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DIGITAL FLUENCY, DISTRACTION AND COGNITION: A COMPARATIVE ANALYSIS OF GEN Z AND MILLENNIALS WITH REFERENCE TO BENGALURU, KARNATAKA

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Abstract:

In contemporary society, digital technology has fundamentally reshaped how individuals process information, manage attention, and regulate cognition. Bengaluru, Karnataka — India's technology capital — presents a unique socio-digital milieu where both Gen Z (born 1997–2012) and Millennials (born 1981–1996) demonstrate distinct patterns of digital engagement, distraction, and cognitive functioning. This quantitative cross-sectional study compared digital fluency, digital distraction, and cognitive failures between Gen Z and Millennial adults in Bengaluru. Data were collected through a structured online survey from 60 adults (38 Gen Z, 22 Millennials) using a purposive/convenience sampling approach. Results indicated that Gen Z reported significantly higher digital distraction than Millennials ($p = .044$), but the two cohorts did not differ significantly in digital fluency, cognitive failures, or self-reported screen time (all $p > .05$). Across the combined sample, digital distraction was strongly and positively correlated with cognitive failures ($r = .62$, $p < .001$), while digital fluency showed negligible association with distraction, cognitive failures, or screen time. These findings suggest that digital distraction — rather than fluency or overall screen exposure — is the variable most closely tied to everyday cognitive lapses, and that this pattern holds broadly across generational cohorts. Findings offer practical insights for counselling psychology, workplace well-being, and digital mental health interventions across generational cohorts in urban India.

Keywords—*Gen Z; Millennials; digital fluency; digital distraction; cognitive failures; screen time; Bengaluru; counselling psychology; generational comparison.*

I. INTRODUCTION

The proliferation of digital technologies in the 21st century has profoundly altered patterns of human attention, memory, and cognitive processing. Bengaluru, Karnataka — widely recognized as India's Silicon Valley — is home to a highly tech-exposed population encompassing both Gen Z and Millennial cohorts who interact with digital environments in qualitatively distinct ways. The advent of smartphones, social media platforms, and always-on connectivity has given rise to phenomena such as continuous partial attention, technoference, and digital cognitive overload, all of which have measurable implications for psychological functioning (Ward et al., 2017; Twenge, 2017).

Generational differences in digital technology use are increasingly recognized as significant determinants of cognitive and psychological outcomes. Gen Z individuals, having grown up with smartphones and social media as normative features of childhood and adolescence, exhibit unique patterns of information-seeking, multitasking, and attentional switching (Prensky, 2001; Twenge & Campbell, 2019). Millennials, by contrast, adopted digital tools progressively during adolescence and early adulthood, fostering a different relationship with technology — one marked by comparatively greater capacity for sustained attention and deliberate digital engagement (Dimock, 2019).

Digital fluency — the ability to locate, evaluate, and effectively use digital tools and information — is increasingly considered a core competency for academic, professional, and social functioning (Eshet-Alkalai, 2004). However, high digital fluency does not necessarily correspond with improved cognitive outcomes; paradoxically, greater digital immersion may be associated with heightened susceptibility to digital distraction and everyday cognitive lapses (Loh & Kanai, 2016; Uncapher & Wagner, 2018). In Bengaluru's competitive educational and professional landscape, these dynamics carry particular significance.

Counselling psychology, with its focus on well-being, human development, and adaptive functioning, is uniquely positioned to examine how generational patterns of digital engagement influence cognition and mental health. Comparative analysis of Gen Z and Millennial cohorts in Bengaluru offers a

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contextually grounded opportunity to identify generational vulnerabilities and strengths, informing culturally relevant digital well-being interventions for urban India.

II. REVIEW OF LITERATURE

A growing body of research examines the intersections of digital technology use, generational differences, and cognitive outcomes. The literature consistently reveals that the quality, nature, and timing of digital adoption significantly moderate psychological and cognitive effects across generational cohorts.

