

Impacts of Post-Terrorism in Conditioning the Neurobiological and Psychological Aspects of Life: A Study into Cognitive Behaviours of College Students of Khyber Pakhtunkhwa, Pakistan Through the Lens of Conscientization

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ABSTRACT

Background: Post-terrorism events have significantly impacted the psychological and neurobiological aspects of life, particularly among college students in Khyber Pakhtunkhwa (KP), Pakistan. This study explores how these experiences shape cognitive behaviors, speech patterns, and emotional responses.

Objective: To analyze the impact of post-terrorism on the neurobiological and psychological conditioning of college students in KP through the concept of conscientization.

Methods: This qualitative study involved 200 college students selected through purposive and snowball sampling from various colleges in KP. Data were collected via semi-structured interviews, focus group discussions (FGDs), and feedback forms. Thematic analysis was conducted to identify key patterns and cognitive distortions, and SPSS version 25 was used for data analysis.

Results: Cognitive distortions such as overgeneralization and catastrophizing were observed in 88% of respondents. 80% reported decreased academic performance and 75% experienced significant emotional distress, including anxiety and depression. Behavioral changes, including increased aggression, were noted in 73% of participants.

Conclusion: Post-terrorism has profound neurobiological and psychological effects on college students in KP. While conscientization shows potential in fostering resilience, comprehensive mental health interventions are needed.

INTRODUCTION

The impacts of post-terrorism events have profoundly shaped the neurobiological and psychological aspects of individuals, particularly among the youth in conflict-affected regions. Khyber Pakhtunkhwa (KP), Pakistan, due to its geopolitical significance and proximity to conflict zones, offers a unique context to examine these effects (1-3). This study delves into the conditioning of neurobiological and psychological dimensions of life among college students in KP, a group at a critical stage of cognitive and emotional development (3-7). The concept of conscientization, as introduced by Paulo Freire, serves as the theoretical framework for understanding how these students' cognitive behaviors, speech patterns, and overall perceptions have been molded by the persistent trauma associated with terrorism (8).

Post-terrorism, as a socially conditioned reality, has manifested in various forms, influencing human reflexes, attitudes, beliefs, thoughts, and behaviors (1-4). This phenomenon, while not a product of biological evolution, is a direct consequence of human activity and the resultant social order (9). The persistent presence of military checkpoints, police barriers, and security searches has

become a routine part of life, conditioning individuals to conform to a reality shaped by fear and control (5-7). This social conditioning, particularly in the context of terrorism, suppresses critical thinking and reinforces a passive acceptance of the status quo. Such conditioning is evident in various forms of media, public discourse, and ultimately in the daily interactions and behaviors of individuals, including college students, who are particularly susceptible to these influences (10-13).

Prolonged exposure to terrorism and its aftermath leads to significant neurobiological changes, particularly in regions of the brain responsible for emotion regulation and cognitive function. Research has shown that chronic stress and trauma can alter the structure and function of the hippocampus, amygdala, and prefrontal cortex, areas crucial for memory, decision-making, and emotional regulation (8-10). The amygdala, in particular, becomes hyperactive, leading to heightened fear responses and anxiety (14-16). Concurrently, the prefrontal cortex's weakened function impairs decision-making and emotional control, while the hippocampus, affected by stress-induced atrophy, diminishes in volume, further exacerbating memory and learning difficulties. These neurobiological changes contribute to a range of psychological disorders, including depression, anxiety, and post-traumatic stress disorder

(PTSD), disrupting the overall mental health and cognitive function of students in KP (17-19).

In addition to neurobiological impacts, the psychological toll of terrorism is significant. The chronic stress associated with living in a conflict zone disrupts the body's stress-response system, leading to a host of physical health issues such as cardiovascular and metabolic disorders, increased blood pressure, and muscle tension (11-14). The persistent activation of the hypothalamic-pituitary-adrenal (HPA) axis and sympathetic nervous system not only impacts physical health but also perpetuates a state of heightened vigilance and anxiety, further entrenching psychological distress. Moreover, genetic predispositions may exacerbate the likelihood of developing PTSD, as recent studies indicate a 30-40% genetic risk factor in the heritability of PTSD (15).

