

# **Exploring the impact of negative emotions on memory vividness in direct and indirect experiences of a traumatic event**

**Beyza Arslan, Selin Keskiner & Jaeseok Kim<sup>1</sup>**

*SWPS University, Poland*

## **Abstract**

This study explores the relationship between negative emotions and memory vividness in the context of the 2023 Kahramanmaraş earthquake in Türkiye. It compares flashbulb memories and emotional reactions in individuals who directly experienced the earthquake ( $n = 26$ ) and those exposed through media ( $n = 26$ ). Results revealed no significant difference in memory vividness or emotional intensity between groups, suggesting that indirect exposure can evoke emotions comparable to direct experiences. Additionally, no meaningful correlation was found between emotional reactions and flashbulb memory scores. Limitations, including a small sample size, highlight the need for further research on emotional memory dynamics.

**Key Words:** *Negative Emotions, Memory, Memory Vividness, Traumatic Events*

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## **Introduction**

This study was based on the recollections of people who experienced the Kahramanmaraş earthquake and those who had no direct experience with it but only heard it on the news. The primary target is to investigate if memories are recalled with greater vividness when associated with negative emotions. This research question addresses whether negative emotions enhance the vividness of memory, and we expect that memories connected to negative emotions are remembered with greater clarity than those that lack such emotional ties.

Flashbulb memory, a term first introduced by Brown and Kulik (1977), refers to the recollections of unexpected, traumatic, vivid, and significant personal or national events. Often, these emotionally shocking experiences are retained in people's memories for many years. According to Brown and Kulik, these vivid memories remain unchanged over time. It is well known that memory is a cognitive process encompassing various dimensions and influenced by a range of factors, particularly emotional experiences. These emotions can enhance or hinder the retention and recall of information, highlighting the complex interaction between our feelings and our ability to remember. Studies show that emotionally charged events, especially negative occurrences like natural disasters, significantly impact memory recall (Knez et al., 2021; Er, 2003). Prior studies have shown that events associated with strong emotions are frequently remembered with enhanced vividness and clarity (Kensinger & Schacter, 2006). High levels of arousal, often present in negative experiences, are thought to enhance the retention of central details while potentially reducing the recall of peripheral information (Bisby & Burgess, 2017). As a result, emotional memories, particularly those tied to traumatic events, are often characterized as vivid and enduring, forming core memories for individuals (Kazui et al., 2000).

Understanding the relationship between negative emotions and memory vividness is important for several reasons. Firstly, this research provides useful insights into how people process and retain information regarding emotional events, particularly traumatic experiences such as earthquakes. These insights have significant effects on mental health interventions, as traumatic memories are central to conditions such as post-traumatic stress disorder (PTSD). Secondly, examining the differences between indirect exposure (e.g., through media) and direct experiences helps in understanding the wider collective impacts of traumatic events. It is noteworthy that individuals who experience disasters indirectly may still experience psychological consequences, even if their memories differ in vividness from those of direct witnesses. Finally, this study provides the field of cognitive psychology by improving our understanding of the mechanisms underlying emotional memory and the factors influencing memory accuracy and vividness.

#### *Rationale and Justification*

We expect that negative emotions affect the vividness of memory. People remember events better when they are linked to negative emotions. Studies on traumatic or highly emotional public events, such as September 11, 2001, have shown that people tend to remember the core elements of these events vividly, though peripheral details may be less reliable (Pezdek, 2003). Further supporting this, recent research on natural disasters reveals that intense negative experiences, such as fires and earthquakes, can leave lasting cognitive, emotional, and sensory memories (Knez et al., 2021; Er, 2003).

## **Methodology**

### *Research Subject and Design*

Our goal is to examine how negative emotions affect memory vividness. To achieve this, we will compare the memories of 26 people who experienced the earthquake in Türkiye (Group 1) with 26 people who only heard about it through the news (Group 2). And participants' ages will be 18 to 65 (male and female). Samples will be collected using an online platform and local community outreach. The survey will be conducted via Google Forms and made available in both Turkish and English to ensure accessibility and accurate comprehension. Participants will take approximately 15 minutes to complete the survey. Although the G\*power analysis indicated a required sample size of 51 participants per group to achieve sufficient statistical power (actual power = 0.805), the survey was conducted with 26 participants per group due to resource limitations.