Digital Fluency and Generational Differences:

Digital fluency encompasses the competencies of navigating, evaluating, and creating with digital tools (Eshet-Alkalai, 2004). Studies confirm that Gen Z demonstrates superior technical fluency relative to Millennials due to earlier and more immersive digital socialization (Prensky, 2001; Seemiller & Grace, 2016). However, Vial (2019) and Ng (2012) caution that digital nativity does not equate to digital wisdom; Gen Z's comfort with technology is often surface-level and lacks the analytical depth observed in digital immigrants who acquired skills purposefully. In the Indian urban context, Bengaluru's tech-sector culture accelerates digital fluency across both cohorts, though exposure pathways and critical digital literacy differ meaningfully (Rao, 2022).

Digital Distraction, Attention, and Cognitive Load:

The relationship between digital technology and attentional functioning has been extensively studied. Ward et al. (2017) demonstrated that the mere presence of a smartphone significantly reduces available cognitive capacity, even when the device is not in use — an effect stronger among individuals with higher smartphone dependence. Ophir, Nass & Wagner (2009) found that heavy media multitaskers performed significantly worse on attention-switching tasks, suggesting that habitual digital distraction may erode top-down attentional control. Loh & Kanai (2016) linked heavy internet use to reduced gray matter density in the anterior cingulate cortex, a region critical for sustained attention and impulse control.

Uncapher & Wagner (2018) conducted a comprehensive review revealing that heavy media multitasking was consistently associated with poorer sustained attention, working memory, and long-term memory consolidation. Twenge et al. (2018) provided large-scale evidence that increased screen time, particularly social media use, is associated with lower psychological well-being, particularly among adolescents and young adults — a cohort heavily represented within Gen Z. In Bengaluru's professional IT corridors, Pattnaik & Singh (2023) found Millennial employees reported greater ability to manage digital interruptions during deep work compared to their Gen Z counterparts.

Cognition, Executive Function, and Screen Time:

Executive functions — including inhibitory control, cognitive flexibility, and working memory — are increasingly implicated in digital technology research. Baumgartner et al. (2014) found that adolescents with higher internet usage showed weaker impulse control. Wilmer, Sherman & Chein (2017) demonstrated that smartphone users who scored high on habitual checking behaviors performed worse on measures of sustained attention and fluid intelligence. Cain & Gradisar (2010) reported that sleep disruption caused by late-night digital device use significantly impaired next-day executive functioning across young adult cohorts.

Research on generational cognition highlights differing trajectories. Carrier et al. (2015) compared young adults (Gen Z predecessors) and older Millennials, finding younger cohorts more adept at rapid information scanning but less proficient in deep reading and text comprehension. Zabel & Connelly (2022) found Millennials demonstrated greater cognitive resilience to digital interruptions in workplace settings, attributing this to more deliberate habits of digital engagement formed in a pre-smartphone era. Studies from Indian urban centers (Ghosh & Datta, 2021; Krishnamurthy, 2022) suggest that academic and professional competition in cities like Bengaluru amplifies the cognitive costs of digital distraction, particularly for Gen Z students managing online learning environments.

Counselling Psychology Implications:

The counselling psychology literature increasingly calls for digital well-being frameworks that account for generational context. Yates & Khattab (2020) argue that awareness of generational digital norms is essential for tailoring psychoeducational interventions around attention and cognitive health. Sharma et al. (2023) found that mindfulness-based digital detox programs significantly improved attentional control and reduced digital distraction in Bengaluru-based young professionals. The literature broadly supports the

ISSN: 3107-6513

integration of digital literacy, attentional training, and cognitive well-being strategies into counselling practice for both Gen Z and Millennial populations in urban India.

III. RESEARCH METHODOLOGY

This study utilized a quantitative cross-sectional research design to examine and compare digital fluency, digital distraction, and cognitive failures between Gen Z (aged 18–27 years) and Millennial (aged 28–43 years) adults residing in Bengaluru, Karnataka. The study assessed generational differences and the relationships between digital variables and cognitive outcomes.

