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Digital micro-engagement: Role in the cognitive failures and emotional dysregulation among young adults

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Abstract

The study examines the relationship between digital Micro engagement, cognitive failure, and emotional dysregulation among young adults with a particular focus on the role of cognitive failure. A total of 200 participants completed measures, assessing digital Micro decision-making, cognitive failure, and emotional dysregulation. Using a quantitative correlation research design along with regression and mediation analysis, the finding demonstrated that digital Micro Engagement were significantly associated with both cognitive failure and emotional regulation. Further, cognitive failure was found to significantly predict emotional dysregulation. Mediation analysis revealed that cognitive failure, partially immediate the relationship between digital Micro Engagement and emotional dis regulation. These finding highlight the impact of fragmented digital behavior and cognitive efficacy and emotional functioning, emphasising the role of cognitive processes in linking digital Engagement with emotional outcome.

Keywords: Digital Micro-Engagement; Cognitive Failure; Emotional Dysregulation; Young Adults; Mediation

1. Introduction

The present study is grounded is an integrative theoretical framework that brings together cognitive, lower theory, executive control theory, and emotional regulation theory to explain the cumulative psychological effect of digital Micro Engagement cognitive failure as an emotional dysregulation among young adults. Rather than conceptualising digital Engagement a simple behaviour, preference or habit, this framework treats it as a cognitive emotional process involving resource allocation, attention control and regulatory efficiency operating within a digital saturated environment. The theoretical integration allows for an understanding of how this interaction may influence both cognitive performance and emotional stability overtime [1-3].

Digital Micro-engagements may be conceptualised as repeated sources of extraneous cognitive load. Each notification, message, or brief digital interaction requires attentional disengagement from the primary task, cognitive appraisal of the new stimulus, and re-Engagement with the original activity. Although each interruption may appear minor, their cumulative effect can consume substantial cognitive resources. Research indicates that even the mere presence of a smartphone can reduce available cognitive capacity, suggesting that attentional resources are partially allocated to monitoring potential digital interruptions [4]. Furthermore, studies on digital multitasking have demonstrated reduced attentional filtering efficiency and poorer cognitive control among frequent media multitaskers [5,6]. These findings support the idea that fragmented digital Engagement may gradually weaken sustained attention and working memory efficiency. Repeated interruptions also disrupt the encoding process necessary for transferring information into long-term memory. Effective learning requires uninterrupted rehearsal and consolidation [7]. When attentional continuity is repeatedly broken, encoding becomes shallow, leading to increased forgetfulness and reduced comprehension. This cognitive fragmentation may manifest behaviourally as everyday lapses, commonly referred to as cognitive failures.

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Broadbent et al. defined cognitive failures as minor errors in memory, perception, and motor functioning that occur in daily activities [8]. In a digitally saturated context characterised by continuous task-switching, individuals may become increasingly vulnerable to such lapses.

1.1. Objective

The primary objective of the present study is to examine the relationship between Micro-Digital Engagement and cognitive failure among young adults. Additionally, the aim to assess whether the cognitive failures are associated with emotional regulation. Further, it seeks to determine the extent to which digital Micro Engagement contribute to both cognitive failure and emotional regulation. Finally, the study aims to examine the mediating role of cognitive failure in the relationship between digital Micro Engagement and emotional distribution, thereby understanding whether the impact of digital Micro Engagement on emotional Dysregulation works indirectly through cognitive failure.

1.2. Hypotheses

The first hypothesis of the presence study is that there will be a positive relationship between digital Micro Engagement and cognitive failure. The second hypothesis proposed that digital Micro Engagement will be positively related to emotional dysregulation. The third hypothesis state that cognitive failure will significantly predict emotional dysregulation among young adults. Finally, the fourth hypothesis propose that cognitive failure will mediate the relationship between digital Micro Engagement and emotional dysregulation, such that high levels of digital Micro Engagement will lead to increase cognitive failure, which intern will contribute to greater emotional Dysregulation.

2. Methodology

The present study employ, a qualitative correlational research design to examine the relationship between digital Micro engagement, cognitive failure, and emotional district relation among young adults. A correlational research design allows for the investigation of association between the variables without establishing casual relationship. In addition, the study seeks to examine the predicting role of cognitive failure and emotional regulation, as well as explore the mediating effect of cognitive failure in the relationship between digital Micro Engagement and emotional dysregulation.

2.1. Research

The current study uses a quantitative, non-experimental correlational design.

2.2. Participants

The sample size for conducting the study on 200 participants, with age ranging from 18 to 30 years Indian population. This stage was chosen because it is a critical life transition phase that is marked by academic and career pressures, identity formation, and heavy technology use.

