



From Social Identity to Cognitive Vulnerability: Exploring the Impact of Stereotype Threat on Episodic Memory Across Different Social Categories

Rishabh Jaiswal ^{a++}, Shraddhesh Kumar Tiwari ^{b#*}
and Dhananjay Kumar ^{at}

^a Department of Psychology, Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, UP, India.

^b Department of Psychology, Noida International University, Greater, Noida, UP, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

This study investigates the effect of stereotype threat on episodic memory among university students from three social categories (General, OBC, and SC/ST). Stereotype threat, defined as the fear of confirming negative stereotypes, was hypothesized to differentially affect memory performance across these groups. A total of 226 participants were randomly recruited and assigned to either a threat or non-threat condition, with those in the threat condition exposed to caste-related

⁺⁺ Research Scholar;

[#] Assistant Professor;

[†] Professor;

*Corresponding author: E-mail: sktiwari057@gmail.com;

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negative stereotypes. The sample included 75 General category participants, 71 OBC participants, and 80 SC/ST participants. An episodic memory task assessed their performance, and descriptive statistics along with a 3x2 ANOVA design were used for analysis. Results showed that General category students made fewer memory errors and were less affected by stereotype threat. OBC students performed better in the absence of threat, while SC/ST students were most susceptible, exhibiting increased memory errors under threat. These findings highlight the varied effects of stereotype threat across social categories, emphasizing the need for interventions to mitigate its negative impact on cognitive performance and academic achievement.

Keywords: Stereotypes threat; performance; episodic memory.

1. INTRODUCTION

In contemporary society, stereotypes continue to wield significant influence, shaping perceptions and behaviours while often resulting in unjust judgments formed through a biased lens [1,2]. As aptly stated, "Stereotypes are the clichés that lead to stigmatization, and as soon as we begin to realize them, they begin to fall apart" [3]. These stereotypes are overgeneralized and preconceived notions about individuals based on characteristics such as gender, race, social class, age, etc. [4,5] The process of stereotyping involves attributing generalized and simplified traits to groups of people, often through verbal labels or as a reflection of prejudice or authoritarianism [6,7]. This indicates that the degree of prejudice is not determined by the mere existence of stereotypes but rather by the characteristics of these stereotypes and how they are used in an individual's thinking [1,8].

While closely related to prejudice, stereotypes differ in that they represent a specific type of concept, whereas prejudices are a particular form of attitude. Stereotypes are not confined to any single aspect of life; instead, they have permeated various domains, inhibited the free exchange of ideas and fostered environments where stereotype threats can thrive [6,9]. Stereotype threat emerges when individuals from stigmatized groups find themselves in situations where negative stereotypes provide a framework for interpreting their behavior [1].

When we talk about stereotypes, there comes a phrase: "Stereotypes are the clichés that lead to stigmatization and as soon as we begin to realize them, they begin to fall apart" [3]. Since these stereotypes are born in the mind, they not only affect any single aspect of human life but also govern and regulate almost every part of human life [10]. Stereotypes can be considered to be a special class of concepts and prejudices as a special class of attitudes [11]. In today's era, this

stereotype is not only limited to any particular domain, instead, its branches are expanding beyond imagination [12]. Every individual is potentially vulnerable to stereotype threat because everyone has at least one social identity that may be the target of a negative stereotype in certain situations [13,14]. Consequently, stereotype threat is pervasive in domains where relevant stereotypes exist; even if not explicitly examined in research, these processes are still active [12]. The threat is internalized and persistent, serving as a constant reminder that others may doubt one's abilities [1,6].

Stereotype threat, a psychological phenomenon, causes individuals to underperform due to the fear of confirming negative stereotypes associated with their social group [6]. This underperformance has been closely linked to disruptions in memory, particularly in working memory and episodic memory [15,16]. In stereotype threat situations, cognitive resources that would normally be dedicated to memory tasks are instead used to cope with the stress and anxiety of the situation [17,15]. This diversion of cognitive resources impairs the processes involved in encoding and retrieving information, leading to decreased memory performance [15,17]. As a result, the decline in memory function contributes significantly to the overall reduction in task performance under stereotype threat [16]. This provides direct evidence supporting Steele and his colleagues' hypothesis [6] that performance deficits under stereotype threat are due to intrusive thoughts occurring during task performance. These results align with recent research by Schmader and Johns [15], which shows a reduction in working memory capacity under stereotype threat and further specifies that it is individuals' domain-specific disruptive thoughts that negatively impact performance [12]. Specifically, using the thought listing technique, the current study demonstrated that participants under stereotype threat spontaneously engage in negative task-

related thinking, which subsequently inhibits their performance [18].

