thinking helps people use their earthquake knowledge to be less susceptible to false memories.

For response bias (criterion), the total effect of earthquake knowledge was not statistically significant, $B = 0.03$, $SE = 0.02$, $t(137) = 1.27$, $p = .205$, 95% CI [-0.01, 0.07], indicating no evidence of an overall relationship between earthquake knowledge and criterion.

CHAPTER 4

DISCUSSION

This research examined how individual differences in analytical thinking, fear of earthquake and earthquake knowledge relate to susceptibility to false memories of earthquake-related fake news. Results showed that 42% of participants reported remembering at least one fake news. Analytical thinking was a strongly protective individual factor against misinformation, as individuals scoring higher in analytical thinking were significantly less likely to report false memories and were better at distinguishing true from fake news. Accordingly, these analytical thinkers also showed more cautious memory reporting overall, as they reported fewer true memories as well. Earthquake knowledge was associated with fewer false memories, suggesting that better earthquake knowledge might help individuals resist misinformation. Additionally, this relationship was mainly explained by analytical thinking, showing that knowledge itself may primarily contribute to better memory performance by helping people evaluate information analytically. Fear of earthquakes, significantly correlated with earthquake knowledge, but it did not directly relate to susceptibility to false memories. Additionally, demographic factors such as gender and perceived economic status had a limited direct impact on memory performance, although lower perceived economic status was modestly associated with reduced ability to accurately discriminate true from false news.

4.1 False memory formation for earthquake misinformation

One of the main findings from this study was that 42% of participants reported at least one false memory after being exposed to fake earthquake-related news. This

finding shows a similar rate to previous research examining false memories that were caused by misinformation across different contexts, such as political events and health crises, where false memory reporting showed to be ranging from 20% to 50% (Greene & Murphy, 2020; Murphy et al., 2019; Mangiulli et al., 2022). It also conforms to the 40% prevalence found in a meta-analysis study of fake news and false memory studies that have used the same definition of false memory and similar recognition-based measurement methods (Schincariol et al., 2024). Almost half of the participants in the present study created false memories for fake earthquake news in spite of living in a city where earthquake is a constant danger. This suggests that being personally familiar with a topic does not necessarily protect memory from misinformation.

In line with previous studies, any reported memory, whether vague or clear, for a fake news item was coded as a false memory (Greene & Murphy, 2020; Mangiulli et al., 2022). In this study, memory reporting means that participants marked on the rating scale whether they remembered the news item, rather than actually retelling or describing the event. This approach follows a standard operational definition in false memory research, where memory reporting for events that did not occur is treated as a memory error, regardless of the confidence or clarity of that recollection. Previous findings demonstrate that even vague or low-confidence false memories can influence attitudes, reinforce misinformation, and alter decision-making behavior (Scuotto et al., 2021; Mangiulli et al., 2022). For example, in Mangiulli et al. (2022), participants who formed false memories for fake COVID-19 vaccine side effects subsequently reported greater vaccine hesitancy, even when their confidence in those memories was low. Therefore, even vague memories are considered evidence of source misattribution or familiarity-based

processing, which are core mechanisms in false memory research (Johnson et al., 1993; Yonelinas, 2002).

Nevertheless, it is important to note that most of these false memories were reported as vague rather than clear memories. There were a few participants who reported "clear" memories when exposed to the fake news items, instead most reported that they had a "vague memory" of the event, about 97% (307 out of 314). This aligns with previous research indicating that vague memories often outnumber clear memories for fake news stories. Vague memories are frequently reported because misinformation often produces a sense of familiarity or plausibility rather than vivid recall of specific details (Greene & Murphy, 2020). According to fuzzy-trace theory, individuals rely heavily on gist-based processing when detailed verbatim memories are absent, making vague recollections particularly prevalent for misinformation (Reyna et al., 2016). In fact, research consistently shows that vague memories constitute the majority of false memory reports following fake news exposure (Schincariol et al., 2024). This finding complements previous research showing that participants with higher analytical thinking tend to adopt a more conservative response strategy, leading them to report memories more cautiously and avoid false reporting. For example, Greene and Murphy (2020) used a similar recognition-based false memory paradigm with political fake news and found that higher CRT scores predicted fewer "remember" responses to fake news headlines. Likewise, King and Greene (2024) examined analytical thinking in a health-related misinformation context, used a recognition memory test, and reported that participants with higher analytical thinking were less likely to report fake news as remembered.

When examining memory for true earthquake-related news, participants reported memory 40% of the items, and 78% of participants reported remembering at least one of the true news stories. This rate is higher than the 16% false alarm rate for fake news, where 42% of participants reported at least one false memory. This pattern aligns with prior research showing that true events are typically remembered more often than fake ones (Greene & Murphy, 2020; Mangiulli et al., 2022). Additionally, when exposed to true news participants' cautious reporting pattern continued. While true news stories were remembered significantly more often than fake ones, they too were mostly reported as vague rather than clear memories. There may be several reasons for these findings. In the memory ratings, the response option "I have a clear memory" ("Net bir şekilde hatırlıyorum") may have caused an unintentional threshold effect. More specifically, because phrasing carries a high level of certainty and intensity that could potentially discourage participants from selecting it unless they were extremely confident. This phrasing was adapted directly from Greene and Murphy (2020), that included options such as "I have a clear memory" and "I have a vague memory." On the other hand, following studies, appear to have change this phrasing to "I remember this" without any certainty claim like "clearly." (King & Greene, 2024; Mangiulli et al., 2022). In turn, findings from these studies reported higher remembered responses compared to vague memory responses. Therefore, we can infer that the wording used in this study may have led participants to default to the "vague memory" option even for items they likely recalled. In addition to the phrasing, the choice to use relatively neutral and factual true news stories may have contributed to this outcome. Considering the potentially traumatic nature of earthquake experiences in Turkey, news were selected carefully to not reactivate participants' memories that would cause them distressing emotions.

In other words, to ensure ethical integrity and avoid emotional harm, the true news items selected were intentionally not sensational, focusing on infrastructure effects (e.g., bent railway tracks, minor landslides) rather than human suffering or dramatic losses. As a result, these news stories may have been less widely shared than more distressing earthquake news, making them less familiar to participants. This is consistent with collective memory research showing that public recall is highest for widely shared or emotionally impactful events, whereas less dramatic incidents such as the true news items in this study are remembered less consistently (Coman et al., 2016; Hirst & Phelps, 2016).

It is also possible that participants' tendency to report vague memories might be due to reluctance to admit unfamiliarity with a topic they feel they should know about, especially when the topic is of national importance or widely discussed, as shown in overclaiming research (Scuotto et al., 2021). Earthquakes in Turkey are not only frequent but also deeply connected into the country's collective memory. This context might have created pressure, conscious or unconscious, for participants to report some form of familiarity, even when none existed.

4.2 The role of individual differences

4.2.1 The impact of analytical thinking on false memory formation

One of the main individual factors that was found to be affecting false memory formation was analytical thinking. It was found that analytical thinking played a protective role in reducing participants' susceptibility to false memories. More specifically, participants who showed higher analytical thinking styles reported significantly fewer false memories for earthquake related fake news. This outcome aligns closely with previous findings indicating that analytical thinkers consistently

exhibit lower vulnerability to misinformation and memory distortion across various contexts, such as political or health related fake news (Greene & Murphy, 2020; Mangiulli et al., 2022; Schincariol et al., 2024). For instance, a study on fake news about national identity found that individuals with higher analytical thinking were significantly less likely to form false memories for misinformation about national stereotypes, even when controlling for other individual differences (Delaney et al., 2024). This protective effect of analytical thinking is theoretically consistent with the dual-process theory (Evans & Stanovich, 2013), which proposes two types of cognitive thinking styles. An intuitive and automatic style (Type 1) and a deliberate and analytical style (Type 2) (Johnson et al., 1993). In the current study, participants with higher CRT scores likely applied systematic processing, carefully analyzing earthquake related news items leading them to be less susceptible to misinformation. From this it can be inferred that analytical thinking reduced the acceptance and subsequent encoding of misinformation into memory. Moreover, participants with higher analytical thinking better at discriminating true from false news stories, as indicated by the signal detection measure d-prime. This finding further emphasizes that analytical cognitive style does not simply decrease acceptance of misinformation it also enhances sensitivity in distinguishing factual information from fabricated content. Therefore, analytical thinkers demonstrate not only cautiousness in memory reporting but also a genuine cognitive advantage in processing and evaluating information under conditions of uncertainty. Together, these results highlight analytical thinking as an important cognitive ability that successfully reduces vulnerability to false memories, especially earthquake misinformation.