The final sample consisted of 60 participants (38 Gen Z and 22 Millennials) recruited using a purposive/convenience sampling technique via an online survey circulated across educational institutions, IT organizations, and community/social networks in Bengaluru. Participants were included based on age group and regular engagement with digital devices. Ethical considerations including confidentiality, voluntary participation, and the right to withdraw were strictly maintained throughout the study. Data were collected using a structured self-report questionnaire administered online, with responses recorded systematically and anonymously. Data analysis was carried out using standard statistical computing procedures, where descriptive statistics (mean and standard deviation) and inferential statistics (independent samples t-test and Pearson correlation analysis) were computed.

IV. OBJECTIVES OF THE STUDY

To assess levels of digital fluency among Gen Z and Millennial adults in Bengaluru.

To measure digital distraction and cognitive failures across both generational cohorts.

To compare Gen Z and Millennial adults on digital fluency, digital distraction, and cognitive failures.

To explore the relationships between digital fluency, digital distraction, screen time, and cognitive failures within the combined sample.

V. HYPOTHESES

H1 — Gen Z will show significantly higher digital fluency than Millennials (tests the digital nativity assumption). Result: Not supported ($p = .324$).

H2 — Gen Z will report significantly higher digital distraction and more cognitive failures than Millennials (tests the attention/cognition gap). Result: Partially supported — significant for digital distraction ($p = .044$), not significant for cognitive failures ($p = .676$).

H3 — Digital distraction will positively correlate with cognitive failures across the combined sample (tests the relational hypothesis). Result: Supported ($r = .62$, $p < .001$).

VI. RESEARCH DESIGN

The present study uses a quantitative cross-sectional research design to examine generational differences in digital fluency, distraction, and cognitive failures among adults in Bengaluru, Karnataka.

Sampling Size: 60 participants (38 Gen Z, 22 Millennials).

VII. TOOLS USED FOR DATA COLLECTION

The study employed a structured self-report questionnaire administered online (via Google Forms) to 60 adults aged 18–43 years, residing in Bengaluru. The instrument consisted of the following sections, each rated on a 5-point Likert scale (Strongly Disagree to Strongly Agree) unless otherwise stated:

1. Demographic details — gender, generational cohort, highest education qualification, and current occupation.

2. Digital device use — average daily smartphone screen time (categorical bands), devices used regularly, and purposes of digital device use.

3. Digital Fluency (5 items) — items adapted from Eshet-Alkalai's (2004) digital literacy framework, covering ease of learning new apps/tools, evaluating the reliability of online information, confidence in solving technical problems, use of technology for productivity, and helping others with technology.

4. Digital Distraction (4 items) — items adapted from Rosen et al. (2013), covering interruption by notifications, losing track of time on digital devices, reduced productivity due to digital distraction, and difficulty focusing without checking the phone.

5. Cognitive Failures (5 items) — items adapted from Broadbent et al.'s (1982) Cognitive Failures Questionnaire, covering losing one's train of thought in conversation, mental fatigue after prolonged device use, forgetting intended actions, difficulty

ISSN: 3107-6513

remembering recently learned information, and difficulty sustaining concentration.

For the purpose of this data-collection round, the instrument was condensed into a single short-form questionnaire to keep the online survey brief; the Attentional Control Scale (Derryberry & Reed, 2002) and the WHO-5 Well-Being Index, which were part of the originally proposed protocol, were not administered in this round. This is noted as a limitation, and their inclusion is recommended for future data collection (see Limitations and Future Research).

VIII. TOOLS USED FOR ANALYSIS

Descriptive statistics, independent samples t-tests, and Pearson correlation analysis were computed using standard statistical computing software to analyse the survey data.

IX. SOURCES OF DATA

Primary data were collected directly from 60 adults residing in Bengaluru, Karnataka — 38 identifying as Gen Z (aged 18–27) and 22 as Millennials (aged 28–43). Participants completed a structured online questionnaire after providing informed consent. Institutional and organizational permissions were obtained prior to data collection.

