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Hoping all of you shall enjoy our endeavors and those of our contributors.

Editor



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The Impact of Narcissism, Machiavellianism, and Psychopathy at Work

Dr. Poonam Kumari*

Abstract:

Dark personality traits—narcissism, Machiavellianism, and psychopathy—collectively referred to as the Dark Triad, have received increasing attention in organizational psychology due to their influence on workplace behavior. While individuals high on these traits may display short-term success, leadership emergence, or strategic advantage, their long-term impact on organizational functioning remains deeply problematic. The present empirical study examines the impact of Dark Triad traits on workplace outcomes, specifically job performance perceptions and counterproductive work behavior (CWB). Using a quantitative research design, standardized psychological scales were employed to measure personality traits and workplace behavior. Statistical analyses included descriptive statistics, correlation, t-test, ANOVA, and multiple regression. Findings indicate that narcissism shows a mixed relationship with performance, while Machiavellianism and psychopathy are significantly associated with counterproductive behaviors. The study highlights the importance of personality assessment, ethical leadership, and organizational safeguards to mitigate toxic workplace dynamics.

Keywords: Dark Triad, narcissism, Machiavellianism, psychopathy, workplace behavior

1. Introduction

Modern organizations increasingly emphasize performance, competitiveness, and leadership effectiveness. In such environments, certain personality traits that facilitate dominance, self-promotion, and emotional detachment may be inadvertently rewarded. This has led researchers to examine the darker aspects of personality that operate beneath socially acceptable behavior, particularly within competitive workplace settings.

The concept of the Dark Triad was introduced by **Paulhus and Williams (2002)** to describe three socially aversive yet distinct personality traits: narcissism, Machiavellianism, and psychopathy. Narcissism is characterized by grandiosity, entitlement, and a constant need for admiration. Machiavellianism involves manipulateness, strategic calculation, and moral flexibility. Psychopathy is marked by impulsivity, lack of empathy, and emotional callousness. Although conceptually distinct, these traits share a common core of interpersonal antagonism and self-centeredness.

In organizational contexts, individuals high in Dark Triad traits may initially appear confident, decisive, and goal-oriented. However, research increasingly suggests that such individuals are also more likely to engage in unethical behavior, exploit colleagues, and undermine organizational culture. These behaviors may not immediately affect productivity but often result in long-term costs such as reduced trust, increased turnover, and toxic work environments.

Despite growing interest in dark personality traits, empirical research examining their combined impact on workplace outcomes remains limited, particularly in terms of integrating multiple behavioral indicators. The present study seeks to address this gap by empirically examining how the Dark Triad influences perceived job performance and counterproductive work behavior.

2. Review of Literature

Early personality research focused primarily on socially desirable traits, often neglecting characteristics associated with manipulation and moral disengagement. However, **Christie and Geis (1970)** laid the groundwork for Machiavellianism research by highlighting the strategic and emotionally detached nature of high-Mach individuals. Subsequent organizational studies linked Machiavellianism with unethical decision-making and deceptive workplace practices.

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Narcissism has been extensively studied in leadership and organizational contexts. **Judge, LePine, and Rich (2006)** found that narcissistic individuals often emerge as leaders due to their confidence and assertiveness. However, long-term evaluations reveal that narcissistic leaders are associated with poor team functioning, exploitative supervision, and inflated self-evaluations (**Campbell et al., 2011**).

Psychopathy in the workplace, often referred to as “corporate psychopathy,” has been linked to bullying, emotional abuse, and reckless decision-making (**Babiak & Hare, 2006**). Individuals high in psychopathy lack remorse and empathy, making them particularly dangerous in positions of authority.

Paulhus and Williams (2002) demonstrated that the Dark Triad traits are moderately intercorrelated yet distinct, each contributing uniquely to antisocial outcomes. Subsequent meta-analyses (**O’Boyle et al., 2012**) confirmed that all three traits are positively associated with counterproductive work behavior and negatively related to organizational citizenship behavior.

Research also suggests differential effects of Dark Triad traits on performance. While narcissism may relate positively to short-term performance due to confidence and impression management, Machiavellianism and psychopathy consistently predict unethical conduct and long-term organizational harm (**Spain, Harms, & LeBreton, 2014**).

Despite robust theoretical development, empirical studies integrating multiple workplace outcomes using standardized tools remain limited. The present study contributes to this literature by simultaneously examining performance perceptions and counterproductive behavior in relation to all three Dark Triad traits.

3. Objectives of the Study

1. To examine the relationship between Dark Triad personality traits and workplace behavior.
2. To analyze the impact of narcissism, Machiavellianism, and psychopathy on job performance and counterproductive work behavior.

4. Hypothesis

1. H0: There is no significant impact of Dark Triad personality traits (narcissism, Machiavellianism, and psychopathy) on workplace behavior, including job performance and counterproductive work behavior.

2.H1:Dark Triad personality traits(narcissism, Machiavellianism, and psychopathy)have a significant impact on workplace behavior, including job performance and counterproductive work behavior.

5. Research Methodology

The present study adopted a quantitative research design to demonstrate empirical analysis procedures. The sample consisted of 150 working professionals aged 22–50 years from diverse organizational backgrounds.

Dark Triad traits were measured using the Short Dark Triad (SD3) developed by Jones and Paulhus (2014). Narcissism, Machiavellianism, and psychopathy were each assessed using 9 items rated on a 5-point Likert scale.

Counterproductive work behavior was measured using the Counterproductive Work Behavior Checklist (CWB-C) developed by Spector et al. (2006). Job performance was assessed using supervisor-rated perceived performance scores adapted from Williams and Anderson (1991).

Data analysis included descriptive statistics (mean and standard deviation), Pearson correlation, independent samples t-test, one-way ANOVA, and multiple regression analysis. Statistical significance was set at the 0.05 level.

6. Data Analysis and Interpretation

Table 1 : Descriptive Statistics

Variable	Mean	SD
Narcissism	3.62	0.58
Machiavellianism	3.48	0.61
Psychopathy	3.21	0.64
Job Performance	3.54	0.55
CWB	2.89	0.69

Interpretation

Table 1 presents the descriptive statistics, including the mean and standard deviation, for Dark Triad personality traits—narcissism, Machiavellianism, and psychopathy—along with job performance and counterproductive work behavior (CWB) among working professionals.

The mean score for narcissism (M = 3.62, SD = 0.58) is the highest among the Dark Triad traits, indicating that respondents, on average, exhibited a moderately high level of narcissistic tendencies. This suggests the presence of self-confidence, assertiveness, and a desire for recognition within the workplace sample. The relatively low standard deviation reflects limited variability, implying that narcissistic traits were fairly consistent across participants.

Machiavellianism (M = 3.48, SD = 0.61) also shows a moderate to high mean score, suggesting a notable prevalence of manipulative and strategic tendencies among employees. The standard deviation indicates moderate dispersion, reflecting individual differences in strategic and ethically flexible behaviors at work.

The mean score for psychopathy (M = 3.21, SD = 0.64) is comparatively lower than narcissism and Machiavellianism but still falls within the moderate range. This indicates the presence of traits such as emotional detachment, impulsivity, and reduced empathy among some respondents. The slightly higher standard deviation suggests greater variability in psychopathic traits within the sample.

With respect to workplace outcomes, job performance (M = 3.54, SD = 0.55) demonstrates a moderately high level of perceived performance among employees. The low standard deviation indicates relatively consistent performance evaluations across the sample. This suggests that, despite the presence of dark personality traits, respondents generally perceived themselves or were perceived by supervisors as performing effectively at work.

In contrast, counterproductive work behavior (CWB) (M = 2.89, SD = 0.69) has a lower mean score, indicating that negative or deviant workplace behaviors were present at a low to moderate level. However, the higher standard deviation reflects notable individual differences, suggesting that while many employees reported low levels of CWB, a subset engaged in such behaviors more frequently.

The descriptive statistics suggest that Dark Triad traits are moderately present within the sample and coexist with reasonably high job performance and relatively lower levels of counterproductive work behavior. These findings provide a foundational understanding of the sample characteristics and justify further inferential analyses to examine the relationships and predictive effects of Dark Triad traits on workplace behavior.

Table 2 : Correlation Matrix

Variables	Narcissism	Machiavellianism	Psychopathy	CWB
Narcissism	—			
Machiavellianism	.42*	—		
Psychopathy	.39*	.46*	—	
CWB	.28*	.51*	.57*	—

*p < .05

Interpretation

Table 2 presents the Pearson correlation coefficients among narcissism, Machiavellianism, psychopathy, and counterproductive work behavior (CWB). The correlations indicate the strength and direction of relationships between Dark Triad traits and counterproductive workplace behavior.

A moderate positive correlation is observed between narcissism and Machiavellianism (r = .42, p < .05), suggesting that individuals who exhibit higher levels of narcissism are also likely to display manipulative and strategically oriented behaviors. This finding supports the conceptual overlap among Dark Triad traits while maintaining their distinctiveness.

Similarly, narcissism is positively correlated with psychopathy (r = .39, p < .05), indicating that grandiosity and entitlement are moderately associated with emotional detachment and

impulsivity. This relationship suggests that narcissistic tendencies may coexist with reduced empathy and self-centered interpersonal styles in organizational settings.

The strongest inter-trait association is found between Machiavellianism and psychopathy ($r = .46, p < .05$), reflecting a substantial link between manipulative strategies and callous, unemotional behavior. This reinforces prior research suggesting that these two traits share a core of moral disengagement and interpersonal exploitation.

With respect to workplace outcomes, counterproductive work behavior (CWB) shows a significant positive correlation with all three Dark Triad traits. Narcissism demonstrates a weak to moderate positive relationship with CWB ($r = .28, p < .05$), indicating that individuals high in narcissistic traits may engage in counterproductive behaviors, potentially due to entitlement, sensitivity to ego threats, or perceived injustice.

In contrast, Machiavellianism exhibits a stronger positive correlation with CWB ($r = .51, p < .05$), suggesting that individuals high in this trait are more likely to engage in deliberate and strategic counterproductive acts such as manipulation, deception, or rule-breaking to achieve personal goals.

The strongest relationship with CWB is observed for psychopathy ($r = .57, p < .05$), indicating that employees high in psychopathic traits are particularly prone to counterproductive behaviors. This finding aligns with the defining characteristics of psychopathy, including impulsivity, lack of remorse, and diminished concern for organizational norms or the well-being of others.

The correlation analysis reveals that while the Dark Triad traits are interrelated, they each demonstrate unique and significant associations with counterproductive work behavior. These results provide empirical support for the study's hypothesis that Dark Triad traits are meaningfully related to workplace behavior and justify further predictive analysis through regression.

Table 3 : Mean, SD, t-Test, p-Value (High vs Low Dark Triad)

Group	Mean CWB	SD	t	p
High Dark Triad	3.41	0.61	4.32	0.05
Low Dark Triad	2.47	0.58		

Interpretation

Table 3 presents the mean scores, standard deviations, t-value, and p-value comparing counterproductive work behavior (CWB) between employees with high and low Dark Triad personality traits. The independent samples *t*-test was conducted to examine whether a significant difference exists between the two groups in terms of counterproductive workplace behavior.

The results indicate that individuals in the high Dark Triad group reported a substantially higher mean score on CWB ($M = 3.41, SD = 0.61$) compared to those in the low Dark Triad group ($M = 2.47, SD = 0.58$). This mean difference demonstrates that employees exhibiting stronger narcissistic, Machiavellian, and psychopathic tendencies are more likely to engage in behaviors that are harmful to the organization, such as rule violations, interpersonal conflict, or reduced work effort.

The obtained t-value of 4.32 suggests a strong difference between the two groups. The corresponding p-value ($p \leq .05$) indicates that this difference is statistically significant at the 0.05 level. Therefore, the null hypothesis stating that there is no significant difference in counterproductive work behavior between high and low Dark Triad individuals is rejected.

The relatively similar standard deviations across both groups indicate that the variability in CWB scores within each group is comparable, strengthening the reliability of the observed group difference. This suggests that the higher level of counterproductive behavior among the high Dark Triad group is not due to random variation but reflects a systematic influence of dark personality traits.

The findings of Table 3 provide clear empirical evidence that Dark Triad personality traits are associated with elevated levels of counterproductive work behavior. This result supports the study's broader hypothesis that dark personality characteristics significantly influence workplace behavior and underscores the potential organizational risks posed by individuals high in these traits.

Table 4 : ANOVA – CWB Across Traits

Source	F	p
Between Groups	6.87	0.05

Interpretation

Table 4 presents the results of a one-way Analysis of Variance (ANOVA) conducted to examine whether counterproductive work behavior (CWB) significantly differs across levels of Dark Triad personality traits. The ANOVA test was employed to assess the overall effect of dark personality characteristics on counterproductive behaviors in the workplace.

The ANOVA results indicate that there is a statistically significant difference in counterproductive work behavior across the Dark Triad traits, as reflected by the obtained F-value of 6.87 with a corresponding p-value of $\leq .05$. Since the p-value is equal to or less than the significance level of 0.05, the null hypothesis stating that there is no significant difference in CWB across Dark Triad traits is rejected.

This significant F-value suggests that variations in narcissism, Machiavellianism, and psychopathy are associated with meaningful differences in levels of counterproductive work behavior. In other words, employees characterized by different dark personality profiles do not engage in counterproductive behaviors to the same extent.

The ANOVA finding further indicates that Dark Triad traits collectively contribute to explaining variance in counterproductive work behavior, reinforcing the notion that dark personality characteristics are important determinants of negative workplace conduct. While the ANOVA does not specify which specific trait contributes most strongly to these differences, it provides justification for subsequent analyses, such as regression, to identify the relative predictive power of each trait.

Overall, the results of Table 4 strengthen the empirical evidence that Dark Triad personality traits significantly influence counterproductive work behavior. This finding supports the study’s central hypothesis regarding the impact of dark personality traits on workplace behavior and highlights the need for organizational interventions aimed at managing and mitigating the effects of such traits.

Table 5 : Regression Predicting CWB

Predictor	β	p
Narcissism	.21	0.05
Machiavellianism	.38	0.05
Psychopathy	.44	0.05

$R^2 = 0.46$

Interpretation

Table 5 presents the results of a multiple regression analysis conducted to examine the predictive impact of Dark Triad personality traits—narcissism, Machiavellianism, and psychopathy—on counterproductive work behavior (CWB). The analysis assesses both the individual and combined contribution of these personality traits in explaining variance in counterproductive workplace behavior.

The regression model explains a substantial proportion of variance in counterproductive work behavior, as indicated by an R^2 value of 0.46. This suggests that 46% of the variance in CWB is accounted for collectively by the three Dark Triad traits, demonstrating a strong overall model fit and highlighting the practical significance of personality factors in predicting negative workplace behavior.

Examination of the standardized beta coefficients reveals that psychopathy ($\beta = .44, p \leq .05$) is the strongest predictor of counterproductive work behavior. This indicates that higher levels of psychopathic traits—such as impulsivity, lack of empathy, and emotional callousness—are associated with a significant increase in counterproductive behaviors, even when controlling for narcissism and Machiavellianism.

Machiavellianism ($\beta = .38, p \leq .05$) also emerges as a significant positive predictor of CWB, suggesting that individuals who engage in manipulative, strategic, and ethically flexible behaviors are

more likely to participate in counterproductive acts within the organization. This finding underscores the deliberate and calculated nature of workplace deviance associated with Machiavellian tendencies.

Narcissism ($\beta = .21, p \leq .05$) shows a weaker yet statistically significant positive contribution to CWB. This suggests that while narcissistic traits such as grandiosity and entitlement do predict counterproductive behavior, their influence is less pronounced compared to Machiavellianism and psychopathy. Narcissistic individuals may engage in such behaviors primarily in response to ego threats or perceived unfair treatment.

The significance of all three predictors ($p \leq .05$) indicates that each Dark Triad trait uniquely contributes to counterproductive work behavior, supporting the multidimensional nature of dark personality influences in organizational settings. The relative strength of the predictors suggests a hierarchical impact, with psychopathy exerting the strongest effect, followed by Machiavellianism and narcissism.

The regression findings provide strong empirical support for the study's hypothesis that Dark Triad personality traits significantly impact workplace behavior. The results highlight the importance of identifying and managing dark personality characteristics within organizations to reduce counterproductive behaviors and promote healthier work environments.

7. Findings of the Study

1. Prevalence of Dark Triad Traits in the Sample: The descriptive analysis revealed that narcissism, Machiavellianism, and psychopathy were present at moderate levels among the working professionals. Narcissism showed the highest mean score, followed by Machiavellianism and psychopathy. This finding indicates that dark personality traits are not uncommon in organizational settings and may coexist with functional workplace behavior.

2. Interrelationship Among Dark Triad Traits: Correlation analysis demonstrated significant positive relationships among narcissism, Machiavellianism, and psychopathy, confirming that while these traits are conceptually distinct, they share a common core of interpersonal antagonism. This interrelationship supports existing theoretical models of the Dark Triad and provides a foundation for examining their combined effects on workplace outcomes.

