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# THE EFFECT OF DOODLING AND DRAWING ON MEMORY RECALL IN YOUNG ADULTS

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**Abstract**

*The research aimed to study the effect of doodling and drawing on memory recall using a Between-Subjects true experimental design. An audio dialogue between a couple, sampled from the dialogue used by Boggs (2017) in his study, was utilized to examine the effect of doodling and drawing on memory retention and recall. The study included 60 university students aged 17-24, mostly recruited from the same university. Participants were randomly allocated into three groups: doodling group, drawing group, and control group. The results of the statistical analysis suggest that doodling and drawing have no positive effect on memory recall. Instead, doodling and drawing led to poorer recall compared to the control group. Drawing conditions resulted in the worst recall on the memory task. Further analysis revealed that cognitive load may play a significant role in these findings, as drawing and doodling could divert attention from auditory processing. It was found that females performed better on memory recall utilizing doodling and drawing, based on the comparison between male and female performance. A comparison within groups showed that females achieved the highest scores in the doodling condition, whereas males had the highest recall scores in the control group. This gender difference suggests that females may process visual and auditory information differently or may be more adept at multitasking. To summarize, doodling and drawing did not enhance memory recall. However, in comparison to one another, doodling has a better effect on memory recall than drawing. Compared to males, females performed better and scored higher in all three domains: doodling, drawing, and control conditions. The experimental findings concluded that doodling and drawing do not affect memory recall in university students. Future research could explore different types of doodling (structured vs. unstructured) or incorporate visual aids to determine if specific conditions might yield different outcomes. Additionally, investigating individual differences in cognitive styles could provide deeper insights into why females outperformed males in this study.*

**Keywords:** Doodling, Drawing, Memory Recall, Gender Difference

## Introduction

Effective memory retention and recall are fundamental to academic success and everyday functioning. Yet, maintaining sustained focus on a task can be difficult, often causing individuals to become distracted or to engage in secondary activities such as doodling. Doodling is defined as the spontaneous, aimless creation of sketches or figures unrelated to the primary task (Andrade, 2010). This behaviour usually arises when attention to the main task diminishes, prompting a mild form of cognitive engagement. In contrast, drawing involves a more deliberate and structured process of creating recognizable images or figures, typically

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requiring greater cognitive and motor involvement (Wammes et al., 2016). Although both doodling and drawing are visual creative outputs, their differences in complexity and intentionality may result in distinct effects on memory performance. Understanding these differences, alongside their potential gender-specific influences, is essential for developing educational strategies that optimize learning outcomes.

The quest to improve memory recall has been a longstanding focus in educational psychology, with various strategies investigated for their effectiveness. Students commonly adopt multiple techniques to enhance retention and recall; however, many such strategies face practical limitations in real-world classroom settings. For example, reading aloud to reinforce memory can disrupt the learning environment and is often impractical (Gawrylowicz & Pereiraand, 2024). Similarly, rewriting or regenerating content demands additional time and effort, which may not be feasible amidst competing academic responsibilities. Another technique, enactment, which links study material to physical actions, is constrained by the nature of the content, as not all material lends itself to meaningful physical association (McDaniel et al., 2005). Given the limitations of traditional memory strategies in classroom settings, it is critical to explore alternative approaches such as visual engagement through doodling and drawing. To understand how these activities may influence memory, several cognitive theories offer valuable insights.

The cognitive benefits of doodling and drawing can be explained by synthesizing Dual Coding Theory (DCT) and the Picture Superiority Effect. Dual Coding Theory posits that cognition involves two interconnected systems: a verbal system specialized for language processing and a nonverbal imagery system that processes visual and spatial information (Clark & Paivio, 1991). Simultaneous encoding via these dual channels enhances memory retention by providing multiple retrieval pathways. Complementing this, the Picture Superiority Effect demonstrates that images are more likely to be remembered than verbal information alone (Paivio, 1971; Paivio & Csapo, 1973; Paivio, Rogers, & Smythe, 1968). This occurs because pictorial stimuli engage both the nonverbal imagery and verbal systems, producing richer encoding. However, unlike verbal material, which can often be recalled sequentially, visual memory retrieval requires encoding spatial and sequential relationships, introducing complexity to the recall process (Weldon & Roediger, 1987). These theories collectively suggest that visual engagement through doodling and drawing may enhance memory by activating multisensory processing pathways more effectively than verbal-only learning methods.