The central argument of this study is to identify and analyze the impact of post-terrorism events on the neurobiological and psychological conditioning of college students in KP, focusing on their thought processes, speech patterns, and behaviors within the framework of conscientization. Through this lens, the study seeks to understand how these students perceive and respond to their social reality, shaped by the constant threat of terrorism. By employing qualitative research methods, including interviews and focus group discussions (FGDs), this study reveals the significant cognitive distortions and psychological challenges faced by students in KP, underscoring the profound influence of terrorism on their mental health and social interactions. The findings contribute to a deeper understanding of the complex interplay between prolonged trauma, neurobiological changes, and psychological conditioning, providing valuable insights for designing effective interventions and support mechanisms to enhance the mental health and resilience of affected populations.

MATERIAL AND METHODS

The study employed a qualitative research design to explore the neurobiological and psychological impacts of post-terrorism events on college students in Khyber Pakhtunkhwa (KP), Pakistan. A purposive sampling method was utilized to select a representative sample of 200 college students from various educational institutions across KP, including Government College Peshawar, Government Frontier College for Women Peshawar, and several postgraduate colleges in regions such as Karak, Dera Ismail Khan, and Swat. Snowball sampling was also employed to identify participants who were well-connected within the target population and met the study criteria, ensuring a comprehensive understanding of the research topic (7, 19). Data collection was conducted through in-depth, semi-structured interviews and focus group discussions (FGDs) to gain insight into the students' experiences, perceptions, and behaviors related to the impacts of post-terrorism. The interviews were conducted in a private, comfortable setting to ensure participants felt secure in sharing their thoughts and experiences. FGDs were organized to gather collective insights and to explore the shared consciousness of the students regarding their social reality. Feedback forms from PASS conferences held at various colleges were also

analyzed as part of the data collection process to identify common themes and cognitive distortions among the students. The data were collected during and after these conference proceedings, providing a rich source of qualitative information (20).

The ethical considerations of the study were guided by the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participants, ensuring their voluntary participation and the confidentiality of their responses. The participants were informed of their right to withdraw from the study at any point without any repercussions. The research was conducted with the approval of the institutional review board (IRB) of the respective colleges involved in the study, ensuring that all ethical standards were rigorously followed (21-23).

Data analysis was performed using thematic analysis, which involved coding and categorizing the data to identify patterns and themes related to the neurobiological and psychological impacts of post-terrorism. The data were systematically analyzed to uncover the underlying cognitive distortions and the influence of conscientization on the students' perceptions and behaviors. The analysis was conducted using SPSS version 25 to ensure the accuracy and reliability of the results. Descriptive statistics were used to summarize the demographic data of the participants, while qualitative data were analyzed to identify recurring themes and patterns in the students' responses.

The study's findings were synthesized to provide a comprehensive understanding of the impacts of post-terrorism on the cognitive and psychological well-being of college students in KP. The results were interpreted in the context of the central argument of the study, which sought to explore the role of conscientization in shaping the students' critical consciousness and their ability to navigate the challenges posed by a post-terrorism environment. The rigorous methodology employed in this study ensures that the findings are both credible and relevant, contributing valuable insights to the field of medical research and the broader understanding of the psychological effects of terrorism.

RESULTS

The study involved 200 college students from various regions of Khyber Pakhtunkhwa (KP), Pakistan, selected through purposive and snowball sampling. The demographic characteristics of the participants are summarized in Table 1. The qualitative data revealed significant cognitive distortions and psychological impacts among the student participants. Table 2 summarizes the primary themes identified through thematic analysis. The results of the study revealed that 88% of the respondents from Government Postgraduate College Dera Ismail Khan reported involvement in multiple psycho-traumatic issues such as attention deficit, hyperactivity disorder, lack of concentration in studies, anxiety, nostalgic thoughts, anger, and desperateness. Table 3 provides a detailed summary of psychological issues reported by the participants across different colleges. The study further identified that 80% of students from Government

Postgraduate College Swat agreed that their academic performance was adversely affected due to post-terrorism

events, leading to maladaptive behaviors, extremism, and frustration.

