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RESEARCH ARTICLE

Institutional and Digital Harassment and Violence against Women: A Comparative Analysis of Pakistan and South Korea

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ABSTRACT

Background: Women violence is an increasing menace all over the world. In this digital age, the modes of violence have changed altogether The Asian countries have specific historic manifests in this regard, which need to be studied comprehensively.
Objective: In this research the complicated dynamics were studied between institutional, socio-cultural norms and shifting digital ecologies and a growing gender-based violence against women. This research particularly, compared the challenges of institutional and digital harassment between Pakistan and South Korea. This study further analyzed various attitudes towards institutional responses to the issues both countries face and how these responses influence women's approach to justice.
Methodology: In this research, atypical use of legal and technological foundations was made. It is a mixed-method qualitative study leveraging feminist legal theory and structural violence theories. A comparison was made in the issues encountered by Pakistan in weak implementation, limited persuasion of the laws and entangled patriarchy system, as compared to South Korea's use of science-based and advanced digital crimes/image-based violence, and accompanying deepfake pornography.
Results: It is found that digital violence is not a unique issue in the world of disparity but an incredibly harmful, troubling and larger issue, and that institutional responses play a key role in shaping access to justice for women in this context. However, institutional responses in both cases of digital violence are exacerbated by issues of disparity and institutional inertia.
Conclusion: it is crucial to design a strategy with multiple facets, legal changes as well as accountability measures for organizations, effective technical solutions that help prevent and deal with gender-based violence. Culture-changing solutions to dismantle the institutional structures that permit and support gender-based violence and give women equal access to justice are also imperative.

INTRODUCTION

Today's realities of Gender-based violence (GBV) have not only evolved beyond the realm of physical violence (Carannante *et al*. 2026). It is also known as an unspoken digital and ubiquitous GBV institutional crisis in today's world (Jahangir 2018; Nazakat and Malik 2025). Women now face violence in online spaces, too – online violence as an ongoing form of structural inequality (Aleem *et al*. 2021).

Lack of proper content moderation, a slow pace in a judicial remedy, and gender-inappropriate support systems allow women to be silenced and enables the perpetrators to be emboldened. The technologies fall short of sustainable solutions, therefore there is no technological solution according to the argument in this article. Rather, a complete overhaul of our concept of justice is needed, one that involves changes to the legal system, increased accountability of technology companies and a fundamental change in culture that will break the cycle of structural inequalities that enable digital violence (Ali and Gavino 2021; Zagloul *et al*. 2022). So, it does not seem to be only about regulating the internet, but reforming the very

institutions that govern our societies, as we take a look at how we should protect women in the digital age, as we look to models like Australia's safety Commissioner for guidance.

As far as institutional violence is concerned, it refers to violence that occurs because of the lack of care or prejudice of an official institution, including the police, courts, office, and other regulatory institutions. When institutions cannot protect women or are not able to respond sufficiently, violence normalizes, according to scholars (Jahangir 2018). For feminist legal theorists, laws still exist symbolically and institutional practices are still patriarchal (Gilani *et al*. 2025). In the Pakistani literature, the major reasons given for low convictions for crimes against women are poor investigation, a victim-blaming attitude among law enforcement and procedural delays. Institutional inertia promotes the lack of reporting and reinforces impunity (Gondal *et al*. 2024).

Digital harassment can be any of any sort including cyber stalking, online threats, doxing, sharing of private photos without consent, deepfake pornography, and digital blackmail (Citron 2014; Mukred *et al*. 2024). There is increasing recognition in research of digital violence as "real violence" that has psychological, societal, and economic consequences. The Digital Rights Foundation (DRF 2023) in Pakistan found that women journalists, activists and professionals are subjected to higher levels of abuse online. Reporting is greatly decreased by fear of social shame and reputational harm. South Korea's research is aimed at sexual crimes facilitated by technology, like those shot on a hidden camera and AI-generated pornography (Ma'arif *et al*. 2025; Lee 2026). More robust laws have not stopped these actions from happening online, where anonymity and cultural misogyny also play a role (Aleem *et al*. 2021).

In addition to this, the gap between the economic status of Pakistan and South Korea and the national technological infrastructure are enormous, but there is an unsettling similarity; that in both countries, women have no state functions that can provide protection from the weaponization of technology effectively. The problem in Pakistan is the lack of a proper and effective justice system due to the influence of patriarchal norms in the country, where conviction rates are extremely low. Prevention of Electronic Crimes Act (PECA) 2016 is not properly enforced and when victims report a crime, they face extreme social stigma and victim blaming (Jahangir 2018; Lee and Park 2024). However, South Korea, a frontrunner in digital connectivity, is facing the problem of sophistication because criminal laws cannot keep up with the increasing popularity of offences such as “molka” and deepfake pornography, which have enhanced with artificial intelligence (Lee 2026; Lee and Park 2024).

Pakistan and South Korea are two entirely different sociopolitical environments and can be compared to see how the failures of their institutions, deeply oodles of socio-cultural norms and the fast-changing digital architectures intertwine to produce and sustain violence against women (Jahangir 2018). It is here where culture and reputation are the impetus of violence, and where a tech-literate misogyny outpaces legislation. Comparing these two settings offers the evidence that the ‘digital' is just another form of an old form of oppression. It shows that unless institutions change, whether due to budget or gender policing, or hesitation to put legislation in place in regard to AI, they are complicit in violence.

In both South Korea and Pakistan, there are specific issues that can be addressed by institutional and legislative change, both of which have the potential to enhance the capacity of women to tackle institutional and online harassment, and access to justice. This research focuses on feminist legal theory and structural violence theory, which argues that digital harassment does not refer to "out of the ordinary" and isolated incidents, but is instead a structural shift from the patriarchal past, which is embedded in institutional inertia. There are numerous studies on violence against women in both countries alone, but there is a lack of studies that compare institutional and digital violence. This study brings together institutional analysis and digital gender violence, whilst also providing a comparative approach.

METHODOLOGY

After giving consideration to feminist legal theory and structural violence theory (Farmer 2004; Qayyum 2025), the qualitative comparative methodology (QCM) is used in this study, supplemented by secondary quantitative data, to analyze the influence of power asymmetries and systemic inequalities on women experiences. It is an outcome of the multi-source evidence and thematic analytical framework, which understand how institutions respond to harassment and digital violence against women in Pakistan, based on government statistics, NGO reports and case studies from 2020-24. While yes, there is a certain legislation like the Prevention of Electronic Crimes Act (PECA) 2016, she adds there is a gap in implementing such law, and the structural set up for the bodies is dim, as there is lack of resources in the cybercrime units, and also high underreporting from the victim due to stigma effect (UN Women 2021). This institutional failure is a second round of violence, aggravating the first one experienced by women.

RESULTS AND DISCUSSION

Even in a country with a well-developed legal system like South Korea, there are no signs of abating sexual violence linked to usage of advanced communication technology such as the use of encrypted communications for cyber blackmail, hidden cameras and deepfake pornography (Rasmussen and Jalmerud 2025; Lee 2026). Despite the state's steps to counter misogyny in its digital presence, from introducing specialist units for digital crimes to even

sending heavy sentences, the study results show a slippery slope in which the advancement of technology fosters radicalization of misogyny (Zagloul *et al*. 2022; Rasmussen and Jalmerud 2025). But due to the rapid evolution of technology and the society's conviction that the internet is an innocent space where society does not consider online abuse to be a concern, enforcement is still inadequate. This chilling atmosphere induces the feminization of women's retreat from public and virtual space.

In Pakistan/South Korea, the institutional responses to digital violence have a gender aspect, with women less likely to report on violence. Legal provisions are based on the reworked Prevention of Electronic Crimes (PECA) Act 2016 which includes provisions for a comprehensive overhaul of laws to address digital harassment crimes, including cyberstalking and non-consensual sharing — which poses challenges for Pakistan on the institutional capacity and deeply entrenched patriarchal norms. Improved digital forensics, gender-responsive training for officials and more enforcement and judicial capacity are key in addressing GBViC effectively.

To prevent secondary victimization, victims of gender-based violence and deepfake crimes need robust support from others, such as legal support and psychological counseling. Gender equality is of importance in South Korea, where institutional patriarchy is an important issue in the face of digital crimes such as deepfake pornography (Rasmussen and Jalmerud 2025; Lee 2026). While there have been recent efforts to punish the use of deepfakes, there is still a need for proactive measures in the areas of AI and content moderation (Mukred *et al*. 2024). The need for quick removal process for the deepfake content is important in the support of the victims, including financial support. To address the issue of digital sex crimes effectively (Javed *et al*. 2025; Rasmussen and Jalmerud 2025), there is a need for greater cooperation with international partners and more public awareness campaigns.

Precedents for legal reforms, like the Online Safety Act in the United Kingdom and the eSafety Commissioner in Australia, could be referenced by nations like Pakistan and South Korea in their fight against institutional and online harassment ((Jahangir 2018; Aleem *et al*. 2021; Im *et al*. 2022; Schoenebeck *et al*. 2023). The eSafety Commissioner is independent, and its work is directed towards improving online safety through an integrated approach to this work, including its focus on establishing a centralized body with strong investigative powers to address issues such as image-based abuse and cyberbullying (Javed *et al*. 2025; Gallegos *et al.* 2026). This could also be an office to investigate complaints made to it, to notify senders of any removal notices and levy penalties on platforms that refuse or do not comply, to ensure greater accountability and facilitate the support of victims. One of the key strengths of the eSafety Commissioner's role is its ability to use a fast content removal system to allow the rapid removal of intimate images that have been shared without the victim's consent, helping to minimize the impacts on victims (eSafety Commissioner 2017). Further, the Commissioner creates a supportive environment focused on victims, provides guidance on reporting, help in emotional and psychological management and connects victims with legal aid components necessary for their overall recovery (Burton *et al*. 2025).

This model also incorporates digital literacy and awareness of online safety in the form of proactive education and prevention measures, including public awareness campaigns and amongst children, parents and educators (MacKinnon 1989; Aleem *et al*. 2021).

Pakistan could have an eSafety Commissioner body to assist its application of the digital safety laws, including the Prevention of Electronic Crimes Act (PECA). This agency could respond to cyber harassment in a focused way, expedite removal of the content, be there to assist the victims and provide specialized training to law enforcement, which has been identified as a challenge for them in combating cyber harassment (Baig and Jafary 2025).

Although South Korea has a strong legal system, it might handle problems like deepfake pornography and other image-based abuse better if it had a specialized organization like eSafety (MacKinnon 1989; Rasmussen and Jalmerud 2025). A central reporting point will be put in place, abusive content will be deleted faster, and victims will be provided with targeted support to manage the specific psychological and reputational impact of AI-related abuse (Gondal *et al*. 2025).

CONCLUSION

This study finds that institutional and digital harassment of women is not an incidental but systemic, as is illustrated in Pakistan and South Korea. In Pakistan, weak institutions, weak enforcement, and cultural stigma maintain a culture of impunity. On the other hand, South Korea's technological developments, which are technologically powerful, have not received sufficient gender protection, with which new forms of abuse are emerging.

Institutional accountability, gender-informed policing, digital governance, survivor-oriented justice systems are needed to tackle these issues, in addition to legislative changes, and solutions must be comprehensive. Digital spaces need to be acknowledged as public space, and women's rights are to be the same as in the offline world.

A multi-pronged approach is needed to address the issue of institutional and digital harassment of women in both countries. This also includes necessary amendments of critical laws in Pakistan, such as the Prevention of Electronic Crimes Act (PECA) 2016. These modifications should make clear definitions of new types of online harassment such as deepfake pornography and sharing digital images without consent, in order to ensure the law is effective and relevant. Secondary victimization may be reduced by strengthening legal measures to protect victims

(such as providing legal assistance, psychological counseling services, and reporting safe outlets), as well.

There is an urgent need to train judicial officers, law enforcement personnel in Pakistan on the issue of GBV, and victim centered approaches to improve institutional accountability against GBV. More investment is needed in the digital forensic system and the efficient judicial system in order to boost conviction rates. Greater accountability in an independent enforcement and victim support network. South Korea needs to take active measures in the law to protect the victims of deepfakes. This includes quick mechanisms for removing content, and thorough support for victims of digital offenses, since digital offenses can impact people on emotional and reputational levels.

Beyond this, social media and online service providers need to follow enhanced content moderation guidelines and have a prompt system in place to remove illegal deepfake content. To address regulatory challenges, the adoption of transparency measures concerning deepfake technology is essential, encompassing the necessity to inform viewers or identify artificial speech and images, such as the EU AI Act. Moreover, the creation of specialized digital forensics for AI-generated content will boost investigators' tools and techniques.

