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BURNOUT AND NEUROCOGNITION: INVESTIGATING THE PSYCHOLOGICAL ASSOCIATION BETWEEN CLINICAL BURNOUT AND NEUROCOGNITIVE FUNCTIONING IN YOUNG DOCTORS

Saima Sohail[1]
(Corresponding Author)
[1]MS Scholar, Department of Clinical Psychology, The Superior University, Lahore.
Email: su92-mscpw-f23-026@superior.edu.pk
Zahra Ijaz Alimirza[2]
[2]Lecturer, Department of Clinical Psychology, The Superior University, Lahore.
Email: zahra.ijaz@superior.edu.pk
Hira Shafiq[3]
[3]MS Clinical Psychology Scholar, Department of Professional Psychology, Bahria University Lahore.
Email: hirashafiq326@gmail.com

Abstract
This study aims to explore the body of research to discover the extent to which burnout can contribute to daily cognitive challenges among young physicians in hospitals around Pakistan. Data was obtained using a cross-sectional, correlational research design on 300 young doctors aged between 22 and 35 years working in public, private, and teaching hospitals. A total of two standardized questionnaires were completed by the respondents. Copenhagen Burnout Inventory (CBI) was used to evaluate emotional exhaustion, and a Cognitive Failures Questionnaire (CFQ) was used to evaluate issues of memory and attention, and routine thinking capabilities. Pearson correlation and linear regression were used to analyze the data. The findings indicated a significant and powerful relationship between cognitive failures and burnout ($r = -.675$, $p < .01$). Burnout was also found to be a significant predictor of cognitive problems, as it explained 45.6 percent of the variation in cognitive failure scores. These results indicate that burnout is not only an emotional problem but a potentially damaging mental acuity and day-to-day performance issue. This research emphasizes the importance of addressing burnout by hospitals, providing young physicians with support systems, stress and mental health resources, to enable them to remain mentally healthy and give their best.

Keywords: *Burnout, Neurocognition, Physicians, Emotional Exhaustion, Young Doctors.*

Introduction

The well-being of the medical staff and the psychological distress of the frontline care professionals have become an international point of concern in recent years as crowds of caregivers report being more stressed and psychologically distressed than ever because of the stress of clinical environments as well as long hours and low investment levels of care support politics (WHO, 2023; McEwen, 2017). Of these psychological stressors, burnout, a syndrome of emotional exhaustion, depersonalization, and diminished personal accomplishment (Maslach & Jackson, 1981), has of late become increasingly prevalent among young physician doctors. Feeling

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significantly stressed with a high workload, these young professionals may find themselves in constant ethical "gray" areas and have few coping options (Iqbal et al., 2022). Although the emotional burden of burnout has been well recognized, its neurocognitive implications, such as control of attention, memory, and executive functioning, have not been investigated in the empirical literature, particularly in the context of low- and middle-income countries.

The provision of healthcare significantly relies on the thoughts of the physicians, especially in physiologically high-risk, time-sensitive clinical scenarios. Studies indicate that burnout may lead to disturbance in the prefrontal cortex as well as the hippocampus, which are two critical regions of the mind associated with attention and memory through chronic stress and raised cortisol levels (Arnsten, 2009; McEwen & Sapolsky, 1995). Such deficits may be identified through multiple failures in working memory, attention absence, and a decline in executive functions, which can all put patient treatment at risk (Deligkaris et al., 2014; Fernandez et al., 2018). In Pakistan, those risks are increased by structural risks of physician insufficiency, long shifts, and the absence of psychological services (Rizwan et al., 2021; Shah et al., 2019). These systemic constraints do not merely contribute to burnout but also expose young doctors to the risks of cognitive overload, clinical misjudgment, and poor decision-making.