Furthermore, participants with higher analytical thinking scores not only reported fewer false memories but also reported fewer memories for true news items.

At first glance, this appears counterintuitive but this result shows an important distinction that the number of "true news memories" reported in this study reflects participants' tendency to report items as remembered, rather than their true memory accuracy. SDT further explain this by separating memory performance into two key aspects which are discriminability and response bias that is general threshold for reporting a memory, measured as criterion (Stanislaw & Todorov, 1999). Participants with higher analytical thinking demonstrated a more conservative response bias, meaning they set a higher threshold before reporting any memory whether true or false as genuinely recalled. Thus, their relatively lower reporting of true news memories does not necessarily indicate poorer actual memory accuracy rather, it suggests heightened caution and reluctance to report memories without high confidence in their validity. This conservative response bias also supported by other false memory studies that have found that higher analytical thinking predicted both fewer false memories and lower true memory endorsements (King & Greene, 2024). The present results highlight that analytical thinking influences not just what individuals recall, but how and if they will go on to report the memories, highlighting the value of taking response strategies into account when examining memory.

4.2.2 The impact of earthquake knowledge on false memory formation

Earthquake knowledge was another individual factor that the current study found to have a significant role on participant's susceptibility to false memories. At first it was found that participants with more accurate knowledge about earthquakes were less likely to report false memories when exposed to misinformation. This finding supports previous research showing that objective knowledge helps prevent false memories, likely because people with stronger knowledge background are better at

spotting and rejecting misleading information (Greene & Murphy, 2020; Scuotto et al., 2021). However, once analytical thinking was taken into account, the protective effect of earthquake knowledge was no longer significant. From this it can be inferred that the effect of knowledge might be partially explained by its relationship with analytical thinking. The following mediation analysis supported this idea, showing that earthquake knowledge was linked to higher analytical thinking, which then reduced false memory susceptibility. In other words, participants with more earthquake knowledge were more likely to show higher levels of analytical thinking, which in turn protected them from forming false memories. Based on this, knowledge itself may not independently affects false memory susceptibility but it seems to support analytical thinking, which plays a role on reducing false memory susceptibility. Also, mediation analysis with d′ as the dependent variable suggested that the relationship between earthquake knowledge and discriminability mediated by analytical thinking. Participants with greater earthquake knowledge tended to score higher on analytical thinking, and this thinking style was linked to better discrimination between true and false information. Although the effect was small, this implies that analytical thinking may help people use their earthquake knowledge in ways that make them less susceptible to false memories.

This relationship between knowledge, analytical thinking, and false memory susceptibility can be understood through the source-monitoring framework (Johnson et al., 1993). According to this model, systematic reasoning processes such as drawing on factual knowledge and prior schemas help individuals evaluate the plausibility and origin of a memory. This is supported by recent studies showing that higher knowledge improves memory discriminability, leading to fewer false memories and more accurate identification of true information (Delaney et al., 2024).

Furthermore, these results indicate that improving accurate knowledge about earthquakes alone might not be enough to decrease susceptibility to misinformation. Instead, to increase resistance to misinformation the combination of knowledge with critical analytical thinking skills needed. Therefore, interventions that aim to decrease susceptibility to misinformation should aim to strengthen analytical thinking alongside improving knowledge on the subject, as knowledge without analytical thinking skills may fail to provide effective protection.

4.2.3 The impact of earthquake fear on false memory formation

Findings showed that contrary to the study's hypothesis and prior research findings (e.g., Scuotto et al., 2021), earthquake related fear did not significantly predict participants' susceptibility to false memories. Although previous studies on fake news about Covid-19, suggested that high levels of fear or anxiety could improve memory performance by improving detailed cognitive processing, this protective effect was not significant in the current study (Greene & Murphy, 2020; Kensinger, 2009). The reason for this outcome could be because earthquake fear did not reach the level of emotional intensity necessary to have a significant impact on memory processes. As mentioned earlier, the reason that might contribute to this outcome could be because the study chose to use relatively neutral and factual news stories to prevent emotional distress. Even tough participants reported moderate fear of earthquakes, they most probably did not experienced emotional arousal from the fake news stories to significantly alter their memory encoding or retrieval processes.

Also, the lack of a direct relationship between earthquake fear and false memory shows how complex effects of emotional effects on cognitive processing. Moderate fear may, in theory, encourage people to carefully analyze information, but

at the same time high levels of fear or anxiety may disrupt cognitive processing as a consequence of resource depletion caused by stress, according to cognitive load theories (Muraven & Baumeister, 2000). In other words, the moderate fear levels reported by participants in this study may not have been strong enough to trigger either enhanced analytical processing or significant cognitive impairment, resulting in no observable impact on memory performance.

It is also important to consider the nature of the measurement used in assessing fear. As mentioned earlier while the instrument was labeled a "fear" scale, many of its items resembled those found in anxiety assessments such as worrying about future earthquake or feeling tense in uncertain situations rather than capturing acute, situational fear. Conceptually, fear represents a rapid, short reaction to an immediate threat, whereas anxiety is a state of anticipatory alertness (Parsafar et al., 2018; APA, 2013). This is why, what measured may have more accurately represented trait like earthquake anxiety rather than momentary, emotionally intense fear. Moreover, study was conducted shortly after a 6.2 magnitude earthquake happened in Istanbul. The earthquake on April 23, 2025 may have caused raised everyone's baseline anxiety, pushing more participants into a higher-arousal range. Hence, this could explain why individual differences in memory related to fear couldn't be observed in this study.

The study also found a positive correlation between earthquake-related fear and earthquake knowledge. This relationship may show an adaptive function of anxiety, meaning individuals experiencing higher levels of concern about earthquakes may be are more motivated to seek out information. Based on this, this finding may suggests that participants who felt more anxious about earthquakes may have developed greater knowledge, as a way to reduce uncertainty and enhance their

sense of control. Previous research has shown that high-risk perception and anxiety can increase information-seeking behaviors and greater preparedness (Lindell & Perry, 2012).

4.2.4 Socioeconomic status and memory discrimination

Initially socioeconomic status (SES) was not the focus of the current study but there was an interesting finding that showed participants with higher perceived economic status reported lower memory discriminability. While the strength of this relationship was modest, it was statistically significant and persisted even after controlling for other predictors such as fear, knowledge, and analytical thinking. This finding could be seen as contradicting because higher SES is typically associated with access to better education resources, which ultimately leads to stronger cognitive performance (Noble et al., 2007). The reason for this might be due to individuals with low SES who may live in more houses that aren't safe and well built for an earthquake might perceive earthquakes as more personally threatening. In other words, people with lower economic status may engage more with earthquake related information out of necessity, which could lead to better memory discrimination in this specific context. However, it is important to note that this relationship was small and came out only in discriminability, not across all memory measures. Therefore, it should be interpreted with caution and seen as exploratory.

4.3 Implications and contributions

It is important to understand the implications of false memories because it can affect a person's decisions, emotions and could create complications in the areas such as law, psychology and health. To elaborate on possible legal effects of false memories,

they can cause people to give false eyewitness testimonies and could cause innocent people to get convicted or vice versa. This effect occurs because people giving eyewitness testimonies can get influenced by suggestive questioning or misinformation that would cause them to testify to something they have not actually witnessed (Morgan et al., 2007). For example, with the help of the legal organization that is called the "Innocence Project" and new DNA identification methods, it was found that incorrect eyewitness reports affected the conviction of %70 percent of people who were sent to prison for something they did not do (Park, 2018). While these examples highlight the judicial risks of memory distortions, the present study extends this concern to public safety and crisis communication. Specifically, the finding that 42% of participants formed false memories for earthquake-related fake news shows that misinformation can compromise individuals' ability to accurately evaluate earthquake-related information. This can have important implications for how people prepare for and respond to real emergencies. One previous study examined the effect of misinformation about earthquakes on public perception towards earthquakes in Romania (Mărcău et al., 2023). Their study showed that people who believed in fake news about seismic activity reported increased fear and reduced psychological well-being. Just as misinformation can distort courtroom testimony, it can also shape public perception, risk assessment, and behavioral intentions during natural disasters.