To successfully fight the spread of illegal material, encrypted messaging services and other online platforms must be utilized to an increased degree. To cultivate a digital accountability culture, South Korea needs to conduct large-scale public education campaigns on the legal repercussions of creating, sharing, or possessing illegal deepfake videos. It is also important to tackle social polarization in connection with the gender issue in order to avoid social backlash against protective measures and to create a more inclusive digital environment.

The recommendations are specific to Pakistan and South Korea but stress the universal need for flexible law, transparency in institutions, responsible technological governance and cultural shift to tackle institutional and digital harassment of women. To conclude, the struggle against violence towards women should evolve together with the progress of technology, to not become another instrument of oppression.

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Both authors contributed equally to this work

CONFLICT OF INTEREST

We, the authors declare no conflict of interest

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RESEARCH ARTICLE

Analysis of Growth and Physiological Characteristics of Maize under Salinity Stress and its Mitigation by Seed Priming with Thiourea

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Kiran T (2026) Analysis of growth and physiological characteristics of maize under salinity stress and its mitigation by seed priming with thiourea. *Innovations in STEAM: Research & Education* 4(1): 26040102. https://doi.org/10.63793/ISRE/0032.

ABSTRACT

Background: Among the many abiotic stresses, salinity stress is the most pervasive one. It affects plant productivity by altering the physiological phenomena. The seed priming strategy has proved of great significance in reducing the salinity stress effects. Thiourea has been least investigated for its specific physiological effects in improving salinity stress tolerance in plants.
Objectives: The purpose of this study was to explore the role of thiourea seed priming on the physiological and biochemical basis of salinity tolerance in hybrid maize (Zea mays L.) at early growth stage.
Methodology: The seed of maize hybrid Ujala were unsoaked, soaked in water (hydro-primed) and 400 µM thiourea (thiourea primed) and sown in plastic pots containing 5 kg of loam soil. After 28 days of growth, the increased salinity treatment (0, 50, 75 and 100 mM) were applied in installments of 25 mM per day. The plants were grown for 24 days after salinity treatment application. The data were recorded for different morphological and biochemical parameters using standard analytical procedures.
Results: Salinity stress adversely affected both physiological and growth attributes due to causing oxidative damage to cellular membranes, ion-toxicity and induced water deficit. However, thiourea primed plants manifested greater salinity tolerance in maize as compared to control and hydro-primed plants by showing improvements in photosynthetic pigments, osmoprotectants, vitamins and phenolic compounds. This was due to the defined role of thiourea to reduce oxidative damage and provide nitrogen nutrition by virtue of the presence of thiol, amino and imino groups in its molecule.
Conclusion: Seed priming with thiourea emerged to be an effective strategy for alleviating salinity stress in hybrid maize due to biological effects. The results suggested that thiourea seed priming can be effectively used to obtain improved maize growth in marginally to moderately salinity-hit areas.

INTRODUCTION

During growth and development, plants face numerous abiotic factors. In semiarid and arid areas of the world, soil salinity is the main factor reducing crop production is soil salinity. High salinity stress results in a random loss of crops production (Aryal *et al.* 2025). Seed germination or seedling production is also delayed or completely inhibited due to ion-toxicity and osmotic stress. Salinity induced osmotic stress affects the germination of seeds by reducing the availability of water thereby causing ion toxicity due to greater amount of ions on a per unit basis (Manono *et al.* 2026). The plants show closely related responses to the salinity and drought stress, because changes in physiological processes are due to deficiency in the uptake of water (Tavili *et al.* 2011). Changes in the metabolism of plants lead to oxidative stresses, resulting in the loss of true plant performance (Hasanuzzaman *et al.* 2021). In maize under salinity stress, the antioxidants and osmolytes help in salinity stress tolerance. Various defense mechanisms such

as hormonal signaling pathways activation controlled by abscisic acid, ethylene, jasmonic acid, and salicylic acid and reactive oxygen species signaling pathways are activated due to abiotic stress (Fujita *et al.* 2006).

In Pakistan, maize (*Zea mays* L.) ranks third most important crop in the cropping system after wheat and rice. It is also known as 'king of the grain crops' as it gives greater grain yield. This crop is widely cultivated in the world and gives more than 50% calories of energy (Ranum *et al.* 2014). Chemical analysis shows that maize grain has 3.0% sugar, 4.8% oil, 5.8% fiber, 72% starch and 10% proteins due to which it is used to manufacture a large number of products and also used as fodder for the livestock (Hanif and Akhtar 2020).

Exogenous application to promote crop yield is a fascinating field of research (Jamei *et al.* 2026). Seed priming with synthetic or natural compounds done before the seed sowing minimizes the biotic and abiotic stress. It protects the plants against stresses without affecting the fitness of plants (Van Hulten *et al.* 2006). Priming of seeds increases the quality of seeds e.g., primed seeds enhanced the germination rate by increasing the uptake of water and rapidly resuming the metabolism rate (Paparella *et al.* 2015). The primed seeds have high percentage of total germination rate, high uniformity and increase in germination rate (Hussain *et al.* 2026). It has an ability to increase the viability and sustainability of seeds (Butler *et al.* 2009).

Different techniques of priming such as hydropriming increases seedling sustainability, crop production and capacity of seeds towards the osmotic adjustment under stress conditions (Abebe and Modi 2009). Under the drought conditions hydro-primed seeds give 3–4 times more increase in shoot and root growth as compared to the non-primed seeds (Adhikari *et al.* 2024). Hydropriming increases the biochemical and physiological processes in seeds even if there is a lowest matric potential and osmotic potential in the medium (Hussain *et al.* 2026).

Thiourea, chemically called Thiocarbamide, is an important compound with great biological effects. The presence of two functional group viz., amino (-NH2) and thiol (-SH) in thiourea which makes it biologically more compatible. Thiol group in thiourea stabilizes the chemistry of protein's groups while $-NH_2$ has a lone pair of electrons due to which it acts as a base (Shanu *et al.* 2013). Recent studies showed that thiourea increases the growth rate in the entire plant along with growth at cellular level under salt stress (Granaz *et al.* 2022). It is reported that 1.3 mM thiourea overcame the salinity and cold stresses and improved the germination potential in *Capsicum* seed (Yadav *et al.* 2011). The germination characters such as mean germination time, rate and final percentage etc. improved due to soaking of *Berberis jaschakaena* seed in different priming agents for 72 h (Belwal *et al.* 2015).

As soil salinity is a great abiotic stress factor for field crops, there was a need to find strategies to combat this adversary. Among the many chemicals used, exogenous use of thiourea has been widely used to improve growth of various plant species under stressful conditions (Wahid *et al.* 2017), however clear mechanism of action is elusive yet. In the present study, thiourea was used as seed priming agent to determine its effectiveness under increased salt stress in a controlled pot experiment by measuring some growth and physiological attributes.

MATERIALS AND METHODS

Experimental details

For the present study, the F1 seeds of maize (*Zea mays* L.) hybrid Ujala were kindly provided by Sohni Dharti Seed Company, Sahiwal, Punjab. Thiourea and pure sodium chloride (NaCl) were purchased from Merck. Distilled water was used for preparation of thiourea priming solution and salt solutions. The experiment was conducted in the Old Botanical Garden of the University of Agriculture, Faisalabad, Pakistan. The soil used to grow the plants was loam. Before sowing the pH and ECe of the soil was determined as 8.13 and 1.5 ds/m. The organic matter content was 40% and water holding capacity was 55%.

Treatment application

Healthy looking seeds of uniform size were used to apply priming treatments. The priming with water (hydropriming) and 400 µM thiourea (thiourea-priming) was done by soaking seeds for 8 h, washed with distilled water and sown in the potted soil. Prior to filling soil in the pots, a hole was made in the bottom of the pot and a piece of muslin cloth was kept in the hole to avoid excessive loss of soil solution. Hydro- and, thiourea-primed and unprimed seeds were sown in separate plastic pots for each priming and salt treatments. Pots were arranged in completely randomized manner with three replications, one hybrids variety ujala, two priming treatments, one treatment is without priming or unsoaked, and three levels of salinity (0 control, 50, 75, 100 mM). The plants were allowed to grow under priming treatments for 28 days then salinity stress applied on plants in installments of 25 mM for four days up to the level of 100 mM. Harvesting was done after 24 days of salinity stress applications.

Sampling for plant analysis

Immediately after harvest, one half of the shoot and root samples from each replicate and treatment were or further biochemical analysis fresh plant sample were placed in the zipper bags, properly labeled and kept in a freezer at -40°C. The other half was put in paper bags and dried in an oven at 65°C for one week and used for dry analysis.

Data collection

Growth attributes: After uprooting the plants and briefly washing in running tap water and blot drying, shoots were

separated from roots. The morphological data were recorded for no. of leaves per plant, fresh and dry weight of shoot and root.

Pigment contents: Chlorophyll a and chlorophyll b were estimated by using the method of Arnon (1949). The carotenoids contents were determined by using the method of Davies (1976). For this purpose, 0.1 g plant leaf sample was grinded in 2 mL of 80% acetone. The volume was maintained up to 10 mL by adding 80% acetone. The absorption of of the extract was taken at 663, 645 and 480 nm using spectrophotometer (UV-3802, UNIC, Shanghai, China). The pigment contents were calculated by the following formulas:

$$\text{Chl. a (mg mL}^{-1}\text{)} = [12.7(OD\ 663) - 2.69\ (OD\ 645)] \times V/1000x\ W28$$

$$\text{Chl. b (mg mL}^{-1}\text{)} = [22.9\ (OD\ 645) - 4.68(OD663)] \times V/1000W$$

Where V = Volume of the extract (mL), W= weight of the fresh leaf (g)

$$\text{Carotenoids} = [(OD\ 480) + 0.114(OD663) - 0.638\ (OD645)],\ E\ 100\%\ cm = 2500$$

$$\text{Carotenoids (mg mL}^{-1}\text{)} = Acar\ /Em100\% \times 10$$

Phenolics analysis: Fresh material (0.1 g) was extracted using 80% acetone, which was used for analysis of different phenolic compounds. Julkunen-Tiitto (1985) method was used for spectrophotometric analysis of soluble phenolics at 730 nm. Flavonoid content was measured spectrophotometrically at 590 nm according to the method of Zhishen *et al.* (1999). Method of Stark and Wray (1989) was followed for anthocyanin analysis using spectrophotometer at 510 nm.

Ionic analysis: Ionic contents were determined by digesting the dried plant sample in 2 mL of hydrogen peroxide (H_2O_2) and 5–7 mL of concentrated nitric acid (HNO_3) on the hot plate at 250ºC. This solution was digested up to 50 mL and Na^+, K^+ and Ca^{2+} were determined using flame photometer.

Statistical analysis

Computer software "Statistix 8.1" was used for all statistical analysis and MS office excel sheets were used to represent the data of three replicates in graphical form. By using the analysis of variance (ANOVA) significant or non-significant differences between the parameters were determined using LSD test at 5% probability level.

RESULTS

Morphological attributes

The statistical analysis of data revealed that there was a non-significant interaction (P>0.05) between the priming and salinity stress treatments (Table 1). Priming alleviated the adverse effect of salinity stress in shoot and root length, dry weight, no. of leaves per plant and leaf area per plant. Results showed that increased salinity levels decreased all these morphological characteristics but the priming with 400 µM thiourea solution significantly improved these attributes both under control and salinity stress. More specifically, the leaf area per plant was distinctly reduced by applied salinity but greatly improved in thiourea primed set exposed to salinity stress (Fig. 1).

Photosynthetic pigment contents

Statistical analysis of data for chlorophyll a, b and carotenoids a non-significant interaction (P>0.05) between the priming and salinity stress while there was a highly significant interaction (P< 0.01) observed in carotenoids contents (Table 1). Results showed that salinity stress decreased the photosynthetic pigment contents. As compared to unsoaked group of plants, thiourea and water primed plants improved the photosynthetic pigment contents, especially the carotenoids under both control and salinity stress conditions (Fig. 2).

Phenolic compounds

Statistical analysis of data showed significant (P<0.01) difference in priming and salinity treatments in all the phenolics including soluble phenolics, flavonoids and anthocyanins with significant interaction of salinity and priming treatments for shoot phenolics (P<0.05), root flavonoid (P<0.01) and root anthocyanins (P<0.01) (Table 1). Perusal of data revealed that soluble phenolics and anthocyanins were lowest under control conditions, which increased with increased salinity levels. However, water and thiourea priming further increased their levels both in shoot and root (Fig. 3). On the other hand, shoot and root flavonoids were higher under control but decreased as the salinity levels increased. However, thiourea followed by water priming were effective in increasing shoot and root flavonoids under the highest salinity level (Fig. 3).

