

Development And Validation of a Digital Resilience Scale for Emerging Adults In AI-Driven Environments

DR. ANKITA DALAL

*Assistant Professor, Amity Institute of Behavioural and Allied Sciences (AIBAS), Amity University
Haryana*

Abstract- *The rapid integration of artificial intelligence (AI) into educational, occupational, and social domains has transformed how emerging adults interact with technology. While AI-driven environments offer unprecedented opportunities for learning, communication, and productivity, they also expose individuals to unique psychological challenges, including information overload, algorithmic dependency, digital fatigue, misinformation, privacy concerns, and technological uncertainty. Existing resilience measures primarily assess adaptation to general life stressors and fail to capture the specific competencies required to navigate AI-mediated digital environments effectively. The present paper proposes the development and validation of a Digital Resilience Scale (DRS) designed specifically for emerging adults aged 18-29 years. Drawing upon resilience theory, digital well-being literature, cyberpsychology, and technology acceptance frameworks, digital resilience is conceptualized as an individual's capacity to adapt, regulate, critically evaluate, and thrive within increasingly AI-driven contexts. A multidimensional model comprising AI adaptability, digital emotional regulation, information management, algorithmic awareness, cyberpsychology well-being, and ethical digital engagement is proposed. The study outlines a systematic scale-development procedure involving item generation, expert validation, pilot testing, exploratory factor analysis, confirmatory factor analysis, and reliability assessment. The proposed scale aims to provide researchers, educators, counsellors, and policymakers with a psychometrically sound instrument for assessing digital resilience among emerging adults. The development of the DRS is expected to contribute significantly to psychological research by addressing an emerging construct that reflects the demands of contemporary AI-integrated societies.*

Keywords: *Digital Resilience, Artificial Intelligence, Emerging Adults, Scale Development, Cyberpsychology, Digital Well-Being, Psychological Resilience*

I. INTRODUCTION

The twenty-first century has witnessed unprecedented technological advancement characterized by the widespread integration of artificial intelligence (AI) into everyday life. AI-powered systems increasingly influence educational practices, workplace functioning, healthcare delivery, social communication, and decision-making processes.

Emerging adults, typically defined as individuals between the ages of 18 and 29 years, are among the most active users of digital technologies and are consequently more likely to encounter both the opportunities and challenges associated with AI-driven environments (Arnett, 2015).

Although digital technologies have enhanced accessibility to information, communication, and learning resources, they have simultaneously generated new psychological stressors.

Individuals are now required to navigate continuous streams of information, algorithmically curated content, digital surveillance, online misinformation, cyber threats, and increasing dependence on AI-assisted systems. These challenges demand a unique set of adaptive psychological skills that extend beyond traditional forms of resilience.

Resilience has traditionally been conceptualized as the ability to adapt successfully in the face of adversity, trauma, stress, or significant life challenges (Masten, 2014).

Contemporary resilience research emphasizes resilience as a dynamic process involving cognitive, emotional, behavioral, and social adaptation rather than a fixed personality trait. However, existing

resilience frameworks were developed largely within offline contexts and may not adequately address challenges arising from digital and AI-mediated environments.

The emergence of cyberpsychology has highlighted the importance of understanding how digital technologies influence human cognition, emotion, identity, and behavior (Attrill-Smith et al., 2019).

Research indicates that excessive digital engagement can contribute to anxiety, information overload, social comparison, digital fatigue, and reduced psychological well-being (Andreassen, 2015; Montag & Elhai, 2020).

Simultaneously, digital technologies provide opportunities for social support, knowledge acquisition, creativity, and psychological growth.

Consequently, an individual's ability to effectively navigate digital challenges while maintaining psychological well-being has become increasingly important.

The concept of digital resilience has recently gained attention within educational and technological research. Digital resilience generally refers to an individual's ability to understand, manage, recover from, and adapt to risks encountered in digital environments (Third et al., 2014).

However, existing conceptualizations primarily focus on internet safety, cyberbullying, and digital citizenship among children and adolescents. Limited attention has been devoted to the broader psychological competencies required to navigate AI-driven ecosystems among emerging adults.