### *Survey Materials*

The survey uses a structured questionnaire adapted from Er (2003) to assess flashbulb memories and emotional reactions related to the earthquake in Türkiye. The questionnaire consists of two sections. Flashbulb memory and emotional reactions. In the flashbulb memory section, the questionnaire consisted of 5 questions. Time (memory of the exact date and time of the earthquake), Place (Memory of the exact location or city during the event), People (Recall of who they were with), Activity (Description of what they were doing at the time), and Details (Number of specific environmental or situational details remembered). The first two questions will score 0 to 3 according to how many subjects are recalled. And the third and fourth will score 0 to 1. And the last question will score 0 to 5, so a total of 0 - 13 points. In the emotional reactions section, the questionnaire consisted of 6 questions. How much fear did you feel at that time? How much sadness did you feel at that time? How much desperation did you feel at that time? How much

anxiety did you feel at that time? How much anger did you feel at that time? How long did these emotions last? And in this section, the scoring guideline is 0 = Not at all, 1 = Slightly, 2 = Moderately, 3 = Strongly, 4 = Very strongly, a total of 0 -24 points. We slightly modified the questionnaire to better align it with the goals of our survey.

### *Study Procedures*

To test our hypothesis, a survey-based study will be conducted targeting participants from various regions in Türkiye. A stratified sampling method will be used to include both individuals living in cities directly affected (Group 1) by the 2023 Kahramanmaraş (Türkiye) earthquake and those living in unaffected areas who only hear about it through the news (Group 2). Data will be collected using an online survey designed to assess the vividness and accuracy of participants' memories. The earthquake-related questions will investigate specific details to measure memory vividness. Data collection will begin 1–2 weeks after confirmation and take about 15 minutes per participant. Since the participants are Turkish, there will also be a translation into the Turkish language for better understanding. Following data collection, responses will be analyzed using descriptive statistics to identify structures in memory recall and vividness. The analysis will be performed using G\*Power software. Ethical issues will be strictly followed throughout the study. Participants will be informed about the design and aim of the research, and informed consent will be obtained before starting the survey. Participation will be pronounced voluntary, and participants may withdraw at any time without any consequences. The survey will be conducted in a controlled environment to minimize external biases, and participants will be assured of their anonymity and confidentiality. This study complied with the Declaration of Helsinki statement of ethical principles for research involving humans. Informed consent about this study was provided by the participants.

## Results

### *Descriptive Analysis*

As we can see in Table 1, the flashbulb memory score in Group 1 (directly experienced the earthquake) was (Mean = 11.54, SD = 1.79), while in Group 2 (heard about the earthquake through media), it was (Mean = 11.12, SD = 2.18). Similarly, for emotional reactions, the score in Group 1 was (Mean = 18.85, SD = 3.12), while in Group 2, it was (Mean = 19.42, SD = 3.41). Based solely on Table 1, no significant results can be inferred.

**Table 1**

*This table shows the descriptive statistics for Flashbulb Memories and Emotional Reactions.*

### **Group Descriptives**

	<i>Group</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>SE</i>	<i>Coefficient of variation</i>
<i>Flashbulb Memory</i>	<i>1</i>	<i>26</i>	<i>11.5</i>	<i>1.79</i>	<i>0.35</i>	<i>0.155</i>
			<i>38</i>	<i>4</i>	<i>2</i>	
	<i>2</i>	<i>26</i>	<i>11.1</i>	<i>2.17</i>	<i>0.42</i>	<i>0.196</i>
<i>Emotional Reactions</i>			<i>15</i>	<i>9</i>	<i>7</i>	
	<i>1</i>	<i>26</i>	<i>18.8</i>	<i>3.12</i>	<i>0.61</i>	<i>0.166</i>
			<i>46</i>	<i>0</i>	<i>2</i>	
	<i>2</i>	<i>26</i>	<i>19.4</i>	<i>3.40</i>	<i>0.66</i>	<i>0.175</i>
			<i>23</i>	<i>8</i>	<i>8</i>	