The current study's findings on earthquake-related fake news provide valuable theoretical and practical information that could contribute to the existing literature on misinformation and memory distortion. On a theoretical level, this research extends our understanding of the cognitive mechanisms underlying susceptibility to false memories, reinforcing and refining existing frameworks such

as dual process theory (Evans & Stanovich, 2013), the source monitoring framework (Johnson et al., 1993). Specifically, the study supports the view that engaging in analytical (Type 2) thinking reduces false memory reporting. Furthermore, it refines this perspective by showing that the protective role of knowledge against false memories is not direct, but instead operates through analytical thinking. It suggests that accurate memory for news is not only depends on a having more factual knowledge, but applying this knowledge through critical evaluation. Therefore, educational interventions must go beyond increasing knowledge on the subject and should target analytical thinking and critical literacy to effectively fight misinformation. Experimental interventions such as the Bad News game, prebunking videos, and critical thinking training have all successfully reduced susceptibility to fake news by enhancing analytical processing and source evaluation skills (Basol et al., 2020; Roozenbeek & van der Linden, 2019; Maertens et al., 2021).

In addition to its contribution to understanding misinformation's effect, this study also provided explanations for the individual factors that could make people more vulnerable to this memory distortion. This study demonstrated the relationship between individual differences such as analytical thinking skills, knowledge and emotional states impact false memory susceptibility. It is important to understand this relationship so that it can provide information for future interventions and education programs aiming to reduce misinformation that was design to protect vulnerable populations. It is especially important to have these strategies for reducing susceptibly to false memory formation in professions such as law, psychology, health care, and education.

4.4 Limitations and future directions

This study has some limitations that should be considered when interpreting the findings. While most of the fake earthquake-related news stories created for this study were designed to be novel, certain topics such as stories about secret nuclear facilities might have partially overlapped with preexisting misinformation or conspiracy theories encountered previously by participants. This limitation is common in fake news research (Greene & Murphy, 2020; Mangiulli et al., 2022), where controlling for participants' prior exposure is challenging. As a result, present study can not fully exclude the possibility that some false memory reporting represent the reinforcement or reactivation of prior misinformation rather than entirely new memory formation. Future studies might consider checking participant's familiarity with misinformation to better differentiate between newly created and preexisting false memories.

Moreover, the emotional context during data collection may have influenced participant's anxiety responses. As mentioned earlier the study was conducted shortly after a recent 6.2 magnitude earthquake near Istanbul, possibly increasing anxiety levels across all participants and reducing individual differences in emotional responses. This timing may have distorted meaningful relationships between earthquake-related anxiety and false memory susceptibility. Although fear scores showed sufficient variability, the post-earthquake context likely raised everyone’s baseline anxiety, pushing more participants into a higher-arousal range. This can change how anxiety relates to memory and make the association with false memory appear weaker or different than under typical conditions. Also, although labeled as measuring "earthquake fear," the scale used in this study mainly assessed anxiety-related responses rather than acute, situational fear. Future research should use

measures specifically designed to capture acute emotional reactions in misinformation contexts, clearly distinguishing fear from anxiety.

Another limitation is that the study did not collect information on participant's media consumptions. Factors such as the type, frequency, and sources of media people engage with can influence both their exposure to misinformation and their ability to evaluate it (Frenda et al., 2013; Pennycook & Rand, 2019). For example, relying heavily on unverified social media sources may increase exposure to false earthquake-related stories. On the other hand, following trustworthy news outlets might provide corrective information that reduces false memory susceptibility. Future research should include measures of media consumption to better understand its role in the formation of false memories for earthquake-related news.

In addition to these limitations, some aspects of the current study could be expanded in future research. In the present study, the sample consisted of undergraduate students at a single university in Istanbul, potentially limiting generalizability. These results may differ among broader populations, such as older adults, non-student populations, or individuals from other geographic regions. This might be because of their education level, how much they have been exposed to misinformation before, and the kinds of media they follow could all influence how CRT, earthquake knowledge, and false memory are related. Future research should combine diverse samples to confirm the external validity of these findings.

APPENDIX A

ETHICS COMMITTEE APPROVAL

T.C.
BOĞAZİÇİ ÜNİVERSİTESİ REKTÖRLÜĞÜ
Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu (Sbinarek)

2025 AİLE YILI

Sayı : E-84391427-050.04-232602 20.05.2025
Konu : 2025-32T Kayıt Numaralı Başvurunuza İlişkin
Etik Kurul Onay Kararı (2025-04)

Sayın Doç. Dr. İnci AYHAN

Tez danışmanlığını yürütmekte olduğunuz öğrenciniz Aleyna Temizel'in "Depremle İlgili Yalan Haberlere Yönelik Yanlış Hafıza Oluşumunda Bireysel Farklılıkların Rolü"" başlıklı projesi ile Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu'na (SBİNAREK) yapmış olduğunuz, 2025-32T kayıt numaralı başvurunuz, 05.05.2025 tarih ve 2025/04 sayılı kurul toplantısında incelenmiş olup projenize etik onay verilmesi uygun bulunmuştur.

Bu karar, tüm kurul üyelerinin çevrim içi katılımıyla gerçekleştirilen toplantıda oy birliği ile alınmıştır. Onay mektubu, tüm üyeler adına Komisyon Başkanı tarafından e-imzalanmıştır.

Bilgilerinizi rica ederiz.

Saygılarımızla,

Dr. Öğr. Üyesi Işıl ERDUYAN
Kurul Başkanı

Adres: Boğaziçi Üniversitesi 34342 Bebek/ İstanbul
Telefon No: Faks No:
e-Posta: İnternet Adresi: www.bogazici.edu.tr
Kep Adresi: bogaziciuniversitesi@hs01.kep.tr

Bilgi İçin: Sevin KOÇ KÖKSAL
Koordinatör
Telefon No: 0 212 359-6837

APPENDIX B

INFORMED CONSENT (ENGLISH TRANSLATION)

Dear Participant,

This study is designed to understand individuals' memory processes and the individual characteristics that may influence them. The research will be conducted online with individuals living in Istanbul, with the approval of the Ethics Committee of the Institute for Graduate Studies in Social Sciences at Bogazici University.

If you agree to participate, you will be asked to read some earthquake-related news stories and later respond to memory questions about them. You will also be asked to provide certain demographic information (e.g., age, gender, education), and to complete questionnaires assessing your analytical thinking, fear of earthquakes, and earthquake knowledge (Cognitive Reflection Test, Earthquake Fear Scale, and Earthquake Knowledge Test). In total, you will be asked to answer approximately 43 questions/items. All your responses will be collected anonymously and used for scientific purposes only.

Before deciding to participate, please read the following carefully: During the study, you will be presented with news stories related to the February 6, 2023 earthquakes. These stories do not contain direct disturbing content; however, since they are earthquake-themed, they may cause some emotional discomfort for certain participants. In addition, the questionnaires include items about earthquake fear and knowledge, which might also lead to temporary emotional discomfort. If at any point during the study you feel uncomfortable, you may withdraw at any time.

Your participation is entirely voluntary. You may withdraw without giving any reason, and all of your data will be deleted. Participation may also contribute to your

awareness in recognizing earthquake-related misinformation and evaluating information more critically.

As compensation, you will receive 1 extra course point in your PSY coded course. At the beginning of the study, you will be asked to provide your student number and specify the PSY-coded course for which you wish to receive the extra point. This information will be stored securely and accessible only to the course instructor, and it will be deleted after the transfer of points. Your student number and course information will not be linked with your research data. Even if you withdraw, you will not lose your right to receive the extra point. No payment will be required, nor will any financial compensation be provided for your participation.

The study will take approximately 40–45 minutes. We recommend completing it in one sitting, in an environment where you will not be distracted.

If you feel the need for psychological support after participation, you may contact the Bogazici University Counseling Center (BÜREM), which provides free psychological counseling to students.

Phone: +90 (212) 359 71 39

Email: burem@bogazici.edu.tr

For any questions or concerns about the study, you may contact the researcher Aleyna Temizel (aleyna.temizel@std.bogazici.edu.tr). For questions about your rights as a participant, you may contact the Bogazici University Social and Human Sciences Research Ethics Committee (SBINAREK) at sbinarek@bogazici.edu.tr.

☐ I agree to participate in this study.

☐ I do not agree to participate in this study.

APPENDIX C

INFORMED CONSENT (ORIGINAL TURKISH)

Değerli Katılımcı,

Bu çalışma, bireylerin bellek süreçlerini ve bu süreçleri etkileyen bireysel özellikleri anlamaya yönelik olarak tasarlanmıştır. Araştırma, İstanbul şehrinde yaşayan bireylerle, Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu onayıyla, internet üzerinden gerçekleştirilecektir.