Neurocognition and Burnout

Effective clinical practice relies on cognitive functioning, which allows healthcare professionals to work with multidimensional information, sustain attention, and make timely decisions under pressure that involve high stakes directly impacting patient outcomes. A breakdown in these cognitive functions (e.g., lapses of attention, impaired working memory, and reduced concentration) can substantially compromise the accuracy of the clinical attitude, as well as make it more likely that there will be errors in diagnosing, treating, and communicating. Although the emotional and motivational outcomes of burnout are well known, recent empirical investigations have emphasized the neurocognitive aspect of burnout and have demonstrated that emotional exhaustion can lead to compromised brain processes relating to attention, decision-making, and executive control (Deligkaris et al., 2014; Shin et al., 2021). The cognitive deficits associated with burnout tend to be insidious and affect almost every mental process by exhibiting forgetfulness, a tendency to become distracted, and problems with multitasking, uncertainty, and inefficiency in problem-solving, which can undermine both physician functioning and patient safety.

Such impacts are particularly alarming in early-career physicians as less able to attenuate cognitive mortgaging of chronic stress, because of both a narrow base of clinical experience and unexercised coping means. They are particularly susceptible to cognitive overload and mental fatigue because they often face workloads and random shift changes, and emotionally intense experiences. This is aggravated in Pakistan by systemic healthcare issues. Hospitals tend to have insufficient personnel, high patient-to-doctor ratios, and unavailable or lacking psychological support systems. Stressful workforces regularly demand junior physicians work long hours with little to no supervision or rest, predisposing them to both burnout and cognitive impairment. However, despite the increasing anecdotal awareness of these problems, there has been relatively little empirical research into the cognitive implications of burnout in the Pakistani setting. A critical gap in the current knowledge base on burnout effects on cognitive performance exists, as most local studies address either emotional exhaustion or job dissatisfaction.

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Theoretical Framework

Cognitive Activation Theory of Stress (Ursin & Eriksen, 2004).

CATS suggests that perceiving a situation as dangerous or a request and having limited coping resources stimulates a long-term stress reaction. In healthcare facilities, chronic exposure to emotional and physical stressors, including working endless hours, carrying a large number of patients, and making critical decisions, induces prolonged cognitive and physiological stress. In the long run, this steady-state stress reaction culminates in the emotional depletion that is the main ingredient of burnout. In this perspective, burnout can be understood as a consequence of repeated failure to make adjustments to chronic stress, which leads to both mental exhaustion and neural breakdown in attention regulation, memory processing, and executive functioning.

Theory of Ego Depletion (Baumeister et al., 1998)

The Ego Depletion Model claims that self-control and cognitive efforts of any kind are a limited source of mental resources. When it comes to burnout doctors with emotional depletion will tend to experience mental lapses, lack of concentration and lapse of memory. Such a model can reinforce the argument that emotional exhaustion worsens neurocognitive performance not only in the emotional but also the functional sense, lessening the brain capacity to handle tasks that demand ongoing durability, multitasking, or quick recall.

Bio-Psychosocial Model (Engel, 1977)

The Bio-Psychosocial Model (Engel, 1977) also supports his study, as it underlines that psychological outcomes, including those described by burnout and cognitive decline, are not only influenced by the psychological processes of individuals but also by their biological and social entities. At the workplace, young physicians encounter chronic biological stress (e.g., fatigue, sleep deprivation), emotional stress (e.g., performance anxiety, extensive workload), and systematic stressors (e.g., understaffing, a lack of institutional support). These overlapping dynamics have the potential to both cause burnout and lead to its cognitive symptoms, including maladaptive memory formation, mind wandering, and exhaustion of decisions. Therefore, the model offers an excellent scope of analysis under which to view the effects of burnout on neurocognitive functioning within the clinical professional environment in a multi-dimensional perspective.