*Inferential Analysis*

We used the Mann-Whitney U test. As we can see in Table 2, for flashbulb memory, Group 1 ( $W = 0.796$ ,  $p < .001$ ) and Group 2 ( $W = 0.799$ ,  $p < .001$ ) both show significant deviations. Similarly, for emotional reactions, Group 1 ( $W = 0.869$ ,  $p = .003$ ) and Group 2 ( $W = 0.917$ ,  $p = .039$ ). The results deviate from normality, so based on these findings, we used the Mann-Whitney U Test. As we can see in Table 3, there is no significant difference in flashbulb memory between the two groups ( $W = 373.50$ ,  $p = .51$ ,  $rb = .105$ ). Similarly, there is no significant difference in emotional reactions between the groups ( $W = 293.00$ ,  $p = .41$ ,  $rb = -.133$ ). Or if a difference exists, it is likely too small to be of practical significance. As we can see in Table 4, Spearman's correlation between flashbulb memory and emotional reactions in Group 1 was not statistically significant ( $p = 0.113$ ,  $p = .424$ ). These results suggest that there is no meaningful relationship between the two variables in this group.

**Table 2** - This table shows the result of the Shapiro-Wilk test for normality

**Test of Normality (Shapiro-Wilk)**

		<i>W</i>	<i>p</i>
<i>Flashbulb_</i> <i>Memory</i>	<i>1</i>	<i>0.796</i>	<i>&lt; .001</i>
	<i>2</i>	<i>0.799</i>	<i>&lt; .001</i>
<i>Emotional_</i> <i>Reactions</i>	<i>1</i>	<i>0.869</i>	<i>0.003</i>
	<i>2</i>	<i>0.917</i>	<i>0.039</i>

*Note.* Significant results suggest a deviation from normality.

**Table 3**

*This table shows the result of the Mann-Whitney test*

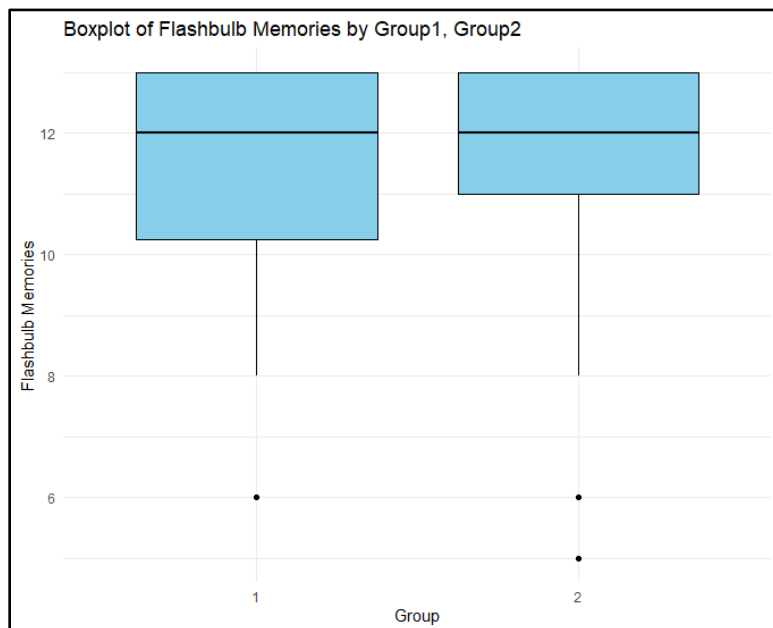
**Independent Samples T-Test**

	W	df	p	Rank-Biserial Correlation	SE Rank-Biserial Correlation
Flashbulb_ Memory	373.5 00		0.508	0.105	0.160
Emotional_ Reactions	293.0 00		0.411	-0.133	0.160

*Note.* For the Mann-Whitney test, effect size is given by the rank biserial correlation.

**Figure 1**

*This boxplot shows the result of Flashbulb Memories of Group 1, 2.*





**Table 4**

*This table shows the correlation between group 1 and group 2*

***Spearman's Correlations***

<i>Variable</i>		<i>Flashbulb_Memory</i>	<i>Emotional_Reaction</i>
			<i>s</i>
1. <i>Flashbulb</i>	<i>Spearman'</i>	—	
<i>Memory</i>	<i>s rho</i>		
	<i>p-value</i>	—	
2.	<i>Spearman'</i>	0.113	—
<i>Emotional</i>	<i>s rho</i>		
<i>Reactions</i>			
	<i>p-value</i>	0.424	—

According to the Figure 1 boxplot, the Flashbulb Memories scores of Group 1 and Group 2 have similar medians and distributions, showing no significant differences. Both groups have a few low outliers, but their overall variability and range are comparable. According to the boxplot, shows that Emotional Reaction scores for Group 1 and Group 2 have similar medians and distributions. Both groups have comparable ranges and variability, with a few low outliers. Again, there is no clear evidence of significant differences between the two groups based on the plot.

