

## DEVELOPMENT AND VALIDATION OF MOBEEN & QURESHI DIGITAL MINDFULNESS SCALE (MQDMS 2026)

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### ABSTRACT

The digital technology become necessity now where, it enhances productivity, creativity, and communication, it also comes with risks: digital addiction, anxiety, sleep disruption, and a constant sense of urgency. Digital mindfulness can enhance our wellbeing, reduce stress and overwhelm, and cultivate a healthier relationship with technology. This concept emphasizes cultivating awareness of digital habits, establishing boundaries, and intentional technology use. However, a standardized assessment tool for digital mindfulness remains limited, highlighting a significant gap in current research. Thus, purpose of study is to develop and validate Digital mindfulness scale. A mixed research design was used, consisting of two phases; Qualitative for items generation (n=90) and quantitative phase for Scale development (n=250), and establishing psychometric properties and validation (n= 320) individuals with age range 18 – 50. for the present study. To determine the underlying structure of the DMS scale, Exploratory Factor Analysis (EFA) was employed, followed by Confirmatory Factor Analysis (CFA) to validate and confirm the structure. The EFA revealed a unifactorial structure consisting 14 items, accounting 30.34% of total variance. for the scale, which was subsequently confirmed by the CFA. scale demonstrate good internal consistency(  $\alpha = .82$ ).its construct, convergent and discriminant validity also established. The Findings indicate that the digital Mindfulness scale is a reliable and valid instrument for assessing mindful engagement with digital technologies. The study contributes a measurement scale, which is currently not available in the marketing literature. The scale can be effectively use in research, education and clinical settings to examine well-being and to inform intervention aimed at promoting healthier digital technology use.

Keywords: Mindfulness, Digital Mindfulness, Development, validation

## Introduction

In the digital age, the rapid advancement of digital technology has changed the way individuals interact, work, and live. This leads to continuous connectivity and accessibility (Carrizales, 2009). Prolonged exposure to digital devices has resulted in a state of perpetual connectedness, contributing to information overload, diminished attention spans, and an increased distraction in that way impacting cognitive and psychological functioning. The continuous barrage of notifications and the addictive nature of specific apps make it difficult to disconnect. Excessive use of digital device is associated with anxiety, depression, and addiction (Chen, 2016). As concerns about the adverse impacts of excessive digital usage has increased, there is a growing interest in finding ways to balance the benefits of technology with overall well-being (D'Arcy, 2014). This led to rise the field of digital mindfulness.

Mindfulness involves being fully present, acknowledging the current moment without judgment, and accepting it as it is (Hayas et al., 2019). Digital mindfulness integrates conventional mindfulness concepts with advanced technology, yielding a novel strategy for enhancing mental health. Mindfulness practices combined with digital technology produces new opportunities to provide flexible and reasonable mental health care. (Kurki et al., 2021). Digital mindfulness refers to a mindful approach, characterized by the evaluation of contextual influences and self-assessment of performance to foster optimized digital interactions. previous studies show that mindfulness in digital environments is important to in maximize and improve meaningful technology use (Dane 2011; Sun et al. 2016; Thatcher et al.2018). Digital mindfulness is a mindful state characterized by four key qualities: awareness of choices, attentiveness to digital cues, receptivity to new experiences, and being present in the moment,

all within digital environments like social media, virtual reality environments, and virtual collaboration platforms. Prior studies suggest that cultivating mindfulness with these attributes can enhance and lead to changes in behavior (Thatcher et al.,2018).

Digital mindfulness includes cultivating habits that enable individuals to stay focused and concentrated, while minimizing technological distractions. It helps users to be more intentional with their digital use, encouraging them to pause and think before mindlessly scrolling or multitasking with several apps (Harley,2022). In today's digital era, this practice is key to managing digital overload and reducing stress. By being more mindful, people can manage their digital habits and boost their well-being.

Digital mindfulness involves the deliberate and conscious use of technology to enhance productivity, reduce stress, and promote balance. It involves intentional technology engagement, clear boundary-setting, mindful content selection, regular digital detox, and a preference for physical experiences. By adopting these practices, individuals can make conscious choices that support their wellbeing in a technology-driven world. Ultimately, technology should be viewed as a tool to improve lives rather than control individuals (Kanengoni, 2023).

These practices facilitate to make conscious choices that promote well-being in digital world. It is essential to realize that technology is a tool Digital mindfulness differs from "digital detoxes" or "disconnection" in that it is regarding a balanced and sustainable approach, rather than temporary or permanent technology avoidance, instead of avoiding the digital world, digital mindfulness promotes intentional use of digital technology. Klase et al. operationalize digital mindfulness as an individual's vigilance, consciousness, openness,

presenters, intentional use, non-judgmental and reflectiveness (Klase et al., 2021).