X. PROCEDURE

Institutional and organizational permissions were obtained from respective educational and professional settings in Bengaluru. Participants were informed about the purpose of the study and consent was obtained prior to participation. The questionnaire was administered online and completed anonymously to ensure confidentiality. Responses were downloaded and cleaned prior to statistical analysis.

XI. ANALYSIS AND DATA INTERPRETATION

Data collected from 60 adults via an online survey in Bengaluru were analyzed to examine generational differences in digital fluency, digital distraction, and cognitive failures, and to explore relationships between these variables. Descriptive statistics and inferential analyses (independent samples t-test and Pearson correlation) were performed on composite scores derived by averaging item ratings within each construct (1 = Strongly Disagree to 5 = Strongly Agree).

Descriptive Statistics: Mean and Standard Deviation of Study Variables

Variables (1–5 scale)	Gen Z Mean (n=38)	Gen Z SD	Millennial Mean (n=22)	Millennial SD
Digital Fluency	3.68	0.54	3.48	0.83
Digital Distraction	3.43	0.68	3.03	0.74
Cognitive Failures	2.98	0.67	2.90	0.79
Screen Time (approx. hrs/day)*	3.51	1.98	3.57	1.69

**Screen time was collected as categorical bands (e.g., "Half an hour", "1 to 2 hours", "2 to 3 hours", "5 hours", "More than 5 hours") and converted to approximate hour values (band midpoints) for descriptive and inferential comparison; this should be treated as an approximation rather than an exact hourly measure.*

Interpretation of Descriptive Statistics Results:

On the 5-point Likert composite scores, Gen Z participants reported marginally higher digital fluency (M = 3.68) than Millennials (M = 3.48), and this pattern was mirrored in digital distraction, where Gen Z scored noticeably higher (M = 3.43) than Millennials (M = 3.03). Cognitive failures were similar across cohorts (Gen Z M = 2.98; Millennial M = 2.90), as was approximate self-reported screen time (Gen Z M ≈ 3.51 hrs/day; Millennial M ≈ 3.57 hrs/day). Unlike the originally hypothesized pattern, Millennials in this sample did not report meaningfully lower screen time than Gen Z, and cognitive failures did not diverge by cohort — only digital distraction showed a clear generational gap, favouring lower distraction among Millennials.

Independent Samples T-Test Results (Gen Z vs. Millennials):

Variable	t-value	df	p-value	Significance (α = .05)
Digital Fluency	1.00	58	.324	Not significant
Digital Distraction	2.07	58	.044	Significant
Cognitive Failures	0.42	58	.676	Not significant

ISSN: 3107-6513

Screen Time	-0.11	58	.910	Not significant

The t-test results indicate that Gen Z and Millennials differed significantly only on digital distraction, t(58) = 2.07, p = .044, with Gen Z reporting higher distraction. Differences in digital fluency, t(58) = 1.00, p = .324, cognitive failures, t(58) = 0.42, p = .676, and screen time, t(58) = -0.11, p = .910, were not statistically significant. This is a notable departure from the originally hypothesized pattern of broad generational disparity: in the present sample, the generational gap is concentrated specifically in digital distraction rather than spanning fluency, cognitive failures, and screen time as well.

Correlation Analysis:

Pearson correlation analysis was conducted to examine the relationships between digital fluency, digital distraction, screen time, and cognitive failures within the combined sample (N = 60).

Variables	Digital Distraction	Cognitive Failures	Screen Time
Digital Fluency	r = .04, ns	r = -.05, ns	r = .13, ns
Digital Distraction	—	r = .62, p < .001	r = .25, p = .050
Cognitive Failures	r = .62, p < .001	—	r = .03, ns

Interpretation of Correlation Results:

Digital Distraction and Cognitive Failures: A strong positive correlation (r = .62, p < .001) indicates that higher digital distraction is closely linked to greater everyday cognitive failures (e.g., forgetting, lapses in concentration, mental fatigue), underscoring the cognitive costs of digital interruption regardless of generational cohort.