Çalışmaya katılmayı kabul ettiğinizde, sizden depremle ilgili bazı haber içeriklerini okumanız ve daha sonra bu içeriklerle ilgili hafızanızı değerlendiren sorulara yanıt vermeniz istenecektir. Ayrıca bazı demografik bilgilerinizi (yaş, cinsiyet, eğitim durumu vb.) paylaşmanız ve analitik düşünme becerilerinizi, deprem korkunuzu, ve depremle ilgili bilgi düzeyinizi ölçen anketleri (Bilişsel Yansıtma Testi, Deprem Korkusu Ölçeği ve Deprem Başarı Testi) doldurmanız istenecektir. Toplamda yaklaşık 43 soru veya maddeye yanıt vermeniz beklenmektedir. Tüm yanıtlarınız tamamen anonim olarak toplanacak ve yalnızca bilimsel amaçlarla kullanılacaktır.

Bu çalışmaya gönüllü olarak katılmadan önce, size çalışmamızın getirebileceği potansiyel riskler ve hakkında bilgi sunmak isteriz. Lütfen bu bilgileri dikkatlice okuyun ve katılma kararı vermeden önce herhangi bir sorunuz varsa sormaktan çekinmeyin. Çalışmamızda, 6 Şubat 2023 tarihinde meydana gelen depremlerle ilgili haber içerikleri sunulacaktır. Bu haberlerin içeriklerinde doğrudan rahatsız edici unsurlar bulunmamaktadır; ancak deprem temalı olmaları sebebiyle bazı katılımcılarda duygusal rahatsızlık hissine yol açabilir. Ayrıca, çalışmada deprem korkusu ve deprem bilgisi ile ilgili anket soruları da alacak olup, bu tür

içeriklerin bazı katılımcılarda geçici duygusal rahatsızlık hissine yol açabileceğini göz önünde bulunduruyoruz. Çalışma sırasında kendinizi rahatsız hissederseniz, süreci istediğiniz zaman sonlandırabilirsiniz.

Araştırmamıza katılımınız tamamen gönüllülük esasına dayanmaktadır. Dilediğiniz zaman herhangi bir gerekçe göstermeksizin çalışmadan ayrılma hakkına sahipsiniz ve bu durumda sizden alınan tüm veriler silinecektir. Çalışmaya katılımınız, depremle ilgili yanlış bilgileri tanıma ve daha eleştirel değerlendirme konusunda farkındalığınızı artırmasına katkı sağlayacaktır. Katılımınız karşılığında, almakta olduğunuz PSY kodlu ders notunuza eklenmek üzere 1 puan verilecektir. Belirttiğiniz PSY kodlu dersinize ek puan verilebilmesi amacıyla, çalışmanın başında yalnızca öğrenci numaranız ve puan almak istediğiniz PSY kodlu dersi belirtmeniz istenecektir. Bu bilgiler sadece ilgili dersin sorumlusu tarafından erişilebilecek şekilde saklanacak, veri toplama süreci tamamlandıktan ve puan aktarımı yapıldıktan sonra güvenli bir şekilde silinecektir. Öğrenci numaranız ve ders bilginiz, araştırma verilerinizle ilişkilendirilmeyecek ve analiz sürecine dâhil edilmeyecektir. Bu işlem, araştırma verilerinden tamamen bağımsız olarak yürütülecek olup, anonimlik ve gizlilik ilkelerine tam uyum sağlanacaktır. Araştırmanın herhangi bir aşamasında çalışmadan ayrılmanız durumunda da bu puan hakkınızı kaybetmeyeceksiniz. Ayrıca bu çalışmaya katılımınız için sizden herhangi bir ücret talep edilmeyecek ve katılımınız karşılığında herhangi bir ödeme yapılmayacaktır.

Bu araştırmanın süresi yaklaşık 40-45 dakikadır. Çalışmayı, dikkatinizin dağılmayacağı ve tek seferde tamamlayabileceğiniz bir ortamda gerçekleştirmeniz tavsiye edilir.

Araştırmaya katılımınız sonrasında psikolojik destek alma ihtiyacı hissederseniz, Boğaziçi Üniversitesi Rehberlik ve Psikolojik Danışmanlık Merkezi

(BÜREM) ile iletişime geçebilirsiniz. BÜREM, öğrencilere ücretsiz psikolojik danışmanlık hizmeti sunmaktadır. İlgili merkeze ulaşmak için:

Telefon: +90 (212) 359 71 39

E-posta:burem@bogazici.edu.tr

Çalışmayla ilgili soru ya da fikirlerinizi iletişim kaynakları üzerinden araştırmacı Aleyna Temizel (aleyna.temizel@std.bogazici.edu.tr) ile paylaşabilirsiniz. Ayrıca araştırma ile ilgili haklarınız konusunda Boğaziçi Üniversitesi Sosyal ve Beşeri Bilimler İnsan Araştırmaları Etik Kurulu'na (SBINAREK) (sbinarek@bogazici.edu.tr) danışabilirsiniz.

Yukarıda yazılanları okudum ve anladım.

☐ Çalışmaya katılmayı kabul ediyorum.

☐ Çalışmaya katılmayı kabul etmiyorum

APPENDIX D

DEMOGRAPHIC INFORMATION

Kaç yaşındasınız? _____

(How old are you?)

Cinsiyetiniz

• Erkek *(Male)*

• Kadın *(Female)*

• Diğer _____ *(Other)*

• Belirtmek istemiyorum *(Prefer not to say)*

Hangi şehirde yaşıyorsunuz? _____ *(Which city do you live in?)*

Eğitim durumunuz nedir (şu anda bulunduğunuz sınıf)? *(What is your current level of education (your current year)?)*

• 1. Sınıf *(1st year)*

• 2. Sınıf *(2nd year)*

• 3. Sınıf *(3rd year)*

• 4. Sınıf *(4th year)*

Yaşam standartlarınızı Türkiye genelinde değerlendirdiğinizde ekonomik durumunuzu nerede görüyorsunuz? *(How would you evaluate your economic status compared to the general standards in Turkey?)*

• Düşük gelir düzeyi *(Low income level)*

• Düşük-orta gelir düzeyi *(Lower-middle income level)*

• Orta gelir düzeyi *(Middle income level)*

• Orta-üst gelir düzeyi *(Upper-middle income level)*

• Üst gelir düzeyi *(High income level)*

APPENDIX E

FAKE AND TRUE NEWS

Figure E1. Nuclear rumor fake news

6 Şubat 2023 yılında meydana gelen büyük depremin ardından Hatay'ın Kırıkhan ve Defne ilçelerinin bazı bölgelerinden yükselen duman ve yüksek sıcaklık sonrasında bölgede gizli bir nükleer çalışmanın olabileceği yönünde tartışmalara yol açtı. Yerli halk, enkaz altından yükselen dumanların keskin bir kokuya sahip olduğunu ve bazı bölgelerde enkazın elle dokunulamayacak kadar sıcak olduğunu bildirdi.

(After the devastating earthquakes on February 6, 2023, smoke and high heat rising from certain areas in Hatay's Kırıkhan and Defne districts led to speculation that there might be a secret nuclear activity in the region. Locals reported that the smoke from under the rubble had a sharp smell, and in some areas the debris was too hot to touch.)

Figure E2. Fish deaths fake news

Hatay ve Adıyaman illerinin çevresindeki bazı göllerde 6 Şubat 2023 depremi sonrasında, çok sayıda balık ölümü yaşandığı bildirildi. Su yüzeyinde ölü balıkların görülmesi, gölde kimyasal sızıntı veya yer altı gazlarının açığa çıkmış olabileceği şüphelerini artırdı.

(After the February 6, 2023 earthquake, mass fish deaths were reported in lakes around Hatay and Adıyaman. The sight of dead fish floating on the water raised suspicions of a chemical leak or underground gases being released into the lake.)

Figure E3. River reversal fake news

6 Şubat Depremi ardından Dicle ve Fırat nehirlerinin bazı bölgelerinde akış yönünün geçici olarak değiştiği bildirildi. Adıyaman'ın Kahta ilçesi, Şanlıurfa'nın Birecik bölgesi ve Diyarbakır'ın Eğil ilçesindeki nehir kesimlerinde suyun ters yönde akış gösterdiğine dair yerel gözlemler kaydedildi. Yetkililer, depremin etkisiyle meydana gelen toprak kaymaları ve fay hareketlerinin nehir yataklarını etkileyerek bu olağandışı duruma neden olduğunu belirtti.

(After the February 6 earthquake, temporary reversals of flow in certain sections of the Tigris and Euphrates rivers were reported. Local observations from Adıyaman's Kahta district, Şanlıurfa's Birecik area, and Diyarbakır's Eğil district indicated backward water flow. Officials explained that landslides and fault movements caused by the earthquake altered riverbeds, leading to this unusual phenomenon.)