### Theoretical Background

#### Theory of Planned Behavior (TPB)

The present study grounded on principle of mindfulness and the Theory of Planned Behavior (TPB). According to TPB, an individual intent to involve in mindful digital behavior is influenced by their attitude toward digital mindfulness such as Beliefs about the benefits and drawbacks of mindful technology use, perceived social norms, i.e. expectations of society to reduce social media use, set digital boundaries and perceived behavioral control i.e. belief in ability to control compulsive scrolling behavior. Mindfulness can further strengthen self-regulation, ensuring that intentions translate into actual mindful technology use, reducing compulsive behaviors and enhancing well-being (Ajzen, 1991; van Deursen et al., 2015)

In Literature, the concept of digital mindfulness is explored, measuring this construct is become crucial now. There are various scales that measures mindfulness including the Freiburg Mindfulness Inventory (FMI) (Buchheld et al., 2001), the Cognitive and Affective Mindfulness Scale (CAMS) (Feldman et al., 2004), the Kentucky Inventory of Mindfulness Skills (KIMS) (Baer et al., 2004), the Mindful Attention Awareness Scale (MAAS) (Brown & Ryan, 2003), and the Mindfulness Questionnaire (MQ) (Chadwick et al., 2005). In addition, The Revised Cognitive and Affective Mindfulness Scale (CAMS-R) (Feldman et al., 2005) and the Philadelphia Mindfulness Scale (PHLMS) (Cardaciotto & Hebert, 2005). Interestingly, These instruments were developed to evaluate mindfulness as a trait or state-like quality, reflecting a individual general tendency to be mindful in everyday life However, these instruments might not fully capture the specific challenges and behaviors linked with use of digital technology, such as habitual checking of devices, Alertness and awareness while using digital

technology, intentional use or Mindless scrolling, consumption of content, Difficulty disengaging from digital platforms, the quality of attention *paid* to technology (e.g., focused use vs. fragmented attention).

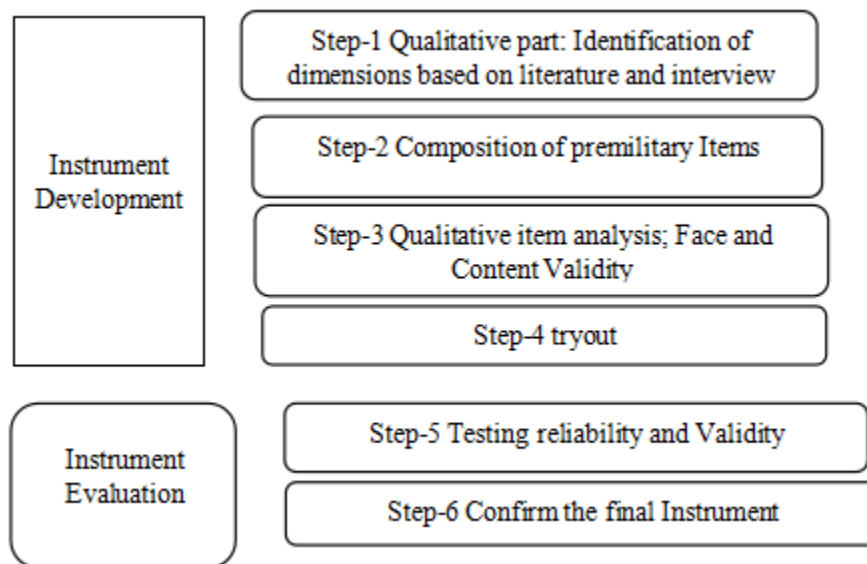
Previous literature shows that, incorporating mindfulness in digital contexts is essential for optimizing technological efficacy and fostering more intentional technology utilization (Dane 2011; Sun et al. 2016; Thatcher et al., 2018). Furthermore, literature identify effect of digital mindfulness intervention on depressive anxiety and stress symptoms their finding revealed Digital mindfulness has positive effect on sleep anxiety emotional regulation stress, depression and improving overall quality of life (Mrazek et al., 2019) moreover, IT mindfulness reduces the technology addition and promote comfortable digital technology use (Langer & Moldoveanu, 2000). Similarly, another study investigates mediating link of reflectiveness between digital mindfulness and mindful use of digital technology results revealed that the integration of digital mindfulness with self-directed reflection on technology use can reduce digital can reduce digital fatigue and increase digital wellness and eventually enhance the productive use of technology through mindful action (Klase et al., 2022).