Problem statement

The psychological, emotional, and cognitive pressures of work are growing, threatening the mental health of healthcare professionals. Young doctors are particularly vulnerable and may work long shifts in understaffed hospitals in charge of critically ill patients, and under intense pressure given the lack of clinical experience. These long-standing strains complicate the probability of burnout, which is a psychological condition characterized by emotional fatigue, emotional callousness, and lack of personal effectiveness. Although the emotional and occupational implications of burnout are well-established, their cognitive implications have been largely understudied, especially in developing countries such as Pakistan. Attention, memory, and decision-making are examples of cognitive functions important to clinical accuracy and patient safety. However, numerous junior physicians describe regular memory lapses, forgetting, and mental exhaustion, which can be traced back to emotional burnout. The apparent absence of empirical studies that address this connection within healthcare practice in Pakistan is one of the critical shortages in scholarly publications and institutional policy-making.

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Proving the impact on neurocognitive performance, burnout is examined as one of the references allowing early detection of the risk, designing psychological interventions, and stimulating safer healthcare settings. The proposed research seeks to fill this gap by examining whether burnout relates to cognitive failures among young doctors through psychological instruments that have been tested in the literature.

Research Objective

- To analyze burnout among young doctors who practice in public, private, and teaching hospitals.
- To assess neurocognitive functioning based on the report of cognitive failures in the same sample.
- To investigate the association between neurocognitive impairment and burnout.
- To find out whether burnout is a significant predictor of cognitive failures through statistical analysis.

Research Questions

The first is whether it is possible to use scientific knowledge as a means of saving the world, as a form of intercession or intercession.

1. What is the rate and extent of burnout among Pakistani young doctors?
2. How high is neurocognitive impairment (measured by cognitive failures) within the same population?
3. Do burnout and neurocognitive functioning have significant relationships in young doctors?
4. How well is burnout predictive of cognitive failures in early-career medical professionals?

Hypotheses

- H1: Burnout may have a significant negative relationship with neurocognitive functioning.
- H2: Burnout will play a significant role in predicting cognitive failures among young doctors.

Rationale of the study

Burnout among health professionals is an emerging trend of global concern. But in Pakistan, the situation is even worse what with most hospitals being regularly under-funded and doctors performing tasks far outside their capability- especially at the start of their careers. Junior doctors are often placed under intense amounts of emotional and cognitive stress, whereas there is little or no training or support regarding psychological self-preservation and cognitive resilience. Though research focused on the emotional implications of burnout has been conducted, very little scholarly interest has been dedicated to the neurocognitive aspect of it, particularly how burnout impacts real-time clinical judgements and decisions. Attention lapses, memory loss, and decreased mental acuity are both disruptive to individual effectiveness and potentially detrimental to patient care and pose a greater risk of clinical errors.

This research, by addressing the direct association between burnout and cognitive failures, offers a vision of the impacts that emotional exhaustion has on fundamental psychological processes. Their conclusions are expected to guide healthcare administrators, educators, and policymakers regarding the necessity to develop intervention strategies, workload reformation, and mental health support systems that would reduce burnout and maintain cognitive integrity among young doctors. The study will add to the literature specific to Pakistan and provide culturally pertinent evidence to inform institutional change in the training and support of physicians.

Significance of Study

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The study is of great importance in academic and practical use. With the growing pressures in the healthcare sector worldwide and particularly in low and middle-income nations such as Pakistan, where healthcare workers have to function in a scenario of high pressure and increasing complexity, the cognitive abilities of the healthcare professionals and their mental health have direct implications on patient care. Although burnout is already a well-known emotional and occupational risk, its cognitive implications in terms of decreased attention, memory, and decision-making are less explored in empirical studies in the Pakistani context.

The present study aims to fill that serious gap as the study explores the impact of burnout on neurocognitive functioning in young physicians. Furthermore, the study will also be valuable to the scientific literature by making burnout more understandable in a neurocognitive context, rather than the emotional and motivational aspects that have long been emphasized. Such an integrative approach can prompt further studies regarding physician performance, workplace mental health, and patient safety, especially in the Pakistani and other South Asian healthcare contexts.