The present paper addresses this gap by proposing the development of a Digital Resilience Scale (DRS) specifically designed for emerging adults. The proposed scale aims to measure the psychological capacities that enable individuals to adapt successfully to the opportunities and challenges presented by AI-mediated environments.

II. REVIEW OF LITERATURE

Resilience has emerged as a central construct within positive psychology and developmental psychology. Early resilience research focused primarily on protective factors that enabled individuals to overcome adversity despite significant risk exposure (Garmezy, 1991).

Subsequent studies expanded the concept to encompass adaptive coping, emotional regulation, optimism, self-efficacy, and psychological flexibility (Masten, 2014).

Masten (2014) described resilience as "ordinary magic," emphasizing that adaptive functioning results from normative psychological processes rather than extraordinary abilities. Contemporary resilience theories suggest that resilience involves interactions among personal, social, environmental, and contextual factors.

However, these frameworks were largely developed in response to traditional life stressors and may not fully account for challenges emerging from digital environments.

Digital technologies have become integral to identity formation, communication, and social participation among emerging adults. According to Arnett (2015), emerging adulthood represents a developmental stage characterized by exploration, instability, and identity development.

Digital platforms increasingly mediate these developmental processes, shaping how individuals form relationships, acquire information, and construct self-concepts.

Research suggests that technological advancement has generated novel psychological challenges, including information overload, digital dependency, and technological stress (Tarafdar et al., 2019).

Individuals frequently encounter excessive information streams that exceed their cognitive processing capacities, contributing to stress, decision fatigue, and emotional exhaustion.

Furthermore, AI-driven recommendation systems increasingly influence information consumption, decision-making, and behavioral patterns.

While these technologies offer convenience and personalization, they may also reduce critical engagement and increase algorithmic dependency (Meske et al., 2022).

Digital well-being refers to the optimal state of psychological functioning achieved through balanced engagement with digital technologies (Vanden Abeele, 2021). Studies indicate that healthy technology use is associated with enhanced social connectedness, educational opportunities, and access to support networks.

Conversely, problematic digital engagement has been linked to anxiety, depression, loneliness, and reduced life satisfaction (Andreassen, 2015).

The increasing prevalence of AI-generated content presents additional challenges related to misinformation, authenticity, privacy, and trust. Emerging adults must develop skills to critically evaluate digital information and maintain psychological well-being despite constant exposure to technologically mediated influences.

Digital resilience has primarily been examined within the context of online safety and youth protection. Third et al. (2014) conceptualized digital resilience as the capacity to recognize online risks, seek support, learn from experiences, and recover from adverse digital encounters. Similarly, educational frameworks emphasize digital literacy, cyber safety, and responsible technology use.

Despite these contributions, current measures fail to capture the broader psychological competencies necessary for navigating AI-driven environments. Existing instruments focus predominantly on risk avoidance rather than adaptation, emotional regulation, critical thinking, and psychological flourishing in technologically complex contexts.

III. RESEARCH GAP AND RATIONALE

Although resilience remains one of the most extensively studied constructs in psychology, existing resilience scales were developed prior to the widespread integration of artificial intelligence into daily life. Similarly, available measures of digital resilience primarily focus on online safety, cyberbullying prevention, and internet risk management among children and adolescents.

There remains a significant lack of psychometrically validated instruments designed to assess how emerging adults psychologically adapt to AI-mediated environments characterized by algorithmic influence, information overload, digital fatigue, privacy concerns, and technological uncertainty.

Furthermore, no comprehensive measure currently integrates emotional regulation, critical digital engagement, AI adaptability, and digital well-being within a unified framework.

The development of a Digital Resilience Scale is therefore necessary to address this conceptual and methodological gap and to provide researchers and practitioners with a robust tool for understanding adaptive functioning in contemporary digital societies.

IV. CONCEPTUAL DEFINITION OF DIGITAL RESILIENCE

For the purpose of this study, digital resilience is defined as:

"The dynamic psychological capacity of an individual to effectively adapt, regulate emotions, critically evaluate information, maintain well-being, and engage responsibly within AI-driven digital environments while recovering from technology-related challenges and uncertainties."