Memory is crucial as it allows us to reflect on the past, enriching our lives with both joyful and sorrowful recollections [19,20]. Rather than merely storing facts, memory is a complex system that organizes experiences based on their significance and ease of access [21,22]). It categorizes information based on how long we need to remember it, separating inputs according to our needs [3]. Memory indeed is an important aspect in every individual's life because without the ability to remember, we would be confined to the present and unable to reflect on the past [20,23]. Memory enriches our lives, allowing us to experience the joy of happy memories and the sorrow of sad ones [24,25].

People often view memory as a simple storage space for facts, but it's much more intricate [26,27]. Memory is a sophisticated system that organizes experiences by their significance and how easily they can be accessed [21,3]. Information is stored in different ways depending on how long we need to remember it, and our memories prioritize and categorize input based on its relevance to us [19,28]. The processes of storing and retrieving information are constantly interacting [12]. Not every event or piece of information instantly becomes a permanent memory. Instead, information must go through at least three distinct stages to be remembered for more than about thirty seconds: the sensory register, short-term memory (STM), and long-term memory (LTM) [14,21].

Research exploring the effects of stereotype threat on episodic memory consistently finds that this psychological phenomenon can significantly impair memory performance. Stereotype threat occurs when individuals are concerned about confirming negative stereotypes associated with their social group, leading to a diversion of cognitive resources away from task performance, including memory-related tasks [12]. Empirical studies have documented that individual under stereotype threat conditions tend to exhibit poorer episodic memory performance. For instance, Hess et al. [5] reported that older adults reminded of stereotypes regarding aging and memory performed worse on memory assessments than those not exposed to such reminders.

Similarly, Mazerolle et al. [11] found that women facing stereotype threat showed lower episodic

memory performance compared to men in situations where stereotypes were not activated. The adverse effects of stereotype threat on episodic memory are believed to stem from increased cognitive load and diminished working memory capacity. Under the pressure of stereotype threat, individuals often experience intrusive thoughts and anxiety, which consume cognitive resources that would otherwise be available for memory encoding and retrieval [7]. Research by Beilock, Rydell, and McConnell [22] suggests that the strain on working memory under stereotype threat is a critical factor leading to impaired memory performance. Interventions designed to mitigate stereotype threat's impact have shown potential in improving episodic memory outcomes. Johns, Schmader, and Martens [4] found that reframing tasks to reduce the focus on stereotype-relevant abilities can ease the cognitive burden of stereotype threat. Keeping this view in the mind, objective of the study was to examine the effect of stereotype threat and non-threat conditions on episodic memory in various social category students.

Hypothesis: There would be a significant effect of social categories and exposure conditions on episodic memory.

2. METHODS

Participants: Study was conducted on 226 university students of three social categories General category (n=75), Other Backward Classes (OBC; n=71), and Scheduled Castes/Scheduled Tribes (SC/ST; n=80). Random sampling method was used to recruit and randomly assign in two conditions (threat and non-threat conditions). Participants were enrolled in various UG and PG university courses.

3. MATERIALS AND PROCEDURE

Stereotype Threat Manipulation: Social Stereotypes Scale [29].

This questionnaire is primarily designed to assess the stereotypes of individuals belonging to a specific social category. statements pertain the characteristics of their own social category. In this study the statements of the stereotypes presented to the members of a given category to prime schema related to their stereotypes about their group and in this way, the stereotype threat and non -threat conditions manipulated.

Episodic Memory Task: To measure episodic memory, participants were presented

with a short story containing specific details such as characters, events, time, and locations etc. They were instructed to read the story carefully. After a 10-minute study period, the story was taken away from the participants and participants were given a 10-minute break. Following the break, they were asked to recall as much of the story as possible by answering 12 questions designed to test their memory of the story's details.