The Drawing Effect further elaborates on these insights by revealing that actively drawing to-be-remembered items substantially improves recall compared to writing or passive viewing (Wammes et al., 2016). This phenomenon is attributed to the integration of motor action, elaboration, and visual representation, which together form richer, multisensory memory traces.

Within this educational and theoretical framework, doodling and drawing have emerged as promising memory aids, yet empirical findings remain mixed. Numerous studies support the positive impact of drawing on memory retention. Conversely, the literature on doodling presents more varied outcomes: structured doodling generally supports memory retention better than unstructured doodling, but consensus on whether doodling and drawing overall aid or hinder recall is lacking. For example, Andrade (2010) found that participants who shaded printed shapes while listening to a monotonous telephone call recalled 29% more information than controls, suggesting that doodling helps maintain arousal and attention, countering the expected impairments seen in typical dual-task conditions. Meade (2019) reported that structured doodling and writing produced comparable recall outcomes, while drawing significantly enhanced memory; notably, unconstrained doodling was associated with declines in recall.

Further empirical research highlights this complexity. Nayar and Koul (2020) demonstrated improved recall in students who practiced structured doodling and note-taking compared to passive listening. Sundararaman (2020) found that both structured and unstructured doodling increased memory recall among high school students, with structured doodling reducing daydreaming and boosting attention. Conversely, Boggs et al. (2017) showed that unstructured doodling lowered recall compared to structured doodling and note-taking. Amico and Schaefer (2020) reported that doodling impaired episodic memory relative to baseline measures, challenging assumptions of consistent cognitive benefits. Meade (2019) further emphasized that structured drawing enhances memory, whereas unconstrained doodling diminishes it, underscoring the critical role of task structure.

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Nuanced findings emerged from Singh and Kashyap (2015), demonstrating that doodling benefits memory retrieval more during recognition tasks than recall. Huang (2023) expanded this by examining structured versus unstructured doodling among Chinese and English speakers, finding that structured doodling enhanced concentration and recall, particularly in Chinese participants. Additionally, Tadayon and Afhami (2016) reported that high school female students engaging in doodling over multiple sessions significantly improved their academic performance compared to non-doodlers.

The role of gender in modulating the effects of doodling and drawing on memory remains underexplored but promising. Picard and Boulhais (2011) suggest that females may possess superior expressive and creative drawing skills, potentially translating to better memory outcomes than males; however, systematic investigation into gender as a moderating factor is limited.

While empirical evidence demonstrates both supportive and contradictory findings regarding the efficacy of doodling and drawing on memory, important distinctions emerge between structured and unstructured forms, as well as between these two visual modalities. Methodologically, many studies utilize small, homogeneous, Western-centric samples, limiting the generalizability of results (Boggs et al., 2017; Andrade, 2010). Theoretical clarity about the specific cognitive mechanisms, whether driven by arousal, attention, multisensory integration, or their interplay, remains insufficient. Moreover, research on cultural variability, particularly in non-Western educational contexts, is sparse. The influence of gender as a moderator in doodling- and drawing-related memory effects is also insufficiently studied.

To address these existing gaps and limitations, the present study investigates the effects of doodling and drawing on memory recall in Pakistani university students, explicitly examining gender differences. This research is significant because there is a notable scarcity of studies conducted within Pakistan on this topic; the majority of existing work has been carried out in Western contexts. There are numerous contradictions between the educational infrastructure, teaching methods, and how students' artistic expressions are viewed and acknowledged in Western countries compared to Pakistan. These cultural and individual differences will affect and shape the impact of doodling and drawing on memory recall.

Exploring the differential performance of males and females under doodling and drawing conditions can offer valuable insights into how tailored learning strategies might be developed for each gender, ultimately aiming to enhance educational outcomes. By focusing on local educational practices, youth demographics, and methodological rigor while addressing these specific research gaps, this study aspires to contribute meaningful findings that are relevant both locally and internationally.

This study will make a significant contribution to the existing literature by expanding understanding of the effects of drawing and doodling on memory recall within a non-Western educational context. The findings are expected to inform culturally sensitive interventions and educational policies designed to improve teaching methods and optimize student learning in Pakistan.

***Objectives***

- To investigate the effect of doodling and drawing on memory recall.
- To examine which method is more effective in retaining information.
- To explore the gender specific difference in memory recall for doodling, drawing, and the control group.