Literature Review

Burnout has recently emerged as a commonly accepted concept in the medical field, especially among the younger medical practitioners and those at the beginning of their careers. Burnout was originally conceptualized by Maslach and Jackson (1981) as a form of psychological syndrome that manifests itself as a long-term reaction to chronic interpersonal stressors at the workplace. It involves three main dimensions: emotional exhaustion, depersonalization, and absence of personal accomplishment. The emotional exhaustion, specifically, is linked to the perceived feelings of emotional depletion and fatigue that may deeply impact the mental functioning, including concentration, memory, and decision-making (Maslach & Leiter, 2016).

The issue of cognitive performance is particularly vital in the health care field, where any error in attention or memory may result in either a medical mistake, a slow reaction, or a wrong patient outcome. The neurocognitive functioning that involves the processes of attention, working memory, information processing, and executive functioning can be impaired in conditions of chronic psychological stress. There is an increasingly scientific literature that is trying to figure out whether and in what way burnout has adverse effects on neurocognitive topic functioning. As an illustration, Deligkaris et al. (2014) performed a meta-analysis and reported that in the case of patients with burnout, the performance in the task of measuring executive functions, attention, and memory was significantly lower. In the same way, Sandström et al. (2005) found that burnout was linked to self-reported cognitive problems, especially in attention and short-term memory.

Additional data provided by Shin et al. (2021) indicate that the primary scale of burnout, emotional exhaustion, can disrupt the work of the prefrontal parts of the brain as emotional exhaustion controls working memory and the process of impulse control. There is evidence in neurological research that demonstrates changes in the prefrontal cortex and hippocampus during chronic stress-induced states (McEwen & Gianaros, 2011).

Neurocognitive errors represent a critical danger not only to the professional efficacy of doctors but also to patient safety, especially in healthcare environments, where clinical precision and quick cognitive reactions are paramount. Healthcare professionals in the early-career stage who have long hours and high workloads characterized by low autonomy are particularly susceptible to the cognitive effects of burnout. Research conducted by Oosterholt et al. (2014) and van der Linden et al. (2005) found that people with burnout symptoms experienced more cognitive

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lapses, including name forgetting, lack of concentration during conversations, and being unable to solve easy tasks.

In Pakistan, this problem is also compounded by the systematic limitations of staff shortages, poor mental health infrastructure, and long duty shifts. Although anecdotal and qualitative reports are available related to stress in physicians, relatively few quantitative studies have been conducted to gauge the immediate effects of burnout on thinking capacity at the local level. This disconnect warrants a systematic empirical exploration of ways in which emotional exhaustion among young physicians can translate into neurocognitive imbalances, especially in terms of attention and memory, and decision-making effectiveness.

Research Gap

This study, accordingly, attempts to fill this knowledge gap by quantitatively investigating the correlation amid burnout and cognitive failures among young healthcare professionals in Pakistani contexts. By giving attention to the psychological implications of burnout, the research presents a worthy contribution that can guide the psychological support systems, employee well-being initiatives, and policy changes in healthcare organizations.

Research Methodology

In this study, a quantitative, correlational type of research was adopted to study the correlation between burnout and neurocognitive functioning among young healthcare professionals. It aimed to understand how sufficiently burnout predicts cognitive failures amongst early-career Pakistani doctors.

Sample and sampling

The study was conducted among 300 young medical professionals (22 - 35 years). The purposive sampling of participants included the public, private, and teaching hospitals of Pakistan. The inclusion criteria ensured that participants had to:

- Work either as a House Officer, Medical Officer, or Postgraduate trainee
- Possess 1 - 5 years of clinical experience
- Currently employed on a full-time basis
- No neurological or psychiatric diagnoses. Have no diagnosed mental health disorders, including learning and attention disorders.