Moreover, a study found that mindful use of technology reduced stress of individuals at workplace (Wrede et al., 2025). Despite the increasing prevalence of digital mindfulness, to date, there is no universally accepted or validated instrument for assessing digital mindfulness. While a few conceptually adjacent tools exist – such as the Information Technology Mindfulness scale (Thatcher et al., 2018) or scales measuring technology self-control. This creates both a theoretical and methodological gap, justifying the development of a Digital Mindfulness Scale (DMS).

**Study Objectives**

- 1- To develop and validate Mobeen & Qureshi Digital Mindfulness Scale.
- 2- To measure conscious and mindful use of digital technology and establishing its link with psychological distress and life satisfaction.

**Method**



*Figure 1. Steps in the Designing of the Scale*

**Participants and Procedure**

The study targeted users of various digital devices. Purposive sampling techniques were used to recruit diverse perspectives on the construct until data saturation. The inclusion criteria include; individuals who have some online presence and digital consumption experience. (Creswell, 2013; Glaser & Strauss, 1967). A conscious effort was made to include participants from diverse ethnic, racial, age, and gender backgrounds. 20 participants took part in research interviews, deemed enough for them to share views and daily digital device experiences. There were three groups of informants: three subject matter experts, five academics, and twelve end-users.

**Research Design**

In present study, A mixed research design was used, consisting of two phases;

**Phase 1**

Qualitative phase that includes, identifying relevant construct, generation an item pool, and validation process for evaluation of items.

**Scale Development Method**

DeVellis' (2016) scale development method was used in this study. Figure 1 shows the procedural steps involved.

**Item generation pool**

The possible dimensions of digital mindfulness were identified through literature review. and interview guidelines were made based on open-ended questions related to components of digital mindfulness i.e. user's alertness, awareness, openness, presenters, non-judgment and reflectiveness (Klase et al., 2021). Semi structured Interviews were conducted up to the saturation. Data was collected and analyzed to extract items. For example, they were asked to tell how they prioritize their digital tasks, how they stay focused and alert while using digital technology? Interviews were properly recorded after gaining consent inform consent then thematic analysis is used to analyze

data, and an item pool was developed containing 56 items that assessing mindful and intentional use of digital devices. Example items from the pool include “I use digital devices with a clear purpose in mind”, “I am aware of how much time I spend on digital devices each day” and “I set boundaries around my digital use”.

### Validation process

Expert review was concocted to refine the item set, expert review was conducted; expert panel include 3 professionals including supervisor and two colleagues who are field expert and researcher. They reviewed each item for clarity, relevance to dimensions, content and face validity. All double barrel items, ambiguous items, poorly worded items were removed. Their input led to changes that made the scale more coherent and readable. Afterword reviewed by English language expert to correct concerns and grammatical errors in items. After expert review only 35 items were approved for polit testing. In scaling method, 5- Point Likert Scale is used in which 1= strongly disagree, 2 =disagree, 3= neutral, 4 = agree, and 5 = strongly agree with 35 as minimum and 175 as maximum score. High scores indicate high digital mindfulness and low score indicates low mindful use of digital devices. The initial version of the scale contained 35 items measuring awareness of digital habit (n=5), intentional use of digital technology (n=5), presence (n=5), openness (n=5), alertness (n=6), Reflection

(n=5), non-judgmental (n=4). The items were modified based on feedback and a tryout with 70 participants who use digital devices more than 3 hours, participants reviewed the items and reported no difficulties in understanding the statements. Thus, the initial final scale of Digital mindfulness uses for further phase.

### Phase 2 Quantitative analysis

2<sup>nd</sup> phase of study is quantitative that consisting of; collecting data, and establishment of Psychometric properties through factor analysis and convergent and discriminant validity. Hypotheses are formulated as;

- 1- Psychological distress is negatively correlated to digital mindfulness
- 2- Satisfaction with life is positively correlation with digital mindfulness

### Sample and Procedure

Participants were recruited using purposive sampling, total sample was n= 660 qualitative interviews were conducted on sample of n=20. For polit testing n= 70. Scale development study was conducted on n=250, for establishing psychometric properties and validation sample of n= 320 individuals with age range 18 - 50. for the present study, only digitally active individuals who spent over 3 hours online or on a device were included. This was done to avoid outlier (Shapira et al.,2007). To keep this article short Demographic details of final sample n=320 is reported below