2.3. Instrumentation

- **Digital Micro-EngagementScale (Including Media Multitasking Index):** Digital Micro-engagements is an 18-item self-report scale adapted from the Media Multitasking Index (MMI), where items are rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Always). The MMI has demonstrated acceptable internal consistency in previous research, with Cronbach's alpha values ranging from .70 to .78. In the present study, internal consistency will be evaluated using Cronbach's alpha coefficient. Higher total scores will indicate greater frequency of digital Micro-Engagement behaviours.
- **Cognitive Failures Questionnaire (CFQ)** Cognitive failures will be measured using the Cognitive Failures Questionnaire (CFQ) developed by Broadbent et al. (1982). The CFQ is a widely used instrument consisting of 25 items that assess everyday lapses in cognitive functioning across domains such as memory failures, attention slips, distractibility, and motor function errors. Items are rated on a 5-point scale (0 = Never to 4 = Very Often), yielding a possible score range from 0 to 100. Higher scores reflect greater levels of cognitive failures.
- **Difficulties in Emotion Regulation Scale (DERS)** Emotional dysregulation will be evaluated using the Difficulties in Emotion Regulation Scale (DERS) developed by Gratz and Roemer (2004). The DERS is a 36-item measure that assesses six dimensions of emotion regulation difficulties: non-acceptance of emotional responses, problems with goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. Items are rated on a 5-point Likert scale ranging from 1 (Almost Never) to 5 (Almost Always). The DERS has demonstrated excellent internal

consistency ($\alpha \approx .93$) and strong construct validity. Higher total scores indicate greater difficulties in emotion regulation.

2.4. Procedure

Participants will be recruited through purposive sampling and invited to complete a battery of standardised self-report questionnaires. Prior to participation, informed consent will be obtained, and participants will be assured of confidentiality and anonymity. The survey will be administered online to ensure accessibility and convenience, with clear instructions provided at the beginning of each section. Respondents will be asked to complete three instruments: the Digital Micro-Engagement Scale (adapted from the Media Multitasking Index), the Cognitive Failures Questionnaire (CFQ), and the Difficulties in Emotion Regulation Scale (DERS). Completion time is estimated at approximately 20–25 minutes. To minimise fatigue and ensure data quality, participants will be encouraged to complete the survey in one sitting. Responses will be screened for completeness, and cases with inadequate completion of questionnaires will be excluded from analysis.

2.5. Data Analysis

The data was analysed using JAMOVI. Descriptive statistics were recorded, which included the mean frequency and standard deviation for the demographic data and the results of the scale. Spearman correlation analysis was used to examine the relationship between the variables following a mediation analysis which was conducting using the JAMOVI.

2.6. Ethical Considerations

Participation was entirely voluntary, with informed consent obtained before data collection and participants been free to withdraw it. Any point without penalty. Confidentiality and anonymity were rigorously, protected, and all data was stored security to prevent unauthorised access. The study was designed to minimise any potential discomfort or psychological distress and appropriate support. Information will be provided if needed. Finally, findings were reported honestly and responsibly, avoiding exaggeration, or misinterpretation to ensure integrity of result.

3. Results

The study consists of 200 participants. Descriptive statistics were computed to understand the distribution of the variables: Micro, digital decision-making, cognitive failure, and emotional dysregulation. The mean score for Micro-Digital decision making was 63.3 (SD = 19.2), indicating moderate Engagement in fragmented digital behaviour. Cognitive failure had a main score of 65.8 (SD = 28.4), suggesting considerable variability in every day, cognitive laps among participants. Emotional dysregulation had a main score of 55.9 (SD = 19.7), reflecting moderate level of difficulty in emotional regulation.

The Shapiro-Wilk test indicated that all three variables significantly deviated from normality ($p < .001$), justify the use of non-parametric test for further analysis.

Table 1 Descriptive Statistics of Final Sample (N= 200).

Statistics	MDD	CF	ED
N	200	200	200
MEAN	63.3	65.8	55.9
MEDIAN	69.5	79.5	65.0
MODE	86.0	88.0	71.0
SD	19.2	28.4	19.7

3.1. Relationship between Micro-Digital decision, cognitive failure, and emotional dysregulation

Spear men rank, order correlation revealed significant positive relation among all study variables. Micro digital decision-making was correlated with cognitive failure ($\rho = 0.383$, $p < .001$), indicating that higher Engagement in fragmented digital decision is associated with increased cognitive lapses. A strong positive correlation was found between Micro-Digital decision-making and emotional deregulation ($\rho = 0.612$, $p < .001$), suggesting that frequent digital Micro Engagement is linked to greater emotional instability. Additional, cognitive failure showed a moderate

positive correlation with emotional dysregulation ($\rho = 0.429, p < .001$), indicating that individual experiencing higher cognitive failure, also report greater difficulty in regulating emotion.

Table 2 Spearman’s rho Correlation Matrix among Study Variables (N= 200)

Variable	MDD	CF	ED
MDD	1.00***	0.383***	0.612***
CF	0.429***	1.00***	0.429***
ED	0.612***	0.429***	1.00***
Df	198	198	198

*MDD-Micro-digital Engagement, CF-Cognitive failure, ED-Emotional Dysregulation

3.2. Prediction of emotional Dysregulation

Linear regression analysis revealed that cognitive failure significantly predicts emotional dysregulation ($\beta = 0.248, t = 5.38, p < .001$). The model accounted for 12.7% of the variance in emotional dysregulation ($R^2 = 0.127$), indicating a meaningful, through modest, predictive effect. This suggest that higher levels of cognitive failure are associated with increased emotional Dysregulation.