Figure E4. Underground city fake news

6 Şubat 2023 depremlerinin ardından, Şanlıurfa'nın Harran ve Siverek ilçeleri kırsalında meydana gelen toprak kaymaları sonucu antik bir yer altı şehri gün yüzüne çıktı. Arkeologların yaptığı ilk incelemelerde, yer altına uzanan tüneller, taş odalar ve su kanalları keşfedildi. Uzmanlar, yapının en az 2.000 yıllık olduğunu düşünüyor.

(Following the February 6, 2023 earthquakes, landslides in the rural areas of Harran and Siverek districts in Şanlıurfa revealed an ancient underground city. Preliminary archaeological examinations uncovered underground tunnels, stone chambers, and water channels. Experts believe the structure is at least 2,000 years old.)

Figure E5. Lanslide hill true news

6 Şubat depremi sonrası Adıyaman'da birçok noktada yüzey kırıkları ve heyelanlar meydana geldi. Karadere mevkisinde de depremin etkisiyle tepede heyelan oluştu. Tepedeki dev kayalar sarsıntıda yerinden oynarken, tepenin ortasında derin yarıklar oluştu.

(After the February 6 earthquake, surface ruptures and landslides occurred in many parts of Adıyaman. In Karadere, the quake triggered a landslide on a hill; massive rocks were displaced, and deep cracks formed in the middle of the slope.)

Figure E6. Bent rails true news

Kahramanmaraş'ın Türkoğlu ilçesi ile Gaziantep'in İslahiye ilçesi arasındaki tren rayları, etkileyen depremlerin etkisiyle büküldü. Aktif fay hattı üzerinde yer alan tren rayları kullanılamaz hale geldi. Bu nedenle tren seferleri de iptal oldu.

(Train tracks between Türkoğlu (Kahramanmaraş) and İslahiye (Gaziantep) were bent by the earthquake. Located directly on an active fault line, the tracks became unusable, and train services were canceled.)

Figure E7. Flooded coast true news

Kahramanmaraş merkezli 6 Şubat depreminden en çok etkilenen bölgelerden biri olan İskenderun'un sahil kesimi, depremden bir süre sonra sular altında kaldı. AFAD'ın Doğu Akdeniz'de tsunami riskinin bulunmadığını açıklamasının ardından gelen görüntüler, deniz dolgusu üzerine inşa edilen alanın çökmesinden kaynaklandı. (*One of the hardest-hit areas after the Kahramanmaraş-centered February 6 earthquake was İskenderun’s coastline, which was flooded shortly after the quake. AFAD announced there was no tsunami risk in the Eastern Mediterranean, and images showed the flooding was caused by the collapse of land reclaimed from the sea.)*

Figure E8. Sivas sinkholes true news

Sivas'ın Ulaş ilçesinde, 6 Şubat'taki Kahramanmaraş merkezli depremlerden sonra oluştuğu belirtilen irili ufaklı obruklar tespit edildi. Yeni Karahisar Mahallesi Hamurkesen mevkisinde, en büyüğünün çapı 10, derinliği ise 5 metreyi bulan 4 obruk oluştuğu gözlemlendi.

(In Ulaş, Sivas, several sinkholes were reported after the Kahramanmaraş-centered February 6 earthquakes. In Yeni Karahisar's Hamurkesen area, four sinkholes were observed, the largest measuring 10 meters in diameter and 5 meters deep.)

APPENDIX F

FEAR OF EARTHQUAKE SCALE

Aşağıda, depremle ilgili bazı ifadeler yer almaktadır. Lütfen her bir ifadeyi dikkatlice okuyunuz ve size en uygun seçeneği 1 ile 5 arasında işaretleyiniz. *(Below are some statements about earthquakes. Please read each statement carefully and mark the option that best suits you between 1 and 5).*

(1 = Kesinlikle Katılmıyorum, 5 = Kesinlikle Katılıyorum)

(1 = Strongly Disagree, 5 = Strongly Agree)

1. Depremden çok korkarım. (1) (2) (3) (4) (5)

   I am very afraid of earthquakes.

2. Depremi düşünmek beni rahatsız eder. (1) (2) (3) (4) (5)

   Thinking about earthquakes makes me uncomfortable.

3. Depremi düşündüğümde ellerim terler. (1) (2) (3) (4) (5)

   When I think about earthquakes, my hands sweat.

4. Depremde hayatımı kaybetmekten korkarım. (1) (2) (3) (4) (5)

   I am afraid of losing my life in an earthquake.

5. Medyada depremle ilgili haberleri / hikayeleri izlediğimde gergin veya endişeli olurum. (1) (2) (3) (4) (5)

   When I watch news or stories about earthquakes in the media, I feel tense or anxious.

6. Deprem hakkında endişelendiğim için uyuyamam. (1) (2) (3) (4) (5)

   I cannot sleep because I worry about earthquakes.

7. Depremi düşündüğümde kalbim hızlı atar ya da çarpar. (1) (2) (3) (4) (5)

   When I think about earthquakes, my heart beats fast or pounds.

APPENDIX G

COGNITIVE REFLECTION TEST

1. Bir kalem ve bir silgi 1.10 liraya mal oluyor. Kalem, silgiden 1.00 lira daha pahalı ise silginin fiyatı ne kadardır? *A pen and an eraser cost 1.10 lira in total. The pen costs 1.00 lira more than the eraser. How much does the eraser cost?*

a) 5 kuruş b) 10 kuruş c) 9 kuruş d) 1 kuruş

2. 5 makineyle 5 alet yapmak 5 dakika sürüyorsa, 100 makineyle 100 alet yapmak kaç dakika sürer? *If it takes 5 machines 5 minutes to make 5 tools, how many minutes will it take 100 machines to make 100 tools?*

a) 5 dakika b) 20 dakika c) 500 dakika d) 100 dakika

3. Bir gölde bir parça nilüfer yaprağı vardır. Bu nilüfer yaprağı her gün iki katına çıkmaktadır. Yaprağın tüm gölü kaplaması 48 gün sürüyorsa gölün yarısını kaplaması ne kadar sürer? *On a lake, there is a patch of lily pads that doubles in size each day. If it takes 48 days for the patch to cover the whole lake, how many days will it take to cover half the lake?*

a) 36 gün b) 24 gün c) 47 gün d) 12 gün

4. Siz bir koşu yarışındasınız ve ikinci olan kişiyi geçtiniz, kaçıncı sıraya yükselirsiniz? *You are running in a race and you pass the person in second place. What position are you in now?*

a) Birinci b) İkinci c) Üçüncü d) Dördüncü

5. Bir çiftlikte 15 tane koyun var. 8 tanesi hariç hepsi öldü, geriye kaç tane kaldı? *On a farm, there are 15 sheep. All but 8 die. How many sheep remain?*

a) 7 b) 8 c) 6 d) 9

6. Ayşe'nin babasının 3 tane çocuğu var. İlk iki çocuğunun adı Eylül ve Ekim ise üçüncü çocuğunun adı nedir? *Ayşe's father has three children. The first two are named September and October. What is the third child's name?*

a) Eylül b) Ekim c) Ayşe d) Kasım

7. 3 metre derinliğinde, 3 metre uzunluğunda, 3 metre genişliğinde (boş) bir çukurun içinde kaç metreküp toprak vardır? *How many cubic meters of soil are there in a hole that is 3 meters deep, 3 meters long, and 3 meters wide (empty)?*

a) 27 b) 0 c) 3 d) 9

APPENDIX H

EARTHQUAKE ACHIEVMENT TEST

Yerkabuğu içindeki kırılmalar nedeniyle ani olarak ortaya çıkan titreşimlerin dalgalar halinde yayılarak geçtikleri ortamları ve yeryüzünü sarsma olayına ne denir?
(*What is the name of the event in which vibrations caused by sudden fractures in the Earth's crust spread as waves and shake the ground and the Earth's surface?*)

a) Zemin kayması (*Ground slip*)

b) Artçı deprem (*Aftershock*)

c) Yanardağ patlaması (*Volcanic eruption*)

d) Deprem (*Earthquake*)

e) Fay (*Fault*)

2. Aşağıdakilerden hangisi depremin şiddetini ölçen hassas elektronik aygıtlara verilen addır?
(*Which of the following is the name given to sensitive electronic devices that measure the intensity of an earthquake?*)

a) Sismolog (*Seismologist*)

b) Sismogram (*Seismogram*)

c) Sismograf (*Seismograph*)

d) Sismoloji (*Seismology*)

e) Sismisite (*Seismicity*)