**Table 1:** *Description of Demographic variables of research participants*

Variables	Categories	Frequency (f)	Percentage (%)
Gender	Male	164	51.2
	Female	156	48.8
Education level	Intermediate	14	12.8
	Bachelor's/ BA	129	40.3
	Masters/BS	113	35.6
	MPhil/ MS	33	10.3
	Ph.D.	3	9
Residence	Rural	70	21.9

	Urban	250	78.1
Family system	Nuclear	178	55.6
	Joint	142	44.4

**Table 2:** *Description of demographic variables of research participants*

Variables	<i>M</i>	<i>SD</i>	Range	Skewness	Kurtosis
Age	26.27	7.203	17-50	1.39	1.35
Family income	130239.06	207545.108	2500-2500000	7.79	75.66
No of hours using digital devices	6.65	3.36	1-18	1.102	.751

Note. *M*= Mean, *SD*= Standard deviation

### Instruments

**Psychological distress scale.** Developed by Kessler et al (2003), 10 items, five-point Likert scale (where 5 = all of the time, and 1 = none of the time). Score is computed by adding score of all 10 items, Low score show low psychological distress whereas, high score shows high psychological distress.

**Satisfaction with life scale.** Developed by diener et al (1985), 5 item scale, 7-point Likert scale response category ranges from 1= strongly disagree to 7= strongly agree. Score of 5 items are then summed to obtain total score of the scale. It demonstrates good Cronbach's alpha .90. construct validity is also established (Diener et al., 1985).

**Digital mindfulness scale.** Developed by Mobeen & Qureshi (2025), 14 items scale, 5-point Likert scale response category ranges from 1= strongly disagree to 5= strongly agree.

### Results

To explore underlying latent factors and structure of data Exploratory Factor Analysis (EFA) is performed. A Principal Components Analysis, an oblimin rotation is used as the factors in Digital mindfulness scale are correlated to each other (Field, 2005). EFA was conducted on subsample(n=250) For measuring sample adequacy Kaiser-Meyer-Olkin test is used and the results showed that the KMO value was .846, which is Meritorious value that was above the recommended value of 0.5 (Hair et al., 2010, 2018). Bartlett's test of sphericity results (Chi-square  $\chi^2 = 913.673$ ,  $df=91$ ,  $p < .000$ ) Results showed data supported factor analysis and provided an adequate sample for further analysis

Figure 2 : Scree plot showing Factor Extraction of Digital Mindfulness Scale

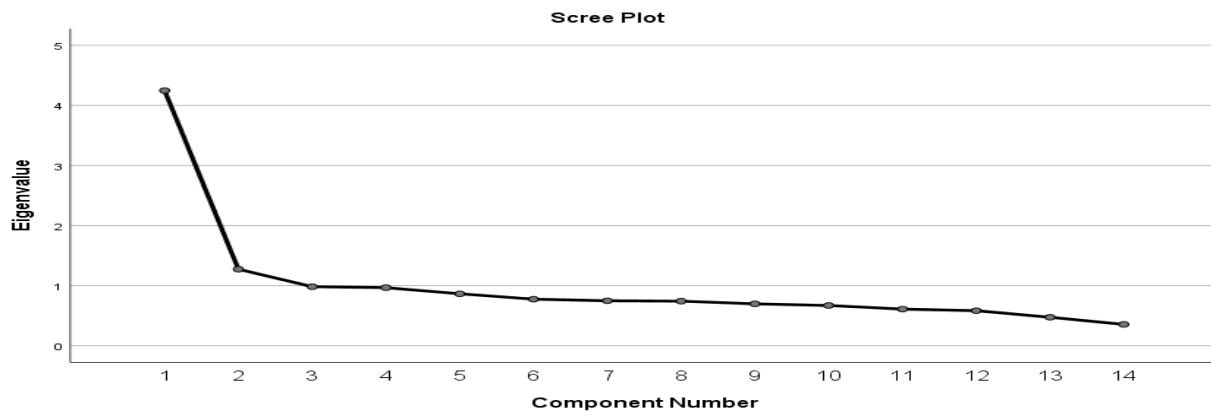


Table 3: Factor Loading and variance of Digital Mindfulness Scale by principle component Analysis

Sr No.	Item No	F1 (DM)	$h^2$
1	24	.479	.230
2	25	.655	.429
3	31	.456	.208
4	14	.618	.381
5	26	.456	.208
6	21	.545	.297
7	5	.583	.340
8	8	.585	.342
9	10	.619	.384
10	9	.506	.293
11	11	.541	.297
12	7	.533	.284
13	27	.545	.317
14	23	.529	.280
Percentage of Variance		30.34	
Eigenvalue		4.25	