Proposed Dimensions of the Digital Resilience Scale

1. AI Adaptability

The ability to learn, adjust, and effectively utilize emerging AI technologies while maintaining autonomy and critical judgment.

2. Digital Emotional Regulation

The capacity to manage emotional responses arising from online interactions, digital stressors, and technology-related challenges.

3. Information Management and Critical Evaluation

The ability to evaluate information credibility, identify misinformation, and make informed decisions in digital environments.

4. Algorithmic Awareness

Understanding how algorithms influence content exposure, decision-making, and online behavior.

5. Cyberpsychology Well-Being

The ability to maintain psychological health despite digital overload, online pressures, and technology-related stress.

6. Ethical Digital Engagement

Responsible, respectful, and socially conscious participation in digital spaces.

OBJECTIVES OF THE STUDY

1. To conceptualize digital resilience within AI-driven environments.
2. To develop a comprehensive item pool reflecting dimensions of digital resilience.
3. To establish the content validity of the proposed Digital Resilience Scale.
4. To examine the factor structure of the scale through exploratory and confirmatory factor analyses.
5. To evaluate the reliability and construct validity of the scale.
6. To provide a psychometrically sound instrument for assessing digital resilience among emerging adults.

V. METHODOLOGY

Research Design

The present study adopts an instrument development and validation research design aimed at constructing a psychometrically sound Digital Resilience Scale (DRS) for emerging adults in AI-driven environments. The scale development process

follows established guidelines proposed by DeVellis (2017), Boateng et al. (2018), and Worthington and Whittaker (2006), encompassing item generation, expert validation, pilot testing, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), reliability assessment, and construct validation.

Scale Development and Validation Procedure

The development and validation of the Digital Resilience Scale (DRS) will be conducted through a systematic multi-phase process. In Phase I, an initial item pool will be generated through an extensive review of literature pertaining to resilience, digital well-being, cyberpsychology, digital literacy, technological adaptation, emotional regulation, and artificial intelligence.

To ensure contextual relevance and content richness, qualitative interviews and focus group discussions will be conducted with emerging adults aged 18-29 years to explore their experiences of navigating AI-mediated technologies and digital challenges.

Based on the findings obtained from the literature review and qualitative inquiry, approximately 60-70 items will be developed across six theoretically derived dimensions:

AI Adaptability, Digital Emotional Regulation, Information Management and Critical Evaluation, Algorithmic Awareness, Cyberpsychology Well-Being, and Ethical Digital Engagement. All items will be rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

In Phase II, the preliminary item pool will undergo content validation by a panel of 8-10 experts drawn from the fields of psychology, cyberpsychology, educational technology, psychometrics, and artificial intelligence ethics. The experts will evaluate each item in terms of relevance, clarity, simplicity, and representativeness.

Content Validity Ratio (CVR) and Content Validity Index (CVI) scores will be computed to determine the adequacy of individual items. Items failing to meet acceptable content validity standards will be revised or eliminated from the scale.

Phase III will involve pilot testing of the revised scale on a sample of approximately 50-100 emerging adults. The pilot study will assess item clarity, comprehensibility, response variability, and preliminary reliability.

Feedback obtained from participants will be utilized to refine the wording and structure of the items before large-scale administration.

In Phase IV, the refined scale will be administered to a larger sample of approximately 300-500 participants for Exploratory Factor Analysis (EFA). Prior to factor extraction, the suitability of the data will be examined using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity.

Principal Axis Factoring with Promax Rotation will be employed to identify the underlying factor structure of the instrument. Items demonstrating factor loadings below .40, cross-loadings above .30, or low communalities will be removed to achieve a parsimonious and theoretically meaningful factor solution.

Phase V will involve Confirmatory Factor Analysis (CFA) using an independent sample of approximately 300-500 emerging adults to validate the factor structure obtained through EFA.

Model fit will be assessed using multiple goodness-of-fit indices, including the Chi-square to degrees of freedom ratio (χ^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). The evaluation of model fit will follow the criteria recommended by Hu and Bentler (1999).