3. Depremi inceleyen bilim dalına ne ad verilir?
(*What is the name of the science that studies earthquakes?*)

a) Arkeoloji (*Archaeology*)

b) Reoloji (*Rheology*)

c) Sismoloji (*Seismology*)

d) Zooloji (*Zoology*)

e) Sinoloji (*Sinology*)

4. Yer kabuğundaki kayalarda sıkışma, gerilme ve makaslama kuvvetiyle oluşan çatlaklara ne ad verilir?

(*What is the name of the cracks formed in rocks of the Earth's crust due to compression, tension, and shear forces?*)

a) Kırık (*Fracture*)

b) Fay (*Fault*)

c) Fay atımı (*Fault slip*)

d) Fay aynası (*Fault scarp*)

e) Magnitüd (*Magnitude*)

5. Yer kabuğunun derinlerinde deprem enerjisinin ilk açığa çıktığı yere ne ad verilir?

(*What is the name of the point deep in the Earth's crust where earthquake energy is first released?*)

a) Dış Merkez (*Epicenter*)

b) İç Merkez (*Hypocenter*)

c) Fay Atımı (*Fault slip*)

d) Magnitüd (*Magnitude*)

e) Sismogram (*Seismogram*)

6. Aşağıdaki şehirlerden hangisi Türkiye'de 1. Deprem kuşağında yer almaz?

(*Which of the following cities is not located in Turkey's first-degree earthquake zone?*)

a) İzmir

b) Karaman

c) İstanbul

d) Erzurum

e) Hatay

7. Türkiye'de kaç tane büyük fay hattı bulunur?

(*How many major fault lines are there in Turkey?*)

a) 2

b) 3

c) 4

d) 5

e) 6

8. Türkiye'de en şiddetli deprem hangi şehirde meydana gelmiştir?

(*In which city did the most severe earthquake in Turkey occur?*)

a) Gölcük

b) Van

c) Düzce

d) Kocaeli

e) Erzincan

9. Türkiye'de yaşanan depremlerle ilgili aşağıdaki ifadelerden hangisi yanlıştır?

(*Which of the following statements about earthquakes in Turkey is incorrect?*)

a) Volkanik depremler görülür (*Volcanic earthquakes occur*)

b) En çok can ve mal kaybına neden olan afettir (*It is the disaster causing the most loss of life and property*)

c) Her bölgede deprem meydana gelebilir (*Earthquakes can occur in every region*)

d) Depremin yaşandığı saat etkilidir (*The time of occurrence affects damage*)

e) Kuzey Anadolu Fay hattı vardır (*The North Anatolian Fault exists*)

10. Türkiye'de yaşanan tektonik depremlerde can ve mal kaybını artıran durumlar hangileridir?

(*In tectonic earthquakes in Turkey, which of the following factors increase loss of life and property?*)

I. Fay hatlarının sıklığı (*Frequency of fault lines*)

II. Depremin meydana geliş saati (*Time of occurrence*)

III. Jeomorfolojik özellikler (*Geomorphological features*)

IV. Yapılarda kullanılan malzeme (*Construction materials*)

a) Yalnız I ve II

b) Yalnız III

c) I, II ve III

d) I, II, III ve IV

e) I ve III

11. Depremin insanlar ve yapılar üzerinde meydana getirdiği hasarın derecesine deprem şiddeti denir. Şiddetin etkisi aşağıdakilerden hangisine göre değişmez?

(*The degree of damage caused by an earthquake on people and buildings is called earthquake intensity. Which of the following does not affect intensity?*)

a) Odak derinliği (*Focal depth*)

b) Zemin yapısı (*Soil structure*)

c) Depremin büyüklüğü (*Magnitude of earthquake*)

d) Sıcak suların varlığı (*Presence of hot springs*)

e) Yapıların dayanıklılığı (*Durability of buildings*)

12. Aşağıdaki doğal afetlerden hangisi deprem sonrasında meydana gelir?

(*Which of the following natural disasters occurs after an earthquake?*)

a) Sel (*Flood*)

b) Heyelan (*Landslide*)

c) Kuraklık (*Drought*)

d) Kasırga (*Hurricane*)

e) Erozyon (*Erosion*)

13. Aşağıdakilerden hangisi depremi tahmin etmek için kullanılan verilerden biri değildir?

(*Which of the following is not used as data to predict earthquakes?*)

a) Su debisindeki ani değişiklikler (*Sudden changes in water flow*)

b) Topraktaki çoraklaşma (*Soil aridification*)

c) Radon ve metan gazı artışı (*Increase in radon and methane gas emissions*)

d) Sismisite artışı (*Increase in seismicity*)

e) Yer kabuğu deformasyonları (*Crustal deformations*)

14. Tektonik depremlerin yaşanmasındaki en etkili faktör aşağıdakilerden hangisidir?

(*What is the most influential factor in the occurrence of tectonic earthquakes?*)

a) Yapıların standarda uygun yapılmaması (*Buildings not up to standard*)

b) Depremlerin merkezden uzakta olması (*Earthquakes occurring far from settlements*)

c) Fay hatlarının varlığı (*Presence of fault lines*)

d) Depremin geç saatte olması (*Late occurrence time*)

e) Karstik kayaçların yaygınlığı (*Prevalence of karstic rocks*)

15. Deprem merkezinden çevreye doğru yayılan kaç çeşit dalga vardır?

(*How many types of waves spread from the earthquake center outward?*)

a) 1

b) 2

c) 3

d) 4

e) 5

16. Aşağıdakilerden hangisi deprem anında yapılacak ilk eylemdir?

(*Which of the following is the first action to take during an earthquake?*)

a) Açık alana çıkmak (*Go to open area*)

b) Merdiven boşluğuna saklanmak (*Hide in stairwell*)

c) İlk yardım çantasına ulaşmak (*Reach first aid kit*)

d) Yıkıcı etkiden korunmak (*Protect from destructive effect*)

e) Yakınlarımızı korumak (*Protect our relatives*)

17. Eğer deprem anında giriş veya alt katta iseniz, yapacağınız ilk iş ne olmalıdır?

(*If you are on the ground floor or basement during an earthquake, what should you do first?*)

a) Yaşam üçgeni yaratmak (*Create a survival triangle*)

b) Yatağın yanına cenin pozisyonu almak (*Lie next to bed in fetal position*)

c) Kapı pervazında durmak (*Stand in door frame*)

d) Masa altına sığınmak (*Take cover under table*)

e) İlk 10-15 saniyede binayı terk etmek (*Leave building in first 10–15 sec*)

18. Deprem sırasında dışarıda iseniz ne yapmanız gerekir?

(*What should you do if you are outside during an earthquake?*)

a) Açık alanda beklemek (*Stay in open area*)

b) Balkon/araba altına sığınmak (*Shelter under balcony/car*)

c) Koşarak bağırmak (*Run around shouting*)

d) Aracınıza girmek (*Get into your vehicle*)

e) Köprü altına sığınmak (*Take cover under bridge*)

19. Eğer deprem sırasında araçta iseniz aşağıdakilerden hangisini yapmanız gerekir? (*If you are in a vehicle during an earthquake, what should you do?*)

a) Araçtan inip balkon altına sığınmak (*Exit car, hide under balcony*)

b) Güvenli yerde durup araçta kalmak (*Stop in safe place, stay inside car*)

c) Durup aracı terk etmek (*Stop and abandon vehicle*)

d) Paniğe kapılmadan devam etmek (*Continue calmly driving*)

e) Binanın yanında durup araçta beklemek (*Stop by building, stay in car*)

20. Aşağıdakilerden hangisi deprem öncesi alınacak tedbirler arasında yer almaz? (*Which of the following is not among precautions to take before an earthquake?*)

a) Deprem planı hazırlamak (*Prepare earthquake plan*)

b) Sobaları sağlam sabitlemek (*Fix stoves/heaters securely*)

c) Dolapları duvara sabitlemek (*Fix cupboards to wall*)

d) Binadan kaçış planı yapmak (*Make escape plans*)

e) Gaz-elektrik sistemini otomatik hale getirmek (*Automate gas/electric systems*)

REFERENCES

American Psychiatric Association. (2013). Anxiety disorders. In *Diagnostic and statistical manual of mental disorders* (5th ed.).

Aldamen, H., & Abdul Jaleel, F. (2024). Disaster misinformation and its effects on public trust: An empirical analysis. *Journal of Risk and Crisis Management*, *18*(2), 45–67. https://doi.org/10.1063/1.4945837

Atir, S., Rosenzweig, E., & Dunning, D. (2015). When knowledge knows no bounds: Self-perceived expertise predicts claims of impossible knowledge. *Psychological Science, 26*(8), 1295–1303. https://doi.org/10.1177/0956797615588195

Aydın, A. F. (2023). Sosyal medyada dezenformasyon ve manipülasyon: 2023 Kahramanmaraş depremi örneği. *İnsan ve Toplum Bilimleri Araştırmaları Dergisi*, *12*(5), 2603-2624.