Table 3 Linear Regression Predicting Emotional Dysregulation from Cognitive Failure (N = 200) Model Fit Measures

MODEL	R	R2
1	0.357	0.127

Predictor	Estimate	SE	T
Intercept	39.575	3.304	11.98
Cognitive Failure	0.248	0.046	5.38

3.3. Mediation analysis

Mediation analysis was conducted to examine whether cognitive failure, mediates the relationship between Micro digital decision-making and emotional Dysregulation. The result revealed a significant indirect effect ($\beta = 0.059, p = .008$), indicating that Micro digital decision-making influence emotional regulation through cognitive failure.

Table 4 Indirect, Direct, and Total Effects of Micro-Digital Decision on Emotional Dysregulation via Cognitive Failure (N = 200)

Type	Effect Path	Estimate	SE	95% CI (Lower-Upper)	β	z	p
Indirect	MDD → CF → ER	0.061	0.023	0.016 – 0.105	0.059	2.66	.008
Component	MDD— CF	0.354	0.102	0.155 – 0.553	0.239	3.48	
Component	CF → ED	0.172	0.042	0.090 – 0.253	0.247	4.13	
Direct	MDD → ED	0.474	0.062	0.353 – 0.594	0.460	7.71	
Total	MDD → ED	0.534	0.062	0.412 – 0.656	0.519	8.5	

*MDD-Micro-digital Engagement, CF-Cognitive failure, ED-Emotional Dysregulation

Further Micro digital decision making significantly predicted cognitive failure ($\beta = 0.239, p < .001$). and cognitive failure significantly predict emotional Dysregulation ($\beta = 0.247, p < .001$). The direct effect of Micro digital decision-making and emotional dysregulation remain significant. ($\beta = 0.460, p < .001$), indicating partial mediation. The total effect was also significant ($\beta = 0.519, p < .001$).

These findings suggest that cognitive failure partially explains the relationship between digital Engagement and emotional Dysregulation.

4. Discussion

The primary objective of the present study was to examine the relationship between digital Micro engagement, cognitive failure, and emotional dysregulation among young adults, along with exploring the predictive and mediating role of cognitive failure. The finding supported the first hypothesis, indicating a significant positive relationship between Micro Engagement and cognitive failure, suggesting that higher level of fragmented digital interactions is associated with increased lapses and every day cognitive functioning. [5,6,7]

Finding of the study also supported the second hypothesis, demonstrating that digital Micro Engagement significantly and positively related to emotional dysregulation. This indicates that individual who engage more frequently in Microlevel digital activities tend to experience greater emotional instability, consistent with prior studies linking excessive digital Engagement with emotional disturbance [4,9,10]. The third hypothesis of the study was also accepted, as cognitive failure was found to significantly predict emotional regulation, suggesting that increase cognitive efficiency contribute to greater difficulties and emotional regulation. [1,8].

The fourth hypothesis of the study was supported, indicating that cognitive failure significantly mediates the relationship between digital Micro Engagement and emotional dysregulation. These result suggest the digital Micro Engagement contributor motion dysregulation board directly and indirectly through the impact on cognitive functioning supporting models of cognitive emotional interaction [2,3]. The presence of partial mediation indicates that while cognitive failure serves as an important underlining mechanism, other factors also play a role in influencing emotional dysregulation. These finding collectively highlight the cascading effect of fragmented digital behaviour on cognitive and emotional processes, thereby contributing to the growing body of literature on the psychological implication of digital engagement.

4.1. Implications

The finding of the study provides important insight into understanding. The impact of digital Micro Engagement of cognitive and emotional functions among young adults. The result highlight the need to identify individual who may be at risk of cognitive inefficiencies and emotional dysregulation due to fragmented digital behaviour. The finding also suggests the importance of developing interaction aimed at improving attention, control, emotional regulation, and healthier digital habits. Further more the study has practical implications for educational settings where students may benefit strategies focused on managing digital distractions and enhancing cognitive functioning.

4.2. Limitations

One of the limitations of the study is that the sample was limited to young adults, which may restrict the generalisability of the finding to other age group. The use of self report measure may have introduce social desirability bias. Additionally, the cross-sectional nature of the study limits the ability to establish casual relationship between variables. Other confounding factors such as individual differences in digital usage, pattern, lifestyle, factors, and environmental influence may have also affected the outcome and should be explored in further research.

5. Conclusion

This study provides strong evidence in support of the hypothesis, indicating that digital Micro Engagement are positively associated with cognitive failure and emotional dysregulation. Cognitive failures were also found to significantly predict emotional dysregulation. Furthermore, cognitive failure was found to mediate the relationship between digital Micro Engagement and emotional dysregulation, suggesting that fragmented, digital behaviour contributes to emotional instability, board directly and indirectly through cognitive processes. The study provides valuable insight into the cognitive and emotional consequences of digital behaviour among young adults.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed

Statement of informed consent

Inform consent was obtained for all individual. Participants included in the study.

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