***Hypothesis***

- The doodling will have a effect on the memory recall compared to drawing and the control group.
- There would be gender differences in memory recall performance within the doodling, drawing, and control groups

## Research Methods

***Participants and Design***

A between-subjects experimental design was employed to examine the effects of doodling and drawing on memory recall. A total of 60 university students aged between 18 and 24 years (NCES, 2022) were recruited through convenience sampling from a local university and randomly assigned to one of three groups: the doodling group (n = 20), the drawing group (n = 20), and the control group (n = 20), using the fishbowl method following procedures similar to those used by Andrade (2010). An a priori power analysis, conducted using

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G*Power software, indicated that a total sample size of 60 participants (20 per group) would be sufficient to detect a small to medium effect size (Cohen's f = 0.25) with an alpha level of 0.05. This sample size provides a statistical power (1 – β) of approximately 0.77 for a one-way ANOVA. Although slightly below the conventional threshold of 0.80, this power level was deemed adequate given practical constraints.

**Materials**

***Audio Dialogue***

An audio dialogue featuring a conversation between a couple planning their vacation was used as the primary learning stimulus, adapted from Boggs et al. (2017), accessible at the following Audio link. The original English version was translated into Urdu and culturally adapted to ensure relevance and comprehension for the Pakistani student sample available at the translated Material link. The translation preserved the content's integrity while modifying cultural references to avoid misunderstandings and to maximize participant engagement. Memory recall was assessed using 13 comprehension questions related to the dialogue content, administered in Urdu. Participants were asked to answer these questions from memory after listening to the audio once. The primary outcome was calculated based on the number of correct answers the participants gave on the memory retrieval questions, with the highest score of 13.

***Doodling task***

Participants assigned to the doodling group (n = 20) were given a blank A4 sheet and a pencil and instructed to create spontaneous, unstructured doodles during the audio presentation. They were explicitly told not to write words, randomly scribble, or create structured drawings, but to doodle freely in any manner they wished.

***Drawing Task***

Participants in the drawing group (n = 20) received an A4 sheet and a pencil and were instructed to produce deliberate and recognizable drawings during the audio presentation. They were reminded not to write words or scribble randomly; their drawings needed to be coherent and identifiable.

***Control Condition***

Participants in the control group (n = 20) were not provided with any paper or drawing materials and were instructed to listen attentively to the audio dialogue without engaging in any secondary task.

***Procedure***

Participants were randomly allocated to one of the three groups: doodling, drawing, or control, using the fishbowl randomization technique to ensure unbiased group assignment. Upon arrival, participants completed demographic and learning style questionnaires. The experiment took place in a quiet, well-lit room with minimal distractions. Each participant was seated comfortably and provided with headphones to listen to the audio dialogue. Before the main task, participants were given instructions that they had to listen to a short Urdu audio clip and perform their assigned task (doodling, drawing, or listening), and in the end, they would be asked questions.

During the experiment, participants listened to a 6-minute 45-second Urdu audio dialogue. Those in the doodling and drawing groups engaged in their respective retention techniques tasks simultaneously while listening, whereas control group participants listened without additional tasks. Participants were observed to ensure that they were not distracted during the experiment task. Immediately after the audio finished, participants in the doodling and drawing groups were asked to hand in their sheets. All participants then received the 13-memory recall questions related to the dialogue and were instructed to answer them from memory within 5-10 minutes.

This measure served as the primary outcome variable, calculated based on the number of correct answers the participants gave on the memory retrieval questions, with the highest score of 13. Finally, participants completed a brief post-experiment questionnaire to provide feedback on their experience and task engagement. Upon completion, participants were debriefed, and the session concluded.

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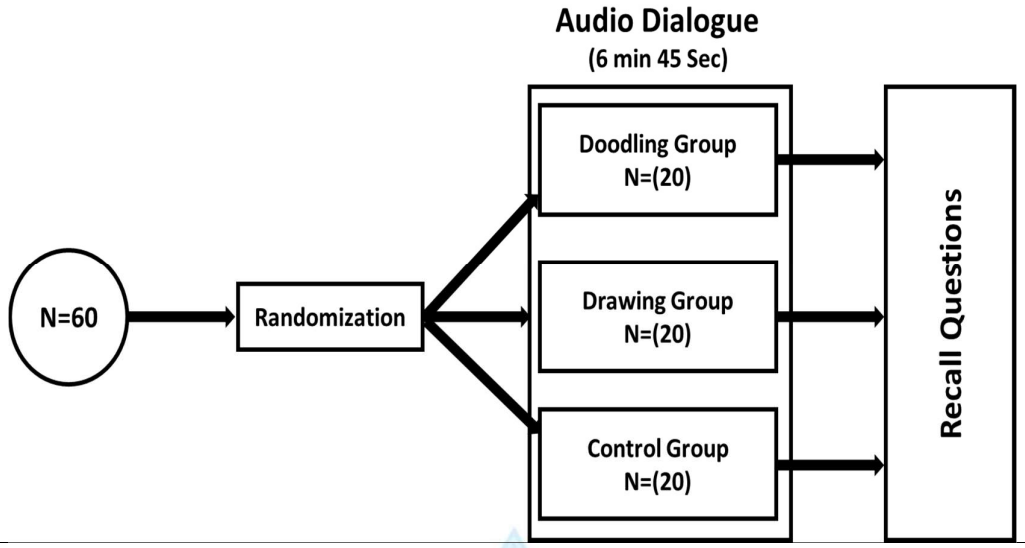
**Figure 1**