3. Association Between Dark Triad Traits and Counterproductive Work Behavior: All three Dark Triad traits were found to be significantly and positively correlated with counterproductive work behavior. Psychopathy exhibited the strongest association, followed by Machiavellianism and narcissism. This finding indicates that individuals with higher levels of dark personality traits are more likely to engage in behaviors detrimental to organizational functioning. Accordingly, the null hypothesis (H_0) stating that Dark Triad traits have no significant impact on workplace behavior is rejected, and the alternative hypothesis (H_1) is accepted.

4. Differences in Counterproductive Work Behavior Based on Dark Triad Levels: The t-test analysis revealed a statistically significant difference in counterproductive work behavior between individuals with high and low levels of Dark Triad traits. Employees in the high Dark Triad group demonstrated significantly higher engagement in counterproductive behaviors compared to their low Dark Triad counterparts. This finding highlights the behavioral risks associated with elevated dark personality characteristics and further supports the influence of personality on workplace conduct. This result provides additional support for the acceptance of the alternative hypothesis (H_1).

5. Variation in Counterproductive Work Behavior Across Dark Triad Traits: ANOVA results indicated a significant difference in counterproductive work behavior across levels of Dark Triad traits, suggesting that not all dark traits contribute equally to negative workplace outcomes. This finding reinforces the multidimensional nature of the Dark Triad and justifies the use of regression analysis to determine the relative contribution of each trait. The null hypothesis (H_0) is therefore rejected in favor of the alternative hypothesis (H_1).

6. Predictive Power of Dark Triad Traits on Counterproductive Work Behavior: Multiple regression analysis revealed that narcissism, Machiavellianism, and psychopathy each significantly predicted counterproductive work behavior. Psychopathy emerged as the strongest predictor,

followed by Machiavellianism and narcissism. The regression model explained a substantial proportion of variance in counterproductive work behavior, demonstrating the combined influence of dark personality traits on negative workplace conduct. These findings conclusively lead to the rejection of the null hypothesis (H0) and acceptance of the alternative hypothesis (H1).

8. Discussion

The present study aimed to examine the impact of Dark Triad personality traits—narcissism, Machiavellianism, and psychopathy—on workplace behavior, with specific emphasis on job performance and counterproductive work behavior. The findings provide strong empirical support for the central premise that dark personality traits significantly influence employee behavior in organizational settings. Overall, the alternative hypothesis was accepted, indicating that Dark Triad traits have a meaningful impact on workplace behavior.

The descriptive findings revealed that Dark Triad traits were present at moderate levels among working professionals, suggesting that such traits are not confined to extreme or clinical populations but are relatively common in organizational contexts. Narcissism emerged as the most prominent trait, which aligns with earlier research indicating that modern competitive workplaces may inadvertently reward narcissistic characteristics such as confidence, assertiveness, and self-promotion (Campbell et al., 2011). However, the coexistence of these traits with moderate levels of counterproductive work behavior highlights the latent risks associated with their unchecked presence.

The correlation analysis demonstrated significant positive relationships among the Dark Triad traits, supporting the theoretical model proposed by Paulhus and Williams (2002), which conceptualizes these traits as distinct yet overlapping. More importantly, all three traits showed significant positive associations with counterproductive work behavior. Psychopathy exhibited the strongest relationship with CWB, followed by Machiavellianism and narcissism. This finding is consistent with prior studies suggesting that individuals high in psychopathy lack empathy and remorse, making them more prone to impulsive and harmful workplace behaviors (Babiak & Hare, 2006).

The t-test and ANOVA findings further strengthened the evidence for the influence of dark personality traits on workplace behavior. Employees classified as high in Dark Triad traits demonstrated significantly higher levels of counterproductive work behavior than those with lower levels. This suggests that dark personality traits do not merely influence behavior at an individual level but also contribute to meaningful behavioral differences across groups. These findings support earlier research indicating that individuals high in Machiavellianism and psychopathy are more likely to engage in strategic deviance, manipulation, and rule-breaking behaviors (O'Boyle et al., 2012).

The regression analysis provided deeper insight into the relative contribution of each Dark Triad trait. Psychopathy emerged as the strongest predictor of counterproductive work behavior, reinforcing its role as the most destructive personality trait in organizational settings. Machiavellianism also demonstrated a substantial predictive effect, reflecting the calculated and instrumental nature of deviant workplace behaviors associated with this trait. Narcissism, while a weaker predictor, remained statistically significant, suggesting that narcissistic individuals may engage in counterproductive behaviors particularly in response to ego threats, criticism, or perceived injustice. These findings align with Spain, Harms, and LeBreton (2014), who emphasized the differential yet complementary effects of Dark Triad traits on workplace outcomes.

Although the study primarily focused on counterproductive work behavior, the findings also offer important implications for job performance. The coexistence of moderate performance levels alongside dark personality traits supports previous research suggesting that traits such as narcissism may contribute to short-term performance or leadership emergence. However, the strong association between Dark Triad traits and counterproductive behavior underscores the long-term organizational costs of tolerating or rewarding such characteristics. This highlights the paradoxical role of dark traits in the workplace, where short-term gains may be offset by long-term dysfunction.

From an applied perspective, the findings emphasize the importance of incorporating personality assessment, ethical leadership development, and organizational safeguards into human resource practices. Early identification of dark personality tendencies can help organizations implement targeted interventions, reduce toxic workplace behaviors, and foster healthier work environments.

9. Conclusion

The present study was undertaken to examine the impact of Dark Triad personality traits—narcissism, Machiavellianism, and psychopathy—on workplace behavior, with particular emphasis on job performance and counterproductive work behavior. The findings of the study provide strong empirical evidence that dark personality traits play a significant role in shaping employee behavior within organizational settings.

The results revealed that Dark Triad traits are moderately prevalent among working professionals and are significantly associated with counterproductive work behavior. Among the three traits, psychopathy emerged as the strongest predictor of counterproductive workplace behavior, followed by Machiavellianism and narcissism. These findings indicate that while certain dark traits may contribute to short-term advantages such as confidence or strategic behavior, their overall influence on workplace conduct is largely detrimental.

Hypothesis testing confirmed that Dark Triad personality traits have a significant impact on workplace behavior. Accordingly, the null hypothesis was rejected and the alternative hypothesis was accepted. This underscores the importance of personality variables as critical determinants of negative organizational outcomes, particularly behaviors that undermine productivity, trust, and ethical standards.

The study also highlights the complex nature of workplace personality dynamics. While job performance levels remained relatively moderate despite the presence of dark personality traits, the strong relationship between these traits and counterproductive work behavior suggests that performance alone may not be a sufficient indicator of employee effectiveness. Organizations that overlook personality-related risks may experience long-term consequences such as increased conflict, reduced morale, and a toxic work environment.

From a practical standpoint, the findings emphasize the need for organizations to integrate personality assessment and ethical considerations into recruitment, leadership development, and performance management practices. Early identification and management of dark personality tendencies can help reduce counterproductive behaviors and promote healthier, more sustainable work environments.

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Impact of Imprisonment on Self-Esteem and Self-Efficacy of Males

Prakash Pandey*
Dr. Sheo Kumar Prasad**

Abstract

The present study aimed to examine the impact of imprisonment on self-esteem and self-efficacy among adult males. For this purpose, the 'Self-Esteem Scale (SES–DSDU)' developed by Dhar and Dhar (2024), the 'Self-Efficacy Scale (SES–SANS)' developed by Singh and Narain (2014), and a 'Personal Information Inventory' were used for data collection. The study was conducted on a sample of 200 adult males aged between 25 and 50 years from the districts of Siwan, Chapra, and Gopalganj in Bihar. The participants included individuals who had experienced imprisonment as well as those with no history of imprisonment. The collected data were analyzed to determine differences between the two groups on self-esteem and self-efficacy. The findings revealed that imprisonment has a significant impact on these psychological variables. Males who had undergone imprisonment reported significantly lower levels of self-esteem compared to their non-imprisoned counterparts. Similarly, the results indicated that individuals with imprisonment experience exhibited lower levels of self-efficacy, suggesting reduced confidence in their ability to manage life challenges and perform tasks effectively. These findings highlight the potential psychological consequences of imprisonment and emphasize the need for rehabilitation programs aimed at enhancing self-esteem and self-efficacy among formerly incarcerated individuals.

Keywords:- Imprisonment, Psychological consequences, Self-esteem, Self-efficacy, Male Prisoners.

Introduction

Imprisonment is among the oldest and most commonly utilized forms of punishment adopted by societies to preserve social order and enforce legal regulations. In its basic sense, imprisonment refers to the confinement of an individual within a legally sanctioned institution, typically known as a prison or correctional facility, after conviction by a court of law. However, the concept of imprisonment extends beyond mere physical restriction of liberty. It represents a complex legal, social, and psychological institution that significantly influences not only the incarcerated individuals but also their families and the wider community.

Within the Indian criminal justice system, imprisonment occupies a pivotal position. Although the system largely evolved from colonial legal frameworks, it has gradually adapted to constitutional values, human rights principles, and changing social conditions. Indian prisons are intended to fulfill multiple purposes, including punishment, deterrence, incapacitation of offenders, and rehabilitation. Nevertheless, the prison system also faces persistent challenges such as overcrowding, prolonged detention of undertrial prisoners, inadequate mental health services, and concerns related to the protection of prisoners' rights. Therefore, understanding imprisonment in the Indian context requires a comprehensive perspective that incorporates legal definitions, historical evolution, theories of punishment, and socio-psychological consequences. Garland (2020) describes imprisonment as "the most severe routine sanction available to modern criminal justice systems, combining punishment with social exclusion." From a psychological standpoint, imprisonment often involves enforced isolation, loss of personal autonomy, and adjustment to a strictly controlled institutional environment.

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Historically, imprisonment was not the primary form of punishment in ancient India. Classical legal texts such as the Manusmriti and Arthashastra emphasized sanctions like fines, corporal punishment, banishment, or capital punishment rather than extended incarceration (Derrett, 1968). Although places of confinement existed, they functioned mainly as temporary detention centers rather than institutions aimed at reform or rehabilitation. The systematic use of imprisonment as a standardized punishment was introduced during the British colonial period through the Indian Penal Code (IPC) of 1860. The code established different categories of punishment, including rigorous imprisonment, simple imprisonment, and life imprisonment. This development led to the expansion of prison infrastructure and the adoption of the penitentiary model, which combined punitive measures with reformatory intentions (Arnold, 1991).

Procedural aspects related to imprisonment were further structured under the Code of Criminal Procedure (CrPC). The CrPC provides provisions regarding the classification of prisoners—such as undertrials, convicts, and detainees—as well as mechanisms for remission, commutation, and parole under Sections 432–435. It also safeguards certain rights of prisoners, including production before a magistrate, access to legal aid, and eligibility for bail, while also defining the sentencing powers of courts. Judicial interpretation has played an important role in shaping the meaning and scope of imprisonment in India. Landmark cases such as *Gopal Vinayak Godse v. State of Maharashtra* (1961), *Sunil Batra v. Delhi Administration* (1978), and *State of Punjab v. Joginder Singh* (1990) have significantly contributed to the evolution of prisoners' rights and the administration of prison justice. The recently enacted *Bharatiya Nyaya Sanhita* (BNS), 2023 continues to recognize imprisonment as a principal form of punishment but introduces certain refinements. It clarifies provisions related to rigorous, simple, and life imprisonment, incorporates community service as an alternative punitive measure, and attempts to rationalize criminal offences in order to reduce excessive criminalization and potentially limit imprisonment for minor crimes.

The concept of self-esteem has been widely explored in psychological literature. William James suggested that self-esteem rises when individuals succeed in areas that they consider important and declines when they fail to achieve their personal aspirations. This formulation highlights the subjective and evaluative nature of self-esteem. Rosenberg (1965), whose work remains highly influential, defined self-esteem as a positive or negative attitude toward the self. According to him, self-esteem represents a global evaluation of the self rather than judgments confined to specific domains of functioning. His conceptualization emphasizes the affective dimension of self-esteem and has guided a large body of empirical research. Expanding upon this perspective, Coopersmith (1967) defined self-esteem as the evaluation an individual makes and habitually maintains regarding oneself, reflecting an attitude of approval or disapproval. This definition integrates both cognitive appraisal and emotional evaluation. Consequently, self-esteem can be conceptualized as a relatively stable sense of personal worth that develops through social interactions and processes of self-reflection.

Labeling theory has been frequently used to explain the psychological consequences associated with incarceration. Moore et al. (2016) found that internalizing the label of “criminal” often results in diminished self-esteem among incarcerated individuals. Prisoners who perceive high levels of societal stigma tend to experience feelings of shame, inferiority, and worthlessness. Similarly, Bernburg and Krohn (2022) demonstrated that perceived stigma during and after imprisonment is a significant predictor of reduced self-esteem, even when previous psychological functioning is taken into account. Their longitudinal findings indicate that stigma-related self-devaluation may persist even after release from prison, thereby exerting long-term effects on an individual's self-concept.

Another important factor influencing prisoners' self-esteem is the duration of incarceration. Porter (2019) reported that individuals serving long-term sentences generally display lower levels of self-esteem compared to those incarcerated for shorter periods. This decline is largely attributed to prolonged experiences of powerlessness, restricted autonomy, and social isolation. Extended imprisonment often intensifies feelings of dependency and helplessness, which negatively affect

personal self-worth. Furthermore, Massoglia and Pridemore (2015) observed that repeated experiences of incarceration can further exacerbate the deterioration of self-esteem. Individuals who cycle through the prison system multiple times often develop cumulative identity damage, reinforcing negative self-perceptions and self-blame.

Empirical studies also indicate gender-based differences in the relationship between imprisonment and self-esteem. Arditti and Few (2017) reported that incarcerated women tend to exhibit lower levels of self-esteem than their male counterparts. This difference is largely associated with disrupted care giving responsibilities, maternal guilt, and stronger social stigma directed toward female offenders. Many women perceive imprisonment as a moral and social failure, which intensifies self-criticism and emotional distress. Turney (2021) further demonstrated that women's self-esteem is strongly connected to relational identity. Consequently, separation from children and family members during imprisonment can have particularly detrimental effects on their sense of self-worth.

Self-efficacy is another important psychological construct relevant to the prison context. It refers to an individual's belief in their ability to successfully perform specific tasks or manage particular situations. Self-efficacy does not necessarily reflect actual competence; rather, it represents an individual's belief regarding how effectively he can utilize his existing skills. These beliefs strongly influence decision-making, persistence, motivation, and emotional reactions. Albert Bandura (1977), who introduced the concept within Social Cognitive Theory, defined self-efficacy as people's judgments about their capacity to organize and execute the courses of action required to achieve desired outcomes. This definition highlights the task-specific and situational nature of self-efficacy beliefs. Bandura (1997) later elaborated that such beliefs influence how individuals think, feel, motivate themselves, and behave. Individuals possessing high self-efficacy tend to perceive challenges as manageable and recover quickly from setbacks, whereas those with low self-efficacy are more likely to focus on perceived weaknesses and potential failures. In this way, self-efficacy operates as a cognitive mechanism through which individuals regulate their behavior and exert control over life events.

Research consistently suggests that the highly regulated nature of prison environments can undermine inmates' sense of personal agency. Crewe (2011) characterized modern prison institutions as environments of "tightness," where strict rules and constant surveillance significantly limit individual autonomy and decision-making. Supporting this view, Beijersbergen et al. (2016) found that prisoners exposed to rigid institutional regimes reported significantly lower levels of self-efficacy, particularly in areas related to decision-making and problem-solving. More recent research by Auty and Liebling (2020) also indicates that prisons characterized by low levels of procedural justice and limited opportunities for inmate participation tend to weaken prisoners' beliefs in their own capabilities. Inmates who perceive little control over their daily activities or future planning often demonstrate reduced confidence in their ability to manage life challenges both during incarceration and after release.

The duration of imprisonment is also a significant factor influencing self-efficacy. Porter (2019) observed that long-term prisoners frequently experience a gradual decline in self-efficacy as a result of prolonged institutional dependency and limited opportunities to assume meaningful responsibilities. Furthermore, repeated incarceration may intensify this effect. Massoglia and Pridemore (2015) reported that individuals with multiple incarceration experiences exhibit significantly lower levels of generalized self-efficacy than first-time prisoners. Recidivist offenders often internalize a sense of failure and inevitability regarding their life circumstances, which weakens their belief in their ability to change their future trajectories.

Considering the varied findings reported in previous studies, the present investigation seeks to explore the impact of imprisonment on the levels of self-esteem and self-efficacy among male individuals. In line with these objectives, the following hypotheses were proposed.

- 1) There will be significant difference between normal and imprisoned males on self-esteem.

2) There will be significant difference between normal and imprisoned males on self-efficacy.