The reliability of the final scale will be assessed using Cronbach's alpha, McDonald's omega, composite reliability, and split-half reliability coefficients. Reliability coefficients exceeding .70 will be considered indicative of acceptable internal consistency.

Furthermore, construct validity will be established through the examination of convergent, discriminant, and criterion validity.

Convergent validity will be assessed using Average Variance Extracted (AVE) and correlations with established measures of resilience and digital well-being. Discriminant validity will be evaluated through the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT).

Criterion validity will be examined by investigating associations between the DRS and related constructs such as psychological resilience, digital literacy, psychological well-being, and technology acceptance. Positive correlations with these constructs are expected, thereby supporting the validity of the proposed measure.

VI. EXPECTED RESULTS

The proposed analyses are expected to yield a multidimensional Digital Resilience Scale comprising six interrelated yet distinct factors.

Exploratory factor analysis is anticipated to support the conceptual dimensions identified during the theoretical framework development, while confirmatory factor analysis is expected to demonstrate satisfactory model fit.

Reliability analyses are expected to indicate strong internal consistency across subscales and the overall measure.

The finalized Digital Resilience Scale is expected to provide a comprehensive assessment of individuals' ability to navigate AI-driven environments while maintaining psychological well-being and adaptive functioning.

VII. DISCUSSION

The proposed Digital Resilience Scale addresses a significant gap in contemporary psychological research by extending traditional resilience frameworks into technologically mediated contexts.

While resilience has historically been conceptualized as adaptation to adversity and life stressors (Masten, 2014), the emergence of artificial intelligence has introduced novel forms of psychological demands that require additional adaptive capacities.

The proposed dimension of AI Adaptability reflects the increasing necessity for individuals to learn, integrate, and critically engage with emerging technologies. Research suggests that technological adaptability is becoming an important predictor of educational and occupational success in digital societies (Meske et al., 2022).

Consequently, resilience within AI-driven environments requires not only coping with stress but also maintaining flexibility and openness toward technological change.

Digital Emotional Regulation represents another critical component of resilience. Existing literature demonstrates that online interactions can evoke intense emotional reactions, including anxiety, frustration, and social comparison (Andreassen, 2015).

Individuals possessing strong emotional regulation skills are more likely to maintain psychological stability despite exposure to digital stressors. Therefore, emotional regulation remains central to adaptive functioning in digital contexts.

Information Management and Critical Evaluation emerged as an essential dimension due to the increasing prevalence of misinformation and AI-generated content. The ability to critically evaluate information has become fundamental for informed decision-making and cognitive resilience.

Scholars have emphasized that digital literacy alone is insufficient; individuals must also possess critical thinking skills to navigate increasingly complex information ecosystems (Vanden Abeele, 2021).

Algorithmic Awareness reflects an emerging competency that has received limited attention within resilience research. AI algorithms increasingly shape individuals' perceptions, preferences, and behaviors through personalized content recommendations.

Awareness of these processes may serve as a protective factor against manipulation, cognitive bias, and excessive dependency on algorithmic systems.

Cyberpsychology Well-Being extends traditional notions of psychological health into digital environments. Existing research suggests that digital fatigue, information overload, and technology-induced stress may negatively affect mental health (Tarafdar et al., 2019).

Individuals demonstrating high digital resilience are expected to maintain healthy boundaries and engage in effective self-care practices despite technological pressures.

Finally, Ethical Digital Engagement reflects the importance of responsible and prosocial technology use. As AI technologies become increasingly integrated into society, ethical awareness and responsible participation in digital spaces are likely to become central aspects of adaptive functioning.

Collectively, these dimensions suggest that digital resilience represents a broader and more complex construct than traditional resilience. The proposed scale therefore contributes theoretically by integrating resilience theory, cyberpsychology, digital literacy, and AI adaptation within a unified framework.

VIII. PRACTICAL IMPLICATIONS

The Digital Resilience Scale has several practical applications.

For educational institutions, the scale may assist in identifying students who experience difficulties adapting to technologically intensive learning environments. Universities can subsequently develop digital well-being interventions and AI literacy programs.