Ionic contents analysis

Statistical analysis of data for shoot and root Na^+, K^+ and Ca^{2+} in the shoot and root of thiourea primed, water primed and unsoaked plants indicated significant (P<0.01) difference with a significant (P<0.01) interaction of these factors for root Na^+ and root Ca^{2+} (Table 1). Graphical data showed that Na^+ increased with increase in the salinity levels while K^+ and Ca^{2+} contents decreased with increase in the salinity levels but the thiourea priming alleviated the salinity stress both in the shoot and root tissues than water primed or non-primed plants (Table 2).

DISCUSSION

Salinity is one of the major abiotic factors that highly reduces crop production each year. Salinity adversely affects the most sensitive stages of crop establishment e.g., seed germination and seedling growth. Hence, salinity stress is the major problem for crop yield (Patade *et al.* 2011). Studies show that seed priming is one of the most important techniques used to improve seed germination under saline

Table 1: Analysis of variance (mean squares) of the applied salinity and priming treatments and their interactions for different parameters of maize

Parameters	Sources of variation			
	Priming (Pr)	Salinity (Sal)	Pr×Sal	Error
Shoot length	676.090**	422.944**	13.674ns	8.819
Root length	120.424*	155.025**	1.053ns	21.875
Shoot dry weight	6.766**	15.596**	0.218ns	0.220
Root dry weight	0.292*	2.132**	0.028ns	0.062
No. of leaves per plant	3.000**	2.148**	0.037ns	0.222
Leaf area per plant	16817.100**	7829.700**	747.800*	282.900
Chlorophyll a	0.477**	0.421**	0.047ns	0.035
Chlorophyll b	0.523**	0.295**	0.012ns	0.011
Carotenoids	0.415**	0.343**	0.042**	0.009
Shoot soluble phenolics	0.259**	0.532**	0.004*	0.001
Root soluble phenolics	0.121**	0.358**	0.002ns	0.001
Shoot flavonoids	0.280**	0.404**	0.004ns	0.004
Root flavonoids	0.270**	0.316**	0.006**	0.002
Shoot anthocyanins	0.872**	0.355**	0.008ns	0.008
Root anthocyanins	0.377**	0.480**	0.005*	0.002
Shoot Na^+	3512.450**	224.333**	24.280**	3.044
Root Na^+	178.420**	4337.340**	41.170**	2.181
Shoot K^+	42.966**	663.457**	0.993ns	0.997
Root K^+	3.366**	276.059**	1.220ns	0.509
Shoot Ca^{2+}	0.928**	62.013**	0.186ns	0.102
Root Ca^{2+}	0.349**	11.652**	0.025*	0.063

Significant at: ** P<0.01, * P<0.05 and NS non-significant. Error degree of freedom 24

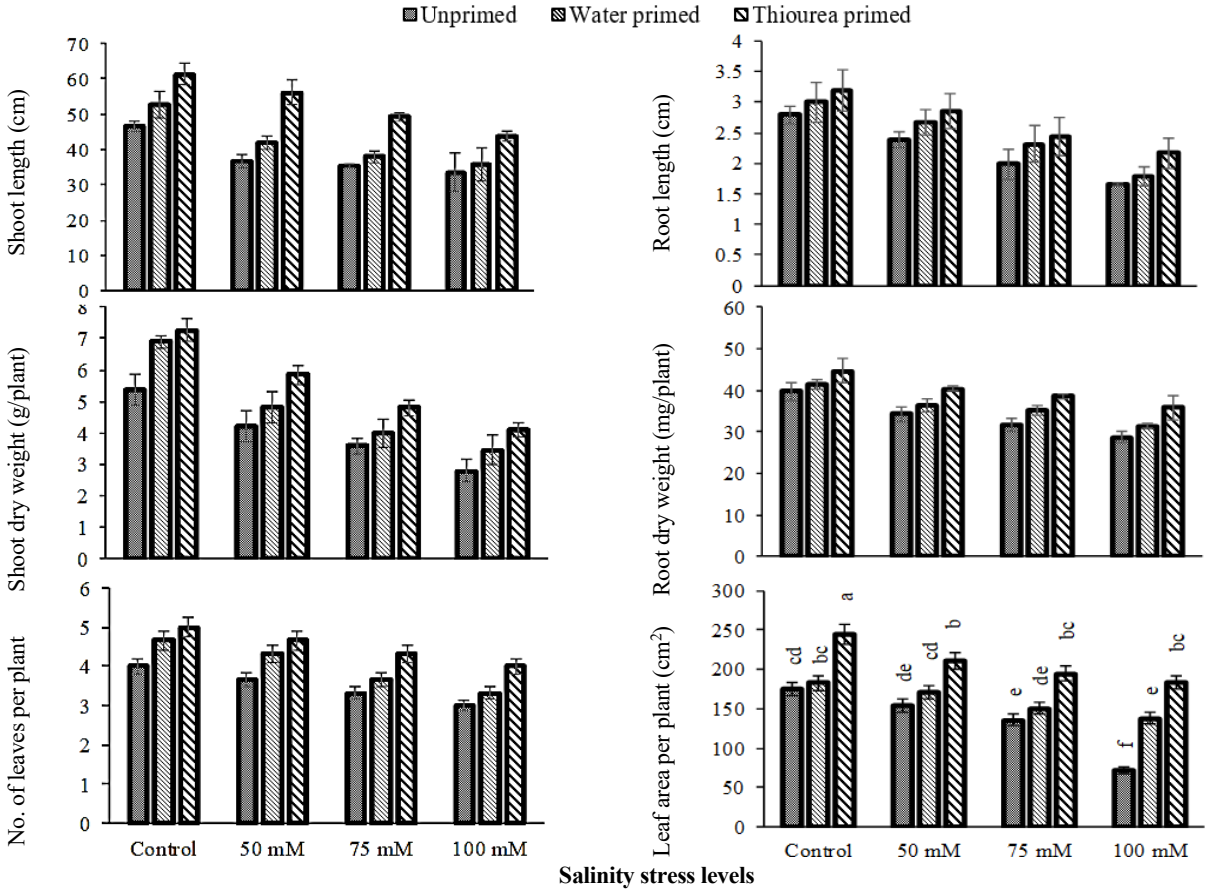

Fig. 1: Changes in growth parameters of maize plants grown from unprimed, hydro-primed and thiourea-primed seeds under increased salinity levels. Different letters on the data points indicate significant (P<0.05) differences among them.

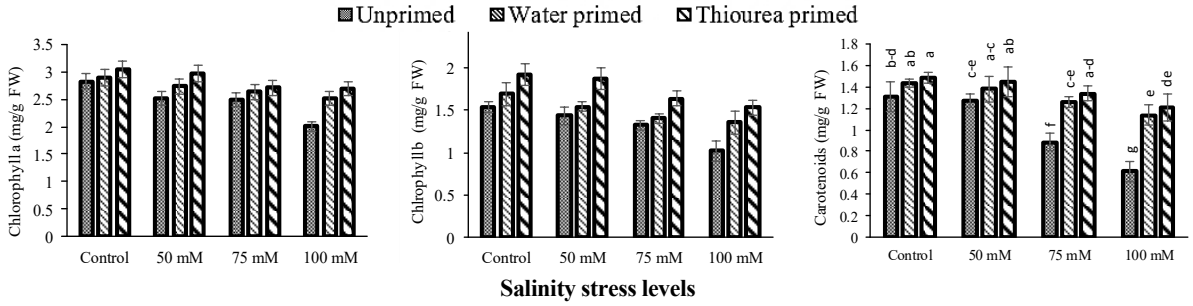

Fig. 2: Changes in photosynthetic pigment contents of maize plants raised from unprimed, hydro-primed and thiourea-primed seeds under increased salinity levels. Different letters on the data points indicate significant (P<0.05) differences among them.

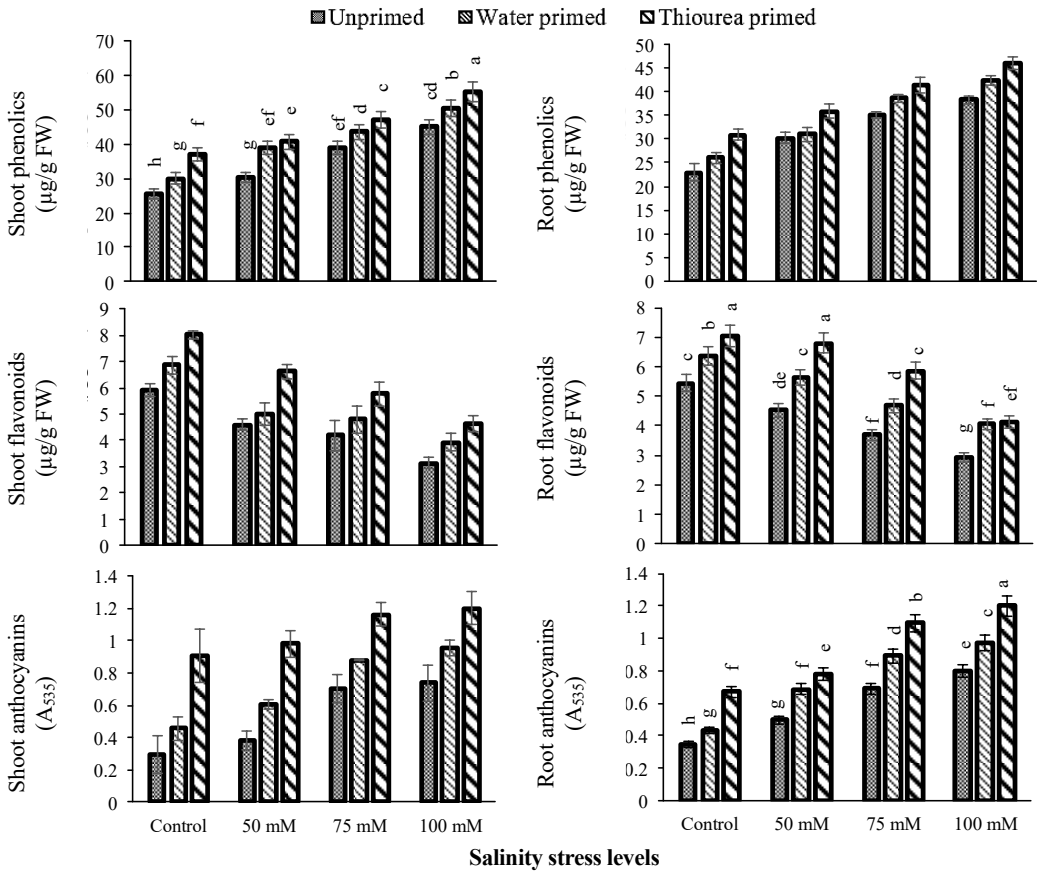

Fig. 3: Changes in phenolics concentration in shoor and root of maize plants grown from unprimed, hydro-primed and thiourea-primed seeds under increased salinity levels. Different letters on the data points indicate significant (P<0.05) differences among them.

conditions. Different natural and synthetic compounds were used before seed germination. Primed plants showed quick and sturdy cellular defenses against abiotic stresses (Biswas *et al.* 2023; Jamei *et al.* 2026).

Application of salinity stress at different levels resulted in decreased in shoot and root length, dry weight, number of leaves and leaf area per plant while thiourea priming was capable to reduce the salt related adversary on maize to remarkable limits (Table 1; Fig. 1). It is reported that salinity-induced reduction in plant growth can be successfully nullified by the exogenous application of stress alleviating agents (Mahajan and Tuteja 2005; Granaz *et al.* 2022), and the same was substantiated in this study by seed priming with thiourea. This has great implications for improving plant yield under salinity stress.