Measures

Informed Consent Form

An Informed Consent Form was created to ensure ethical compliance and voluntary participation of the respondents. The form contained extensive details of what the study aims to achieve, the steps to be followed, confidentiality, and the rights of the participants of the study. It made it clear that the decision to participate was purely voluntary and that the study participants were free to opt out of the study at any point, and there would be no reprisal. The form explained that the collected data will only be utilized for academic and research purposes, and the personal identities will be confidential and anonymous. The participants were requested to read the form and give their written or digital consent, and then complete the questionnaires.

Demographic Information Form

A Demographic Information Form was filled in to acquire necessary background information about the participants to comprehend their working conditions better and meet the inclusion criteria. The items contained in the form were Age, Gender, Designation (House Officer, Medical Officer, Postgraduate Trainee), and Type of hospital (Public, Private, or Teaching).

Copenhagen Burnout Inventory (CBI)

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The CBI is a 19-item scale developed by Kristensen et al. (2005), which provides an assessment of burnout comprising three domains (personal, work-related, and client-related burnout). Personal burnout scores were largely used in the study as they show emotional burnout regardless of their label as a professional. Each item was categorized on a 5-point Likert scale, where 1 is never, and 5 is always. The scale has a good internal consistency, Cronbach's alpha =.88.

Cognitive Failures Questionnaire (CFQ)

The CFQ is a 25-item self-report measure developed by Broadbent et al. (1982) designed to measure cognitive lapses in everyday life in domains of attention, memory, perception, and action. They were asked to rate the frequency of such failures on a 5-point Likert scale. A higher score means a more impaired neurocognitive state. In the current context, the CFQ had a very high rate of reliability (Cronbach's alpha = .91).

Procedure

Data on participants was collected after seeking institutional review board approval. Permission was taken from participants with informed consent. The questionnaires were held in both paper format and electronic format, in the form of duty breaks or end of shift. Anonymity and confidentiality were guaranteed throughout the process.

Statistical Analysis

IBM SPSS version 27 was used to analyze data. Sample characteristics were reported according to descriptive statistics. The correlation between burnout and neurocognitive functioning was measured with Pearson's product-moment correlation. To investigate the predictive capacity of burnout on cognitive failures, a simple linear regression was implemented.

Result

The results section shows the most important statistical results associated with the correlation between burnout and neurocognitive functioning (assessed through cognitive failures). Correlational analysis and regression analysis were done through IBM SPSS (version 27).

Table 1

The standard deviation and the mean of the key variables

Variable	N	Mean	SD
Burnout (CBI)	300	60.82	11.26
Cognitive Failures (CFQ)	300	69.47	13.92

The average values indicate moderate to high evaluation of burnout and the visible prevalence of cognitive failure in young healthcare officers.

Correlation Analysis

A Pearson product-moment correlation analysis was performed to find the relationship between burnout and neurocognitive functioning in young doctors. A strong negative correlation was established, $r = -.675$, and it was determined to be statistically strong with $p < .01$. This finding implies that an increase in levels of burnout is associated with a significant deterioration in neurocognitive performance. Specifically, increased rates of cognitive failures, such as memory lapses, attentional slips, and perceptual errors, are linked to the increase in emotional exhaustion

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in everyday clinical activity. The magnitude and orientation of this association imply that burnout influences a critical set of cognitive processes vital in safe and efficient medical practice rather negatively and extensively. In practice, the young doctors with high burnout may be more likely to commit mental errors, forgetting about the patients, missing important information, or committing certain mistakes that could be avoided under stress. These results are supportive of the earlier studies, which show that burnout can affect executive control, concentration, and short-term memory, all of which play a part in healthcare decisions. The evidence contributes to the hypothesis that emotional exhaustion is not merely an emotional experience, but it is also a cognitive liability, underlining the necessity of urgent workplace interventions targeting both psychological and functional manifestations of burnout within clinically oriented settings.