*Experimental Design to Assess the Effect of Doodling and Drawing on Memory Recall*




*Note.* The research design suggests steps and procedures to assess the effect of doodling and drawing on memory recall. The participants were allocated to the doodling, drawing, and control groups through a randomization process. Each group was subjected to listening to an audio dialogue, which was followed up by recall questions to assess memory recall.

**Data Analysis**

The primary outcome was the total number of correct answers on the memory recall questionnaire (maximum score = 13). Data were analysed using one-way ANOVA to examine the effects of group assignment (doodling, drawing, control) on memory recall performance. Post-hoc comparisons were conducted using the LSD test to identify significant differences between groups. Data processing and statistical tests were performed using SPSS v27.

**Results**

Hypothesis: Doodling will significantly affect the memory recall group compared to drawing and the control group. A one-way ANOVA was conducted to determine whether memory recall differed significantly among the doodling, drawing, and control groups.

**Table 1**

*One-Way ANOVA Analysis for Difference in Scores on Memory Recall Questions Between the Doodling* (*n*=20)*, Drawing* (*n* =20), *and the Control Group* (*n* =20)

| | Doodling Group (n=20) | | Drawing Group (n=20) | | Control Group (n=20) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **M** | **SD** | **M** | **SD** | **M** | **SD** | **F (2,57)** | **p** | **$\eta^2$** |
| Scores | 7.30 | 2.56 | 4.68 | 2.20 | 8.10 | 2.60 | 10.63 | .000 | .27 |

*Note.* M=Mean, SD=Standard Deviation, $\eta^2$ =Eta Square

The analysis showed a significant main effect of group on memory recall performance, $F$ (2, 57) = 10.63, $p < .001$, with a large effect size ($\eta^2 = .27$) as shown in Table 1. Specifically, the doodling group (M = 7.30, SD = 2.56) and control group (M = 8.10, SD = 2.60) demonstrated higher recall scores than the drawing group (M = 4.68, SD = 2.20). The results suggest that the participants' recall was the highest in the control group, followed by the doodling group. The participants in the drawing condition performed the lowest in the

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recall task.

**Table 2**

*Post Hoc Analysis for Memory Recall scores Among the Doodling (n=20), the Drawing (n =20), and the Control Group (n =20)*

| Mean Pair | Difference | p | Comparison |
|---|---|---|---|
| Doodling-Drawing | 2.63* | .001 | 1>2 |
| Doodling-Control | -.80 | .308 | 1<3 |
| Drawing-Control | -3.42* | .000 | 2<3 |

Table 2 represents a pairwise comparison of memory recall between the three groups (doodling, drawing, and control). Post hoc analyses revealed that the doodling group performed significantly better than the drawing group (MD = 2.63, p = .001). There was no significant difference between the doodling and control groups (MD = -0.80, p = .308).

The drawing group performed significantly worse than the control group (MD = -3.42, p < .001). These results suggest that participants in the doodling group outperformed those in the drawing group, and participants in the control group outperformed those in the doodling group. The drawing group demonstrated the lowest recall performance among the three.

Hypothesis: There would be significant gender differences in memory recall performance within the doodling, drawing, and control groups.

To test this hypothesis, independent samples t-tests were conducted to examine whether males and females differed significantly in their memory recall scores within each of the three groups (doodling, drawing, and control).