Aydin, S., Haşiloğlu, M. A., & Kunduraci, A. (2016). The establisment of an achievement test for determination of primary teachers' knowledge level of earthquake. In AIP Conference Proceedings (Vol. 1726, No. 1). AIP Publishing.

Basol, M., Roozenbeek, J., & van der Linden, S. (2020). Good news about bad news: Gamified inoculation boosts confidence and cognitive immunity against fake news. *Journal of Cognition, 3*(1), Article 2. https://doi.org/10.5334/joc.91

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.2015.01.002

Bilişli, Y., Çakmak, F., Zetter, S. A., & Ünal, M. I. (2024). Navigating truth and disinformation: A comparative analysis of generational responses to the 6 February 2023 earthquake in digital media in Türkiye. *Heliyon*, *10*(19).

Boxell, L., Gentzkow, M., & Shapiro, J. M. (2018). A note on internet use and the 2016 U.S. presidential election outcome. *Journal of Economic Perspectives*, *32*(2), 211–216. https://doi.org/10.1371/journal.pone.0199571

Bless, H. (2000). The interplay of affect and cognition: The mediating role of general knowledge structures. *In feeling and thinking: The role of affect in social cognition* (pp. 201–222). Cambridge University Press.

Brainerd, C. J., & Reyna, V. F. (1995). Fuzzy-trace theory: An interim synthesis. *Learning and Individual Differences, 7*(1), 1–75. https://doi.org/10.1016/1041-6080(95)90018-7

Brainerd, C. J., & Reyna, V. F. (2005). *The science of false memory*. Oxford University Press. https://doi.org/10.1016/1041-6080(95)90018-7

Calvillo, D. P., et al. (2023). Political ideology and the formation of false memories. *Memory & Cognition*, *51*(4), 733–745.

Çağiş, Z. G., Akçe, İ., Aziz, I. A., Rizzo, A., Nucera, G., Bragazzi, N., & Yildirim, M. (2023). The mediating role of peritraumatic stress in the relationship between childhood psychological maltreatment and optimism and pessimism among earthquake survivors in Turkey. *J Health Soc Sci*, *8*(2), 121-131. https://doi.org/10.3758/s13421-023-01397-9

Çaki, F., & Uzun, A. (2023). Urban Transformation, Collective Memory, and Disaster Preparedness: A Case from Turkey. *Geohazards and disaster risk reduction: Multidisciplinary and integrated approaches* (pp. 73-88). Cham: Springer International Publishing.

Chen, S., Xiao, L., & Kumar, A. (2023). Spread of misinformation on social media: What contributes to it and how to combat it. *Computers in Human Behavior*, *141*, 107643. https://doi.org/10.1016/j.chb.2022.107643

Coman, A., Momennejad, I., Drach, R. D., & Geana, A. (2016). Mnemonic convergence in social networks: The emergent properties of cognition at a collective level. *Proceedings of the National Academy of Sciences*, *113*(29), 8171–8176. https://doi.org/10.1073/pnas.1525569113

Delaney, T., Castillo, L., Friehs, M. A., Buttlar, B., & Greene, C. M. (2024). Us versus them: The role of national identity in the formation of false memories for fake news. *Journal of Experimental Psychology: Applied*, *30*(1), 33. https://doi.org/10.1037/xap0000498

Evans, J. S. B., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on Psychological Science*, *8*(3), 223-241.

Eysenck, M. W., & Groome, D. (2020). Introduction: Memory Failure and Its Causes. In *Forgetting: Explaining memory failure* (pp. 1-13). SAGE Publications Ltd.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

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.

Frederick, S. (2005). Cognitive reflection and decision making. *Journal of Economic Perspectives*, *19*(4), 25-42. https://doi.org/10.1257/089533005775196732

Genç, M., & Sözen, E. (2022). Development of an Earthquake Knowledge Assessment Scale: Validity and Reliability Study. *Kastamonu Education Journal*. https://doi.org/10.24106/kefdergi.1100570

Greene, C. M., & Murphy, G. (2020). Individual differences in susceptibility to false memories for COVID-19 fake news. *Cognitive Research: Principles and Implications, 5,* 61. https://doi.org/10.1080/09658211.2021.1923754

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,* 587–604. https://doi.org/10.1186/s41235-020-00262-1

Güler, A., Gül, S., & Yıldırım, M. (2024). Social comparison, resilience, life satisfaction, depression, and anxiety among earthquake survivors in Turkey. *International Journal of Disaster Risk Reduction, 105,* 104426. https://doi.org/10.1016/j.ijdrr.2024.104426

Gülüm, E. (2024). Remembering a disastrous past to imagine catastrophic future (s) on social media: The expected Istanbul earthquake. *Media, Culture & Society, 46*(5), 959-974. https://doi.org/10.1177/01634437241228724

Hirst, W., & Phelps, E. A. (2016). Flashbulb memories. *Current Directions in Psychological Science, 25*(1), 36–41. https://doi.org/10.1177/0963721415622487

Howe, M. L., & Malone, C. (2011). Mood-congruent true and false memory: Effects of depression. *Memory, 19*(2), 192–201. https://doi.org/10.1080/09658211.2010.544073

Johnson, M. K., Hashtroudi, S., & Lindsay, D. S. (1993). *Source monitoring. Psychological Bulletin, 114*(1), 3–28. https://doi.org/10.1037/0033-2909.114.1.3

Johnson, M. K. (2001). Source monitoring and memory distortion. *Philosophy, Psychiatry, & Psychology, 8*(4), 343–351. https://doi.org/10.1353/ppp.2002.0009

Kensinger, E. A. (2009). Remembering the details: Effects of emotion. *Emotion Review, 1*(2), 99–113. https://doi.org/10.1177/1754073908100432

King, M., & Mayo, N. (2024). Susceptibility to cancer misinformation: Predictors of false belief and false memory. *Applied Cognitive Psychology*. https://doi.org/10.1002/acp.4093

Lazer, D. M. J., Baum, M. A., Benkler, Y., Berinsky, A. J., Greenhill, K. M., Menczer, F., Metzger, M. J., Nyhan, B., Pennycook, G., Rothschild, D., Schudson, M., Sloman, S. A., Sunstein, C. R., Thorson, E. A., Watts, D. J., & Zittrain, J. L. (2018). *The science of fake news. Science (New York, N.Y.), 359*(6380), 1094–1096.

Lindell, M. K., & Perry, R. W. (2012). The protective action decision model: Theoretical modifications and additional evidence. *Risk Analysis, 32*(4), 616–632. https://doi.org/10.1111/j.1539-6924.2011.01647.x

Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of Verbal Learning and Verbal Behavior, 13*(5), 585–589. https://doi.org/10.1016/S0022-5371(74)80011-3

Loftus, E. F., Miller, D. G., & Burns, H. J. (1978). Semantic integration of verbal information into a visual memory. *Journal of experimental psychology: Human Learning and Memory, 4*(1), 19. https://doi.org/10.1037/0278-7393.4.1.19

Loftus, E. F. (1993). The reality of repressed memories. *American Psychologist*, *48*(5), 518. https://doi.org/10.1037/0003-066X.48.5.518

Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals*, *25*(12), 720-725. https://doi.org/10.3928/0048-5713-19951201-07

Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. *Learning & Memory*, *12*(4), 361–366. https://doi.org/10.1101/lm.94705

Maertens, R., Roozenbeek, J., Basol, M., & van der Linden, S. (2021). Long-term effectiveness of inoculation against misinformation: Three longitudinal experiments. *Journal of Experimental Psychology: Applied, 27*(1), 1–16. https://doi.org/10.1037/xap0000315

Mangiulli I, Battista F, Kafi NA, Coveliers E, Webster TC, Curci A and Otgaar H (2022) False memory and COVID-19: how people fall for fake news about COVID-19 in digital contexts. *Frontiers in Psychology 13*, 972004. https://doi.org/10.3389/fpsyg.2022.972004

Mărcău, C., Ilie, A. C., & Ciobanu, A. M. (2023). The impact of earthquake-related misinformation on public perception. *Frontiers in Public Health, 12*, 1244564.