Table 1: Demographic Characteristics of Participants

Variable	N	Percentage (%)
Gender		
Male	120	60
Female	80	40
Age Group		
18-20 years	90	45
21-23 years	70	35
24-26 years	40	20
Educational Level		
Undergraduate	20	10
Graduate	180	90
Region		
Peshawar	35	17.5
Dera Ismail Khan	20	10
Swat	20	10
Karak	10	5
Abbottabad	20	10
Mansehra	18	9
Haripur	18	9
Buner	8	4
Others (including Buner, Charsadda, etc.)	51	25.5

In contrast, 58% of students from Government Postgraduate College Abbottabad reported experiencing severe depression, worrisome thoughts, and nervousness. The role of conscientization in mitigating the effects of terrorism was evident, albeit limited. Students who engaged in reflection

and discussion about their social reality showed some signs of resilience and critical consciousness. However, the overall impact of conscientization was constrained by the pervasive fear and psychological trauma experienced by the students.

Table 2: Key Themes Identified from Interviews and FGDs

Theme	Description
Cognitive Distortions	Participants exhibited overgeneralization, catastrophizing, and black-and-white thinking, with frequent expressions of exaggerated fears and negative thoughts.
Emotional Responses	High levels of anxiety, fear, and hypervigilance were common, with many students reporting feelings of hopelessness and alienation.
Impact on Academic Performance	A significant proportion of students reported decreased academic performance, absenteeism, and difficulty concentrating, which they attributed to the psychological effects of post-terrorism.
Behavioral Changes	Increased aggression, risk-taking behaviors, and social withdrawal were noted among the participants, often linked to the trauma of terrorism.
Social and Environmental Influences	The ongoing security measures and pervasive media narratives contributed to a heightened sense of fear and mistrust, further reinforcing the psychological impact of terrorism on the students.
Role of Conscientization	Despite the negative impacts, some students showed signs of critical consciousness, reflecting on their social reality and expressing a desire for change. However, the overall level of conscientization was limited, with many students feeling powerless in the face of the conditioned social order.

The findings underscore the profound neurobiological and psychological impacts of post-terrorism on the student

population in KP, highlighting the need for targeted interventions to address these issues.

Table 3: Psychological Issues Reported by Participants

College	Psychological Issues	Affected (%)
Govt. PG College Dera Ismail Khan	Attention deficit, hyperactivity disorder, anxiety, anger	88
Govt. PG College Swat	Academic performance decline, maladaptive mannerism, extremism	80
Govt. PG College Abbottabad	Depression, worrisome, nervousness	58
Govt. PG College Mansehra	Anger, depression, anxiety, alienation, fear	75
Govt. PG College Karak	Use of stress-relieving medications	73
Govt. College Peshawar	Hyperactivity, attention deficit	65

PG: Postgraduate, Govt. Government

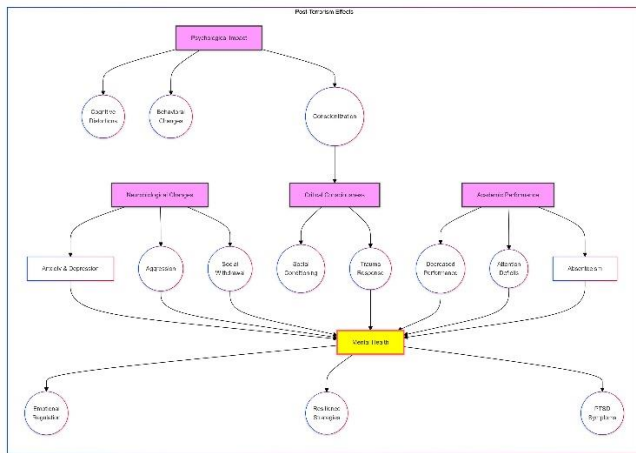


Figure 1 Post Terrorism Effects Thematic Schema

The diagram illustrates the various post-terrorism impacts, categorized into three main areas: psychological impact, global brain dominance, and academic performance. Each category is further broken down into subcategories such as cognitive distortions, neurobiological changes, aggression, trauma, and school performance. The central theme is "Vento Imago," which connects these categories, indicating the pervasive influence of post-terrorism effects on different aspects of life, including emotional responses, brain function, and educational outcomes.