**Table 3**

*Independent Sample t-test for Difference in Gender Scores on Memory Recall in the Doodling* (*n*=20)*, the Drawing* (*n* =20), *and the Control Group* (*n* =20)

| | Male | | Female | | | | |
|---|---|---|---|---|---|---|---|
| **Variables** | **M** | **SD** | **M** | **SD** | **t** | **p** | **Cohen's d** |
| Doodling Group(n=20) | 5.80 | 2.25 | 8.80 | 1.93 | -3.20 | .005 | -1.43 |
| Drawing Group(n=20) | 4.65 | 2.42 | 4.70 | 2.08 | -.05 | .96 | -.02 |
| Control Group (n=20) | 7.45 | 2.64 | 8.75 | 2.52 | -1.13 | .27 | -.50 |

*Note*. M= Mean, SD= Standard Deviation

The results indicated a significant gender difference in the doodling group, with females (M = 8.80, SD = 1.93) outperforming males (M = 5.80, SD = 2.25), t(18) = -3.20, p < .005, Cohen's d = -1.43, suggesting a large effect size. No significant gender differences were observed in the drawing group, t(18) = -0.05, p = .96, or in the control group, t(18) = -1.13, p = .27. Although females showed higher mean scores across all groups, indicating better recall performance compared to males in the doodling, drawing, and control groups, these differences were only statistically significant within the doodling condition (see Table 3). These findings suggest that gender may moderate memory recall when doodling is involved, with females potentially benefiting more from doodling than males. However, no gender differences emerged in the drawing or control conditions.

Following the independent samples t-tests comparing males and females within each group, separate one-way ANOVAs were conducted for males and females to examine whether memory recall performance varied across the three experimental conditions within each gender. This analysis aimed to identify whether the impact of doodling, drawing, and control conditions on recall differs for males and females, providing a nuanced understanding of gender-specific effects.

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**Table 4**

*One-Way ANOVA Analysis for Comparison of Gender Scores on Memory Recall in Doodling Group* (*n*=20)*, Drawing Group* (*n* =20), *and Control Group* (*n* =20)

| | Doodling Group | | Drawing Group | | Control Group | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Variable** | **M** | **SD** | **M** | **SD** | **M** | **SD** | **F (2,27)** | **p** | **$\eta^2$** |
| Male | 5.80 | 2.25 | 4.65 | 2.42 | 7.45 | 2.640 | 3.32 | .05 | .20 |
| Female | 8.80 | 1.93 | 4.70 | 2.08 | 8.75 | 2.519 | 11.51 | .00 | .46 |

*Note.* M=Mean, SD=Standard Deviation, $\eta^2$ =ETA Square

As shown in table 4, one-way ANOVA for males revealed significant differences in memory recall scores across the doodling, drawing, and control groups, F= 3.32, p = .05, $\eta^2$ = .20. Males performed best in the control group (M = 7.45), followed by the doodling group (M = 5.80), with the lowest scores observed in the drawing group (M = 4.65). For females, the ANOVA indicated highly significant differences across conditions, F= 11.51, p < .001, $\eta^2$ = .46. Females showed the highest recall scores in the doodling (M = 8.80) and control groups (M = 8.75), with markedly lower scores in the drawing group (M = 4.70).

These findings suggest that females benefit more from doodling in terms of memory recall compared to drawing, while males show relatively better recall in the control and doodling conditions than in drawing. Overall, females outperformed males in memory recall across all conditions.

**Table 5**

*Post Hoc Analysis for Difference between Group Scores of Genders in Doodling Group* (*n*=20)*, Drawing Group* (*n* =20), *and Control Group* (*n* =20)

| **Mean Pair** | **MD** | **p** | **comparison** |
|---|---|---|---|
| | **Male** | | |
| Doodling-Drawing | 1.15 | .301 | 1>2 |
| Doodling-Control | -1.65 | .142 | 1<3 |
| Drawing-Control | -2.80* | .016 | 2<3 |
| | **Female** | | |
| Doodling-Drawing | 4.10* | .000 | 1>2 |
| Doodling-Control | .05 | .960 | 1>3 |
| Drawing-Control | -4.05* | .000 | 2<3 |

*Note.* MD = Mean Difference

Table 5 represents a pairwise comparison of memory recall of male and female participants in the three groups (doodling, drawing, and control) within themselves is presented. The results indicate that in male participants, the mean difference between doodling-drawing (MD=1.15, p <.001) is significant, but between the doodling-control (MD=-1.65, p=1.43) is not significant. Drawing-control (MD=-2.80, p=.016) has a significant mean difference. Control-doodling (MD=1.65, p=.142) doesn't have a significant mean difference.