Table 2: Ionic concentrations in the shoot and root tissues of maize plants grown from unprimed (control), hydro-primed and thiourea-primed

NaCl Salinity stress	Priming	Shoot Na^+	Root Na^+	Shoot K^+	Root K^+	Shoot Ca^{2+}	Root Ca^{2+}
		Concentration (mg/g dry weight)					
Control	Control	5.20±0.29g	8.82±0.52g	31.64±0.89a	22.94±1.37a	10.25±0.45a	6.78±0.46ab
	Hydropriming	5.38±0.24g	8.76±0.56g	32.67±1.24a	22.45±0.66a	10.57±0.57a	6.81±0.22a
	Thiourea priming	5.34±0.19g	8.57±0.41g	33.99±1.31a	22.65±0.46a	11.46±0.27a	6.97±0.23a
50 mM	Control	21.90±1.65e	26.50±1.26e	19.98±1.25a	15.37±0.84a	7.30±0.28a	6.23±0.21c
	Water	20.38±0.89ef	26.42±0.94e	20.25±1.30a	15.04±0.62a	7.25±0.29a	6.37±0.27bc
	Thiourea	18.69±1.27f	22.18±1.88f	24.09±1.33a	15.64±0.54a	7.74±0.45a	6.71±0.35ab
75 mM	Control	37.28±1.67c	45.87±1.89c	16.24±0.53a	11.37±0.71a	5.69±0.30a	4.88±0.13de
	Water	34.58±1.50c	44.57±0.83c	16.87±0.66a	11.41±0.96a	5.73±0.24a	5.16±0.25d
	Thiourea	30.53±2.07d	38.43±1.49d	20.27±0.82a	13.05±0.73a	5.86±0.22a	5.17±0.18d
100 mM	Control	56.08±3.95a	64.98±2.25a	10.96±0.47a	8.96±0.19a	4.62±0.19a	4.27±0.17f
	Water	54.65±1.88a	64.08±2.13a	11.80±0.67a	10.27±0.17a	4.79±0.10a	4.35±0.19f
	Thiourea	44.22±1.64b	49.18±1.83b	14.73±0.78a	11.21±0.42a	4.92±0.14a	4.66±0.17ef

Letters with same alphabet differ non-significantly (P>0.05)

Salinity induced changes observed in plants and their potential reversal with the exogenous applications are due to some important physiological changes taking place in metabolic pathways, which is important to explore to find the possible reasons for improved plant growth. In this study, there was a marked improvement in the chlorophyll a, b and carotenoids with thiourea priming (Fig. 2), which was due to reduction in ion-toxicity and increase in beneficial nutrients (K^+ and Ca^{2+}). Turan (2009) described that decrease in plant growth may be due to excessive accumulation of ions or osmotic reduction in water availability. Perveen *et al.* (2013) reported that higher level of thiourea showed inhibition in growth while 0.25 mM thiourea applied to the maize which is grown in roots is highly effective for total dry mass and for root growth and health. Mehmood *et al.* (2021) described that the most effective range of thiourea level was 400 µM, which played a major role in hybrid maize explant for the origination of root and shoot.

Among the photosynthetic pigments, carotenoid levels were specifically improved with thiourea priming, which indicated that thiourea plays a role in improving photosynthesis in maize leaves (Fig. 2). In fact, carotenoids play dual roles of harvesting light for use in photosynthesis and prevent photooxidative damage to chloroplastic lamellae (Simkin *et al*. 2022). In this context, Cha-um and Kirdamanee (2009) reported that chlorophyll concentration was reduced by salinity stress. Chlorophyll fluorescence data has revealed that photon yield decreases due to increase in the salinity stress, which results in a considerable reduction in the plant growth and development (Kalaji *et al*. 2011; Hosseini *et al.* 2023).

Wang *et al.* (2024) reported that due salinity stress reactive oxygen species produced that causes oxidation of cellular membrane and photosynthetic pigments by damaging the chloroplastic membranes. Parveen *et al.* (2018) described that on maize plant addition of 0.25 mM thiourea results in the biosynthesis of antioxidants such as anthocyanins, phenols, ascorbic acid. Mohamed *et al.* (2018) reported that in maize, the levels of antioxidants and osmoprotectants were adversely affected by the soil salinity. They reported that as compared to control plants, there was a reduction in flavonoid contents due to salinity stress. In this study, although applied salinity increased the contents of soluble phenolics, flavonoids and anthocyanins as salt stress response, however their levels were further enhanced with thiourea priming (Fig. 3). These findings indicated an adaptive role of thiourea in improving salinity stress resistance in maize. The phenolic compounds have been considered pivotal in improving salinity tolerance in different plant species (Ahlawat *et al.* 2024; Gul *et al.* 2024). As reported, salinity stress resistance properties of phenolics compounds appear to be due to the presence of hydroxyl group attached to benzene ring structure, which detoxify the harmful ions and ROS produced under salinity stress (Michalak 2015; Šamec *et al.* 2021).

CONCLUSION

Salinity stress decreased all growth parameters, increased some secondary metabolites and sodium ions contents. Priming especially thiourea priming was found effective in reducing the toxic effect of salinity by improving all ionic, growth, biochemical and physiological parameters. The alleviation of salt stress effect on maize appears to be due to the structural properties of thiourea molecule, which are pivotal in detoxification of the reactive oxygen species and excess ions in the shoot and root tissues.

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DATA AVAILABILITY

The data will be made available on a fair request.

ETHICS APPROVAL

Not applicable to this study.

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OPINION ARTICLE

Exhuming Trauma, Fear and Hatred beyond Borders: A Freudian Psychoanalysis of Sylvia Plath and Parveen Shakir's Poetry

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Khan MA (2026) Exhuming trauma, fear and hatred beyond borders: a Freudian psychoanalysis of Sylvia Plath and Parveen Shakir's poetry. *Innovations in STEAM: Research & Education* 4(1): 26040103. https://doi.org/10.63793/ISRE/0033.

ABSTRACT

Background: This article dives into the raw, often painful worlds of Sylvia Plath and Parveen Shakir, exploring how trauma, fear, and hatred grew in their hauntingly stunning poetry. By using the lens of Freudian psychology, this research digs up ghosts in both poetesses' writings which are hidden forces like the death force and repressed recollections. On one hand, Plath wrestled with self-destruction and own family struggle using a sharp language that cuts like a knife. On the other hand, Shakir navigated the sensitive stability of choice and heartbreak in the strict social obstacles of South Asian context.
Objective: To examine manifestations of repression, ambivalence, melancholia, and the death drive in selected texts of both authors.
Methodology: Methodology under the lens of psychoanalytical theory is adopted to demystify trauma, melancholia fear and hatred in the poetry of selected poetesses.
Results: The findings of this study indicate that trauma does not care about obstacles of languages and borders rather it is transcendental. Whether it ends in the annihilation we see in Plath's work or the unending longing located in Shakir's, the archetype is the same: a haunted human soul seeking to make sense of an apocalyptic world. It is vivid through their work at the same time thoughts may be in a conflict or repetition compulsion, it is art that plays the role of a bridge to cross over from apocalyptic world to a balanced life. Their poetry is not an ordinary bunch of words; it is proof of a series of human existence through which they provide a meaningful language to reflect and understand us.
Conclusion: This article concludes that both Sylvia Plath and Parveen Shakir have been navigating the equally deep and frequently wild forces of human heart. By applying Freudian psychoanalytic lens, this paper explored how the subconscious techniques, old wounds, invisible fears and demise pressure build and shape rhythm and imagery in their poetry.

INTRODUCTION

Sylvia Plath (1932–1963) and Parveen Shakir (1952–1994) both belong to different spheres of the world however there is a clear resemblance in the language they use, the language of the soul. Plath is considered a minaret of Western confessional poetry acknowledged for her sharp, regularly violent explorations of fragmented thoughts. In comparison, Shakir presented a challenging female angle that always fight for a legitimate space. On one angle, they might look opposite however, if we dig out deeper, we observe that Plath's poetry is a semi violent storm of alienation and anger. On the other hand, Shakir celebrates her desirous dance of sensitivity and aesthetics. But, if we look closer, there is a deep pain of emotions, abandonment and the inner fight that we all are part of in a parallel world. In Western context, Plath's poem *Ariel* redefines unpleasant topics of trauma, suicide and an experience of existential wrath.

However, in Pakistan, Shakir's debut collection entitled *Khushbu* (fragrance) proved an emotional revolution among oriental female Anglophone writers. She, regardless of the part of a colonial-society that enforces to be silent, gave a chance to womanish aspects of longing, jealousy and betrayal. While analyzing their work, critics

often look at them differently, but I argue that there is a deeper connection of human psyche. Both the poets spent their lives exhuming very own ache. With the help of a systematic and beautiful obsession, they showcased their dark recollections, the sting of betrayal, worry of loss and even self-hatred into a large canvas. Irrespective of their geographical and lingual differences, they have been each trying to escape and survive the same shadow of past.

Objectives

- To examine manifestations of repression, ambivalence, melancholia, and the death drive
- To analyze selected poems through Freudian psychoanalytic theory
- To compare Western confessional poetry with South Asian lyrical tradition

Significance of the Research

This research is significant in connection with Sigmund Freud's psychoanalysis and literary artwork of Sylvia Plath and Parveen Shakir who masterly dealt with their inner demons. Consequently, I am exploring the subconscious drives and the emotive disruptions in their writing to see how they turned their darkest fears into art, proving that poetry is often a survival approach for the soul.

BACKGROUND AND RATIONALE

Participants

Exhuming literature under the les of psychoanalysis is different from ordinary reading because while doing so, we are observing the work of a subconscious mind. Sigmund Freud's foundational ideas suggest that a poem can feature just like a dream (Freud 1915; 1920). A deeper space in which our hidden conflicts, needs and drives no matter sooner or later discovered a manner to talk (Jones 1953). Thinkers like Eagleton (1996) and Tyson (2006) have long advocated this approach, arguing that the symbolic language poet use is mostly a clever set of linguistic patterns that do not come up at surface immediately. When we speak about trauma, it only turns into a vivid picture. As Caruth (1996) and other theorists have referred to, it is hard to evaluate the exact moment it occurs. However, it returns later showing up in a poet's stanza or in a person's life through repetitive pictures and fragmented rhythms. In poetry, the pain and sufferings are so sharp which breaks the narrative aside "leaving in the back of a trail of metaphors that struggles to make feel of the past" (Van der Kolk and Van der Hart 1995). Sylvia Plath is indeed the most well-known example of representation of this inner disaster. For many years, critics like Bassnett (1987) and Wagner-Martin (2004) have explored how her violent imagery and self-adverse subject matters were not simply "art," however an intuitive reflected image of her mental conflicts (Bassnett 1987; Gill 2007). Whether her images are regarded as a feminist riot in opposition to a suffocating society or a literal manifestation of Freud's "dying force", it is vivid that her series *Ariel* represents a raw but cathartic breaking factor (Showalter 1977; Wagner-Martin 2004).

On the other side, Parveen Shakir proved equally revolutionary in Urdu poetry. She modernizes the Urdu ghazal and gave it a striving new feminist voice that ultimately provides equally deep mental scrutiny of inner character. Shakir's poetry is full of lyrical beauty that hides inner warfare of betrayal, jealousy, and social constraints. There is an overlooked possibility right here to see how her "feminine subjectivity" as described by Freud is truly a complex negotiation of the same everyday psychic conflicts (Rahman 1997; Ali 2009).

By bringing Plath and Shakir on a surface collectively, we are able to see how Freud's principles majorly from *The Unconscious* (1915) and *Beyond the Pleasure Principle* (1920) just like the "repetition compulsion" are vivid wherein we unconsciously reenact our ache, or the "melancholia" where we overthrow our anger inward and practice to the human heart regardless of language. Similarly, in *Mourning and Melancholia* (1917), Freud distinguishes between healthy mourning and compulsive melancholia—where the lost object is internalized and the ego turns aggressive toward itself. This is also clear and comparable in the work of both poets which approximately coming across how the mind, while confronted with loss and trauma, makes use of the beauty of a poem to keep from falling apart.

Research gap

In this critique, I used Freudian psychoanalysis as a flashlight to see into the "unconscious" (Freud 1915) angles of these poems. I am searching for the ones repressed reminiscences and hidden emotions that Freud first recognized in 1915, the ones quiet whispers under the surface of the text. This includes exploring the "dying drive" (Thanatos), wherein we see the poets wrestling with self-destructive impulses, and identifying the various "protection Mechanisms" (Freud 1926)—like repression or projection—that a mind uses to protect itself from ache. Through treating their dream-like imagery and symbolic language as signifiers of a deeper mental truth, I will begin to see the poems as maps of the human soul in misery. For Sylvia Plath, I notice on her maximum raw and unfiltered works, specifically from the collection *Ariel*. In poems like *Daddy* and *Lady Lazarus*, I see her confronting paternal trauma and the cyclical nature of her personal struggle. For Parveen Shakir, we look to the evocative verses in "*Khushbu*" (fragrance) and the haunting traces of "*Tanha Tanha*" (Lonely Lonely), which capture the profound pain of

abandonment and longing. Those particular works were selected due to the fact they do not simply point out emotion; they stay in it, imparting a deep engagement with the form of relational ruptures and psychological extremes that shape human experience.

Limitations

While there is a list of psychoanalysts working on the same field including Lacan who presented his complex theory of "*object-relations*" however, this study focused only on the core ideas of Freud. By further narrowing the focus, I explored the classic Freudian concepts i.e., trauma, fear, hatred and inner conflict that connect these two writers. Additionally, it is important to acknowledge that Parveen Shakir wrote her heart out in Urdu. While translating her work into English allows me to share it with a wider audience, some of the delicate layers and "hidden" meanings of her original language might naturally lose a bit of their luster in translation. I have done my best to honor her original intent while recognizing that every language has its own unique soul.