**Figure 2**

*This boxplot shows the result of Emotional Reactions of group 1, 2*



## Discussion and Conclusions

Regarding flashbulb memories, this study did not statistically support the hypothesis that individuals who directly experienced a negative event would have more vivid memories. This suggests that the vividness of memories may be influenced by factors other than direct experience, such as personal importance or recall frequency. In terms of the hypotheses pertaining to emotional reactions, there was no significant difference in emotional intensity between the groups, indicating that indirect experiences (e.g., through news) may evoke strong emotional responses similar to direct experiences. Regarding the relationship between flashbulb memories and emotional reactions, results reveal a weak correlation ( $r = 0.113$ ) that was not statistically significant, implying that flashbulb memories and emotional reactions might function independently or be

influenced by other factors. This study is not without limitations. For example, a G\*Power calculation indicated that each group required at least 52 participants for sufficient statistical power. However, due to resource limitations, each group had only 26 participants, which likely reduced statistical power.

With an emphasis on flashbulb memories and emotional responses associated with the 2023 Kahramanmaraş earthquake in Türkiye, this study investigated the connection between negative emotions and recall vividness. Contrary to the hypothesis that negative emotions enhance memory vividness, the findings showed no statistically significant difference in flashbulb memories between individuals who directly experienced the earthquake and those who learned about it through the news ( $p = 0.508$ ). Emotional reactions were similarly intense in both groups, with no significant difference ( $p = 0.411$ ), suggesting that indirect exposure to traumatic events can evoke emotions comparable to direct experiences. Additionally, the weak positive correlation ( $r = 0.113$ ) between flashbulb memories and emotional reactions was not statistically significant ( $p = 0.424$ ), implying that these constructs may function independently or be influenced by other factors. The limited sample size ( $n = 30$ ) was a major drawback that decreased statistical power and probably contributed to the lack of notable findings. In summary, the study indicates the need for more research with bigger samples to better understand the interaction between emotional experiences and memory recall in the context of traumatic events, even though it did not validate the hypothesis.

## References

- Bisby, J., & Burgess, N. (2017). Differential effects of negative emotion on memory for items and associations, and their relationship to intrusive imagery. *Current Opinion in Behavioral Sciences*, 17, 124–132. <https://doi.org/10.1016/j.cobeha.2017.07.012>
- Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition*, 5(1), 73–99. [https://doi.org/10.1016/0010-0277\(77\)90018-X](https://doi.org/10.1016/0010-0277(77)90018-X)
- Kazui, H., Mori, E., Hashimoto, M., Hirono, N., Imamura, T., Tanimukai, S., Hanihara, T., & Cahill, L. (2000). Impact of emotion on memory. *The British Journal of Psychiatry*, 177(4), 343–347. <https://doi.org/10.1192/bjp.177.4.343>
- Pezdek, K. (2003). Event memory and autobiographical memory for the events of September 11, 2001. *Applied Cognitive Psychology*, 17(9), 1033–1045. <https://doi.org/10.1002/acp.984>
- Er, N. (2003). A new flashbulb memory model applied to the Marmara earthquake. *Applied Cognitive Psychology*, 17(5), 503–517. <https://doi.org/10.1002/acp.870>
- Rubin, D. C., & Kozin, M. (1984). Vivid memories. *Cognition*, 16(1), 81–95. [https://doi.org/10.1016/0010-0277\(84\)90037-4](https://doi.org/10.1016/0010-0277(84)90037-4)
- Finkenauer, C., Luminet, O., Gisle, L., El-Ahmadi, A., Van Der Linden, M., & Philippot, P. (1998). Flashbulb memories and the underlying mechanisms of their formation: Toward an emotional-integrative model. *Memory & Cognition*, 26(3), 516–531. <https://doi.org/10.3758/bf03201160>
- Knez, I., Willander, J., Butler, A., Sang, Å. O., Sarlöv-Herlin, I., & Åkerskog, A. (2021). I can still see, hear and smell the fire: Cognitive, emotional and personal consequences of a natural disaster, and the impact of evacuation. *Journal of Environmental Psychology*, 74, 101554. <https://doi.org/10.1016/j.jenvp.2021.101554>