In female participants, the mean difference between doodling-drawing (MD=4.10, p <.001) is significant, but between the doodling-control (MD=.05, p=.960) is not significant. Drawing-control (MD=-4.05, p=.000) has a significant mean difference. Control-doodling (MD=-.05, p=.960) doesn't have a significant mean difference. According to the results, male participants performed better in the doodling group as compared to the drawing group. They performed better in the control group as compared to the doodling and drawing group. As for females, they performed better in the doodling group as compared to the drawing group and control group. They performed better in the control group as compared to the drawing group.

**Discussion**

The purpose of this study was to examine the effect of doodling and drawing on memory recall. The research was designed to explore the effect and the extent to effect doodling and drawing have on memory retention and recall. The current study hypothesized that doodling and drawing would have a significant positive effect on memory recall in university students. This hypothesis was rejected as the control group, i.e.,

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no task group, performed better than the doodling and drawing group. These results relate to the findings of Boggs et al (2017) as the current study also utilizes unstructured doodling to assess memory recall. The results of this study indicated that participants in the unstructured doodling condition performed significantly worse on the recall scores of the test in comparison to those in the structured doodling and note-taking conditions. The results can better be explained by the fact that, according to the pre-experimental questions, the majority of the participants were not even aware of the term "doodling" and asked for further explanation and elaboration on the term. Almost no one had used doodling as a memory retention strategy priory and were fairly new to the concept. The reason that most of the participants were very new to the process of doodling, resulting in being more conscious and attentive towards doodling instead of the memory task, can explain the decreased performance in the doodling groups.

Another hypothesis for this study was that drawing would have a significantly more positive effect on memory recall in university students as compared to doodling. This hypothesis was also rejected as the drawing group scored the lowest on the memory recall score as compared to the doodling group and control group. These results can relate to the study by Bainbridge et al. (2021) investigated the impact of scene-object consistencies on memory representations, as measured through drawings made during recall. Their findings indicate a dual effect on memory: enhanced global (scene) information but reduced local (object) detail. Participants were observed to fixate longest on inconsistent objects, but these fixations during study did not correlate with recall performance, time, or drawing order. In conclusion, the study demonstrates a nuanced effect of scene inconsistencies on memory detail during recall, with drawing leading to decreased recall accuracy.

The lowest scores on drawing can be explained by the responses of participants on pre- and post-questionnaires. In the pre-experimental questions, very few participants reported having used drawing as a memorizing strategy. As for post-experimental questions, participants in the drawing group reported they felt like drawing hindered their performance as they got too concentrated on drawing that they couldn't concentrate on the audio and retain information. Another point that can further explain the low performance of the drawing group is that many volunteers refused to take part in the study when they found out that they had to draw. Even the participants who took part in the study were not confident or accustomed to using drawing as a memorization strategy.

The third hypothesis to be tested in this study is that females will perform better on recall using doodling and drawing in university students as compared to males. This hypothesis has been consistent with the outcomes, as females performed better overall as well as group-wise in memory recall as compared to men. No such study has been conducted in this domain to relate to the results and explain the outcome. Some studies conform to the idea that females perform better at creative activities as compared to men, which can contribute as an explanation to the fact that females performed better in contrast to males in the current research study.

Picard & Boulhais (2011) examined differences in expressive drawings among both sexes. The results were produced by the collection of data from 105 boys and 105 girls aged 9–15 years. The drawings were analysed based on their expressive strategies and complexity. The findings of the study supported the notion that males and females differ in how they express emotions, even in drawings. These results suggest that divergent thinking might play a role in expressive drawing ability. According to the results and findings of this study, it can be said that females performed better as females generally are better at the creative and drawing domain.

**Conclusion**

This study found that both doodling and drawing may hinder memory recall, with the control group performing best and the drawing group performing worst. Females consistently outperformed males, especially in the doodling condition, suggesting gender differences in how drawing and doodling tasks aid memory. These results differ from previous research, indicating that cultural and contextual factors may influence outcomes. Future research should use within-subject designs to control individual differences and include more diverse samples to improve generalizability. Investigating task-specific drawing instructions and underlying cognitive processes could further clarify these effects. These findings caution against universally

recommending doodling or drawing as memory aids and emphasize the importance of gender-sensitive, culturally relevant educational strategies.

***Limitations and Suggestions***

The study has limitations, including a limited, region-specific sample, which restricts generalizability. Participants were not asked to draw the material to maximize the picture superiority effect. Additionally, the independent groups design may introduce variability due to individual differences like IQ and creativity. Future research should use repeated-measures designs and broader, more diverse samples to enhance validity and generalizability.

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