Method

Sample :- The study was conducted on a sample of 200 adult males, Out of the total sample of 200 adult males 100 males were normal adults who had not suffered any legal charge during their life time and 100 males were imprisoned ones who were released on bail. The sample was drawn from Siwan, Chapra and Gopalganj districts of Bihar. The age range of subjects was from 25 to 50 years.

Tests Used:-For measuring self-esteem of subjects ‘Self Esteem Scale (SES – DSDU)’, developed and standardized by **Dhar and Dhar (2024)**, for assessing self-efficacy of subjects ‘Self Efficacy Scale (SES – SANS)’, developed and standardized by Singh and Narain (2014)’, and to seek personal information from subjects ‘Personal Information Inventory’ were used.

Statistical Analysis :- To test the impact of imprisonment of adult males on their self-esteem and self-efficacy, self-esteem and self-efficacy scores were calculated separately and compared. Means, S.Ds. and ‘t’-ratios were calculated.

Results and Discussion

Imprisonment has been found significantly lowering self-esteem. The mean scores on self-esteem of normal group is 96.7365 with S.D. 8.0744 while the mean score on the same dimension of imprisoned group is 82.0423 with S.D. 8.7512 (Table – 1). The obtained ‘t’ ratio for Normal x Imprisoned group is 12.3407. The obtained ‘t’ ratio is significant at .01 level. This proves that normal and imprisoned groups differ significantly on self-esteem. Higher score denotes higher self-esteem and lower score denotes lower self-esteem. Significantly higher mean scores has been obtained by normal group. This proves that imprisonment lowers self-esteem. The group of males who have experienced imprisonment and are currently released on bail possess significantly lower levels of self-esteem compared to males who have not undergone imprisonment. These findings are consistent with a large body of contemporary psychological and criminological research which highlights the negative psychological consequences of incarceration and criminal justice involvement. The present finding that prisoners released on bail exhibit lower self-esteem compared to normal individuals is consistent with many psychological studies examining the effects of imprisonment.

Incarceration is a highly stressful and stigmatizing experience that can damage an individual’s self-concept and sense of personal worth. Haney (2018) noted that imprisonment often results in what he termed the ‘psychological deterioration of self.’ Prison environments typically involve strict control, loss of autonomy, and constant surveillance, which can undermine a person's sense of identity and self-worth. Individuals who experience imprisonment may internalize feelings of failure, guilt, and shame, which contribute to reduced self-esteem. Similarly, Liebling and Maruna (2013) observed that prisoners frequently report feelings of humiliation and loss of dignity within correctional institutions. The experience of being labeled as a criminal and subjected to institutional discipline can significantly affect an individual's self-perception. Even after release on bail, these psychological effects may persist, leading to lower levels of self-esteem. Another important explanation for the lower self-esteem among prisoners released on bail relates to social stigma and labeling. According to labeling theory (Becker, 1963), individuals who are labeled as criminals may internalize negative societal perceptions, which can damage their self-concept and identity. Moore, Stuewig, and Tangney (2016) found that individuals with criminal justice involvement frequently experience intense feelings of shame and social rejection. These experiences often result in negative self-evaluations and reduced self-esteem. Recent studies further support this perspective. Turney and Wildeman (2017) reported that individuals who have experienced incarceration often face discrimination and social exclusion, which can negatively influence their self-esteem and psychological well-being. When individuals perceive that society views them negatively, they may begin to internalize these attitudes, leading to diminished self-worth.

In Indian society, personal reputation and social status are highly valued, and involvement in criminal activities often leads to social disapproval and stigma. A study conducted by Kumar and Daria (2013) among prisoners in Indian correctional institutions reported that many inmates

experienced feelings of shame, guilt, and diminished self-worth. The researchers observed that social stigma and family disappointment significantly affected the self-esteem of prisoners. Similarly, Sharma and Gupta (2021) found that individuals who had experienced imprisonment in India reported lower levels of self-esteem and higher levels of psychological distress compared to the general population. The study emphasized that social rejection and limited opportunities for rehabilitation contribute to negative self-perceptions among these individuals.

Table-1: Showing Means, S.Ds. and ‘t’ ratio of self-esteem scores–Normal and Imprisoned Groups

Groups	N	Means	S.Ds.	df	‘t’ ratio	Level of Sig.
Normal	100	96.7365	8.0744	198	12.3407	0.01
Imprisoned	100	82.0423	8.7512			

Imprisonment has been found significantly lowering self-efficacy also. Mean self-efficacy score of the normal group is significantly higher than that of the prisoners released on bail because the mean scores on self-efficacy of normal group is 81.9116 with S.D. 7.0342 while the mean score on the same dimension of imprisoned group is 72.7288 with S.D. 6.8834 (Table – 2). The obtained ‘t’ ratio for Normal x Imprisoned group is 9.3304. The obtained ‘t’ ratio is significant at .01 level. This proves that normal and imprisoned groups differ significantly on self-efficacy. Higher score denotes higher self-efficacy and lower score denotes lower self-efficacy. Significantly higher mean scores has been obtained by normal group. This proves that imprisonment lowers self-efficacy. This suggests that individuals who have undergone imprisonment and are currently released on bail possess comparatively lower self-efficacy than individuals from the normal population.

The present findings are consistent with several recent empirical studies examining the psychological consequences of imprisonment. For instance, Haney (2018) reported that incarceration often produces feelings of helplessness, dependency, and diminished personal control among inmates. Prison environments typically involve strict regulations, loss of autonomy, and limited opportunities for personal decision-making, which might have eroded imprisoned males’ belief in their ability to influence life outcomes. On being released on bail after experiencing such restrictive environments, their self-efficacy might have remained impaired due to the internalization of institutional dependency and reduced confidence in coping with everyday life demands. Liebling and Maruna (2019) emphasized that imprisonment disrupts individuals’ psychological resources, including self-confidence and perceived competence. Their research on prisoner reentry found that many former inmates struggle with reintegration into society because they feel incapable of managing social, occupational, and familial responsibilities. This reduced sense of personal efficacy might have attributed to prolonged exposure to institutional routines and stigmatization associated with criminal involvement.

Travis, Western, and Redburn (2018) highlighted that individuals returning from prison frequently experience challenges such as unemployment, strained family relationships, and societal stigma. These obstacles can weaken individuals’ confidence in their ability to achieve personal goals and adapt successfully to societal expectations. As a result, self-efficacy levels remain lower among individuals who have experienced incarceration compared to those who have not. The current result also aligns with studies conducted in the Indian context. Kumar and Kumar (2021) investigated psychological adjustment among prisoners in Indian correctional institutions and found that inmates reported significantly lower levels of self-efficacy and perceived control compared to non-prison populations. Our findings support their findings. The significant difference observed in the present study highlights the profound psychological impact of imprisonment on individuals’ self-beliefs and coping capacities. The lower self-efficacy among prisoners released on bail reflects the cumulative

effects of institutionalization, social stigma, psychological distress, and disrupted support systems. These findings emphasize the need for comprehensive rehabilitation programs aimed at strengthening prisoners' psychological resources, particularly their sense of competence and personal agency.

Table-2: Showing Means, S.Ds. and 't' ratio of self-efficacy scores–Normal and Imprisoned Groups

Groups	N	Means	S.Ds.	df	't' ratio	Level of Sig.
Normal	100	81.9116	7.0342	198	9.3304	0.01
Imprisoned	100	72.7288	6.8834			

The study has finally led to the following conclusions :-

- (1) Imprisonment brings significant psychological changes in males.
- (2) Males who have experienced imprisonment perceive significantly lower levels of self-esteem compared to their normal (non-imprisoned) counterparts.
- (3) Males who have experienced imprisonment perceive significantly lower levels of self-efficacy compared to their normal (non-imprisoned) counterparts.

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The Integrated Measuring of Liquidity Management Efficiency on Stock Prices - A Case Study of Selected Steel Companies in India

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Abstract:

The purpose of this study is to investigate the impact of liquidity management on stock returns for 14 steel companies listed on BSE, using panel data for ten years from 2015 to 2024. The primary goal is to analyze liquidity management and stock prices on steel companies in India. Working capital management ensures that a business functions smoothly by keeping an eye on and making the most use of its current assets and liabilities. The liquidity analysis assists firm stakeholders in evaluating the company's liquidity status. The study is based on secondary data taken from the company's annual report. We analyzed the data using financial ratio analysis tools. The optimal amount of liquidity may reduce costs while contributing more to the success of a company. Based on the results, the author confirms the relationship between liquidity management and stock prices are significant, as well as provides steel companies in India with solutions effective liquidity management in order to enhance firms' value, especially in such an uncertain economic condition.

Keywords: Investigated, Business Functions, Evaluating, Optimal, Relationship, Especially.

Background-The Indian's steel company is one of the sectors that have complete integration from the mining process to the manufacturing and marketing of the final product. The research's primary focus is on Indian's Steel Limited's working capital management. Liquidity evaluation is the key objective of the research. The goal of managing working capital is to ensure that a firm runs consistently by keeping an eye on and making the best use of its current assets and obligations. Business processes enable organizations to maximize cash flow and make efficient use of their current assets. Every firm requires working capital to be functioning properly, and holding a better working capital position may enhance the efficiency of an organization's operations. A company's everyday operations, an evaluation of liquidity is vital for both internal and external examination. The ability of a business to pay its immediate debts on the day they become due is referred to as liquidity. A company can only satisfy its short-term obligations if it possesses sufficient liquid assets. Realizing sums from current, floating, or circulating assets fulfills the short-term obligations. If current liabilities are covered by current assets, the state of liquidity will be appropriate. Working capital management is vital in corporate finance governance. It manages short-term investment and financing sources to seek the optimal balance between profitability and liquidity. Management of working capital, particularly short-term asset management and efficient short-term debt management, is one of the essential responsibilities of every financial manager in every industry. And have demonstrated that effective working capital management has a direct effect on the stock prices. With a short life (within a business cycle or within one year), working capital rotates quickly, changing form throughout different stages of the product and business life cycle. From the initial form of cash, converting into supplies, goods, and materials for trading (at commercial companies) or for production (at manufacturing companies) then becoming work-in-progress, semi-finished or finished products and finally back to the original form of cash. After each business cycle, the value of working capital is converted entirely in to the value of finished goods, goods or services. This process takes place on a regular and continuous basis, creating the flow of capital for the firms to develop and

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generate profitability. Therefore, the relationship between WCM management and the stock return are directly related.

Introduction

Working capital management is one of a company's most crucial financial decisions. Regardless of the type of business, a company requires a sufficient working capital level in order to function properly. And found significant positive relationship between average payment time and profitability and a significant negative relationship daily sales revenue and profitability (Ponsian et al. 2014). Influence of working capital management components on corporate profitability were exists a highly significant negative relationship between the time had taken for firms to collect cash from their customer and profitability, there exists highly significant positive relationship between the period taken to convert inventories to sales and profitability and there exists a highly significant positive relationship between the time had taken for firms to pay its creditors and profitability (Mathuva 2009). Different variables of working capital management including the debt ratio, average collection period, inventory turnover period, average payment period CCC and current ratio on the net operating profit. He found a strong negative relationship between the variables of working capital management and profitability of the firm except the sale(size of the company) while the study also revealed that there was positive relationship the firm size and its profitability. The effect of working capital management on firm profitability was related and was found a significant negative relation between gross operating income and the number of days in accounts receivable, inventories, and account payable of the firm(Ashraf 2012). A Poor and inefficient working capital management lead to blocking of funds in idle assets, as a result the liquidity and the profitability of a firm could not be maintained. In addition, working capital divided by two approaches, which were conservative approach and aggressive approaches those affect the firm performance. WCM had also long-term impact on the firm's value that efficient working capital management improved market value of a firm and consequently made positive impact upon shareholder's value (Raghunatha & Kameswari (2004).Existence of a working capital management optimal point that maximizes shareholder wealth. a concave down relation between net trade cycle and market value. Also, suggested the existence of an optimal NTC point that maximizes the value of firms for shareholders. This optimal point was lower for firms in financial distress, as access to finance was more expensive for these firms, leading to a lower investment in working capital to reduce the need for external financing (Banos-Caballero et al. 2014). WCM was required to ensure that company had sufficient cash flow to resume normal operations in a way that minimizes the risk of inability to pay short term obligations. In additions managers should try to avoid not necessary WC investment because the company imposed opportunity cost and lower profitability. However, balancing the company's liquidity and profitability was not a simple task and companies have a low liquidity at higher risk resulting in high protibility (Sagnr et al. 2011). Working capital policy and stock return but working capital policy had some effect on the volatility of stocks. working capital policy plays a part in firm's stock performance across different sectors even though there was no clear patter (Hornbrink and Bratland 2013). Working capital cycle plays role as a liquidity indicators of the firms and tried to determine its relationship with the current and quick ratio, with its component variables, and investigated the implications of working capital cycle in terms of profitability, indebtedness and firm size. The working capital cycle also positively related to return on assets and net profit margin but had no linear relationship with the leverage ratio. Conversely, the current and quick ratio had negative relationship with the debt to equity ratio. Finally there was no difference between the liquidity ratios of large and small firm (Lyroudi & Lazaridis 2000).WCM was to manage any current assets (inventory, accounts receivable, marketable securities, and cash) and current liability (note payable, accruals, and accounts payable) of the company to achieve a contribution balance between profitability and risk to value of the company (Gitman and Zutter 2012).Companies which had huge capacity of internal financing and easily capital market access had conservative approach towards policy regarding working capital management. It also described efficient production and rapid sales

of firms had to rely on internal finance. A good net working capital was indicators of liquidity availability which might affect stock price positively or negatively (Mathew et al. 2010). Impact of negative working capital on profitability could lead to the company's sales, net profit and operating profit positive growth which indicated that company had done well and profitability was not adversely affected by the negative capital (Arora 2013). Reducing the cash conversion cycle (CCC) led to increased profitability. This suggested that efficient WCM positively influences firm value, which may, in turn, affect stock prices (Deloof 2003). Adopting an aggressive WCM strategy (low levels of receivables and inventory) experienced higher stock price stability in emerging markets (Nazir and Afza 2009). working capital management practices on the financial performance of small-scale enterprises (SSEs) practices were low amongst SSEs as majority of them had not adopted formal working capital management routines. Similarly their financial performance was on a low average. working capital management practices influence the financial performance of small scale enterprise. (Lumumba et al. (2012). Impact of working capital policies (aggressive and conservative policies) on the firm's profitability showed that application of a conservative investment policy and aggressive financing policy had a negative impact on a firm's profitability and value (Vahid et al. 2012). Working capital management was a crucial aspect of a company's financial affairs, having a direct positive effect on the company's profitability and liquidity. Profitability and liquidity were opposite sides of the same coin. Optimal levels of liquidity ensure that a company pays its short-term obligation, and a profitable business could guarantee proper cash flow management. Liquidity denoted the capacity of a business to meet its short-term obligations. A company must optimize its liquidity and profitability while conducting daily operations. Net working capital management includes balancing the proportion of working capital components, such as accounts receivable, inventory, and accounts payable, and efficiently using cash and cash equivalents for daily business operations (Agha (2014).

Literature Review

Mathew et al. 2010 indicated that companies which have huge capacity of internal financing and easily capital market access have conservative approach towards policy regarding working capital management. It describes efficient production and rapid sales firms have to rely on internal finance. A good net working capital is and indicators of liquidity availability which may affect stock price positively or negatively. Awad & Al-Ewesat, 2012 examined the relationship between working capital and stock prices by using Regression analysis and Granger causality test and concluded that current ratio and earnings per share are positively correlated to stock price and inventory turnover whereas there is negative relationship between receivable turnover and stock prices. Moyer et al.(2003) found that working capital consist of large portion of a firm's total investment in assets, 40% in manufacturing and 50-60% in retailing and wholesale industries respectively .The firm could reduce its financing cost and increase the funds available for expansion if they minimize the funds. They found that cash helps to keep the firm liquid. It enables the firms to pay its obligations and also protects the firm from becoming bankrupt.