ANALYSIS AND DISCUSSION

In *Lady Lazarus*, Sylvia Plath presents daily life into a poignant cycle of death and rebirth notably writing that she has "done it once more" (Plath 1965) once each decade. This continuous rhythm shows like a vivid instance of Freud's "repetition compulsion," where thoughts remain connected with old wounds in a firm effort to hold them in the end (Freud 1920). Her voice travels among dark, biting humor and cold sense of fear which indicates an invited traumatic visitor in her subconscious who is unwilling to leave. Furthermore, in *"Daddy"*, Plath's aggressive attitude towards her father serves as a classical example of "psychic displacement" she carries an inner suffocating anger and shifts it into an external image. When she ends with the famous line, "Daddy, daddy, you bastard, I'm through, (Plath 1965)" we observe a person struggling to get rid of twisted psychic web. Plath's use of terms death and its remains is not just a poetic fondness however, it clearly indicates towards Freud's concept of Thanatos, the "dying drive" (Freud 1926). As Showalter (1977) argues, her fascination of being wiped away reflects an appeal toward seldom destruction. Even if we examine these poems under a political lens, a Freudian opinion guides us to observe the internal war she turned into fighting. In comparison, Parveen Shakir's work explores a pain that is simply deep, however subtle to some extent. Her use of metaphors i.e., "fragrance" and "shadows" talks about longing and absence which may indicates a "displacement" of her own fears of being alienated or worse, abandoned to life. In most of her Urdu ghazals, her beloved turns into a "partial item" and in Freudian terms; it is a source of both extreme desire and painful denial that ultimately leaves the poet stuck into a situation of keep protecting or move on.

Shakir's use of anger in poetry is often silent and oblique, tucked away in hints like "Your silence weighs heavier than your phrases (Shakir 1977)". Here, we see the practical shape of the "projection" _when a mind feels an internal anger and can't openly express, it places it onto the silent loved one. At one side, Plath's hatred is a two way storm that runs both inward and outward however, Shakir's is subjected to return by cultural expectancies for a female in a patriarchal society of South Asia. Moreover, Plath thinks suicide is a charming compulsion and faces loss of life however, Shakir on the other hand, circumnavigates trauma through the pain of unsatisfied preference. Plath's pain works around in a modest way, however Shakir's is a long awaited and has unresolved desire. Additionally, their truth is also shaped differently as per their field of living. For example, being the habitant of a Western "confessional" style of society, Plath has a privilege to speak out both psychologically and physically. On the other hand, Shakir, being the part of Urdu subculture, is bound to divert her anger into a hostile and rhythmic unhappiness. Nevertheless, both used their artwork for "sublimation," rotating their raw, subconscious pain into something lasting. In *Daddy*, Plath addresses her dominant father figure with a symbolic "killing" that openly reflects oedipal complex—a mix of love and hatred that Freud referred to as ambivalence. With the help of Nazi imagery i.e., "Panzer-man", she further turns her father into a tyrant while connecting her private trauma to a larger ancient canvas. Here Freud's theories on "melancholia" help give justification to why she turns her aggression again towards herself while keeping the figure she fights to break out.

In *Lady Lazarus*, Plath shapes the act of death into "artwork" which flawlessly showcased the Thanatos drive_ an immediate desire to cease the pain and conquer it. Even in *Tulips*, she is so alienated and in search of "regression," as a defensive tool and wants to be "no one". Regardless of red plants which are pulling her back as intrusive nostalgia, she further wants to be an empty quite nation. Meanwhile Shakir remains extra limited towards her feelings. In her collection *Khushbu* (fragrance), she is of the view that love is as sailing as a fragrance and the absence of her beloved causes deep Freudian melancholia in which the ego suffers in silence. Her anxiety is interpersonal_ she is not as bold as Plath to die however; she is worried of facing emotional eraser. Ultimately, unlike Plath's trauma which leads closer to a final extinction, Shakir's leads towards a lifetime desire. Plath externalizes her anger with a loud voice, whilst Shakir respires it into an allegory. However, each emphasizes the importance of how mind uses poetry to live on its personal shadows. Consequently, the story of human resilience is everlasting even before the Freudian aspects and technical structure of a poem/ghazal. Sylvia Plath and Parveen Shakir were part of extraordinary cultures and their fight for social justice was also same. They raised voice for the shadow of the heart. Their fight is not ordinary because it highlights the worry of being removed and betrayed from their beloved. It

further unveils the heavy weight of trauma that is vivid in their writing. They both fought unconsciously and made it visible among the social fabric.

Plath considers poetry a high-stakes area where she fought for a loud and violent battle with the help of her own psyche. According to her to manage with inner fury, a timeless loud and shout talk is the only survival tool. No matter if it looks aggressive or "un-ladylike" it is still mandatory. But for Shakir, the struggle is severe but quitter. However, she also justifies that being quieter is not "silence" rather it is a giant energy of longing and restraint. She personifies her pain as a perfume which aroma stays and haunts the room long after the departure of her beloved. Consequently, this analysis indicates that trauma does not bother about boarders or languages. No matter it ends in the "annihilation" we see in Palth's work or the "endless longing" traced in Shakir's, it has same basis: a schizophrenic human soul seeking to make sense of an apocalyptic world. Their work, as an asset, prove that at the same time as the thoughts may be a place of combat and "repetition compulsion" art plays its role as a bridge and humans may cross over from suffering into understanding. They did not write just poems but built existence rafts out of the words that ultimately provide us with a meaningful language to understand our own shadows.

CONCLUSION

Both Sylvia Plath and Parveen Shakir through their poems have been navigating the equally deep and frequently stormy waters of human heart. With the help of Freudian concepts, I explored how the hidden truths of unconscious desires, fears, old wounds and demise pressure create rhythm and imagery in the poetry. I auxiliary explored that Plath's work is a war of the words, words that damages herself inertly. Also, her father's control on her that she could not get rid of. Advocating Freud's ideas of "repetition compulsion" and "Thanatos". Comparatively, Shakir's world is a heartbreak but sensitive where she fights for "longing" and "projection" to justify her voice in a frequently quitter subculture. Like every woman, she transformed her internal chaos and apocalypse into a lovely scenery and canvas of the words which leads to a beautiful pathway. A pathway that according to Shakir, is her justified way to the logical world. If Plath's journey is aggressive and full of explosions, pushing her towards the edges of life Shakir's however is, to still connect with the lyrical disappointed and hurting road of life. This study further conclude that "repetition compulsion" in the way Plath revisits her pain, "melancholia" Shakir assumes her losses, and "sublimation" in the way each poet grew to become their suffering into ageless art. Plath might also have been more self-adverse whilst Shakir remained existence-putting forward in spite of her wounds, however each have been "exhuming" their trauma from the shadows of the thoughts. Eventually, through these two voices, while our cultures might also different but the way we reveal our trauma and fear is deeply connected. With the help of Freudian Psychoanalysis, I have only unveiled one aspect of theoretic work however, there are still other psychological perspectives i.e., Lacanian speech and desire, feminism, queer theory and Marxism, through which some future researchers can circumnavigate these pieces of literature in a more specific way. Doing so would not just assist us apprehend literature; it allows us to understand the shared language of human ache and the exquisite ways we use art to live on it.

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DATA AVAILABILITY

The data will be made available on a fair request to the corresponding author.

ETHICS APPROVAL

Not applicable to this study.

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RESEARCH ARTICLE

Nursing Care for a Patient with Thromboangiitis Obliterans (TAO) Complicated with AIDS in a High-Altitude Region

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ABSTRACT

Background: In the nursing profession, the most important aspect is patient care. The Acquired Immunodeficiency Syndrome (AIDS) is considered as a fatal disease, and the patient care under defined conditions is of paramount importance.
Objectives: This article summarizes the nursing experience for a patient with AIDS complicated by Thromboangiitis Obliterans (TAO) or clinically known as Buerger's disease in a high-altitude region.
Methodology: Key nursing interventions included: implementing meticulous thrombolytic catheter management to ensure patency and safety; rigorous monitoring for bleeding tendencies during sequential thrombolysis and anticoagulation therapy; strengthening observation of blood circulation in the affected limb to prevent tissue necrosis; applying standardized pain assessment and a multimodal analgesic protocol; dynamic monitoring of infection indicators and implementing targeted prevention and control measures; and providing individualized psychological support while establishing a social support system. The above interventions were used in combinations with pharmacotherapy and surgery. represent the main treatment approach for lower extremity TAO.
Results: Through these comprehensive interventions, the patient's lower limb symptoms significantly improved by postoperative day 7, pain was effectively alleviated, and the patient was discharged for rehabilitation with a good follow-up status.
Conclusion: Alongside the exercised nursing interventions, combined pharmacotherapy and surgery represented the main treatment approach for lower extremity TAO.

INTRODUCTION

Thromboangiitis Obliterans (TAO) is a vascular disease characterized by segmental, non-atherosclerotic inflammation. Common clinical manifestations include coldness and intermittent claudication in the distal limbs, with rest pain, ulcers, and even gangrene possible in advanced stages (Li *et al.* 2021a, b). Its pathogenesis is not fully understood but is generally associated with smoking, cold environmental stimuli, infection, and abnormalities in the autoimmune system. These factors can lead to vascular endothelial injury, subsequently triggering vascular inflammation and thrombotic occlusion.

Acquired Immune Deficiency Syndrome (AIDS) is caused by the Human Immunodeficiency Virus (HIV) (Fu 2020). HIV infection can lead to severe immune function impairment, making the vascular endothelial structure and function susceptible to damage (Mahajan *et al.* 2025). Meanwhile, high-altitude regions are characterized by hypoxia, low atmospheric pressure, and cold, dry climates, which can lead to slowed blood circulation, vasoconstriction, and reduced vascular elasticity, further exacerbating vascular endothelial dysfunction and inflammatory responses (Wang *et al.* 2023). The confluence of these factors resulted in more complex vascular pathology, posing significant challenges for clinical nursing care, with few related reports documented (Fogante *et al.* 2022). To ensure the dual safety of the patient, we now

share the nursing care of a patient with TAO complicated with AIDS in a high-altitude region who accepted thrombolysis and anticoagulation therapy. The patient has recovered and been discharged from the hospital, and he has developed well during follow-up.

MATERIALS AND METHODS

General information

The patient was a 28-year-old male, weighing 70 kg, admitted on January 25, 2024, "with the complained of numbness and pain in the left lower limb for one month, aggravated for two weeks. The patient reported discovering decreased temperature, swelling, and pain in the fourth toe of his left foot one week prior, accompanied by skin breakdown and gangrene at the medial base of the toe, with intermittent oozing of pale-yellow fluid, for which no measures were taken. The patient had a 10-year smoking history of approximately 20 cigarettes per day and lived in a high-altitude region above 4000 m for five years. There was no history of other chronic diseases or family genetic disorders. One week prior to admission, he was diagnosed with "AIDS" but had not yet initiated treatment.

Admission examination

Body temperature 37.8°C, pulse 106 times/min, respiration 18 times/min, blood pressure 129/80 mm Hg. The fourth toe of the left foot showed decreased skin temperature, swelling, and persistent pain (VAS score 5). Skin breakdown with basal gangrene was present, with visible pale-yellow exudate. The area below the mid-left calf had lower skin temperature and decreased sensation. Posterior tibial and dorsalis pedis artery pulses were weak.

Treatment course

The treatment course is presented as Fig. 1. On the third day of admission, left lower limb venous antegrade angiography and thrombolytic catheter placement were performed under local anaesthesia. Angiography demonstrated the following findings: normal morphology of the left common iliac, external iliac, and internal iliac arteries; patency of the left common femoral artery; and occlusion of the left anterior tibial and posterior tibial arteries. A guidewire was used to pass the occluded segment of the posterior tibial artery, followed by balloon angioplasty. A thrombolytic catheter was then left in place for subsequent thrombolytic therapy. On the third postoperative day, follow-up angiography via the thrombolytic catheter confirmed no significant filling defects in the left superficial femoral artery, with patent blood flow. The anterior tibial artery did not opacity, but the posterior tibial and peroneal arteries opacified well, with visible collateral circulation formation. Subsequently, the thrombolytic catheter and sheath were removed. The puncture site was sealed with a closure device and pressure bandaged. The patient returned to the ward without discomfort.

The patient was discharged on postoperative day 7 with no special complications and stable condition. Telephone follow-ups at 1-, 3-, and 6-months post-discharge revealed significant reduction in swelling and pain in the left leg below the mid-calf and the left fourth toe. Pain was tolerable, peripheral circulation had recovered, skin temperature was normal, the original ulcer at the toe base had healed and scabbed over without exudate, and dorsalis pedis artery pulsation was good.

Nursing Care

Implementing meticulous thrombolytic catheter management to ensure patency and safety: Post-catheterization thrombolytic therapy is crucial for surgical prognosis, with catheter patency being a key factor. It is imperative for nursing personnel to strictly differentiate between thrombolytic catheter and the vascular sheath, with clear labeling and secure fixation (Vijayakumar *et al.* 2013).