Digital Distraction and Screen Time: A modest positive correlation (r = .25, p = .050) suggests a borderline association between higher daily screen time and greater digital distraction, though this relationship is weaker than typically reported in the literature and should be interpreted cautiously given the categorical screen-time measure.

Digital Fluency and Other Variables: Digital fluency showed negligible and non-significant associations with digital distraction (r = .04), cognitive failures (r = -.05), and screen time (r = .13). This suggests that, in this sample, being technically proficient with digital tools neither protects against nor predisposes individuals to digital distraction or cognitive lapses — fluency appears to function as a largely independent construct.

Cognitive Failures and Screen Time: A negligible, non-significant correlation (r = .03) was observed, indicating that raw screen time alone was not a strong predictor of cognitive failures in this sample; the quality of digital engagement (i.e., distraction) appears more relevant than sheer duration of use.

XII. CONCLUSION

The present study examined generational differences in digital fluency, digital distraction, and cognitive failures between Gen Z and Millennial adults in Bengaluru, Karnataka, using data collected from 60 participants (38 Gen Z, 22 Millennials). Findings reveal that Gen Z reported significantly higher digital distraction than Millennials, but the two cohorts did not differ significantly in digital fluency, cognitive failures, or self-reported screen time. This indicates that, in this sample, generational differences in digital experience are more narrowly concentrated in susceptibility to distraction than in overall technical competence or cognitive functioning.

Correlation analyses highlight digital distraction as a variable strongly and consistently linked to everyday cognitive failures across both cohorts, while digital fluency was largely unrelated to distraction, cognitive lapses, or screen time. These findings carry important implications for counselling psychology practice in urban India: interventions aimed at reducing digital distraction — such as notification management, structured focus periods, and mindful technology use — may be more directly beneficial for cognitive well-being than interventions focused solely on digital literacy or screen-time reduction. School, college, and workplace counselling programs should integrate psychoeducation around digital distraction and its cognitive costs to support holistic mental health and productivity across generational cohorts.

XIII. LIMITATIONS

This quantitative cross-sectional study was conducted on a relatively small and unevenly distributed sample of 60 adults from Bengaluru (38 Gen Z, 22 Millennials), which may limit statistical power for the Millennial subgroup and generalizability to broader populations or other Indian cities. Participants were recruited using

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purposive/convenience sampling through an online survey, which may introduce self-selection bias. The study relied on a condensed, self-report Likert instrument rather than the full standardized versions of the originally proposed scales; the Attentional Control Scale and WHO-5 Well-Being Index were not administered in this data-collection round, limiting the ability to test relationships involving attentional control and psychological well-being as originally planned. Screen time was measured using broad categorical bands rather than precise hourly tracking, introducing measurement imprecision. Variability in participants' occupational and educational settings, digital device types, and specific platform usage was not fully controlled, and external factors such as socio-economic background and organizational digital culture were not directly measured.

XIV. FUTURE RESEARCH

Future studies should aim for a larger and more evenly balanced sample across both cohorts, drawn from multiple Indian cities to enhance generalizability and enable cross-city comparisons. Administering the full standardized Attentional Control Scale and WHO-5 Well-Being Index alongside the current measures would allow direct testing of the originally proposed relational hypothesis linking distraction, attentional control, and well-being. Precise, continuous measurement of screen time (e.g., device-reported usage logs) rather than categorical self-report bands is recommended to improve measurement accuracy. Longitudinal designs would help examine how digital fluency, distraction, and cognitive failures evolve over time within each generational cohort, while qualitative methods such as interviews or focus groups would provide richer insight into subjective experiences of digital distraction and coping strategies. Experimental interventions targeting digital distraction reduction in Gen Z and Millennial adults in urban India represent a promising avenue for applied counselling research.

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