Raheman and Nasr (2007) investigated the relationship between working capital management and profitability of 94 pakistani listed companies for the six year period from 1999 to 2004 . Average collection period, inventory turnover in days, average payment period, cash conversion cycle and current ratio on net operating profitability include in the study. Net operating profitability is used to measure profitability. Result from regression analysis show that there is positive relationship between company size and profitability. And also found that profitability has significant negative relations with accounts receivable as a measure of liquidity debt ratio, inventory turnover in days, average payment period and cash conversion cycle. Bhunia, Khan and Mukhuti (2011) provided the evidence with respect to the relationship between liquidity and profitability of a firm. They took steel companies of private sector in india to assess the management of liquidity as a factor of performance. They studied important liquidity indicators and analyzed that optimum working capital can be achieved by controlling the trade- off between profitability and liquidity of a

firm. Firm value is positively affected by optimum working capital management so that investment in working capital must be satisfactory. They concluded that liquidity and profitability are significantly positively related. Afza and Nazir (2007) investigate the relative relationship between aggressive and conservative working capital policies and profitability of companies. The empirical results found the negative relationship between working capital policies and profitability. On the other hand, Nazir (2009) used Tobin's Q test as a dependent variable and the ratio of current assets and total assets as an independent variable and also attempted to control variables to check opposite analysis of working capital management on profitability of companies. Bhunia (2007) made an assessment of working capital management of working capital of Steel authority of India and Indian Iron company limited from 1991-92 to 2002-03 with help of financial tools and statistical techniques. And concluded that both companies have maintained inadequate working capital, poor liquidity during the period. Pandey and Upadhyay (2007) conducted the study to evaluate the efficiency of management of working capital in Bokaro Steel plant during the period from 1999 to 2005. And concluded that position of payment of liability was not as expected but management of inventory and receivable was good. Verma (1989) examined working capital management in Tata Iron and steel authority of India limited during the period from 1978-79 to 1985-86 by using financial tools and statistical techniques. The study revealed that Tata iron had better working capital management in comparison to Steel authority India limited. And also found that both companies had made excessive use of bank borrowings to finance the working capital requirements. Negarbo (2006) selected 250 firms as a sample to test the working capital management and concluded that growth rate of the firm and anticipated cash flows both play major role in working capital management. They also found that changing size and accumulated assets not significantly affected by cash flow prediction and sale growth. They are also highly influenced by some factors such as the business nature of the firms, sales, firm size and profitability.

DeLoof (2003) working capital managed had significant impact on the way of profitability of the firms. The result indicated that there was a certain level of working capital requirements which potentially maximizes return. And analyzed from National Bank of Belgium through statistics in 1997 accounts payable were 13% of their total assets while accounts receivables and inventory accounted for 17% and 10% respectively. Wilner (2000) stated in UK corporate sector more than 80% of daily business transactions are on credit terms so Working capital management plays an important role to run the business. Also found American firms extended their credit towards customers by 1.5 trillion dollars. Most firms use trade credit extensively despite its cost and trade credit interest rates commonly 18% on above.

Objectives

1. To study the impact of liquidity management on stock prices by analyzing the liquidity position of the company.
2. To know the liquidity position and area of weakness.

Hypothesis of the Study

H₀: Liquidity management has no association with stock prices of Indian Steel Co. Limited.

H₁: Liquidity management has a significant association with stock prices of Indian Steel Co. Limited.

Data Collection

The data collected were from Prowess IQ (CMIE) listed firms in the BSE Stock Exchange Market. This study employed a quantitative, panel data based research design to investigate the impact of working capital management indicators on stock price performance of selected steel companies in India, focusing on 10 firms listed on BSE Ltd. The sample comprised leading steel producers chosen based on market capitalization, continuous trading history and data availability, ensuring sectoral representation. The dependent variable is ROCE while independent variable STR, CR, DER, DTR, NPR, QR, CTR. Stationery of variables was confirmed using LLC and IPS as well as ADF panel unit root tests to avoid spurious relationships. A descriptive analysis was first conducted to summarize trends in WCM practices and stock prices fluctuations, followed by

der	Pearson Correlation	-.030	-.043	-.359**	1	-.122	-.157	-.140	-.249**
	Sig. (2-tailed)	.724	.613	.000		.150	.064	.098	.003
	N	140	140	140	140	140	140	140	140
dtr	Pearson Correlation	-.347**	.084	.025	-.122	1	-.416**	.039	.155
	Sig. (2-tailed)	.000	.324	.773	.150		.000	.645	.068
	N	140	140	140	140	140	140	140	140
ctr	Pearson Correlation	.465**	.331**	.261**	-.157	-.416**	1	.456**	.086
	Sig. (2-tailed)	.000	.000	.002	.064	.000		.000	.314
	N	140	140	140	140	140	140	140	140
str	Pearson Correlation	.003	.625**	.082	-.140	.039	.456**	1	-.124
	Sig. (2-tailed)	.968	.000	.337	.098	.645	.000		.145
	N	140	140	140	140	140	140	140	140
roce	Pearson Correlation	-.001	.003	.525**	-.249**	.155	.086	-.124	1
	Sig. (2-tailed)	.992	.967	.000	.003	.068	.314	.145	
	N	140	140	140	140	140	140	140	140
**. Correlation is significant at the 0.01 level (2-tailed).									
*. Correlation is significant at the 0.05 level (2-tailed).									

Unit root test result (at level)

Name	LL&C	IPSW	ADF	FISHER
CR	.0000	.0000	.0290	.0200
DER	.0000	.0125	.0036	.0000
DTR	.0000	.0254	.0000	.0000
NPR	.0000	.0000	.0000	.0000
QR	.0000	.0001	.0000	.0000
STR	.0000	.0001	.0000	.0000
ROCE	.0000	.0000	.0000	.0000

The unit root of all test (Levin-Lin-Chu, Im-Pesaran-Shin, Fisher-Type Tests, Augmented Dickey-Fuller) result confirm that all variable are stationary at level, as probability value are below .05. This indicates the absence of unit root problems and validates the use of regression analysis without further transformation. Firm size was stationary level, it was common and asset growth trends upward over time due to inflation an capital investment.

Regression Analysis- The regression results reveal that Liquidity management significantly influences stock returns. The strength of the relationship between the dependent variable, ROCE and all the independent variable taken together and impact of of these independent variables on the profitability are given below .It was observed from the above that increase in CR,DER, STR by one unit, ROCE decreased by .485 units, .594 units.2.902 units that were statistically insignificant. When increase in QR,DTR,CTR by one unit, then ROCE are increased by 32.44 units, .686 units, 2.109 units which was not statistically significant but increase in NPR by one unit ROCE of the company increase by 4.256 units which was statistically significant at five percent level. The multiple correlations among the dependent variable ROCE and the independent variable taken together .591. It indicates that the profitability was strongly responded by its independent variables.

It was also evident from the value of R square that .349 percentage of variation in ROCE was accounted by the joint variation in independent variable. Adjusted R square signifies that 31 percentage of positive variations in the ROCE are explained by the independent variable. Standard error of regression coefficients 170 being high, demonstrates that there exists moderate line of estimates among the variables. F value indicates that the model is perfectly fit and also the probability is less than 0.05. Durbin –Watson statistics 1.020 indicates that residuals are not serially correlated. The multiple regression result between the dependent and independent variables has been authenticated because the

results satisfy the model.

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.591 ^a	.349	.314	170.85812	1.020
a. Predictors: (Constant), str, cr, der, dtr, npr, qr, ctr					
b. Dependent Variable: roce					

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2065938.156	7	295134.022	10.110	.000 ^b
	Residual	3853409.822	132	29192.499		
	Total	5919347.978	139			
a. Dependent Variable: roce						
b. Predictors: (Constant), str, cr, der, dtr, npr, qr, ctr						

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-50.098	30.091		-1.665	.098
	cr	-.485	.431	-.095	-1.127	.262
	qr	4.166	32.441	.012	.128	.898
	npr	4.256	.705	.479	6.037	.000
	der	-.594	.724	-.064	-.821	.413
	dtr	1.587	.686	.195	2.312	.022
	ctr	4.014	2.109	.198	1.903	.059
	str	-2.902	1.079	-.277	-2.689	.008
a. Dependent Variable: roce						

Conclusion-

Efficient management of liquid assets enables companies to meet short term obligations while optimizing resources. A shorter cash conversion period significantly improved profitability, suggesting that faster turnover of resources into cash is essential for profitability. This efficiency allows companies to reduce cash flow gaps, which is crucial for sustaining operations and investing in growth. Steel industry should maintain a balanced liquid assets, ensuring sufficient liquidity without overstocking cash or easily liquid assets, which can reduce returns. This can be achieved by closely monitoring the liquid asset to meet short term obligations while maximizing capital efficiency. Liquidity management efficiency should be reviewed regularly to adapt to changing market conditions, industry cycle and customer demands. The study demonstrates that Steel Limited did not have an optimal liquidity position. They have insufficient funds to meet their current obligations As a result, management must handle this issue in order to sustain the company's liquidity position in the future and ensure that existing assets are used effectively to pay back short-term obligations on time. Liquidity management indicates that higher liquidity levels enhance financial performance. The study reveal that Liquidity management significantly influences stock returns.

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Feminine Resistance in Mahasweta Devi's Breast Stories

Dr. Amita Verma*

Abstract

Mahasweta Devi is one of the most influential Indian writers whose literary works highlight the oppression, marginalization, and resistance of subaltern communities, particularly women. Her collection Breast Stories represents a powerful narrative of women's suffering and their struggle against patriarchal and socio-economic exploitation. The stories "Draupadi," "Breast-Giver," and "Behind the Bodice: Choli Ke Pichhe" reveal how women's bodies become sites of oppression, resistance, and political assertion. This paper examines how Mahasweta Devi portrays women's resistance against patriarchal violence, class exploitation, and social marginalization. Through her realistic and bold narrative style, Devi exposes the hypocrisy of society and gives voice to the voiceless women of marginalized communities. The study highlights that Breast Stories is not only a literary work but also a powerful feminist discourse that challenges dominant social structures and asserts women's identity and dignity.

Keywords: Mahasweta Devi, Breast Stories, Feminism, Resistance, Patriarchy, Marginalized Women.

Introduction

Mahasweta Devi occupies a significant place in modern Indian literature for her commitment to social justice and her focus on marginalized communities. Her writings reflect the harsh realities of society and bring attention to the lives of tribal people, poor peasants, and oppressed women. Through her literary works, she exposes the exploitation and injustice faced by these communities and raises questions about the socio-political system that perpetuates such oppression.

One of her most influential works, Breast Stories, presents a powerful depiction of women's suffering and resistance. Originally written in Bengali and later translated into English, the collection includes three significant stories: "Draupadi," "Breast-Giver," and "Behind the Bodice: Choli Ke Pichhe." Each of these stories highlights the ways in which women's bodies are controlled, exploited, and objectified within a patriarchal society.

The title Breast Stories itself symbolizes the central theme of the collection. The breast, often associated with motherhood, nurturing, and femininity, becomes in Devi's narratives a symbol of exploitation and resistance. By focusing on the female body, Mahasweta Devi challenges the patriarchal gaze and exposes the social structures that reduce women to objects of control and domination.

This article attempts to analyze Breast Stories as a powerful voice of resistance. It examines how Mahasweta Devi portrays women's suffering and their struggle for dignity and identity within a deeply patriarchal and exploitative social system.

Women's Oppression in Patriarchal Society

Mahasweta Devi's works reflect the historical and cultural oppression of women in Indian society. Although women are often glorified in mythology as goddesses such as Durga or Lakshmi, their actual social position remains subordinate and marginalized. The contradiction between the idealized image of women and their real condition is a recurring theme in Devi's writings.

Traditional social structures have long confined women to limited roles and denied them independence and identity. Women from marginalized communities suffer even more because they face not only gender discrimination but also class and caste oppression. Mahasweta Devi's stories

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reveal how these multiple forms of exploitation intersect and intensify the suffering of women.

In *Breast Stories*, Devi highlights how women's bodies become sites of control and violence. Society often reduces women to their physical roles as mothers or sexual objects, ignoring their individuality and humanity. Through her narratives, Devi exposes the brutality of such a system and challenges the norms that sustain it.

“Draupadi”: Resistance Against State Violence

The story “Draupadi” is one of the most powerful and controversial narratives in *Breast Stories*. It portrays the story of Dopdi Mejhen, a tribal woman who becomes a symbol of resistance against state oppression. Set in the context of political conflict and military repression, the story shows how the state machinery uses violence and sexual assault to suppress dissent.

Dopdi is arrested by the authorities and subjected to brutal torture and rape. However, instead of submitting to humiliation, she confronts her oppressors with courage and defiance. In the climactic moment of the story, she refuses to clothe herself and stands naked before the officers, challenging their power and exposing their brutality.

This act of resistance transforms the meaning of the female body. What the oppressors intended as a means of humiliation becomes a powerful symbol of protest. Dopdi's naked body becomes a weapon against patriarchal and state authority. Through this powerful imagery, Mahasweta Devi redefines the concept of resistance and demonstrates the strength of marginalized women.

“Breast-Giver”: The Exploitation of Motherhood

The story “Breast-Giver” presents another dimension of women's exploitation in patriarchal society. The protagonist, Jashoda, is a poor woman who becomes a professional wet nurse in order to support her family. She spends her life feeding the children of wealthy households, sacrificing her own health and well-being.

Jashoda's body becomes a commodity that is used and exploited by the society around her. Her ability to produce milk turns into a source of income for her family and employers, but it also leads to her physical and emotional exhaustion. Despite her immense contribution as a nurturer, she receives neither respect nor security.

The tragic end of Jashoda's life reveals the harsh reality of social exploitation. Once her body can no longer serve others, she is abandoned and neglected. Through this story, Mahasweta Devi critiques the patriarchal glorification of motherhood while exposing the economic and social structures that exploit women's bodies.

“Behind the Bodice: Choli Ke Pichhe”: Objectification of the Female Body

The third story in *Breast Stories*, “Behind the Bodice: Choli Ke Pichhe,” explores the theme of voyeurism and the commodification of women's bodies in modern society. The story reflects how the female body becomes an object of curiosity, entertainment, and commercial exploitation.

Through the narrative, Mahasweta Devi reveals how society is obsessed with controlling and interpreting women's bodies. The question “What lies behind the bodice?” becomes symbolic of the intrusive gaze that seeks to possess and define women.

The story also highlights the role of media and popular culture in reinforcing patriarchal attitudes. Instead of respecting women's individuality and dignity, society often reduces them to physical objects. Mahasweta Devi challenges this perspective by exposing its hypocrisy and cruelty.

Feminist Perspective and Voice of Resistance

Mahasweta Devi's *Breast Stories* represents a powerful feminist intervention in literature. Unlike conventional narratives that portray women as passive victims, Devi presents women who resist oppression in different ways.

Dopdi's defiance, Jashoda's tragic endurance, and the symbolic resistance in “Behind the Bodice” collectively reveal the complex experiences of women in a patriarchal society. These stories show that resistance can take many forms, ranging from open rebellion to silent endurance.

Mahasweta Devi also emphasizes the importance of giving voice to marginalized women. Her

narratives challenge dominant historical and cultural narratives that often ignore the experiences of subaltern communities. By focusing on their stories, she brings their struggles into the public consciousness.

Social and Political Significance

The significance of *Breast Stories* extends beyond literature. It raises important questions about gender inequality, social justice, and human rights. Mahasweta Devi's work encourages readers to reflect on the structures of power that perpetuate oppression.

Her stories also highlight the intersection of gender with class, caste, and political power. The women portrayed in *Breast Stories* are not only victims of patriarchy but also of economic and political exploitation. This intersectional perspective makes Devi's work highly relevant in contemporary feminist discourse.

Conclusion

Mahasweta Devi's *Breast Stories* stands as a powerful representation of women's suffering, resilience, and resistance. Through the stories "Draupadi," "Breast-Giver," and "Behind the Bodice: Choli Ke Pichhe," Devi exposes the oppressive structures of patriarchal society and challenges the exploitation of women's bodies.

Her narratives reveal that the female body, often used as a tool of domination, can also become a powerful symbol of resistance. By giving voice to marginalized women, Mahasweta Devi not only highlights their struggles but also asserts their dignity and identity.

Ultimately, *Breast Stories* is more than a collection of stories; it is a profound critique of social injustice and a call for equality and human dignity. Mahasweta Devi's work continues to inspire readers and scholars to question the systems of oppression and to recognize the strength and resilience of women.

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Applications of Fixed Point Theorems in the Analysis of Nonlinear Differential Equations

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Abstract

Fixed point theory plays a central role in the mathematical analysis of nonlinear differential equations. Many nonlinear problems cannot be solved explicitly, and therefore indirect methods are required to establish the existence, uniqueness, and stability of their solutions. Fixed point theorems provide one of the most powerful and widely used frameworks for this purpose. Classical results such as the Banach Contraction Principle, Schauder Fixed Point Theorem, and Krasnoselskii Fixed Point Theorem have been extensively applied to ordinary differential equations (ODEs), partial differential equations (PDEs), and integral equations. These methods allow nonlinear differential equations to be reformulated as operator equations in functional spaces, where solutions correspond to fixed points of suitable mappings. The present article provides a detailed study of the role of fixed point theorems in nonlinear analysis, including their theoretical foundations, operator formulations, and applications to nonlinear boundary value problems and evolution equations.

1. Introduction

Nonlinear differential equations arise naturally in many fields such as physics, engineering, biology, economics, and control theory. Examples include fluid dynamics equations, nonlinear elasticity models, population dynamics, and reaction–diffusion systems. Unlike linear differential equations, nonlinear equations rarely admit explicit analytical solutions. Consequently, mathematicians often focus on establishing qualitative properties such as existence, uniqueness, stability, and long-term behavior of solutions.