In the present study, the researcher employed a purposive sampling method to recruit participants, who were then called to the laboratory. Rapport was established with each participant to create a comfortable and trusting environment. Following this, informed consent was obtained, and the purpose and procedure of the study were thoroughly explained to ensure participants had a clear understanding and were willing to participate voluntarily. Participants were tested individually and were assigned to experimental conditions representing the crossing of stereotype condition (threat condition). While giving the Stereotype Threat Questionnaire to the participants, they were instructed that, "you are presented with statements related to the characteristics of your caste and category. Please read these statements and indicate your responses by marking a tick mark (✓) for them as per your choice. You are free to respond according to your own views. Your responses will be kept confidential. Further, those in the threat condition were additionally instructed as below, prior to the memory task:

"One goal of this study is to examine social category differences in memory ability. I am now going to examine your memory ability using a test that has been used extensively by researchers to study social category effects on memory. Notably, participants from the General category outperformed those from SCST and OBC categories in this task.

Those in the Controlled condition (nonthreat condition) received the following instructions: One goal of this study is to examine individual differences in memory ability and the factors that account for those differences. I am now going to examine your ability to process memory task. In an effort to reduce potential biases, we will be using a task that has been shown to be appropriate for individuals of all students.

After filling the questionnaire, the participants were asked to study a short story for a duration of 10 minutes. Following this study period, the story was taken away, and participants were given a 10-minute break. After the break, their ability to recall the story was tested to assess memory performance. The memory recall assessment consisted of 12 carefully designed questions directly related to the details of the story, designed to evaluate participants' episodic memory. Participants were given 10 minutes to respond, ensuring they could recall information without pressure. Each response was expected to be concise, typically in a single-word format, reflecting the precision of their memory retention.

4. RESULTS

Table 1 represents the mean and standard deviation of episodic errors across categories (General, OBC, and SC/ST) and conditions (threat and non-threat) for the participants. The analysis revealed that the participants from the General category exhibited a mean episodic error of 2.79 (SD = 1.42) under the threat condition, which slightly increased to 3.03 (SD = 1.54) under the non-threat condition. The overall mean for this category across both conditions was 2.91 (SD = 1.47). The mean values indicate that General category members accounted for fewer episodic errors, thus performing better compared to members of the OBC and SC/ST groups in both conditions. Notably, the mean episodic error for the General category was lower in the threat condition compared to the non-threat condition. For the OBC category, a noticeable shift was observed with a mean episodic error of 3.89 (SD = 1.47) under the threat condition, which decreased to 3.06 (SD = 1.57) under the non-threat condition. The total mean for the OBC category across conditions was 3.48 (SD = 1.57). The mean episodic error for the OBC category was lower in the threat condition compared to the non-threat condition, indicating that participants from the OBC category performed better than those from the SC/ST category in both conditions. Participants from the SC/ST category demonstrated a pronounced increase in episodic errors under the threat condition, with a mean of 6.62 (SD = 1.57), compared to a reduced mean of 4.95 (SD = 1.72) under the non-threat condition. The total mean episodic error for this category was 5.89 (SD = 1.68). The SC/ST category showed the highest mean episodic error under the threat condition compared to the non-threat condition and also when compared to both the General and OBC categories.

The analysis of variance (ANOVA) was conducted to examine the effects of social category and condition on episodic errors. The results revealed statistically significant main effects and interaction effects. The main effect of Social Category was highly significant, [F (2, 220) = 80.516), (p < .01)] indicating that episodic errors vary considerably across different social categories. This suggests that the social background of participants plays a crucial role in their susceptibility to episodic errors. The main effect of Condition was also significant, [F (1, 220) = 14.596), p < .01], signifying that the presence or absence of stereotype threat significantly influences episodic errors. This finding underscores the impact of external psychological factors on memory performance. Moreover, the interaction effect between Social Category and Condition was significant, [F (2, 220) = 7.941), p < .01], highlighting that the effect of stereotype threat on episodic errors is not uniform across social categories. This interaction indicates that certain social groups are more affected by stereotype threat than others, leading to differential impacts on episodic memory performance.

5. DISCUSSION

The results of this study illustrate the significant role of stereotype threat in influencing episodic memory performance across different social categories. Participants from the General

category exhibited fewer episodic errors compared to those from OBC and SC/ST categories, which is consistent with Steele and Aronson's [6] findings that higher-status groups are generally less susceptible to stereotype threat. This may be due to a lower level of internalized negative stereotypes, as evidenced by the General category's relatively stable performance even under threat conditions.