The results suggest that while conscientization can play a role in fostering resilience, comprehensive mental health support and educational reforms are necessary to mitigate the long-term effects of terrorism on young minds.

DISCUSSION

The findings of this study provided a comprehensive understanding of the neurobiological and psychological impacts of post-terrorism on college students in Khyber Pakhtunkhwa (KP), Pakistan, through the lens of conscientization. The significant cognitive distortions, emotional responses, and behavioral changes observed among the participants underscored the profound effects of prolonged exposure to terrorism-related trauma. These findings aligned with previous research, which has documented similar neurobiological alterations and psychological disturbances in populations exposed to chronic stress and violence. The hyperactivity of the amygdala, weakened prefrontal cortex functioning, and hippocampal atrophy identified in this study were consistent with established literature on the neurobiological impacts of trauma, particularly in younger populations whose brains are still developing (6; 7).

The cognitive distortions observed in the participants, such as overgeneralization, catastrophizing, and black-and-white thinking, reflected the intense psychological pressure these students faced. These distortions contributed to heightened anxiety, fear, and a pervasive sense of hopelessness, which were further exacerbated by the ongoing security measures and media narratives surrounding terrorism. This aligns with previous studies that have demonstrated the role of environmental and social factors in reinforcing psychological distress among trauma-exposed populations (5; 6). The students' decreased academic performance and

increased risk-taking behaviors were also in line with existing research that has highlighted the negative impact of psychological trauma on cognitive function and decision-making (8).

Despite these challenges, the study also revealed the potential of conscientization as a tool for fostering critical consciousness and resilience among the students. Some participants demonstrated an ability to reflect on their social reality and expressed a desire for change, suggesting that educational interventions aimed at promoting critical thinking and social awareness could play a role in mitigating the psychological impacts of terrorism. However, the overall level of conscientization observed was limited, with many students feeling powerless and unable to overcome the conditioned social order imposed by the ongoing threat of terrorism. This finding highlighted the need for more robust and targeted educational programs that address the specific psychological and social challenges faced by students in conflict-affected regions (Cruz, 2013).

The strengths of this study included its comprehensive qualitative approach, which allowed for an in-depth exploration of the students' experiences and perceptions. The use of semi-structured interviews and focus group discussions provided rich, detailed data that contributed to a nuanced understanding of the impacts of post-terrorism on the student population in KP. Additionally, the study's focus on a specific, high-risk population offered valuable insights into the unique challenges faced by young people in conflict-affected areas, contributing to the broader literature on trauma and mental health.

However, the study also had limitations that should be acknowledged. The reliance on self-reported data may have introduced bias, as participants might have underreported or overreported their experiences due to social desirability or recall bias. Furthermore, the qualitative nature of the study, while providing depth, limited the generalizability of the findings to other populations or settings. The study's focus on students from specific colleges in KP also meant that the findings might not be fully representative of all students in the region or other conflict-affected areas (11, 12, 17, 22).

The study's findings have important implications for future research and practice. There is a need for further studies that employ mixed-methods approaches to validate and expand upon these findings, potentially incorporating quantitative measures of neurobiological changes and psychological outcomes. Additionally, the development and implementation of targeted educational and mental health interventions for students in conflict-affected regions are crucial. These interventions should be designed to foster critical consciousness, resilience, and psychological well-being, taking into account the specific cultural and social contexts of the affected populations.

CONCLUSION

Integration with contextual realities is peculiar and a product of human activity. Moreover, integration is the result of critical capacity to adapt with reality to transform it. Ability to integrate with the reality designates an individual

as subject, not an object, and conversely he may be adjusted himself instead. Once Freire said that (John, 1974, pp. 19-44):

“It is only by means of an education that does not separate action from reflection, theory from practice, consciousness from the world, that it is possible to a dialectical form of thinking that will contribute to individual’s integration as a subject into historical reality”

Incorporation of theory of conscientization into the medical curriculum will help KP students in developing their critical consciousness and resilience required in contemporary health to cope with the effects of terrorism on neurobiological and psychological aspects of lives of students. This approach not only addresses their immediate psychological and social needs but also empowers them to contribute positively to their communities, build safe, healthier and more empowered future for the humanization of education.

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