Mazzoni, G., & Kirsch, I. (2002). Autobiographical memories and beliefs: A preliminary metacognitive model. Applied Cognitive Psychology, 16(5), 559–576. https://doi.org/10.1002/acp.814

Mazzoni, G., Scoboria, A., & Harvey, L. (2010). Nonbelieved memories. *Psychological Science, 21*(9), 1334–1340. https://doi.org/10.1177/0956797610379865

McGaugh, J. L. (2004). The amygdala modulates the consolidation of memories of emotionally arousing experiences. *Annual Review of Neuroscience, 27*, 1–28. https://doi.org/10.1146/annurev.neuro.27.070203.144157

Meisenberg G (2015) Verbal ability as a predictor of political preferences in the United States, 1974–2012.*Intelligence, 50*, 135–143. https://doi.org/10.1016/j.intell.2015.03.004

Méndez-Muros, M. M., et al. (2024). Misinformation and the collective memory of disasters: Lessons from the 2023 Turkey-Syria earthquakes. *Societies*, *14*(2), 43.

Mitchell, K. J., & Johnson, M. K. (2000). Source monitoring: Attributing mental experiences. *The Oxford handbook of memory*, 179-195.

Morgan III, C. A., Hazlett, G., Baranoski, M., Doran, A., Southwick, S., & Loftus, E. (2007). Accuracy of eyewitness identification is significantly associated with performance on a standardized test of face recognition. *International Journal of Law and Psychiatry*, *30*(3), 213-223.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, *126*(2), 247. https://doi.org/10.1037/0033-2909.126.2.247

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. https://doi.org/10.1177/0956797619864887

Nichols, R. M., & Loftus, E. F. (2019). Who is susceptible in three false memory tasks? *Memory*, *27*(7), 962–984. https://doi.org/10.1080/09658211.2019.1611862

Noble, K. G., McCandliss, B. D., & Farah, M. J. (2007). Socioeconomic gradients predict individual differences in neurocognitive abilities. *Developmental Science*, *10*(4), 464-480. https://doi.org/10.1111/j.1467-7687.2007.00688.x

Otgaar, H., Scoboria, A., & Mazzoni, G. (2014). On the existence and implications of nonbelieved memories. *Current Directions in Psychological Science*, *23*(6), 349–354. https://doi.org/10.1177/0963721414542102

Otgaar, H., Muris, P., Howe, M. L., & Merckelbach, H. (2017). What Drives False Memories in Psychopathology? A Case for Associative Activation. *Clinical Psychological Science : Journal of the Association for Psychological Science*, *5*(6), 1048–1069.

Özdemir, E. K. (2024). Social media in crisis communication: A case analysis of the 2023 Kahramanmaraş earthquakes. *Akdeniz Üniversitesi İletişim Fakültesi Dergisi*, (44), 112-131.

Parsafar, P., & Davis, E. L. (2018). Fear and anxiety. In *The function of emotions: When and why emotions help us* (pp. 9-23). Cham: Springer International Publishing.

Park, J. (2018). Eyewitness identification and innocence. *Loyola Law Review, 64*, 669–701.

Pennycook, G., & Rand, D. G. (2019). Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. *Cognition, 188*, 39-50. https://doi.org/10.1016/j.cognition.2018.06.011

Pennycook, G., McPhetres, J., Zhang, Y., Lu, J. G., & Rand, D. G. (2020). Fighting COVID-19 misinformation on social media: Experimental evidence for a scalable accuracy-nudge intervention. *Psychological Science, 31*(7), 770–780. https://doi.org/10.1177/0956797620939054

Primi, C., Morsanyi, K., Chiesi, F., Donati, M. A., & Hamilton, J. (2016). The development and testing of a new version of the Cognitive Reflection Test applying item response theory (IRT). *Journal of Behavioral Decision Making, 29*(5), 453–469. https://doi.org/10.1002/bdm.1883

Prizmić-Larsen, Z., Vujčić, M., & Lipovčan, L. K. (2023). Development and validation of the Fear of Earthquake Scale. *Natural Hazards Journal*, *12*(1), 45-60.

Reyna, V. F., & Lloyd, F. J. (2006). Theories of false memory in children and adults. *Learning and Individual Differences, 16*(4), 429–455. https://doi.org/10.1016/j.lindif.2006.03.013

Roediger, H. L., & McDermott, K. B. (1995). Creating false memories: Remembering words not presented in lists. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21*(4), 803. https://doi.org/10.1037/0278-7393.21.4.803

Roediger, H. L., & Geraci, L. (2007). Aging and the misinformation effect: A meta-analytic review. *Psychology and Aging, 22*(3), 633–655. https://doi.org/10.1037/0882-7974.22.3.633

Roozenbeek, J., & van der Linden, S. (2019). The fake news game: Actively inoculating against the risk of misinformation. *Journal of Risk Research, 22*(5), 570–580. https://doi.org/10.1080/13669877.2018.1443491

Schincariol, A., Otgaar, H., Greene, C. M., Murphy, G., Riesthuis, P., Mangiulli, I., & Battista, F. (2024). Fake memories: A meta-analysis on the effect of fake news on the creation of false memories and false beliefs. *Memory, Mind & Media, 3*, e17.

Scuotto, C., Ilardi, C. R., Avallone, F., Maggi, G., Ilardi, A., Borrelli, G., Gamboz, N., La Marra, M., & Perrella, R. (2021). Objective knowledge mediates the relationship between the use of social media and COVID-19-related false memories. *Brain Sciences, 11*(11), 1489. https://doi.org/10.3390/brainsci11111489

Stanislaw, H., & Todorov, N. (1999). Calculation of signal detection theory measures. *Behavior Research Methods, Instruments & Computers, 31*(1), 137–149. https://doi.org/10.3758/BF03207704

Storbeck, J., & Clore, G. L. (2005). With sadness comes accuracy; with happiness, false memory: Mood and the false memory effect. *Psychological Science, 16*(10), 785–791. https://doi.org/10.1111/j.1467-9280.2005.01592.x

Strange, D., Clifasefi, S. L., Garry, M., & Harper, D. N. (2011). Photographs cause false memories for criminal events. *Applied Cognitive Psychology, 25*(5), 769–774.

Tabacnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). New York, NY: Allyn & Bacon.

Thomson, K. S., & Oppenheimer, D. M. (2016). Investigating an alternate form of the cognitive reflection test. *Judgment and Decision Making, 11*(1), 99-113.

Thomson, K. S., & Oppenheimer, D. M. (2023). Combining cognitive reflection tests: Reliability, predictive validity, and a unified measure of analytic cognitive style. *Psychological Assessment, 35*(2), 176–189. https://doi.org/10.1037/pas0001187

Toplak, M. E., West, R. F., & Stanovich, K. E. (2013). Do performance-based measures and ratings of executive function assess the same construct? *Journal of Experimental Child Psychology, 114*(3), 389–402. https://doi.org/10.1016/j.jecp.2012.10.005

Toplak, M. E., West, R. F., & Stanovich, K. E. (2014). Assessing miserly information processing: An expansion of the Cognitive Reflection Test. *Thinking & Reasoning, 20*(2), 147-168. https://doi.org/10.1080/13546783.2013.844729

Usta, G., et al. (2023). The Turkish Adaptation of the Fear of Earthquake Scale. *Journal of Psychological Assessment, 15*(2), 105-123.

Wertsch, J. V., & Roediger III, H. L. (2008). Collective memory: Conceptual foundations and theoretical approaches. *Memory, 16*(3), 318-326. https://doi.org/10.1080/09658210701801434

World Health Organization. (2020, February 2). *Novel Coronavirus (2019-nCoV) situation report – 13*. https://www.who.int/

Wylie, J., Foxwell, L., & Greene, C. M. (2014). Individual differences in the impact of misinformation. *Memory, 22*(1), 129–141.

Yıldırım, M. (2023). The psychological impact of the devastating earthquake in Turkey. *J Concurr Disord*.

Yılmaz, O., & Saribay, S. A. (2018). Lower levels of resistance to change (but not opposition to equality) is related to analytic cognitive style. *Social Psychology, 49*, 65-75.

Yılmaz, O., & Sarıbay, S. A. (2016). An attempt to clarify the link between cognitive style and political ideology: A non-western replication and extension. *Judgment and Decision Making, 11*(3), 287-300.

Yonelinas, A. P. (2002). The nature of recollection and familiarity: A review of 30 years of research. *Journal of Memory and Language, 46*(3), 441–517. https://doi.org/10.1006/jmla.2002.2864

Zhu, B., Chen, C., Loftus, E. F., Lin, C., He, Q., Chen, C., Li, H., Xue, G., Lu, Z., & Dong, Q. (2010). Individual differences in false memory from misinformation: Cognitive factors. *Memory, 18*(5), 543–555. https://doi.org/10.1080/09658211.2010.487051