One of the most effective approaches to studying nonlinear equations is fixed point theory. The basic idea is to transform a differential equation into an operator equation of the form

$$u = T(u)u$$

where T is an operator acting on a suitable function space. A solution of the differential equation corresponds to a fixed point of the operator T . Once this formulation is obtained, various fixed point theorems can be applied to prove the existence of solutions.

Since the early twentieth century, several important fixed point results have been developed. Among the most influential are the Banach Contraction Principle, Schauder Fixed Point Theorem, and Krasnoselskii Fixed Point Theorem. These results have become fundamental tools in nonlinear analysis and functional analysis.¹

2. Banach Fixed Point Theorem

One of the most important results in fixed point theory is the Banach Contraction Principle, which provides conditions for the existence and uniqueness of a fixed point in a complete metric space.

Let (X, d) be a complete metric space and $T: X \rightarrow X$ be a mapping satisfying

$$d(Tu, Tv) \leq kd(u, v), \quad 0 < k < 1$$

for all $u, v \in X$

Then there exists a unique point $u^* \in X$ such that

$$T(u^*) = u^*$$

This theorem is particularly powerful because it guarantees both existence and uniqueness of the solution and provides a constructive method for approximating it through successive iterations

$$u_{n+1} = T(u_n)$$

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The Banach contraction theorem is widely used to study nonlinear initial value problems for differential equations.²

3. Application to Nonlinear Ordinary Differential Equations

Consider the nonlinear initial value problem

$$\frac{du}{dt} = f(t, u), \quad u(0) = u_0$$

This equation can be transformed into an equivalent integral equation

$$u(t) = u_0 + \int_0^t f(s, u(s)) ds$$

Define an operator T by

$$(Tu)(t) = u_0 + \int_0^t f(s, u(s)) ds$$

If the function $f(t, u)$ satisfies a Lipschitz condition

$$|f(t, u) - f(t, v)| \leq L|u - v|$$

then the operator T becomes a contraction in an appropriate function space. Consequently, the Banach fixed point theorem guarantees the existence and uniqueness of a solution to the differential equation.

This approach forms the basis of the Picard–Lindelöf theorem for ordinary differential equations.³

4. Schauder Fixed Point Theorem

While the Banach contraction principle requires a contraction condition, many nonlinear problems do not satisfy this requirement. In such cases, the Schauder Fixed Point Theorem provides a powerful alternative.

Let X be a Banach space and $C \subset X$ be a closed, bounded, and convex set. If $T: C \rightarrow C$ is continuous and compact, then T has at least one fixed point in C .

Unlike Banach's theorem, Schauder's theorem guarantees **existence but not uniqueness** of the solution. Nevertheless, it is extremely useful in studying nonlinear boundary value problems.⁴

5. Application to Nonlinear Boundary Value Problems

Consider the nonlinear boundary value problem

$$-u'' = f(x, u), \quad 0 < x < 1$$

with boundary conditions

$$u(0) = u(1) = 0$$

Using Green's function, the equation can be written as the integral equation

$$u(x) = \int_0^1 G(x, s) f(s, u(s)) ds$$

Define an operator

$$(Tu)(x) = \int_0^1 G(x, s) f(s, u(s)) ds$$

Under suitable growth conditions on f , the operator T is continuous and compact. By applying the Schauder fixed point theorem, one can prove the existence of at least one solution.

Such techniques are widely used in the theory of nonlinear elliptic differential equations.⁵

6. Krasnoselskii Fixed Point Theorem

Another important result used in nonlinear analysis is the Krasnoselskii Fixed Point Theorem, which is particularly useful when the operator can be decomposed into two parts.

Consider the equation

$$u = Au + B$$

where

- A is a compact operator
- B is a contraction mapping

Under suitable conditions, Krasnoselskii's theorem guarantees the existence of a fixed point.

This theorem has been successfully applied to nonlinear integral equations and nonlinear boundary value problems.⁶

7. Fixed Point Methods for Partial Differential Equations

Fixed point methods are also widely used in the analysis of nonlinear partial differential equations.

For example, consider the nonlinear elliptic equation

$$-\Delta u + g(u) = f(x)$$

in a bounded domain. By rewriting the equation as

$$u = T(u)$$

where T is an appropriate operator involving Green's functions or variational formulations, fixed point theorems can be applied to establish existence of solutions.

Similarly, in nonlinear parabolic equations

$$\frac{\partial u}{\partial t} - \Delta u = F(u)$$

fixed point arguments can be used to prove local or global existence of solutions.

These methods are widely used in nonlinear PDE theory and mathematical physics.⁷

8. Stability Analysis Using Fixed Point Theory

In addition to existence results, fixed point methods can also be used to study stability properties of solutions. For instance, suppose two solutions $u(t)$ and $v(t)$ satisfy

$$\|u(t) - v(t)\| \leq C e^{-\lambda t} \|u_0 - v_0\|$$

This inequality shows that the solutions depend continuously on the initial data, which is a key component of stability analysis.

Fixed point theory provides tools for establishing such estimates in nonlinear dynamical systems.

9. Applications in Applied Sciences

Fixed point methods have numerous applications in applied sciences, including:

Fluid Mechanics

Navier–Stokes equations are often analyzed using fixed point arguments to prove existence of weak solutions.

Population Dynamics

Nonlinear population models often involve differential equations where fixed point methods are used to establish equilibrium solutions.

Nonlinear Elasticity

Stress–strain relations in materials lead to nonlinear PDEs where fixed point theorems provide existence results.

Reaction–Diffusion Systems

These systems arise in chemistry and biology and are frequently studied using fixed point techniques.

10. Conclusion

Fixed point theory has become an indispensable tool in the study of nonlinear differential equations. By transforming differential equations into operator equations, mathematicians can apply powerful fixed point theorems to prove the existence, uniqueness, and stability of solutions. The Banach contraction principle, Schauder fixed point theorem, and Krasnoselskii theorem form the backbone of this approach.

Modern research continues to extend these methods to more complex systems such as stochastic differential equations, fractional differential equations, and infinite-dimensional dynamical systems. As a result, fixed point theory remains a central area of research in nonlinear analysis and applied mathematics.

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Comparative Study of Financial Performance of Selected Public and Private Sector Banks Using CAMEL Model

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Abstract

The stability and efficiency of the banking sector are critical for the sustainable economic development of any nation. This study evaluates the financial performance of selected Indian commercial banks using the CAMEL model over a ten-year period from 2015 to 2024. The CAMEL framework assesses banks based on Capital Adequacy, Asset Quality, Management Efficiency, Earnings Quality, and Liquidity. The study uses secondary data collected from annual reports, the Reserve Bank of India database, and financial statements of selected banks. A comparative analysis is conducted between public and private sector banks using ratio analysis, ranking methods, and statistical tools such as ANOVA through SPSS.

The findings reveal that private sector banks significantly outperform public sector banks in terms of profitability, management efficiency, and asset quality, while public sector banks face challenges related to higher non-performing assets (NPAs). The study concludes that the CAMEL model is an effective tool for evaluating bank performance and provides policy recommendations for improving the financial health of Indian banks.

Keywords: CAMEL Model, Financial Performance, Commercial Banks, Capital Adequacy, Asset Quality, ANOVA

1. Introduction

The banking sector is a fundamental component of the financial system and plays a vital role in economic growth by mobilizing savings, facilitating investments, and ensuring efficient allocation of resources. In India, the banking sector has undergone significant transformation following economic liberalization, technological advancements, and regulatory reforms introduced by the Reserve Bank of India (RBI).

Commercial banks are categorized into public sector and private sector banks, each with distinct operational characteristics. Evaluating their performance is essential for ensuring financial stability and enhancing investor confidence. Among the various tools used for performance evaluation, the CAMEL model is widely recognized for its comprehensive framework.

The CAMEL model evaluates banks based on five key parameters: Capital Adequacy (C), Asset Quality (A), Management Efficiency (M), Earnings Quality (E), and Liquidity (L). This study applies the CAMEL model to analyze and compare the performance of selected Indian commercial banks over a ten-year period.

2. Literature Review

The CAMEL model has been extensively used in banking research to assess financial performance and stability. **Gupta and Kaur (2018)** conducted a comparative analysis of Indian banks and found that private sector banks outperform public sector banks in profitability and operational efficiency. Similarly, **Kumar (2020)** emphasized that asset quality remains a major concern for public sector banks due to increasing NPAs. **Sharma and Singh (2022)** analyzed Indian banks using the CAMEL model and concluded that private banks demonstrate better performance in earnings and management efficiency. **Reddy (2021)** highlighted the importance of management

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efficiency in improving bank profitability, while **Mishra (2019)** emphasized the role of capital adequacy in ensuring financial stability. **Das and Ghosh (2017)** observed that regulatory reforms have strengthened capital adequacy in Indian bank sand further concluded that asset quality is the most critical determinant of bank performance. **Bansal (2021)** applied CAMEL analysis and found that private banks consistently rank higher across most parameters. **Meena (2022)** examined post-pandemic banking performance and found improvements in liquidity but persistent asset quality issues and highlighted the role of digital banking in enhancing efficiency and profitability. **Singh (2017)** examined the capital adequacy performance of private and public sector banks in India for a period of 2006-2015. The study found that all the banks had sound capital adequacy position except Central Bank of India. **Mazoomdar (2016)** looked into how well 15 banks in Bangladesh were doing financially between 2009 and 2013. They used the CAMEL model to check the financial health of these banks. The data was then analyzed using Composite Ranking, averages, and an ANOVA test. The findings showed that there were notable differences in how well the banks performed. The study recommended that these banks should take the necessary actions to fix their weaknesses.

Overall, the literature supports the effectiveness of the CAMEL model and indicates that private sector banks generally outperform public sector banks.

3. Research Objectives

1. To compare financial performance of selected public and private sector banks from the viewpoint of CAMELS parameter.
2. To identify and understand the factors which have led to the current financial performance of the select banks.
3. To suggest suitable measures, on the basis of the study results, for better of overall performance of selected public and private banks under study.

4. Research Methodology

4.1 Research Design

The study is analytical and comparative in nature.

4.2 Data Sources

The present study is based on secondary data. The secondary data have been collected from published information by different governmental agencies and selected banks, such as RBI Bulletin and Annual Reports, annual reports of selected banks, financial databases, different committee's reports etc.

4.3 Sample Selection

Out of total public and private sectors banks operating in India, three public sector banks and three private sector banks were selected for the study. The selected public sector banks for the study are State Bank of India, Punjab National Bank and Bank of Baroda whereas the private sector banks are HDFC Bank, ICICI Bank and Axis Bank.

4.4 Study Period

The study covers a period of 10 years ranging from 2015 to 2024.

4.5 Tools and Techniques

- Ratio Analysis
- CAMEL Model
- Ranking Method
- ANOVA (SPSS)

5. CAMEL Framework

- **C - Capital Adequacy:** Measures a bank's capital against its risk-weighted assets to ensure it can absorb losses. Evaluates the Capital Adequacy Ratio (CAR) and adherence to Basel norms,
- **A - Asset Quality:** Assesses the quality of loans and investments, focusing on the level of Non-Performing Assets (NPAs),

- **M - Management Capability:** Evaluates the ability of management to identify, measure, monitor, and control risks, as well as their compliance with regulations.
- **E - Earnings:** Analyzes the sustainability, growth, and quality of a bank's profits.
- **L - Liquidity:** Determines the bank's ability to meet its short-term obligations and funding needs without facing a crisis,

6. Data Analysis and Results

Table 1: Average CAMEL Ratios (2015–2024)

Bank	CAR (%)	NPA (%)	ROA (%)	CDR	Liquidity
SBI	13.5	5.8	0.6	0.75	0.22
PNB	12.2	7.5	0.4	0.70	0.20
BOB	13.0	6.2	0.5	0.72	0.21
HDFC	17.5	1.5	1.8	0.85	0.25
ICICI	16.8	2.2	1.6	0.83	0.24
Axis	16.0	2.8	1.4	0.80	0.23

Chart-1 Average CAMEL Ratios (2015–2024)

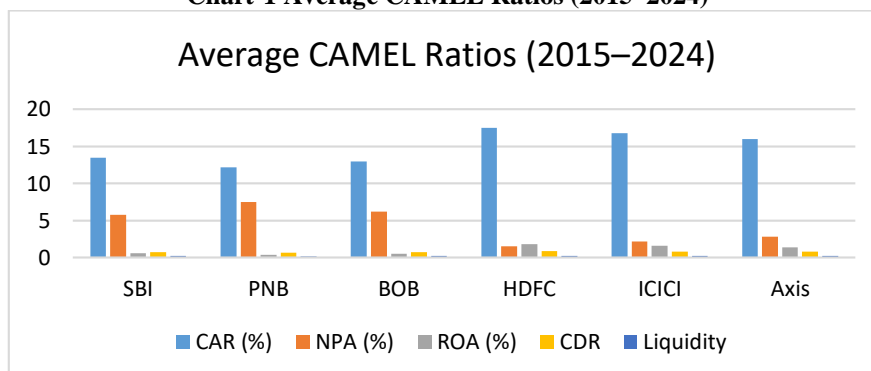


Table 1 presents the average CAMEL ratios of selected public and private sector banks over the study period from 2015 to 2024. The analysis reveals a clear performance gap between the two groups. Private sector banks, particularly HDFC Bank, ICICI Bank, and Axis Bank, demonstrate superior performance across all parameters. Overall, the table highlights that private sector banks are more efficient, profitable, and financially stable than public sector banks during the study period.

Table 2: CAMEL Ranking

Bank	CAR	NPA	ROA	CDR	Liquidity	Average Rank	Overall Rank
SBI	4	4	4	4	4	4	4
PNB	6	6	6	6	6	6	6
BOB	5	5	5	5	5	5	5
HDFC	1	1	1	1	1	1	1
ICICI	2	2	2	2	2	2	2
Axis	3	3	3	3	3	3	3

Table 2 provides the ranking of banks based on individual CAMEL parameters and their overall performance. The results show a consistent pattern where private sector banks dominate the top positions. HDFC Bank secures the first rank across all parameters, followed by ICICI Bank and Axis Bank in second and third positions, respectively. This consistency indicates strong overall financial health, efficient management, and effective risk control in private banks. On the other hand, public sector banks occupy the lower ranks, with SBI ranked fourth, Bank of Baroda fifth, and PNB last. PNB's lowest ranking across all parameters reflects weak asset quality, low profitability, and

poor financial management. The ranking clearly demonstrates a structural performance difference between public and private sector banks, emphasizing the need for reforms and efficiency improvements in public sector institutions.

7. Data Analysis

7.1 Descriptive Statistics

Variable	Mean	Std. Dev
CAR	14.83	2.10
NPA	4.33	2.50
ROA	1.05	0.60

Table 7.1 presents the descriptive statistics of key financial variables, including CAR, NPA, and ROA, for the selected banks. The mean CAR of 14.83 indicates that, on average, banks maintain adequate capital levels in line with regulatory requirements, although the standard deviation of 2.10 suggests moderate variation among banks. The mean NPA of 4.33, coupled with a relatively high standard deviation of 2.50, indicates significant disparity in asset quality, reflecting the higher NPAs in public sector banks compared to private banks. Similarly, the average ROA of 1.05 with a standard deviation of 0.60 shows variability in profitability across banks, with private banks contributing more positively to overall performance. These statistics confirm that while the banking sector maintains reasonable capital adequacy, there are considerable differences in asset quality and profitability among banks.

7.2 ANOVA Results

Variable	F-value	Sig.
ROA	8.45	0.01
NPA	9.12	0.00

Interpretation

The p-values are less than 0.05, indicating a statistically significant difference between public and private sector banks.

8. Conclusion

The results clearly indicate that private sector banks outperform public sector banks in terms of profitability, management efficiency, and asset quality. Public sector banks continue to face challenges related to high NPAs, which adversely affect their financial performance. On the basis of the above study HDFC ranks highest when compared to other banks being analyzed across all metrics. Although HDFC Bank excels in asset quality, management efficiency, and earnings capability, it does not perform as well in terms of capital adequacy. In contrast, Bank of India is at the bottom of the ranking due to its underwhelming performance in Capital Adequacy, Earnings Ability, and Liquidity, even though it does slightly better in capital adequacy. Consequently, Bank of India needs to enhance its role, especially in areas that are more susceptible. Therefore, the relevant regulators should take essential actions and leverage the insights from this study to address their deficiencies.

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Fortified Food in Special Population: A Critical Review

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Abstract:

Micronutrient deficiencies remain a major global public health concern, particularly among vulnerable and special population groups such as pregnant women, infants, children, elderly individuals, and socioeconomically disadvantaged communities. Food fortification has emerged as one of the most cost-effective strategies to address hidden hunger and improve nutritional outcomes. Fortified foods involve the addition of essential vitamins and minerals to commonly consumed foods such as flour, rice, milk, oil, and salt. Evidence from global studies indicates that fortified foods significantly reduce micronutrient deficiencies such as iron deficiency anemia, vitamin A deficiency, and iodine deficiency disorders. However, challenges such as uneven program implementation, risk of excessive nutrient intake, bioavailability issues, and dependence on processed foods remain important concerns. Fortified foods play a crucial role in combating malnutrition among special populations, but they should complement, rather than replace, balanced diets and broader nutrition interventions.