Regression Analysis

A linear regression was done to analyze whether burnout was a significant predictive risk of cognitive failures among young doctors. The findings revealed that the overall model was significant, $F(1, 298) = 78.2$, $p < .001$, which implied that burnout was an influential indicator of neurocognitive impairment. The R^2 was calculated to be 0.456, which indicates that 45.6 percent of the difference in the scores of cognitive failure was attributed to the amount of burnout experienced by the participants. This significant percentage implies that emotional exhaustion is a major cause of heightened cognitive errors, including forgetfulness, loss of attention, and perception problems in daily clinical practice. These results further underscore the mental hazard involved in burnout and that the greater the level of emotional stress, the less will be the capability to perform in a cognitively strenuous setting.

Table 2

Predictor	B	SE	β	t	p
Burnout	– 0.842	0.095	–.675	–8.84	<.001

The regression coefficient of burnout is also statistically significant, indicating that a - 0.84 unit increase in reported cognitive failures occurs in every unit increase in burnout score.

Conclusion

The results of the study show that burnout may substantially influent neurocognitive deficits in young physicians, and emotional exhaustion and cognitive aspects follow their toll in neurocognitive impairments, causing mental lapses, and inefficient cognition. Such impairments can harm the judgment of a clinical practitioner, their care of patients, and safety in the workplace. The researchers point out the criticality of viewing burnout as not only a psychological but also a cognitive risk threatening the performance and results, healthcare provided.

Discussion

The current research was designed to explore how neurocognitive performance relates to burnout among young healthcare providers in Pakistan. The results indicated that there was a strong negative correlation, which was statistically significant, between burnout and cognitive performance, and regression analysis indicated that there was a significant effect in which burnout significantly predicted cognitive failures, accounting for 45.6 percent of the variance. These findings confirm the two hypotheses and are consistent with earlier global studies (e.g., Deligkaris et al., 2014; Oosterholt et al., 2014), which strengthens the argument that chronic emotional exhaustion leads to severe cognitive outcomes.

The research follows the findings of the previous literature by focusing more on the cognitive burden of burnout in the Pakistani healthcare system, especially on the early-career

physicians who get overloaded, understaffed, and experience long shifts with a scarcity of any psychological aid. The identified cognitive deficits (such as attention lapses, forgetfulness, and disorganization) have severe consequences in the risky medical settings where correctness in decision-making and alertness are paramount to patient safety.

Previously, burnout was associated with low motivation, emotional dysfunction, and job dissatisfaction (Maslach & Leiter, 2016), and this study highlights its effect on executive functioning. Findings will offer empirical data that burnout is not only an emotional factor but also a cognition risk factor, especially within the fast-paced, stress-prone careers, such as healthcare. These outcomes align with neurobiological studies indicating that prolonged stress is associated with reduction in the functionality of the prefrontal cortex, which influence attention, memory, and working memory (McEwen & Gianaros, 2011).

Future Recommendations

In light of the results of the research conducted, the following recommendations are offered in order to mitigate the effects of the cognitive and psychological impact of burnout on the health of the young doctors. To begin with, hospital management needs to understand burnout not only as an emotional issue, but as a severe cognitive risk factor which can directly damage clinical performance and jeopardize patient safety. This change of paradigm is needed to formulate more effective policies in institutions. Secondly, sustainable interventions in the workplace must be considered, such as implementing flex hours, proper rest time, and specified mental health support services. These interventions can help retain neurocognitive effectiveness and considerably slow the accumulation of emotional fatigue.

Also, regular mental health checks ought to be incorporated into hospital protocols to accountably check and trace early indicators of burnout. Such evaluations may be used as preventive instruments for detecting emotional and cognitive stress before it develops into chronic damage. Last but not least, stress management and emotional regulation training, as well as cognitive resilience training, should be integrated into residency training and early career training. Provision of psychological coping skills to young medical workers right at the beginning of their careers will not only positively influence individual mental health but also lead to a safer and more efficient provision of health care delivery. The long-term cognitive consequences of burnout and the outcomes of particular interventions on various medical specializations should also be considered in future studies.

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