For mental health professionals, the scale may provide valuable insights into technology-related stress and psychological functioning. Counsellors and psychologists can utilize the measure to identify areas requiring intervention and support.

For policymakers, the scale may contribute to the development of digital citizenship initiatives and public mental health programs aimed at promoting healthy technology use.

For organizations, assessment of digital resilience may assist in employee training and workforce development initiatives as workplaces become increasingly dependent on AI systems.

IX. LIMITATIONS

Several limitations should be acknowledged. First, the proposed scale focuses specifically on emerging adults and may not generalize to adolescents or older adults. Second, rapidly evolving technological environments may necessitate periodic revisions of the scale to maintain relevance.

Third, cultural differences may influence perceptions of digital resilience and AI adoption, limiting the generalizability of findings across countries. Finally, self-report measures remain susceptible to social desirability and response biases.

SUGGESTIONS FOR FUTURE RESEARCH

Future studies should:

1. Validate the scale across diverse cultural contexts.
2. Examine gender differences in digital resilience.
3. Explore longitudinal changes in digital resilience.
4. Investigate relationships between digital resilience and mental health outcomes.
5. Examine digital resilience among working professionals.
6. Assess intervention effectiveness in enhancing digital resilience.
7. Explore the role of digital resilience in mitigating AI-related anxiety and technological stress.

CONCLUSION

Artificial intelligence is transforming nearly every aspect of human life, creating both opportunities and challenges for psychological adaptation. Existing resilience measures fail to adequately capture the competencies required to navigate AI-mediated environments effectively.

The present paper proposed the development and validation of a Digital Resilience Scale designed specifically for emerging adults.

By integrating dimensions of AI adaptability, digital emotional regulation, information management, algorithmic awareness, cyberpsychology well-being, and ethical digital engagement, the proposed scale offers a comprehensive framework for understanding resilience in the digital age.

The development of a psychometrically sound Digital Resilience Scale has the potential to advance research, inform intervention development, and support psychological well-being in increasingly AI-driven societies.

REFERENCES

- [1] Andreassen, C. S. (2015). Online social network site addiction: A comprehensive review. *Current Addiction Reports*, 2(2), 175-184. <https://doi.org/10.1007/s40429-015-0056-9>
- [2] Arnett, J. J. (2015). *Emerging adulthood: The winding road from the late teens through the twenties* (2nd ed.). Oxford University Press.
- [3] Attrill-Smith, A., Fullwood, C., Keep, M., & Kuss, D. J. (2019). *The Oxford handbook of cyberpsychology*. Oxford University Press.
- [4] Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quinonez, H. R., & Young, S. L. (2018). Best practices for developing and validating scales for health, social, and behavioral research. *Frontiers in Public Health*, 6, 149. <https://doi.org/10.3389/fpubh.2018.00149>
- [5] DeVellis, R. F. (2017). *Scale development: Theory and applications* (4th ed.). Sage Publications.
- [6] Garmezy, N. (1991). Resiliency and vulnerability to adverse developmental outcomes associated with poverty. *American Behavioral Scientist*, 34(4), 416-430.
- [7] Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new

- alternatives. *Structural Equation Modeling*, 6(1), 1-55.
- [8] Masten, A. S. (2014). *Ordinary magic: Resilience in development*. Guilford Press.
- [9] Meske, C., Bunde, E., Schneider, J., & Gersch, M. (2022). Explainable artificial intelligence: Objectives, stakeholders, and future research opportunities. *Information Systems Management*, 39(1), 53-63.
- [10] Tarafdar, M., Cooper, C. L., & Stich, J. F. (2019). The technostress trifecta: Techno-eustress, techno-distress and design. *Information Systems Journal*, 29(1), 6-42.
- [11] Third, A., Bellerose, D., Dawkins, U., Keltie, E., & Pihl, K. (2014). *Children's rights in the digital age: A download from children around the world*. Young and Well Cooperative Research Centre.
- [12] Vanden Abeele, M. M. P. (2021). Digital wellbeing as a dynamic construct. *Communication Theory*, 31(4), 932-955.
- [13] Worthington, R. L., & Whittaker, T. A. (2006). Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist*, 34(6), 806-838.