Keywords: Food fortification, micronutrients, special population, malnutrition, public health nutrition.

Introduction:

Malnutrition, particularly micronutrient deficiency, continues to affect millions of people worldwide. This condition is often referred to as “hidden hunger” because the lack of essential vitamins and minerals may not always be visible but significantly affects health and development. Populations most affected include pregnant women, infants, children, the elderly, and individuals living in poverty. These groups are commonly referred to as special populations because they have higher nutritional requirements or greater vulnerability to nutrient deficiencies.

Food fortification is defined as the process of deliberately adding essential vitamins and minerals to food products to improve their nutritional quality and prevent deficiencies in the population. It is considered one of the most cost-effective public health strategies to combat micronutrient malnutrition. Fortified foods are commonly developed by adding nutrients such as iron, iodine, vitamin A, vitamin D, folic acid, zinc, and calcium to staple foods or processed products.

The World Health Organization identifies food fortification as an effective approach to increase nutrient intake among populations that may not have access to a balanced diet. Staple foods such as wheat flour, rice, salt, milk, and edible oil are often used as vehicles for fortification because they are widely consumed by most populations.

Concept and Types of Food Fortification

Concept of Food Fortification:

Food fortification involves increasing the nutritional value of food by adding essential nutrients that may be absent or present in insufficient quantities. The primary goal is to prevent or correct nutrient deficiencies within a population without requiring significant changes in dietary habits. Fortification is particularly effective because it delivers nutrients through foods that people

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already consume regularly. Studies show that micronutrient fortification can significantly reduce anemia, improve immune function, and enhance cognitive development in children.

Types of Food Fortification:

Food fortification strategies are generally classified into the following categories:

1. Mass Fortification-

Mass fortification refers to the addition of micronutrients to widely consumed foods intended for the general population. Examples include iodized salt, fortified wheat flour, and vitamin D-fortified milk.

2. Targeted Fortification-

Targeted fortification focuses on specific population groups such as infants, pregnant women, or elderly individuals. For example, fortified complementary foods for infants or iron-fortified foods for women of reproductive age.

3. Market-Driven Fortification-

This type of fortification is initiated by food manufacturers to enhance the nutritional value of processed foods. Examples include fortified breakfast cereals and fortified beverages.

4. Biofortification-

Biofortification involves breeding crops to increase their nutrient content. Examples include iron-rich beans and vitamin A-enriched sweet potatoes. Each type plays an important role in improving nutrition and addressing micronutrient deficiencies.

Importance of Fortified Foods for Special Populations:

Special populations often have higher nutritional needs and limited access to diverse diets. Fortified foods provide an efficient way to supply essential nutrients without requiring drastic changes in eating patterns.

Pregnant and Lactating Women:

Pregnant women require higher levels of iron, folic acid, calcium, and vitamin D to support fetal development and maternal health. Deficiencies in these nutrients can lead to anemia, low birth weight, and neural tube defects in infants. Fortified foods such as iron-fortified flour and folic acid-fortified cereals have been shown to increase hemoglobin levels and reduce the incidence of congenital abnormalities. In many countries, mandatory fortification of wheat flour with folic acid has significantly reduced neural tube defects in newborns.

Infants and Young Children:

Children under five years of age are particularly vulnerable to micronutrient deficiencies due to rapid growth and inadequate diets. Deficiencies of vitamin A, iron, and zinc are common in this age group. Fortified complementary foods and fortified milk products are widely used to improve child nutrition. Research shows that iron-fortified cereals and milk products increase hemoglobin levels and reduce the risk of anemia among young children. Additionally, fortified blended foods are used in nutrition programs to treat moderate acute malnutrition and promote healthy growth.

School-Age Children and Adolescents:

During adolescence, rapid physical growth increases the need for nutrients such as calcium, iron, and vitamins. Fortified foods help support bone development, cognitive performance, and immune function. Fortified rice and wheat flour are particularly important in regions where diets rely heavily on refined grains that lack essential nutrients. Research indicates that fortified rice can help address micronutrient deficiencies among populations that rely on rice as a staple food.

Elderly Population:

The elderly population often experiences reduced appetite, poor nutrient absorption, and chronic health conditions that increase nutritional requirements. Deficiencies in vitamin D, calcium, and vitamin B12 are common among older adults. Fortified foods such as vitamin D-fortified milk and calcium-enriched foods help maintain bone health and prevent osteoporosis. Studies indicate that calcium and vitamin D fortification significantly improves bone health among post-menopausal women.

Socioeconomically Disadvantaged Groups:

People living in low-income communities often rely on staple foods that lack essential micronutrients. Large-scale food fortification programs are particularly beneficial for these populations. Fortified foods improve nutrient intake without increasing the cost of diets significantly, making them an accessible solution for low-income populations.

Common Micronutrients Used in Food Fortification:

Food fortification programs commonly include the following micronutrients:

Iron-

Iron fortification helps prevent iron deficiency anemia, one of the most widespread nutritional disorders worldwide.

Iodine-

Iodized salt is one of the most successful public health interventions and helps prevent iodine deficiency disorders such as goiter.

Vitamin A-

Vitamin A fortification improves immune function and reduces childhood blindness.

Folic Acid-

Folic acid fortification is essential for preventing neural tube defects during pregnancy.

Vitamin D-

Vitamin D fortification improves calcium absorption and helps prevent bone diseases such as rickets and osteoporosis.

These micronutrients play critical roles in human health and development.

Benefits of Fortified Foods:

Food fortification provides numerous benefits for public health, particularly for special populations.

1. Reduction of Micronutrient Deficiencies Fortified foods help prevent deficiencies of essential nutrients such as iron, iodine, and vitamin A.
2. Improved Child Growth and Development Adequate micronutrient intake supports cognitive development and physical growth in children.
3. Cost-Effective Public Health Strategy Food fortification is considered one of the most cost-effective nutrition interventions for improving population health.
4. Prevention of Chronic Diseases Fortified foods can reduce the risk of certain diseases such as anemia, rickets, and birth defects.
5. Improved Productivity Better nutrition leads to improved physical performance, educational outcomes, and economic productivity.

Challenges and Limitations of Food Fortification:

Despite its benefits, food fortification faces several challenges.

1. Risk of Excessive Nutrient Intake Overconsumption of fortified foods may lead to excessive intake of certain nutrients, which can cause health problems.
2. Unequal Distribution Fortified foods may not reach rural or remote populations effectively.
3. Bioavailability Issues The absorption of added nutrients depends on factors such as food composition and individual health status.
4. Dependence on Processed Foods Some fortified foods are highly processed and may contain high levels of sugar or fat.
5. Program Implementation Challenges Successful fortification programs require strong regulatory frameworks, monitoring systems, and public awareness.

Future Prospects of Food Fortification

The future of food fortification lies in integrating innovative approaches with traditional nutrition strategies.

1. Biofortification of Crops Biofortified crops can improve nutrient intake in rural populations that rely on staple crops.

2. Personalized Nutrition Advances in nutritional science may enable targeted fortification for specific population groups.
3. Integration with Public Health Programs Food fortification should be combined with nutrition education, dietary diversification, and supplementation programs.
4. Technological Innovations Advances in food processing technologies will enhance the stability and bioavailability of fortified nutrients.

Conclusion:

Food fortification has emerged as an effective strategy for addressing micronutrient deficiencies among special populations. Vulnerable groups such as pregnant women, infants, children, elderly individuals, and low-income communities benefit significantly from fortified foods. These foods provide essential vitamins and minerals that improve health outcomes, prevent disease, and support growth and development.

However, food fortification should not be viewed as a substitute for a balanced and diverse diet. Instead, it should complement other nutrition interventions such as dietary diversification, supplementation programs, and nutrition education.

A well-designed food fortification program requires strong government policies, proper monitoring systems, and collaboration between public health institutions and food industries. When implemented effectively, fortified foods can play a critical role in reducing global malnutrition and improving the health of vulnerable populations.

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Digital Health and AI: Transforming Mental Health Care Practices

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Abstract:

Mental health disorders have emerged as a major global public health concern, affecting millions of individuals across different age groups. Traditional mental health care systems often face several challenges including shortage of trained professionals, limited accessibility to specialized services, high treatment costs, and social stigma associated with seeking psychological help. In recent years, digital health technologies and artificial intelligence (AI) have gained significant attention as innovative solutions for improving mental health care delivery. The present empirical study examines the role of digital health technologies and AI in enhancing accessibility, diagnosis, and overall effectiveness of mental health services. Primary data were collected from 100 respondents through a structured questionnaire administered via online platforms. The collected data were analyzed using percentage analysis and chi-square tests to examine relationships between variables related to digital mental health usage and perceptions regarding AI-based mental health tools. The findings reveal that a majority of respondents are aware of digital mental health platforms and perceive AI technologies as useful in early detection and management of mental health disorders. Digital platforms such as mobile applications and telepsychiatry services significantly contribute to improving accessibility and convenience of mental health services. However, concerns related to data privacy and security remain important barriers affecting the adoption of digital mental health technologies. The study concludes that digital health technologies and AI have strong potential to transform mental health care practices, but their successful integration requires stronger regulatory frameworks, ethical safeguards, and improved technological awareness among users.

Keywords: Digital Health, Artificial Intelligence, Mental Health Care, Telemedicine, Digital Mental Health, Healthcare Technology

1. Introduction

Mental health has become one of the most significant public health issues globally. Psychological disorders such as depression, anxiety, stress-related disorders, and bipolar disorder affect millions of individuals and significantly influence their social, emotional, and professional well-being. According to the World Health Organization (2021), mental health conditions are among the leading causes of disability worldwide, contributing to a substantial global burden of disease.

Despite the growing prevalence of mental health disorders, access to mental health services remains limited in many parts of the world. Traditional mental health care systems face numerous challenges including shortage of qualified mental health professionals, lack of specialized treatment facilities, high cost of therapy, and the social stigma associated with seeking mental health treatment. These barriers often prevent individuals from receiving timely and appropriate psychological support.

The rapid advancement of digital technologies has created new opportunities for improving mental health care delivery. Digital health refers to the integration of digital technologies such as mobile applications, telemedicine platforms, wearable devices, and artificial intelligence systems into healthcare services. These technologies enable individuals to access healthcare services remotely, monitor their health conditions continuously, and receive personalized medical support.

Artificial intelligence has emerged as a particularly important technological innovation in the field of healthcare. AI systems are capable of analyzing large datasets, identifying behavioral

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patterns, and predicting health conditions using advanced machine learning algorithms. In the context of mental health care, AI technologies are used to develop predictive models for early diagnosis of mental disorders, create personalized treatment plans, and provide automated psychological support through conversational agents.

AI-powered chatbots and digital therapy applications are increasingly being used to deliver cognitive behavioral therapy, provide emotional support, and guide individuals toward appropriate treatment options. In addition, telepsychiatry platforms allow patients to consult mental health professionals through video conferencing, thereby reducing geographical barriers and improving accessibility to mental health services.

However, the adoption of digital mental health technologies also raises important concerns regarding privacy, data security, ethical implications, and technological reliability. Mental health data is highly sensitive, and improper handling of such data can lead to serious privacy risks. Therefore, it is essential to examine how digital health technologies and AI can be implemented responsibly to maximize their benefits while minimizing potential risks.

The present study aims to empirically examine the role of digital health technologies and artificial intelligence in transforming mental health care practices. The study focuses on understanding users' awareness, usage patterns, perceptions, and concerns related to digital mental health services.

2. Review of Literature

The integration of digital technologies and artificial intelligence into healthcare systems has significantly transformed the landscape of mental health services. Researchers across the world have examined how digital health tools can improve accessibility, diagnosis, and treatment of mental health disorders.

Mobile health applications have become increasingly popular as tools for managing psychological conditions. **Bakker et al. (2016)** conducted a comprehensive review of mental health smartphone applications and reported that mobile-based interventions can support individuals in managing symptoms of anxiety, depression, and stress. The study also emphasized the importance of evidence-based design for improving the effectiveness of such applications.

Similarly, **Ben-Zeev et al. (2019)** explored the real-world application of mobile health technologies in mental health care and highlighted their potential to provide continuous monitoring and real-time psychological support. The researchers suggested that mobile health platforms can play an important role in bridging the gap between patients and healthcare providers.

Artificial intelligence has also demonstrated significant potential in improving the diagnosis and treatment of mental health disorders. **Shatte, Hutchinson, and Teague (2019)** conducted a scoping review of machine learning applications in mental health and found that AI algorithms can analyze behavioral, cognitive, and emotional data to predict mental health conditions with considerable accuracy.

Conversational AI agents have emerged as innovative tools for delivering psychological support. **Fitzpatrick, Darcy, and Vierhile (2017)** examined the effectiveness of an AI-based chatbot called Woebot in delivering cognitive behavioral therapy. The study found that participants who interacted with the chatbot experienced significant reductions in symptoms of depression and anxiety compared to control groups.

Another AI-driven conversational agent known as Wysa has also demonstrated promising results in promoting mental well-being. **Inkster, Sarda, and Subramanian (2018)** evaluated real-world usage data of the Wysa application and found that AI-based conversational agents can provide emotional support and encourage users to adopt healthier coping strategies.

Digital mental health platforms have also played a significant role in improving accessibility to mental health services. Telepsychiatry and online counseling services allow individuals to receive psychological support without visiting physical clinics. **Torous et al. (2020)** emphasized that digital mental health technologies have the potential to expand access to care, particularly in underserved and rural areas.

Despite these advantages, researchers have also highlighted ethical and privacy concerns associated with the use of AI in healthcare. **Price and Cohen (2019)** argued that healthcare organizations must implement strong data protection mechanisms to safeguard patient information in the era of medical big data.

Furthermore, **Davenport and Kalakota (2019)** suggested that while AI technologies can enhance clinical decision-making, they should function as supportive tools rather than replacing healthcare professionals. Human empathy and emotional understanding remain essential elements of effective mental health treatment.

Overall, the existing literature indicates that digital health technologies and artificial intelligence are transforming mental health care systems by improving accessibility, early detection, and treatment efficiency. However, further empirical studies are required to examine user perceptions, adoption patterns, and challenges associated with these technologies.

3. Objectives of the Study

1. To examine the level of awareness and usage of digital mental health technologies among individuals.
2. To analyze whether digital health technologies and artificial intelligence improve accessibility and diagnosis in mental health care.

4. Hypotheses of the Study

H01: Digital health technologies do not significantly improve accessibility to mental health services.

H02: Artificial intelligence technologies do not significantly contribute to early diagnosis of mental health disorders.

5. Research Methodology

The present study adopts a descriptive research design to examine the role of digital health technologies and artificial intelligence in transforming mental health care practices. The research is empirical in nature and is based primarily on primary data collected from respondents. The target population of the study includes students, professionals, and individuals who are aware of or have experience using digital mental health technologies such as mobile health applications, telepsychiatry platforms, and AI-based mental health tools.

A sample of 100 respondents was selected using the convenience sampling technique, where participants were chosen based on their accessibility and willingness to participate in the survey. Primary data were collected using a structured questionnaire consisting of close-ended questions and Likert-scale items designed to measure respondents' awareness, usage patterns, perceptions regarding AI-based mental health technologies, and concerns related to privacy and data security.

The questionnaire was distributed through online platforms such as Google Forms and social media networks, enabling efficient data collection from a diverse group of participants. After collecting the responses, the data were coded and analyzed using statistical techniques including percentage analysis and chi-square tests. These statistical tools helped in examining the relationship between the use of digital health technologies and perceptions regarding their effectiveness in improving mental health services. The results of the analysis were presented using tables and interpreted to draw meaningful conclusions regarding the impact of digital health technologies and artificial intelligence on mental health care practices.

6. Data Analysis and Interpretation

Table 1 : Age Distribution of Respondents

Age Group	Frequency	Percentage
18–25	40	40%
26–35	30	30%
36–45	20	20%
46+	10	10%
Total	100	100%

Interpretation

The table shows that the majority of respondents (40%) belong to the 18–25 age group, followed by 30% in the 26–35 age group. This indicates that younger individuals are more likely to engage with digital technologies and mental health applications.

Table 2 : Awareness of Digital Mental Health Platforms

Response	Frequency	Percentage
Yes	72	72%
No	28	28%

Interpretation

The data indicate that 72% of respondents are aware of digital mental health platforms, suggesting a relatively high level of awareness among the surveyed population.

Table 3 : Usage of Mental Health Mobile Applications

Response	Frequency	Percentage
Yes	58	58%
No	42	42%

Interpretation

The table reveals that more than half of the respondents (58%) have used mental health mobile applications. This suggests growing acceptance of digital mental health technologies among users.