Thrombolysis was performed via continuous micro-pump infusion of urokinase through the thrombolytic catheter, combined with a 72 h micro-pump infusion of heparin sodium through the vascular sheath to achieve localized heparinization of the affected limb. This aimed to prevent catheter-associated mural thrombosis and new thrombus formation, avoiding complications such as subcutaneous or mucosal bleeding that may arise from intramuscular anticoagulant injections (López-Rubio *et al.* 2024). Nurses operated the micro-pump proficiently and instructed the patient to limit movement range of the surgical limb to prevent catheter kinking, folding, displacement, or dislodgement.

Given the higher arterial pressure and increased risk of blood backflow, the pump solutions were changed regularly to prevent clotting and blockage, ensuring a stable drug concentration in the blood. Attention was paid to prevent backflow during solution changes. If backflow occurred, it was promptly flushed back into the vessel with positive pressure maintained, and the syringe was reconnected to the micro-pump for continued infusion. Strict aseptic technique was applied to the thrombolytic catheter interface, covered with a sterile dressing. The three-way connector was changed every three days, and the thrombolytic catheter retention time did not exceed four days.

The patient was assisted with axial turning at regular intervals. Pressure bandage sites were checked regularly, and tubing management was reinforced to prevent catheter displacement or slippage due to limb flexion. Warning signs for catheter slippage and surgical markers were placed at the foot of the bed. Furthermore, we improved the fixation method for the thrombolytic catheter by designing a specialized protective strap for the femoral artery puncture catheter. This strap fully encased the external portion of the catheter to prevent inadvertent removal by the patient during

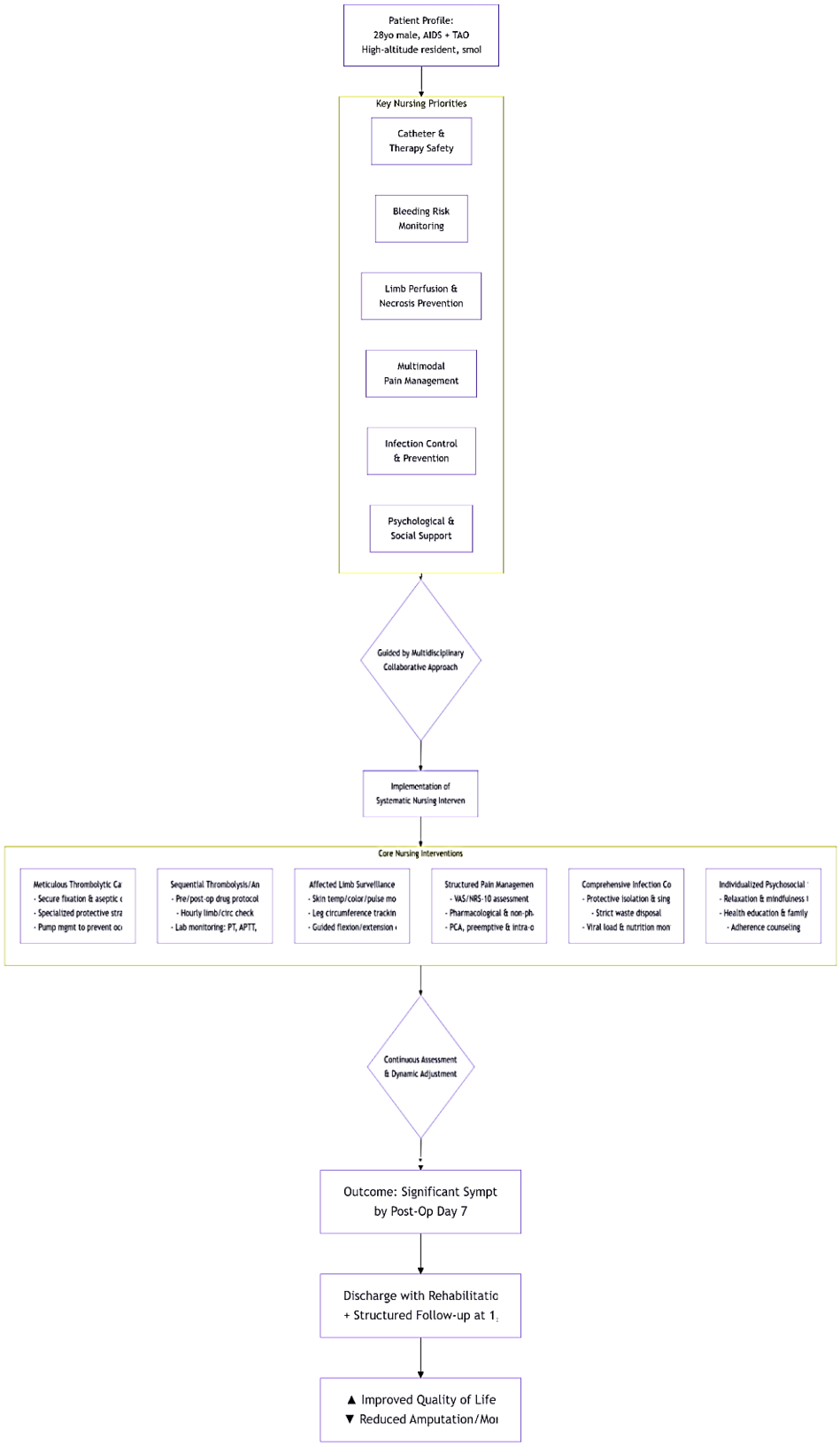

Fig. 1: Coarse of treatment of TAO-AIDS complicated patient

sleep. The catheter was secured within gaps between multiple straps, reducing reliance on medical adhesive and lowering the risk of medical adhesive-related skin injury (MARSI).

Rigorous monitoring for bleeding tendencies during sequential thrombolysis and anticoagulation therapy: To optimize therapeutic efficacy, preoperative medication included papaverine hydrochloride for vasodilation, argatroban for antiplatelet therapy (to improve limb ulcers, rest pain, and cold sensation), cilostazol tablets for microcirculation improvement, and calcium dobesilate capsules for vascular protection. Postoperatively, urokinase and heparin sodium were promptly initiated for thrombolysis and anticoagulation. Continuous micro-pump infusion of 300,000 units of Urokinase for Injection, diluted in 100 mL of 0.9% sodium chloride injection, was administered via the thrombolytic catheter every 12 h. Simultaneously, a heparin sodium solution (12,500 units of unfractionated heparin sodium injection diluted in 500 mL of 0.9% sodium chloride injection) was continuously infused via a micro-pump through the vascular sheath for 72 h. After 20 min priming perfusion, the catheter line was flushed with 500 mL of normal saline.

During treatment, the patient's blood pressure, heart rate, oxygen saturation, respiratory rate, and consciousness were closely monitored. Special attention was paid to observing for bleeding, subcutaneous ecchymosis, or color changes at the wound, puncture sites, and systemic skin and mucous membranes, as well as changes in stool and urine color. Daily laboratory tests included Prothrombin Time (PT), Thrombin Time (TT), Fibrinogen (FIB), Fibrinogen Degradation Products (FDP), Activated Partial Thromboplastin Time (APTT), and D-dimer levels. The affected limb was kept elevated and supported with a U-shaped positioning cushion. Circulation status of the affected limb was checked hourly, and changes in skin temperature were recorded. Following sequential thrombolysis and anticoagulation therapy, a limb elevation test (Buerger's test) was performed: the affected limb was elevated to a 45° angle for 3 min, with no symptoms of numbness, pain, or pallor.

Strengthening observation of blood circulation in the affected limb to prevent tissue necrosis: The primary focus of nursing management for lower extremity arterial thrombolysis intervention lies in preserving sufficient blood perfusion to the affected limb. Postoperatively, the affected limb was kept in a straight, immobilized position for 6 h and maintained elevated. The patient was assisted in adopting an appropriate lateral position. Leg circumference was measured at fixed times daily on the same limb and compared with previous measurements to observe reduction in swelling (Fig. 2).

Therefore, continuous monitoring was maintained for alterations in skin color and temperature of the affected limb. Additionally, the recovery of the dorsalis pedis pulse was carefully palpated and recorded in detail. Simultaneously, warmth preservation measures were implemented for the affected limb to alleviate vascular spasms.

Fig. 2: Circumference of limb before (upper image) and after (lower image) nursing care.

RESULTS AND DISCUSSION

Applying standardized pain assessment and a multimodal analgesic protocol

Our department abandoned the traditional single-drug analgesic model and adopted a goal-oriented, multimodal pain management strategy (Liu 2020a; Li *et al.* 2021b, c). A pain assessment system was established to develop individualized pre-emptive analgesic plans (Sultan *et al.* 2026). A four-party collaborative pain management system, involving physicians, nurses, the patient, and family was established. The advantage of this system lies in its standardized, process-oriented management with specific, quantifiable criteria, making each nursing intervention more targeted and planned. We developed a standard workflow for patient pain management, making the process more systematic and standardized, thereby improving the quality of pain management (Wang *et al.* 2020).

The Visual Analogue Scale (VAS) was uniformly adopted as the pain assessment tool, with standardized assessment times specified: preoperatively and on postoperative days 1, 3, and 7 (Xie *et al.* 2020). Postoperatively, the Numerical Rating Scale (NRS-10) was

used to assess pain levels. When the NRS-10 score was below 4, non-pharmacological methods such as verbal reassurance, positive suggestion, and abdominal massage were used for pain relief. If the score reached or exceeded 4, physicians were promptly notified for administration of non-steroidal anti-inflammatory drugs (NSAIDs) or opioid analgesics (Yang 2019). Pain level was reassessed one hour after medication. Assessment content included nature, intensity, frequency, and duration of pain, as well as its impact on the patient's rest, sleep, and functional activities. Additionally, attention was paid to the patients' cognitive response to pain, management of related complications, pain control effectiveness, and its reactions (Tang 2019).

For post-interventional breakthrough pain, spasmodic pain, and chronic dull pain, stratified management strategies were implemented (Du and Tin 2020). Preoperatively, diclofenac sodium suppository 50 mg was administered rectally for analgesia. Intraoperatively, a combination of remifentanil ($5\mu g \cdot kg^{-1} \cdot h^{-1}$) and dexmedetomidine ($0.5\mu g \cdot kg^{-1} \cdot h^{-1}$) was used for awake analgesia intervention (Xue 2020). Postoperatively, parecoxib 40mg was administered at the end of surgery, and patient-controlled analgesia (PCA) with butorphanol 2mg/kg plus azasetron 10 mg, diluted to 200 mL, was provided with a basal rate of 4 mL/h. Intraoperatively, vital signs were closely monitored, and psychological changes were gauged through communication (Hu 2020). Pain was assessed again immediately upon the patient's return to the ward and then every 4 h for two days. A self-made scale was used to evaluate the patient's pain status. During pharmacotherapy, drug dosages were adjusted based on the patient's specific condition. Pain status was timely evaluated, and symptomatic management was promptly initiated for potential PCA pump malfunctions or drug side effects.

Dynamic Monitoring of Infection Indicators and Implementing Targeted Prevention and Control Measures

AIDS patients are prone to psychological burdens and infection risks, necessitating continuous monitoring and effective infection prevention. While the patient had the indwelling thrombolytic catheter postoperatively, strict blood and body fluid isolation measures were enforced during procedures, and protective isolation was implemented to prevent secondary infections. Concurrently, personal hygiene education was strengthened, a single room was arranged, and the patient's infection status was regularly monitored to promptly eliminate potential infection sources. Vital signs were monitored accurately and promptly, important indicators like viral load were regularly rechecked, and any patient discomfort or changes in condition were reported to physicians immediately. An individualized diet plan was formulated to ensure variety and balance, rich in vitamins, protein, and minerals.

Detailed explanations were provided regarding drug names, dosages, administration times, and methods. The ward environment was kept clean, tidy, and ventilated. Medical and general waste were strictly disposed of according to infectious waste standards with clear labelling (Liu *et al.* 2020; Jiang and Qin 2026).

Providing Individualized Psychological Support and Establishing a Social Support System

Building upon medication and health education, we instructed the patient to practice non-pharmacological interventions such as attention diversion, muscle relaxation training, and meditation training (Niu *et al.* 2016). Psychological support intervention was reinforced to guide the patient in maintaining an optimistic mood. For patients experiencing low mood, depression, or discouragement, psychological counselling was provided, guiding them through self-relaxation exercises such as sitting quietly with eyes closed, full-body relaxation, and gently breathing.

Furthermore, the patient progress was promptly recognized and affirmed to strengthen their confidence and improve treatment adherence. During this process, emerging issues were timely identified and analyzed, and the psychological intervention plan was adjusted to ensure the steady advancement of psychological care. Through the collaborative efforts of healthcare staff and the patient, the aim was to eliminate negative emotions, improve treatment adherence, and thereby better achieve therapeutic goals.