For the OBC category, a decrease in episodic errors when stereotype threat was removed suggests that stereotype threat adversely affects performance, corroborating Schmader, Johns, and Forbes [12], who demonstrated that such threats increase cognitive load and anxiety, impairing performance. The reduction in errors for the OBC group under non-threat conditions supports the idea that removing stereotype threat can improve cognitive outcomes.

In contrast, participants from the SC/ST category showed the highest episodic errors under threat conditions, reflecting a heightened sensitivity to stereotype threat. This finding aligns with Major and O'Brien's [10] research, which found that marginalized groups experience more severe performance decrements under stereotype threat due to greater anxiety and concern about confirming negative stereotypes. The substantial difference in episodic errors between threat and non-threat conditions highlights the critical need for targeted interventions for these groups.

Table 1. Mean and SD of episodic error on category and condition

Category	Condition	Mean	SD
General	Threat	2.7949	1.41755
	Non threat	3.0278	1.53969
	Total	2.9067	1.47202
OBC	Threat	3.8889	1.46926
	Non threat	3.0571	1.57074
	Total	3.4789	1.56624
SCST	Threat	6.6222	1.57088
	Non threat	4.9429	1.72224
	Total	5.8875	1.68383

Table 2. Summary of Two-way ANOVA Social Category and Condition

Source	df	Mean Square	F
Category	2	178.319	80.516**
Condition	1	32.325	14.596**
Category * Condition	2	17.588	7.941**
Error	220	2.215	
Total	226		

Note: - ** (p<.01), * (p<.05)

The interaction between social category and condition reveals that the impact of stereotype threat varies across different groups, consistent with the research of Inzlicht and Schmader [30]. Their findings indicate that while stereotype threat affects all individuals, its intensity differs based on social category and the perceived relevance of the stereotype. Our conclusion highlights that participants from the SC/ST category demonstrated a higher number of errors, suggesting a performance decrement. This performance decline is a result of several societal factors that play a significant role in priming stereotype threat.

First, socioeconomic status emerges as a key factor. Participants from marginalized groups, such as SC/ST, are more likely to face economic hardships that contribute to cognitive stress and impair memory recall. In contrast, those from the General category, often facing fewer socioeconomic challenges, exhibit better performance on memory tasks. Educational opportunities further widen this gap. Individuals from the General category, with better access to quality education, show enhanced cognitive abilities, while OBC and SC/ST participants, who may have had limited access to educational resources, experience more episodic errors [31-35].

Cultural and psychological factors also contribute to these differences. Cultural norms and memory strategies vary across social groups, with the General category potentially benefiting from cultural practices that emphasize cognitive skills. Meanwhile, marginalized groups may have cultural influences that impact how they process and retrieve information. Psychologically, higher self-efficacy in the General category, coupled with better belief in their abilities, likely results in better memory performance. On the other hand, marginalized groups, burdened by the long-term effects of negative stereotypes, often exhibit lower self-efficacy and motivation, contributing to increased episodic errors.

Lastly, the historical context of discrimination and stigma faced by OBC and SC/ST groups cannot be overlooked. The chronic stress and psychological burden associated with these experiences have detrimental effects on cognitive performance, leading to heightened anxiety and more significant performance decrements. This finding is consistent with the research of Major and O'Brien [10], which demonstrates that marginalized groups experience greater performance declines

under stereotype threat due to their heightened sensitivity to confirming negative stereotypes [36-39].

6. CONCLUSION

In summary, the interaction between societal, economic, educational, cultural, psychological, and historical factors explains the disparities in episodic errors across social categories. The priming of stereotype threat, reinforced by these factors, results in performance decrements, particularly in marginalized groups.

7. IMPLICATION

Findings of the study will be helpful to understand the main causative factors and consequences of stereotype threat on retrieval from long term memory (episodic and semantic). The research assume that student's stereotype threat can mutually and independently affect the retrieval from memory stores (semantic and episodic). Present study will also be useful for principal and teachers in planning and organizing student's activities as well as providing holistic development of adults. It will also be informative for society that students are not just stand for academic's success but also necessary to inbuilt a better cognitive ability.

These findings emphasize the significant impact of stereotype threat on episodic memory, particularly in situations where individuals are vulnerable to stereotype-related stress. The literature highlights the need for strategies to diminish the influence of stereotype threat to support better memory performance across different groups.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

We hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

CONSENT

As per international standards or university standards, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

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