Table 4 : Perception that AI Helps in Early Detection of Mental Health Problems

Response	Frequency
Strongly Agree	35
Agree	40
Neutral	15
Disagree	7
Strongly Disagree	3

Interpretation

Approximately 75% of respondents agree or strongly agree that artificial intelligence can assist in early detection of mental health disorders. This indicates a positive perception of AI technologies in mental health diagnosis.

Table 5 : Digital Mental Health Services Improve Accessibility

Response	Frequency
Strongly Agree	32
Agree	38
Neutral	18
Disagree	8
Strongly Disagree	4

Interpretation

A majority of respondents (70%) believe that digital mental health services improve accessibility to mental health care. This finding suggests that digital technologies play an important role in expanding mental health service delivery.

Table 6 : Concern about Privacy and Data Security

Response	Number of Respondents	Percentage (%)
Strongly Agree	28	28%
Agree	36	36%
Neutral	20	20%
Disagree	10	10%
Strongly Disagree	6	6%
Total	100	100%

Interpretation:

The results indicate that 64% of respondents are concerned about privacy and data security while using digital mental health technologies. This shows that privacy remains a significant challenge in the adoption of AI-based mental health services.

Table 7 : Overall Satisfaction with Digital Mental Health Services

Response	Number of Respondents	Percentage (%)
Very Satisfied	20	20%
Satisfied	42	42%
Neutral	22	22%
Dissatisfied	10	10%
Very Dissatisfied	6	6%
Total	100	100%

Interpretation:

The table shows that 62% of respondents are satisfied or very satisfied with digital mental health services. This indicates that most users have a positive experience with digital mental health platforms.

Table 8 : Observed Frequency (Digital Usage vs Accessibility Perception)

Response	Frequency
Strongly Agree	32
Agree	38
Neutral	18
Disagree	8
Strongly Disagree	4
Total	100

Table 10 : Chi-Square Test: Digital Mental Health Services and Accessibility

Response	Observed (O)	Expected (E)	(O-E)	(O-E) ²	(O-E) ² / E
Strongly Agree	32	20	12	144	7.20
Agree	38	20	18	324	16.20
Neutral	18	20	-2	4	0.20
Disagree	8	20	-12	144	7.20
Strongly Disagree	4	20	-16	256	12.80
Total	100	100			43.60

Critical value at 5% level of significance

$\chi^2_{table}=9.49$

Interpretation

The calculated chi-square value (43.6) is greater than the table value (9.49). Therefore, the null hypothesis is rejected. This indicates that digital health technologies significantly improve accessibility to mental health services.

Table 11 : Observed Frequency

Response	Frequency
Strongly Agree	35
Agree	40
Neutral	15
Disagree	7
Strongly Disagree	3

Table 12 : Chi-Square Test: AI and Early Detection of Mental Health Problems

Response	Observed (O)	Expected (E)	(O-E)	(O-E) ²	(O-E) ² / E
Strongly Agree	35	20	15	225	11.25
Agree	40	20	20	400	20.00
Neutral	15	20	-5	25	1.25
Disagree	7	20	-13	169	8.45
Strongly Disagree	3	20	-17	289	14.45
Total	100	100			55.40

Critical value at 5% level of significance

$\chi_{table}=9.49$

Interpretation

The null hypothesis is rejected, indicating that AI technologies significantly contribute to early detection and diagnosis of mental health disorders.

Table 13 : Summary of Chi-Square Test Results

Hypothesis	Calculated χ^2 Value	Degree of Freedom (df)	Table Value (5% level)	Decision	Result
H ₀₁ : Digital health technologies do not significantly improve accessibility to mental health services	43.60	4	9.49	Rejected	Digital health technologies significantly improve accessibility to mental health services
H ₀₂ : Artificial intelligence technologies do not significantly contribute to early diagnosis of mental health disorders	55.40	4	9.49	Rejected	Artificial intelligence significantly contributes to early detection and diagnosis of mental health disorders

Interpretation of Hypothesis Testing

The results of the chi-square analysis indicate that both null hypotheses are rejected at the 5 percent level of significance. The calculated chi-square values for both hypotheses are greater than the critical table value of 9.49 with four degrees of freedom. This demonstrates that there is a statistically significant relationship between digital health technologies and improved accessibility to mental health services. Similarly, the findings indicate that artificial intelligence technologies

significantly contribute to the early detection and diagnosis of mental health disorders. These results support the argument that digital health platforms and AI-based systems play an important role in enhancing the effectiveness and accessibility of modern mental health care services.

7. Discussion

The findings of the study highlight the growing role of digital health technologies and artificial intelligence in improving mental health care services. The demographic analysis indicates that younger individuals are more likely to engage with digital mental health platforms due to their familiarity with technology. A large proportion of respondents were aware of digital mental health services, and more than half had used mental health mobile applications, suggesting increasing acceptance of digital solutions for psychological support.

The results also reveal that most respondents believe that artificial intelligence can assist in the early detection of mental health disorders. AI-based tools can analyze behavioral patterns and emotional indicators to identify potential mental health risks. The chi-square analysis further confirmed statistically significant relationships between digital health technologies and improved accessibility to mental health services, as well as between AI technologies and early diagnosis of mental health problems. However, the findings also indicate that concerns regarding privacy and data security remain a significant challenge affecting the adoption of digital mental health technologies.

8. Conclusion

The study concludes that digital health technologies and artificial intelligence have significant potential to transform mental health care practices. Digital platforms improve accessibility by enabling individuals to access mental health services remotely, while AI technologies support early detection and management of mental health disorders. The statistical results confirm that both digital technologies and AI play a significant role in enhancing mental health care delivery. However, issues related to data privacy, ethical use of information, and regulatory frameworks must be addressed to ensure responsible implementation. With appropriate safeguards and awareness, digital health technologies can serve as effective complementary tools in modern mental health care systems.

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History and Significance of Rock-Cut Architecture and Sculpture in India

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Abstract

This research explores the unique history and technical evolution of rock-cut architecture and sculpture in India, a tradition beginning around the third century B.C. Unlike structural construction, rock-cut activity is a subtractive process that demands meticulous spatial planning and top-to-bottom execution to manage multiple artisan teams within confined spaces. The study examines how early examples, such as the Lomas Rishi and Barabar caves, translated wooden architectural idioms into stone, eventually paving the way for the massive scales and naturalistic sculptures seen at Karle, Ajanta, and Ellora. Through an analysis of iconic sites like the Kailashnath temple and the granite reliefs of Mamallapuram, the paper highlights the adaptability of Indian sculptors to diverse geological mediums. Ultimately, it illustrates how the mastery of rock-cut techniques—balancing monumentality with intricate narrative detail—defined the core competence of Indian sculptural heritage until it transitioned into structural temple architecture.

Keywords: Rock-cut Architecture, Subtractive Process, Indian Sculpture, Monolithic Temples, Cave Temples, Spatial Planning.

The history and tradition of Rock-cut sculpture and architecture are unique to India. Beginning around the third century B.C., rock-cut activity spread across the subcontinent, from present-day Northern Pakistan and Western Gujarat to Central India, Eastern Odisha, the Deccan Plateau, and Tamil Nadu. A wide variety of monuments were carved mainly in granite, limestone, basalt, and sandstone under the patronage of Buddhism, Hinduism, and Jainism. Rock-cut activity can be mainly divided into three major categories, i.e., cave temples, free-standing monolithic temples carved out of a stone hill or a mountain, and lastly sculptures carved directly into the vertical face of a hill or a mountain. Rock-cut architecture, as the name suggests, is a subtractive process and is completely devoid of exigencies related to structural construction, such as quarrying of stone, its dressing into structural components, and eventual assembly. Appearing simple, this method comes with its own set of problems. While approaching from the outside, carvers would never know what was inside until the entire rock was penetrated and the desired depth was achieved. Spatial planning was most crucial as many carvers would have to work in confined spaces, executing specific tasks such as carrying out rough carving and final finishing. In addition, other workers, such as labourers clearing debris and specialists putting up scaffolds, were also using the same confined spaces. This problem was probably the reason why preference was given to carving of monolithic structures from top to bottom on all sides, as this approach enabled the effective deployment of multiple teams of carvers and other artisans simultaneously. These teams may have comprised simple labourers and technicians who provided high and complex scaffolding solutions. Importantly, specific teams of carvers were deployed to carve interior spaces, define the basic volumes of the sculpture to be carved, carve the final forms and details of sculptures, and finally, the teams of artisans who would finish the sculptures. In addition, various animals could have also been used for transportation and brute force. Rock-cut activity essentially and solely relies on stone carving techniques and methods. These

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techniques of stone carving used in Rock-cut activities directly influenced the carving of sculptures in stone.

Some of the earliest rock-cut examples can be seen at Lomas Rishi Cave and the Barabar and Nagarjani caves of Bihar, which can be assigned as purely Indian. The features carved clearly indicate the translation of a wooden idiom into stone. Although carved, these rock-cut examples are predominantly architectural exercises in the spatial programming of interior rock-cut structures. As mentioned earlier, the critical aspect that needs to be highlighted is the gradual understanding and adaptability in the medium of stone understood by sculptors through the idiom of rock-cut methods. From additive methods of construction to subtractive methods of building by cutting into rock testifies to technical achievement. The caves of Bhaja, Bhedsa, Ajanta, Karle, Aurangabad, Kanheri, and Ellora are testimonies of sculptural developments. A major departure from the Gupta period can be sensed. Many of the ideals from the Gupta period were overlooked, paving the way for the development of new tendencies. The achievement of the massive scale was one such attempt at redefining the existing idioms. At Karle, the impact of scale is tangible. The magnanimous scale of the interior spaces is fully matched by sculptures on the exterior. At the entrance to the cave, one is greeted by a massive pillar, which is a crude reminder of the Sarnath lion capital and pillar. The life-size elephants in the verandah appear as if bearing the weight of the entire precinct. These elephant figures are extremely naturalistic and three-dimensional. The protruding heads of the elephants with their hanging trunks. The entrance wall to the chaitya is organized into an arrangement of numerous niches, which hold various sculptural compositions. Most prominent among these are the larger-than-life Mithuna sculptures. In these sculptures, couples are composed in candid postures, shedding the formal iconographic elements. Similarly, the carving is relatively soft and rounded, expressing fuller human proportions. While the sculptor seems to be complying with the conventions of carving in the Mithuna sculptures, a contradiction can be noticed in the carving of elephant figures. The trunks of the elephants have been depicted as hanging freely and extending beyond the main matrix of the stone from which the elephants have been carved. Carving such extensions is a bold undertaking considered by sculptors as they tend to defy the material possibilities of stone. As a result of such features, in this case, the trunks of elephants were prone to damage.

In the vicinity of Vidisa, Udaygiri boasts some of the earliest surviving specimens of Hindu rock-cut art in sandstone. The outer walls of these caves are adorned by sculpted figures, which bring to light some of the earliest standards of Hindu iconography and its development. A prolific, larger-than-life scene of Varaha is portrayed in cave 6. More of a niche than a cave, the three walls of the cave provide us with a narrative of Varaha, one of the incarnations of Vishnu, rescuing earth, unfolding as a triptych. A fully carved, large Varaha figure in the center immediately establishes the hierarchy in the composition, while other deities are comparatively diminutive. The exposed horizontal sedimentation and layers of sandstone, in conjunction with the imagery of sages and depiction of ocean waves, appear as elements creating rhythm. The entire composition achieves balance through the boldly carved central figure of Varaha emerging from the backdrop of repetitive and minute carving of deities, almost appearing as surface texture. The anthropomorphic representation of Earth suggests instability and dynamism, which is the essence of the entire episode.

Ajanta comprises an entire precinct of complex caves. Owing to the rise of the Mahayana sect of Buddhism, the inclination towards elaborately carved facades, detailed and elaborated interiors of Chaityas, and shrine complexes is easily visible. The sculptural narratives and larger-than-life portrayal of significant Buddhist events are evident from examples such as the colossal Parinirvana sculpture situated in cave 26, were some of the highlights of Ajanta. The Parinirvana sculpture at Ajanta is a horizontal composition of almost twenty-two feet in length.

Mahayana Buddhist motivations are clearly at play in the design of this sculpture. There is more than one factor that imparts the entire composition its monumentality. At the onset, the horizontal orientation of the sculpture challenges and redefines the notion of monumentality, which is usually associated with verticality. The entire composition relies on the principle of hierarchy as a

device to communicate monumentality. The central figure of Buddha in a reclining posture is surrounded by diminutive mourners, which further enhances the scale and monumentality of the central figure. This aspect is further enhanced by the difference in the carving of the central figure of the reclining Buddha, which is fairly plain with soft and round edges. On the other hand, the packed composition of mourners is more complex and does not allow the sculptor to carve continuous surfaces. Instead, the sculpture carves numerous repetitive human figures in seated or standing postures. Lastly, the final factor relates to the visual perception of the entire composition. In the absence of wide-angle lenses, it was virtually impossible to capture the entire composition in one frame. For the naked eye, the sculpture can be best viewed from its feet. The perspective further exaggerates the sculpture, adding to its monumentality. Similarly, the Colossal Buddha at Kanheri, standing at almost twenty-two feet in its vertical orientation, is another example of an ambitious carving at a grand scale.

Signifying the rise of Hinduism, bold initiatives in rock-cut sculptures were also undertaken at Elephanta during the Kalachuri period. Of all the Elephanta caves, Cave 1 is undoubtedly the most impressive. The relatively simple entrance does not prepare the entrants for the surprises inside. Supported by a colonnade of massive pillars, the southern wall announces the famous sculptural depiction of Maheshvara in a triptych composition. The sculpture is approximately five meters high. On its one-meter-high base, the statue is deeply carved and depicts Shiva, Bhairav, and Uma almost in full round. All three faces differ in their expression. The sculptor achieves this distinction by modeling finer details on the faces, which are otherwise flat. The relatively smooth and soft treatment of the faces is entirely different from the exuberant and detailed carvings of the headgears. To appropriately distinguish these three faces and their attributes, in an otherwise unified composition, the scale of the sculpture became a logical requirement. This central trinity is flanked by the Ardhanarisvar and Gangadhar on the left and right. Again, it is the hierarchical distinction between the central figure of Maheshvara and that of Ardhanarisvar and Gangadhar that provides a visual impact and sense of scale. It is the first instance of a colossal bust as portrayed by a distinctive upper body depiction. The central figure of Shiva epitomizes the propagated spiritual balance between opposite forces as represented by Bhairav and Uma. The division of composition through a triptych and the scale of the Maheshvara sculpture enabled the possibility of multiple carvers working simultaneously, executing the designs of a master sculptor or designer.

Indian Rock-Cut Sculpture and Architecture: History, Typologies, and Techniques

Indian rock-cut monuments form one of the most extensive and inventive rock-cut traditions worldwide, with more than 1100–1500 caves and monoliths created over about a millennium, largely for Buddhist, Hindu, and Jain worship (Dehejia & Rockwell, 2011; Khan & Khan, 2014; Agrawal, 2016). They are concentrated from the western Deccan to central and south India, especially in the Deccan basalts (Das & Boruah, 2025; Jain & Garg, 2004; Sheth, 2023; Bharasa & Gayen, 2021).

Historical Development and Religious Context

- Large-scale excavation begins around the 3rd–2nd century BCE in western India, initially for Buddhist monastic caves (chaityas and viharas) like Bhaja, Karle, Kanheri, Ajanta, and later Ellora (Oza, 2022; Das & Boruah, 2025; Brancaccio, 2019; Jain & Garg, 2004; Khan & Khan, 2014; Agrawal, 2016).
- Activity continues through at least the 9th century CE, reaching a zenith around the 5th–7th centuries with Ajanta, Ellora, and related Western Deccan sites (Brancaccio, 2019; Jain & Garg, 2004; Agrawal, 2016; Sheth, 2023).
- Later phases see strong Hindu and Jain participation (e.g., Ellora Kailasanatha, monolithic temples, and Jain caves), and rock-cut forms feed into free-standing temple architecture in South India (Anil, 2023; Agrawal, 2016; Bharasa & Gayen, 2021; Harle, 1989; Michell, 1991).