CONCLUSION

For TAO, neither pharmacotherapy nor angiogenesis therapies can achieve complete recanalization of the occluded arteries and satisfactory improvement in blood circulation within a short time frame. Surgical intervention yields superior results in improving blood circulation, yet it only enables recanalization of locally affected arteries. The affected limb may still present with ischemia, and there remains a risk of postoperative arterial restenosis, re-occlusion, and disease progression. The incidence of TAO complicated with AIDS is relatively low, and there are few published reports on effective treatments, thus posing significant challenges to clinicians. Currently, combined pharmacotherapy and surgery represent the main treatment approach for lower extremity TAO. In this case, the patient's symptoms significantly improved after active treatment. Through this case, we recognized the importance of collaborative diagnosis and treatment, particularly regarding key points such as thrombolytic catheter management, critical aspects of thrombolysis and anticoagulation therapy, monitoring of blood supply to the affected limb, multimoda pain management, strengthening social support, infection risk monitoring, and individualized psychological support. Through the comprehensive implementation of interventional therapy and systematic nursing care, not only was lower limb pain effectively alleviated and blood supply improved, but the risk of amputation and mortality were

significantly reduced, enhancing the patient's quality of life and long-term prognosis.

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CONFLICT OF INTEREST

The authors appear to find no conflict of interest

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RESEARCH ARTICLE

Confidence in the Era of Distraction: The Influence of Media Multitasking on Self-Perception and Self-Efficacy Among University Students

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ABSTRACT

Background: Digital multitasking is the concurrent use of more than one digital media platform. It is important to delve into the relationship between human attributes and digital multitasking among university students' population. Self-perception encompasses a person's understanding and judgment of his/her own characteristics, skills, and behavior, whereas self-efficacy is the perception of capability in executing and dealing with tasks or challenges successfully.
Objectives: The current research analyzed the inter-relations among digital multitasking, self-perception, self-efficacy, and gender influence over these variables, among university students.
Methodology: A total of 106 undergraduate students filled out the Media Multitasking Frequency-Revised (MMT-R) scale, Rosenberg Self-Esteem Scale (adapted as a self-perception measure), and the General Self-Efficacy Scale (GSE).
Results: Digital multitasking predicted self-perception with a significant effect explaining 5% of the variance. Males showed higher self-perception compared to females, no gender differences in multitasking or self-efficacy were found. Implications for teaching strategies and psychological well-being are explored, as well as limitations in terms of sample, measurement, and study design.
Conclusion: There was a significant positive correlation between digital multitasking and self-perception while no significant relation resulted between digital multitasking and self-efficacy, indicating that multitasking behavior may not manifest in increased belief in one's own ability. Gender-based comparisons revealed that males had significantly higher scores of self-perception than females. Overall, the study adds to our knowledge of how digital habits influence psychological traits in educational contexts.

INTRODUCTION

With the advent of computer era, the world witnessed a revolution different from any other in the history of mankind. Media has become an inherent part of human beings daily run of life and turning the entire world into a digital village. With the growth in technology, human behavior also changed, as the people depend more and more on digital platforms to get information, to communicate and to connect with the world. The prevalence of mobile phones, computers, and wireless internet has produced a hyperconnected reality in which diverse sources of media are consumed simultaneously. Individuals nowadays process enormous flow of news from news organizations, blogs, sites, and social networks, enlarging their vision and understanding of social realities as well as taxing their capacity to deal with attention, cognitive burden, and emotional management.

The word multitasking, is based on the Latin prefix multi meaning "many" and the English term task, was first used in 1965 to characterize the IBM System/360 computer's ability to execute several actions at the same time. The term has since been coined to characterize the human activity of performing two or more tasks

simultaneously. Media multitasking, in particular, is the synchronous consumption of various forms of media, both conventional (e.g., TV, radio) and digital media (e.g., smartphone, social media, online video). According to Bardhi *et al*. (2010), media multitasking encompasses any behavior entailing simultaneous use of more than one source of media, frequently mixed with entertainment, communication, and productivity.

For socio-humanist scholars, media multitasking has become an interesting area of study for two main reasons. First, it is a characteristic behavior of modern society, particularly among young adults and students who are socialized in a world filled with digital technology. Second, its cognitive, psychological, and social consequences are complex and not well understood yet. Ophir (2009) discovered that frequent multitaskers are likely to have poor cognitive control, indicating that ongoing media use might decrease attention, memory and the capacity to screen out irrelevant information.

Turkle (2011) mounts trenchant critiques of the possibly corrosive effect of digital technology on human interactions and identity construction. It is her argument that as digital tools become part of the self, they redefine the way people feel intimacy, solitude, and emotional validation. With this digital age, individuals find themselves going beyond mere communication and data gathering in cyber spaces to seeking affirmation and community affiliation. But this relies on mediated interaction raises questions regarding authenticity, emotional disconnection, and the breakdown of face-to-face communication.

The university setting offers a specific useful context for studying digital multitasking. University students, described as "digital natives," use technology not only in an academic context, but also socially and for recreation. This pervasive connectivity, while it expands access to information, can result in fractured attention, heightened stress, and academic underachievement (Junco 2012). In addition, it also intersects with fundamental psychological constructs including self-efficacy and self-perception, influencing the way students perceive themselves and their abilities in both academic and non-academic areas.

Self-perception involves people's judgments of their capability, behavior and overall self. It is an essential component of how they deal with social and academic contexts. Self-efficacy, on the other hand, is the belief in one's ability to perform actions necessary to achieve specific goals (Bandura 1977; Rushby *et al*. 2025). While students may view their ability to multitask as a sign of efficiency or technological adeptness, studies suggest this may create distorted self-perceptions. For example, heavy media multitaskers have been known to overestimate both their proficiency and productivity even when they have no resultant performance outcomes that correlate with such beliefs (Sanbonmatsu *et al*. 2013).

In addition, studies suggest that multitasking behaviors may impact students' overall general self-efficacy in subtle ways. At first glance, juggling several digital tasks may enhance mastery and control feelings. However, in practice multitasking usually results in mental overload, decreased task satisfaction, and an illusion of productivity (Misra & Stokols, 2012). This mismatch between perceived and actual ability can erode students' faith in their overall ability to cope with challenges, which leads to undermining resilience, initiative and academic motivation. Compounding this complexity is the existence of gender variations in digital behavior. Previous research has posited that men and women can be different in terms of how they go about multitasking, as well as the effects it has on self-reporting and academic performance. An understanding of these gender-based variations presents a fuller picture of the psychological impact of digital media habits.

In a study, Wang and Tchernev (2012) examined the motivations for digital multitasking and found that the participants would engage in multitasking because of internal psychological needs such as social connectivity, search for information, and habituated behavior. It was then determined that even though multitasking satisfies these psychological needs, it comes at the cost of cognitive performance. The participants indicated decreased accuracy and focus on tasks, suggesting that multitasking could lead to cognitive overload and reduced efficiency in processing.

Boahene *et al.* (2019) drawing on social cognitive theory, discussed how multitasking behaviors influence self-perception and performance among students. They concluded that students with high self-efficacy demonstrated higher levels of strategic use of media and better performance. Disjointed student multitasking behaviors, however, are likely to have lower confidence and competence and demonstrate how multitasking can impact and mislead self-perception and cognitive assessment.

Luo *et al.* (2020) research examined the longitudinal relationships between media multitasking, academic performance, and self-esteem of Chinese adolescents. The researchers discovered that media multitasking negatively affected academic performance but did not affect self-esteem directly. However, academic performance mediated the relationship between media multitasking and self-esteem, implying that the negative impacts of multitasking on academic performance could indirectly influence students' perception of themselves.

Alghamdi *et al.* (2020) addressed the psychological incompatibility between perceived and actual multitasking ability. They established that individuals who thought they were good multitaskers tended to overestimate their skill level. The overestimation of their skill level led to lower academic performance because such students underestimated the detrimental cognitive consequences of task-switching. The research identified a metacognitive gap that maintains ineffective multitasking habits.

Kolo *et al.* (2017) examined the general theme of self-efficacy in the context of digital behavior. Their research identified that more self-efficacious students used media

positively and had greater psychological resilience. Nevertheless, individuals with excessive or poorly managed digital use tended to report lower follow-through with tasks and efficacy, implying that digital habits can be a help or a hindrance to one's self-efficacy depending on management.

Lin *et al.* (2017) conducted a study of multitasking self-efficacy and how it correlated with academic achievement. The research identified that students who held exaggerated impressions of their ability to multitask tended to experience attention control problems as well as task completion difficulties. This incongruity between perception and action resulted in decreased academic achievement scores and heightened stress levels, showing that multitasking self-efficacy may prove to be maladaptive if not based on a realistic level of capability.

Brooks (2015) examined connection between computer multitasking self-efficacy and academic success by having participants complete an educational video by simultaneously using multiple social media sites. Results showed that, even with high self-reported efficacy at multitasking, students who multitasked performed significantly lower on a quiz about the content of the post-video. This finding illustrated that high self-efficacy was not shielded from cognitive negative effects of divided attention.

Mohammed *et al.* (2021) set out to investigate the correlation between social media use, multitasking, and academic self-efficacy among Malaysian university students. The research established that both social media use and multitasking were positively related to students' self-efficacy, which in turn significantly affected their academic performance. The research also established self-efficacy as a mediator of social media multitasking and academic achievement, implying that the promotion of self-efficacy would counteract possible adverse effects of multitasking.

Pérez-Juárez *et al.* (2023) research examined digital distractions among university students in an engineering institution where technology is central to learning practices. Students rated themselves as being able to improve in performance, and the importance of strategies to make awareness of digital distractions and build self-control abilities and to make sustainable use of technology in education was noted. Literature reviewed indicates that multitasking has a significant impact on people's self-perception and overall self-efficacy, particularly for university students. Although there are studies to indicate that there are instances where multitasking may increase engagement if properly maintained or applicable to the situation, there is overwhelming evidence to indicate that habitual or uncontrollable multitasking tends to distort people's self-perceptions either in overestimation or loss of esteem and eroding one's confidence in his or her effectiveness in handling multiple tasks. This intricate relationship highlights how digital multitasking can influence not just cognitive results but also psychological measures integral to academic and personal achievement. Delving into these dynamics is crucial for crafting approaches that enable students to retain realistic self-evaluations and enhance their overall general self-efficacy in more digital classrooms.

In doing so, the present study attempts to examine the effects of digital multitasking on students' self-perception and self-efficacy at the university level, as well as gender differences in these associations. Through an examination of both behavioral and psychological aspects of media multitasking. This study further aims to identify patterns that can help tailor interventions to increase students' digital literacy, mental health, and academic achievement. The hypotheses of the study are:

H1: There will exist relationship between digital multitasking, self-perception, and self-efficacy.

H2: Digital Multitasking and self-perception will be positively correlated.

H3: Digital multitasking and self-efficacy will be negatively correlated.

H4: Gender differences will exist in digital multitasking behaviors, self-perception, and self-efficacy.

METHODOLOGY

Participants

The sample consisted of 105 participants drawn from seven faculties of Govt. College University Faisalabad. These faculties included Arts and Social Sciences, Engineering, Medical Sciences, Pharmacy, Life Sciences, Physical Sciences, and Business. Fifteen participants were taken from each department including both males and females to ensure gender diversity. Seventy (70) females and thirty-five (35) males are covered in the sample. A mixture of quota sampling (A non-random strategy in which participants are included in the sample on the basis of pre-existing categories (e.g., gender, faculties) until the quotas are reached) and convenience sampling (a non-random strategy in which participants are selected due to easy access and availability) methods was applied. Quota sampling was utilized to cover each faculty proportionally, whereas convenience sampling enabled easy access to participants through university networks and face-to-face.

Inclusion criteria: The inclusion criteria existed of participants who are enrolled as full-time university students in any of the previously mentioned faculties. The age limit was 18-26 years. Only students who reported regular use of digital media devices were eligible, as this was central to the study of digital multitasking behaviors.

Exclusion criteria: Participants reporting any diagnosed cognitive or psychological disorder or were on academic leave were excluded to maintain the validity of the results.

Measures

Three validated psychological scales were used in the survey:

Media Multitasking-Revised (MMT-R) Scale: Ralph *et al.* (2015) developed the MMT-R scale that measures how often and how extensively people use digital media simultaneously in everyday life. The 18 items of the scale are usually rated on a Likert scale of 1 (Never) to 5 (Always). The first scale item is reverse scored. Higher scores reflect higher frequency of media multitasking.

General Self-Efficacy Scale (GSE): Schwarzer and Jerusalem (1995) gave this scale to measure a person's general confidence in coping with difficult situations and goal accomplishment. The scale contains 10 items rated on a 4-point Likert scale from 1 (Not at all true) to 4 (Exactly true). The total score is 10 to 40, and higher scores represent higher self-efficacy.