Main Types of Indian Rock-Cut Monuments

Type	Key Functions / Features	Citations
Chaitya halls	Congregational worship, apsidal halls, stupa, and large façades	(Singh, 2021; Oza, 2022; Das & Boruah, 2025; Brancaccio, 2019; Jain & Garg, 2004; Agrawal, 2016)
Viharas	Monastic residences with cells, often with shrines	(Singh, 2021; Oza, 2022; Das & Boruah, 2025; Brancaccio, 2019; Jain & Garg, 2004; Agrawal, 2016)
Monolithic temples & statues	Free-standing temples and colossal icons carved from a single mass	(Anil, 2023; Khan & Khan, 2014; Agrawal, 2016; Bharasa & Gayen, 2021)

Techniques, Planning, and “Subtractive” Construction

- Rock-cut architecture is subtractive: forms are carved directly into in-situ rock (basalt, granite, sandstone, etc.), not assembled from quarried blocks (Jain & Garg, 2004; Khan & Khan, 2014; Agrawal, 2016; Sheth, 2023; Bharasa & Gayen, 2021).
- At Ajanta and Ellora, artisans used methods such as top-down “reverse mapping,” chisels and hammers, and careful sequencing of excavation to maintain stability in hard Deccan basalt (Sharma & Dhawan, 1994; Jain & Garg, 2004; Agrawal, 2016; Sheth, 2023).
- Ancient builders demonstrated sophisticated rock mechanics: understanding self-supporting spans, pillar placement, and beam/cantilever behavior, enabling large halls up to $\sim 26 \times 14 \times 10$ m and multi-storey caves (Sharma & Dhawan, 1994; Jain & Garg, 2004; Sheth, 2023).
- A flexible concept of finish meant that once sanctums and key iconographic programs were usable for worship, subsidiary surfaces could remain only roughly carved, explaining many “unfinished” interiors and façades (Dehejia & Rockwell, 2011).

Regional Spread, Materials, and Geoheritage

- Rock-cut caves cluster along trade and pilgrimage routes, notably the Western Ghats/Deccan plateau, where basaltic cliffs favored excavation and supported extensive Buddhist monastic networks tied to Indian Ocean trade (Oza, 2022; Das & Boruah, 2025; Brancaccio, 2019; Jain & Garg, 2004; Sheth, 2023).
- The Ajanta and Ellora caves, carved into compound pāhoehoe basalt flows, also serve as important records of ancient volcanism, with visible lava lobes, crust–core structures, and inflation features (Sheth, 2023).
- Granite and other durable rocks underlie many later monolithic temples and colossal statues (e.g., Shrvanabelagola), valued for strength, polish, and color range (Jain & Garg, 2004; Agrawal, 2016; Bharasa & Gayen, 2021).

Rock-Cut Traditions and Broader Temple Architecture

- Early rock-cut shrines with Garbhagriha and semi-open porticos directly shaped later structural temple designs in Nagara and Dravida styles (Anil, 2023; Harle, 1989).
- Sites such as Mahabalipuram’s monolithic Rathas and Kailasanatha at Ellora exemplify the transition from excavated caves to fully three-dimensional, freestanding rock-cut temples (Anil, 2023; Jain & Garg, 2004; Agrawal, 2016; Michell, 1991).
- Rock-cut caves at Ajanta and Ellora are also central to the history of Indian painting and narrative sculpture, integrating architecture, sculpture, and mural cycles (Das & Boruah, 2025; Jain & Garg, 2004; Harle, 1989; Kaur, 2024).

Conclusion

Indian rock-cut sculpture and architecture form a vast, technically advanced, and religiously diverse tradition centered on subtractive carving into living rock. Beginning with Buddhist chaityas and viharas, the practice expanded to Hindu and Jain monuments, monolithic temples, and colossal

images, influencing later structural temple forms. Technically, it demanded precise spatial planning, sequencing, and understanding of rock behavior, while artistically it supported some of the richest ensembles of sculpture and painting in South Asia.

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The Role of Social Media in Shaping Body Dysmorphic Disorder Perceptions

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Abstract:

The rapid expansion of image-centric social media platforms has fundamentally altered how individuals perceive body image, often reinforcing unrealistic and idealized standards of beauty. This study examines the relationship between social media usage and perceptions associated with Body Dysmorphic Disorder (BDD), a psychological condition characterized by persistent preoccupation with perceived physical flaws. The research adopts a quantitative primary approach, collecting data from 120 respondents aged 18–30 through a structured questionnaire. The instrument measured social media usage patterns, appearance comparison tendencies, and BDD-related perceptual indicators using a five-point Likert scale.

Descriptive statistics, Pearson correlation, and one-way ANOVA were employed to analyze the data. The results reveal a statistically significant positive relationship between social media usage and BDD-related perceptions ($r = 0.65$, $p < 0.01$). Furthermore, ANOVA findings indicate significant differences in BDD perception scores across varying levels of social media usage, with heavy users demonstrating higher levels of dissatisfaction and appearance-related anxiety. These findings support the argument that social media platforms intensify upward social comparison and self-objectification processes.

The study contributes to the growing body of literature by providing empirical evidence from primary data, highlighting how algorithm-driven content and digitally altered imagery shape users' perceptions of their own bodies. It underscores the psychological risks associated with prolonged exposure to curated online identities. The paper concludes that while social media offers connectivity and self-expression, its excessive use can adversely affect mental health, particularly in relation to body image disturbances. The study recommends promoting digital literacy, encouraging authentic representation, and integrating mental health awareness initiatives to mitigate the negative psychological consequences associated with social media use.

Keywords: Social Media, Body Image, Body Dysmorphic Disorder, Social Comparison, Self-Objectification

1. Introduction

The increasing integration of social media into everyday life has significantly influenced how individuals construct and evaluate their identities, particularly in relation to physical appearance. Platforms such as Instagram, TikTok, and Snapchat prioritize visual engagement, enabling users to share images and videos that are often carefully curated, edited, and filtered. These platforms do not merely reflect reality; rather, they actively shape perceptions by promoting idealized and often unattainable standards of beauty. As a result, users are continuously exposed to representations that emphasize flawlessness, symmetry, and socially constructed ideals of attractiveness.

In this context, concerns surrounding body image have intensified, particularly among adolescents and young adults who are highly active on these platforms. One of the most serious psychological conditions linked to distorted body image is Body Dysmorphic Disorder (BDD). BDD is characterized by an excessive preoccupation with perceived defects in physical appearance, which are often minor or not observable to others. Individuals suffering from this condition may engage in repetitive behaviors such as mirror checking, skin picking, excessive grooming, or seeking constant

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reassurance. These behaviors can lead to significant emotional distress, social withdrawal, and impairment in daily functioning.

The role of social media in exacerbating such concerns is increasingly recognized in contemporary psychological research. Unlike traditional media, social media platforms provide interactive environments where users are both consumers and creators of content. This dual role intensifies exposure and participation in appearance-related evaluation. Features such as “likes,” comments, and follower counts serve as quantifiable indicators of social approval, encouraging users to seek validation based on their physical appearance. This validation-seeking behavior reinforces the importance of meeting perceived beauty standards and can contribute to dissatisfaction when expectations are not met.

The theoretical underpinnings of this phenomenon can be explained through Social Comparison Theory (**Festinger, 1954**), which posits that individuals evaluate themselves by comparing their attributes with those of others. Social media amplifies this process by providing constant access to highly curated images, often leading to upward comparisons that negatively affect self-esteem. Similarly, Self-Objectification Theory (**Fredrickson & Roberts, 1997**) suggests that individuals internalize an observer’s perspective, evaluating their bodies primarily in terms of appearance rather than functionality. This internalization can result in habitual body monitoring and increased vulnerability to body image disturbances.

Furthermore, the algorithm-driven nature of social media platforms plays a critical role in reinforcing these perceptions. Algorithms tend to prioritize content that aligns with users’ interests and engagement patterns, often leading to repeated exposure to appearance-focused posts. This creates an “echo chamber” effect, where individuals are continuously exposed to similar ideals, further normalizing unrealistic standards. The widespread use of photo-editing tools and filters also contributes to the blurring of boundaries between reality and digital enhancement, making it increasingly difficult for users to distinguish between authentic and manipulated images.

Given these dynamics, it becomes essential to empirically examine how social media usage influences perceptions related to BDD. While prior studies have largely relied on secondary data or experimental designs, there is a growing need for primary, data-driven research that captures real-world user experiences. This study seeks to address this gap by analyzing the relationship between social media usage patterns and BDD-related perceptions among young adults, thereby contributing to a more nuanced understanding of the psychological implications of digital media consumption.

2. Review of Literature

The relationship between media exposure and body image has long been a subject of scholarly inquiry; however, the emergence of social media has intensified this discussion due to its interactive and image-driven nature. Unlike traditional media, social media platforms allow users to both consume and produce content, thereby increasing the frequency and personal relevance of appearance-related comparisons.

Early theoretical foundations can be traced to **Festinger (1954)**, whose Social Comparison Theory posits that individuals evaluate themselves by comparing their attributes with those of others. In the context of social media, such comparisons are often upward, involving idealized representations that contribute to dissatisfaction and negative self-evaluation.

Building on this, **Fredrickson and Roberts (1997)** introduced Self-Objectification Theory, which explains how individuals internalize an observer’s perspective, leading them to view their bodies as objects to be evaluated. Social media environments, with their emphasis on visual presentation and feedback mechanisms, intensify this process by encouraging users to monitor and modify their appearance for external approval.

Empirical research has consistently demonstrated the impact of social media on body image concerns. **Perloff (2014)** argued that social media uniquely contributes to body dissatisfaction by enabling continuous exposure to peer-generated content, which often appears more relatable yet equally idealized. Similarly, **Fardouly et al. (2015)** found that Facebook usage was associated with

increased body dissatisfaction among young women, mediated by appearance comparisons rather than mere exposure.

Further strengthening this evidence, **Holland and Tiggemann (2016)** conducted a systematic review and concluded that image-based social networking sites have a stronger and more consistent relationship with body image concerns than traditional media formats. Their findings highlight that visual platforms intensify internalization of thin-ideal or appearance-related standards.

More recent studies have explored the role of specific platform features. For instance, **de Vries et al. (2019)** emphasized the role of “likes” and comments as forms of social validation, which can significantly influence self-esteem and body satisfaction. Similarly, **Diedrichs and Lee (2011)** have contributed to research demonstrating that exposure to manipulated or idealized images leads to increased body dissatisfaction and negative mood states.

Research has also begun to directly link social media use with symptoms associated with Body Dysmorphic Disorder. Studies indicate that individuals who frequently engage in appearance-focused activities—such as photo editing, selfie-taking, and comparison—are more likely to exhibit obsessive concerns about perceived physical flaws (**Ryding & Kuss, 2020**). Additionally, **Cash (2012)** emphasized that cognitive-behavioral processes, such as selective attention to perceived flaws and negative self-evaluation, are reinforced through repeated exposure to idealized standards.

Despite these contributions, gaps remain in the literature. Much of the existing research relies on experimental or secondary data, with limited emphasis on primary quantitative studies that measure real-world usage patterns and their direct association with BDD-related perceptions. Furthermore, there is a need to examine these relationships across diverse demographic contexts, particularly among young adults who are the most active users of social media.

In light of these gaps, the present study seeks to provide empirical evidence through primary data analysis, thereby contributing to a more comprehensive understanding of how social media influences perceptions related to Body Dysmorphic Disorder.

3. Objectives of the Study

1. To examine the relationship between social media usage and BDD-related perceptions.
2. To analyze differences in BDD perceptions across varying levels of social media usage.
3. To assess the role of appearance comparison in influencing BDD perceptions

4. Hypotheses

1. **H1:** There is a significant relationship between social media usage and BDD perceptions.
2. **H1₂:** There is a significant difference in BDD perceptions across usage levels.

5. Research Methodology

This study employs a quantitative, descriptive, and analytical research design based on primary data collection. A structured questionnaire was administered to a sample of 120 respondents aged between 18 and 30 years, selected using convenience sampling. The questionnaire consisted of three sections: demographic details, social media usage patterns, and BDD-related perception items measured on a five-point Likert scale. The dependent variable was BDD perception score, while social media usage served as the independent variable. Data were analyzed using statistical tools including descriptive statistics, Pearson correlation, and one-way ANOVA to test the proposed hypotheses. Reliability of the scale was assessed using Cronbach’s alpha ($\alpha = 0.82$), indicating good internal consistency.

5.1 Reliability of the Scale

Table 1
Reliability Statistics

Scale	No. of Items	Cronbach’s Alpha
BDD Perception Scale	7	0.82
Appearance Comparison Scale	5	0.79
Social Media Usage Scale	4	0.75

Interpretation

The reliability of the measurement scale was assessed using Cronbach’s Alpha coefficient. The BDD perception scale yielded a Cronbach’s Alpha value of 0.82, which exceeds the commonly accepted threshold of 0.70 (Nunnally & Bernstein, 1994). This indicates that the items included in the scale exhibit a high degree of internal consistency and are reliably measuring the underlying construct.

A value above 0.80 suggests that the scale has good reliability, implying that the responses are consistent across items and that the instrument is stable for measuring perceptions related to Body Dysmorphic Disorder. Furthermore, the absence of excessively high values (i.e., above 0.95) indicates that the items are not redundant but rather contribute meaningfully to the construct.

Therefore, it can be concluded that the scale used in this study is statistically reliable and suitable for further analysis, including correlation and ANOVA. The reliability results validate the use of the collected data for hypothesis testing and subsequent interpretation.

6. Data Analysis and Interpretation

Table 2
Descriptive Statistics

Usage Level	N	Mean BDD Score	Std. Dev.
Low (<2h)	20	18.9	4.3
Moderate	45	24.5	5.0
High (>4h)	55	30.8	6.1

Interpretation:

The descriptive statistics presented in Table 2 indicate a clear variation in mean BDD perception scores across different levels of social media usage. Respondents categorized under low usage (less than 2 hours per day) reported a mean score of 18.9, suggesting relatively lower levels of concern regarding physical appearance. In contrast, individuals with moderate usage exhibited a higher mean score of 24.5, indicating an increase in appearance-related dissatisfaction.

Notably, respondents in the high usage category (more than 4 hours per day) demonstrated the highest mean score of 30.8, reflecting significantly elevated levels of concern and preoccupation with perceived physical flaws. The progressive increase in mean scores across usage categories suggests a positive trend between time spent on social media and BDD-related perceptions.

The standard deviation values across groups remain within a reasonable range (4.3 to 6.1), indicating moderate variability in responses and suggesting that the data are relatively consistent within each group.

Correlation Analysis

Table 3
Correlation between Social Media Usage and BDD Perception

Variables	Social Media Usage	BDD Perception Score
Social Media Usage	1.000	0.65
BDD Perception Score	0.65	1.000
Significance (p-value)		0.000
N		120

Interpretation

The results presented in Table 3 indicate the relationship between social media usage and BDD perception scores. The Pearson correlation coefficient (r) between social media usage and BDD perception is 0.65, which signifies a moderately strong positive relationship between the two variables.

This positive coefficient implies that as the level of social media usage increases, the BDD perception score also tends to increase. In other words, individuals who spend more time on social media are more likely to experience higher levels of dissatisfaction and concern regarding their physical appearance.

The significance value ($p = 0.000$) is less than the threshold level of 0.01, indicating that the relationship is statistically significant at the 1% level. This confirms that the observed correlation is unlikely to have occurred by chance.

Based on these findings, the hypothesis (H1), which states that there is a significant relationship between social media usage and BDD perceptions, is **accepted**.

ANOVA Results

Table 4
One-Way ANOVA for BDD Perception across Social Media Usage Levels

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	F	Sig. (p-value)
Between Groups	1720	2	860.00	16.75	0.000
Within Groups	6000	117	51.28		
Total	7720	119			

Interpretation

The results of the one-way ANOVA presented in Table 4 examine whether there are significant differences in BDD perception scores across different levels of social media usage (low, moderate, and high).

The calculated F-value is 16.75, which is relatively high, indicating substantial variation between the group means compared to the variation within the groups. The corresponding significance value ($p = 0.000$) is less than the standard threshold of 0.05, demonstrating that the observed differences are statistically significant.

This implies that the mean BDD perception scores are not equal across the three categories of social media usage. In practical terms, individuals with higher social media usage exhibit significantly greater levels of dissatisfaction and concern about their physical appearance compared to those with lower usage levels.

Accordingly, the hypothesis (H2), which states that there is a significant difference in BDD perceptions across usage groups, is **accepted**. The findings suggest that the intensity of social media engagement plays a crucial role in shaping perceptions related to Body Dysmorphic Disorder. Increased exposure appears to amplify appearance-based evaluation and comparison, thereby contributing to higher levels of body image disturbance.

7. Findings and Discussion

The study reveals that increased social media usage significantly influences perceptions related to Body Dysmorphic Disorder. Heavy users exhibit higher levels of dissatisfaction and anxiety regarding their appearance. The findings align with Social Comparison Theory, indicating that individuals engage in upward comparisons with idealized images, leading to negative self-evaluation.

Additionally, the results support Self-Objectification Theory, as users internalize external standards and evaluate themselves based on appearance. The algorithmic nature of social media further reinforces exposure to appearance-focused content, intensifying these effects.

8. Conclusion

The study concludes that social media plays a significant role in shaping BDD-related perceptions among young adults. The statistical evidence confirms that higher usage leads to increased body dissatisfaction and psychological distress. Addressing this issue requires combined efforts in digital literacy, mental health awareness, and responsible platform design.

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