Rosenberg Self-Esteem Scale (RSES): Morris Rosenberg (1965) devised the RSES, which assesses overall self-perception through the measurement of positive and negative self-judgments. The 10-item scale has responses scored on a 4-point Likert scale ranging from 1 (Strongly disagree) to 4 (Strongly agree). Scores range from 10 to 40, with higher scores reflecting greater self-esteem or self-concept.

Operational definitions

Media Multitasking Frequency (MMF): It describes the degree to which people engage in multiple activities of digital media use at the same time during routine activities. In this research, it was assessed with the Revised Media Multitasking Scale (MMT-R), which asks participants about how often they multitasked using different types of media at the same time (e.g., texting while viewing videos). Greater scores represent more often multitasking.

Self-perception: Self-perception is a general perception of one's value, qualities, and skills, especially by himself in social and academic situations. In this research, it was measured through the Rosenberg Self-Esteem Scale (RSES), with the higher score indicating stronger self-perception. Items were reversed scored where appropriate to ensure consistency of direction.

Self-efficacy: Self-efficacy is a concept describing one's perception of his or her capability to effectively execute and cope with tasks under a range of situations. This was assessed via the General Self-Efficacy Scale (GSE), which captures the participant's self-perceived ability to handle everyday problems. Stronger self-efficacy is indicated by higher scores.

Procedure

The questionnaire was administered online via faculty announcement groups and gathered university-wide in person. Informed consent was given before conducting the survey, and confidentiality was guaranteed to facilitate frank responses. Data collection took place over a four-week period to provide sufficient participation across faculties.

Data analysis

Responses were collated and analyzed through statistical software SPSS. Descriptive statistics provided participant demographics and scale scores summary. Correlational analyses investigated the interplay among digital multitasking behavior, self-efficacy, and self-perception and helped to identify how multitasking affects self-perception among university students.

Data handling

All data gathered were stored securely on password-protected devices, and only the research team had access. The data were anonymized before analysis, and identifying details were deleted to ensure confidentiality and to prevent identification of individual participants. Data were treated in accordance with data protection law, and the findings are reported in summary form to avoid identification of individual participants. Upon finalization of the research, the raw data will be kept safely for a duration stipulated by institutional guidelines and eventually destroyed in a proper manner.

Ethical considerations

This research was carried out in accordance with ethical guidelines for human-subject research. Before taking part, all participants were given clear information regarding the purpose of the study, methods, and their rights as a participant. Informed consent was gathered electronically via an embedded consent form at the start of the survey. Participants were made aware that taking part was voluntary, they could withdraw at any time without a penalty, and that their answers would be kept confidential and anonymous. No individually identifiable information was gathered to ensure privacy.

RESULTS

Descriptive statistics and reliability analysis

Three significant psychological constructs were measured: media multitasking, self-perception and self-efficacy. Descriptive statistics revealed that the Media Multitasking Scale (MMF) scores ranged from 43 to 79 ($M = 56.22$, $SD = 7.67$), Rosenberg Self-Esteem Scale (RSE) scores, which reflect self-perception, varied from 9 to 32 ($M = 14.68$, $SD = 3.54$), and General Self-Efficacy Scale scores varied between 13 and 40 ($M = 28.27$, $SD = 5.68$). Reliability testing revealed acceptable to high internal consistency for the MMF ($\alpha = .78$) and GSE ($\alpha = .83$), whereas the RSE indicated lower reliability ($\alpha = .63$). These findings give an indication of the core variables and justify the usage of the MMF and GSE scales when measuring their respective dimensions in this population (Table 1).

Table 1: Descriptive Statistics and Reliability Coefficients for Study Variables (n = 105)

Variable	No. of Items	Min	Max	Mean	SD	Cronbach's alpha
Media Multitasking (MMF-total)	18	43.00	79.00	56.22	7.67	0.78
Self-Perception (RSE-total)	10	9.00	32.00	14.68	3.54	0.63
Self-Efficacy (GSE-total)	10	13.00	40.00	28.27	5.68	0.83

Note. Cronbach's alpha values represent internal consistency reliability for each scale.

Correlational analyses

Pearson product–moment correlation coefficients were calculated to examine the relationships among media multitasking, self-perception, and self-efficacy. Results are displayed in Table 2. There was a strong positive correlation between media multitasking and self-perception (r = 0.224, P = *0.022*), suggesting that students who perform more frequent media multitasking report higher self-perception. Conversely, self-perception and self-efficacy were strongly negatively correlated (r = –.439, P < *0.001*). Nonetheless, no significant relationship existed between media multitasking and self-efficacy (r = –.122, P = *0.216*).

Regression analysis

To test whether media multitasking was a predictor of self-perception, a basic linear regression analysis was carried out with MMF-total as the predictor and RSE-total as the dependent variable (Table 3). The model was statistically significant [F (1, 103) = 5.45, P = *0.022*], accounting for ~5% of the variance in self-perception scores (R^2 = 0.05).

Gender-based analyses

Independent samples t-tests were conducted to examine gender differences in media multitasking, self-perception, and self-efficacy. The results are presented in Table 4. A significant difference was observed in self-perception scores between male and female participants, with males reporting significantly higher self-perception than females (t(103) = –2.54, p = .012). However, no significant gender differences were found for media multitasking or self-efficacy scores.

Table 2: Pearsons correlations between media multitasking, self-perception and self-efficacy

Variable	1	2	3
MMF-total	—		
RSE-total	0.224*	—	
GSE-total	–0.122	–0.439**	—

*$P < 0.05$ and **$P < 0.01$

Table 3: Simple linear regression predicting self-perception from media multitasking (N = 105)

Predictor	B	SE	β	t	p
(Constant)	17.42	2.31	—	7.54	< 0.001
MMF-total	0.095	0.041	.224	2.33	0.022

Note. MMF-total = Media multitasking total score. B = unstandardized regression coefficient; SE = standard error; β = standardized coefficient.

DISCUSSION

The current research explored the correlation between digital multitasking, self-perception, and self-efficacy among university students, with a further emphasis on gender differences. The findings indicated a positive significant correlation between digital multitasking and self-perception but not between digital multitasking and self-efficacy. Furthermore, gender comparisons revealed large differences in self-perception with the males' higher scores but no significant differences in frequency of multitasking or in self-efficacy.

The descriptive statistics reveal that sampled students had high and moderate media multitasking (M = 56.22, SD = 7.67). Except for this widespread participation, the self-perception scores were discovered to be relatively low (M = 14.68, SD = 3.54), which suggests the majority of the students would think less positively about themselves. In contrast, self-efficacy ratings were average (M = 28.27, SD = 5.68), demonstrating a good amount of confidence that they could handle tasks. This trend shows students as active digital multitaskers who are self-assured in general but might be having trouble with the way they see themselves, which is an area of potential discrepancy between perceived competence and self-concept.

The positive correlation between multitasking online and self-conception runs counter to earlier findings of negative consequences from multitasking. It is reported that online multitasking will fulfill inner psychological needs such as social belonging or searching for information but ultimately diminishes task accuracy due to cognitive overload (Wang and Tchernev, 2012; Öksüz *et al.* 2026). In the same vein, Alghamdi *et al.* (2020) noted that students who overestimated their ability at multitasking performed worse, implying metacognitive mismatch.

Table 4: Gender Differences in media multitasking, self-perception, and self-efficacy (n = 105)

Variable	Gender	Mean	SD	*t*	*df*	*p*	95% CI of mean difference
MMF-total	Male	54.71	8.28	–1.43	103	0.156	[–5.39, 0.88]
	Female	56.97	7.29				
RSE-total	Male	15.53	3.56	–2.54	103	0.012*	[–2.97, –0.37]
	Female	13.86	3.36				
GSE-total	Male	27.37	7.13	–1.01	49.88	0.319	[–4.02, 1.34]
	Female	28.71	4.80				

*$P < 0.05$

On the other hand, these findings are more consistent with Mohammed *et al.* (2021), wherein there was a positive relationship between multitasking and academic self-efficacy, which was mediated through higher confidence. This suggests that students might perceive their multitasking as a sign of competence or adaptability and consequently develop a positive self-concept despite lowered performance. Such a mismatch between perceived and actual multitasking ability might be a reflection of cultural or situational norms that excessively value productivity and multitasking.

In contrast to predictions and Hypothesis 3, computer multitasking was not significantly correlated with self-efficacy in this study. Past research including Boahene *et al.* (2019) and Kolo *et al.* (2017) highlighted that students with greater self-efficacy are found to have better constructive media behaviors and perform more favorable academic results. Wu *et al.* (2017) identified that exaggerated multitasking ability perceptions might be associated with lower task completion and higher stress. These contradictory results indicate that although students might be confident in their capability for multitasking, this might not carry over to a general sense of efficacy if it is not accompanied by subsequent success within academic settings.

The absence of a significant correlation in our results can also suggest that general self-efficacy, as operationalized in this research, is not affected by multitasking routines per se. Alternatively, perhaps it mirrors students' compartmentalized perceptions of competence—confident in navigation of the digital world but not necessarily in general academic or life tasks.

Gender comparisons showed that male students reported significantly greater levels of self-perception than female students, although no significant differences between genders were identified in multitasking frequency or self-efficacy. This conforms with previous research (Boahene *et al.* 2019), where it is inferred that male students may indicate greater confidence within digital contexts due to differing socialization experiences or confidence norms.

The absence of gender differences in self-efficacy does not necessarily imply that male and female students both perceive themselves as competent in general regardless of multitasking behaviors. The greater self-perceived scores among males may imply that digital multitasking contributes more positively to their self-perception, or that males conceptualize multitasking success differently than women. This research builds on work by Luo *et al.* (2020), who showed that academic performance mediated the link between media multitasking and self-esteem. Although our research did not measure academic performance, the link between multitasking and self-perceived competence can be attributed to students correlating multitasking skill with academic ability. Similarly, Pérez-Juárez *et al.* (2023) emphasized the importance of self-regulatory strategies to cope with digital distractions. The current findings confirm the potential for students to overestimate their ability at multitasking, advocating for metacognitive awareness and instructional intervention. Brooks (2015) also showed that high levels of multitasking self-efficacy failed to insulate students against the cognitive penalty of divided attention. The present results are consistent with this conclusion, in that high levels of multitasking frequency were not associated with greater self-efficacy, suggesting a potential disconnection between perceived and actual ability.

CONCLUSION

The present study explored the inter-relationship between digital multitasking, self-perception, and self-efficacy among university students. The results showed a significant positive correlation between digital multitasking and self-perception. However, no significant relation resulted between digital multitasking and self-efficacy, indicating that multitasking behavior may not manifest in increased belief in one's own ability. Moreover, gender-based comparisons revealed significant differences in self-perception scores, with males showing significantly higher scores than females. No such differences were found in digital multitasking and self-efficacy variables. Overall, the study adds to a rich picture of how digital habits create psychological traits in educational contexts.

Implications

These results have several practical and theoretical implications:

Educational interventions: The significant correlation between digital multitasking and self-perception reveals that

students overestimate their capabilities in dealing with general and academic tasks. This false confidence can affect how they approach learning material. Training in digital literacy and time management are crucial educational interventions that can enable students to critically evaluate their multitasking tendencies.

Gender-sensitive programming: Since gender variation had been discovered in the self-perception aspect, university support services would be well advised to involve gendered strategies to address self-image and academic confidence, especially among female students who may underreport or experience lower rates of self-perception.

Curriculum design: Academic professionals and administrators can use these findings to foster environments that discourage deleterious multitasking i.e., excessive use of digital devices during lectures.

Limitations

Following are some of the limitations of this study:

Cross-sectional design: The researchers used a cross-sectional research design which restricts it from making causal inferences. Longitudinal studies are required to make certain inferences if multitasking would cause changes in self-perception and self-efficacy over time.

Self-report measures: All the information were collected through self-report questionnaires that are prone to social desirability bias or inauthentic self-evaluation, particularly when working with multitasking activities.

Sample demographics: The sample only included university students from a specific area, which limits its generalizability to other populations or age groups.

Measurement tools: One of the scales had a reliability score less than optimal thresholds that could potentially impact the validity of results. In any future research, consideration needs to be given to revising or replacing less reliable measures.

Cultural context: Cultural factors specific to Pakistani university population can shape multitasking behaviors, self-perception and self-efficacy beliefs. Future studies should include cross-cultural comparisons to increase generalizability.

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AUTHOR CONTRIBIUTIONS

Both authors contributed equally to this work.

CONFLICT OF INTEREST

The authors declare no competing interest.

DATA AVAILABILITY

The data will be made available on a fair request to the corresponding author.

ETHICS APPROVAL

Not applicable to this study.

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