Note. Factor loading  $>.040$  are reported

To identify the number of factors, parallel analysis and scree plot examination were employed, with both methods indicating that a single-factor extraction was most suitable (Figure 1). Factor analysis results are interpret based on the factor loadings. Basic rule is; a variable has a minimum factor loading of 0.3 or greater to be retained, that indicates variance explained by the factor is 10%

However, Comrey and Lee (1992) guidelines for factor loadings:  $\geq 0.4$ : fair,  $\geq 0.5$ : good,  $\geq 0.6$ : very good,  $\geq 0.7$ : excellent in a larger sample ( $>200$ ), In the current study, all factor loadings were above 0.4 indicating Fair to very food factor loading, Items with loadings below 0.3 on any factor were dropped from the pool (Hair et al., 2010). Exploratory factor analysis was rerun after dropping problematic items. Items with loadings  $<0.3$  were considered for

deletion. (Hair et al., 2010). Items that load on multiple factor with >0.30 also removed (Field, 2005). the model was re-specified and rerun each time (Zainudin, 2012; Costello & Osborne, 2005; Lloret-Segura et al., 2014). The final

unidimensional factor contributed 30.34% of the variance and consist of total 14 items.

**Validation Study Results**

A Confirmatory Factor Analysis (CFA) validated the previously identified factor structure (Table 3). CFA was conducted on second subsample(n=320).

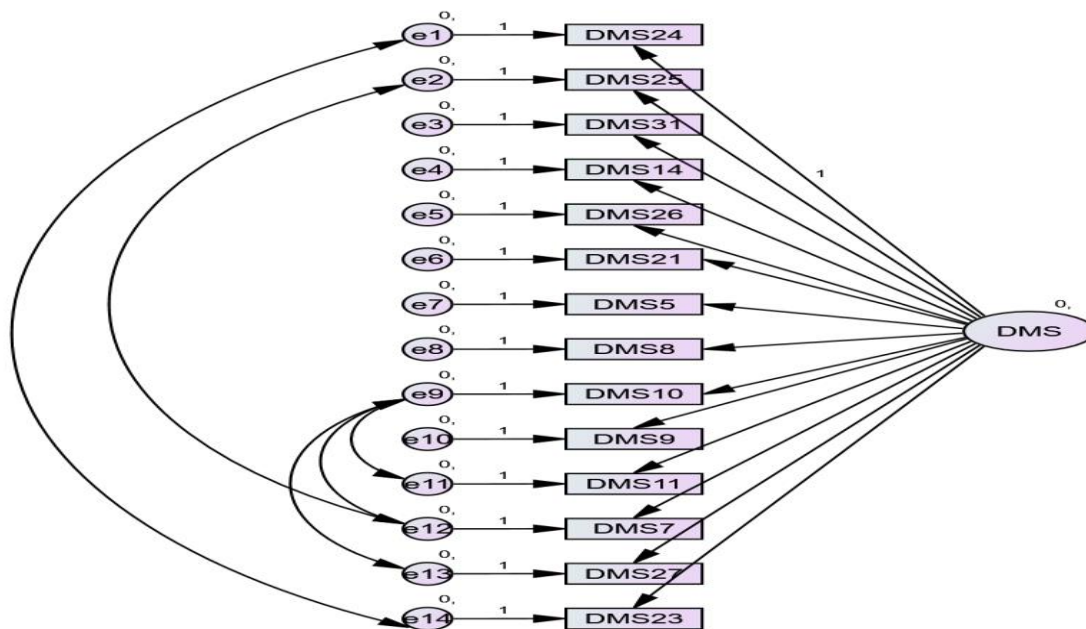
**Table 4:** *Confirmatory factor analysis Showing Indices of Model Fit for Digital Mindfulness scale*

Model	$\chi^2$	df	p	CMIN/df	Fit Indices			
					CFI	NFI	TLI	RMSEA
DMS	116.44	72	.001	1.62	.947	.875	.933	.044

Note. *df* =degree of freedom, CFI= comparative normed fit index, NFI= normed fit index, TLI= Tucker-Lewis index, RMSEA= Root Mean Squared Error of Approximation

The model fit was satisfactory:  $\chi^2(72) = 116.44$ ,  $p = .001$ ;  $CFI = .947$ ;  $TLI = .933$ ;  $RMSEA = 0.044$ . Item

factor loadings were strong (>0.50), confirming each item's relevance to the construct. According to findings of exploratory and confirmatory factor analysis, 14 items Digital mindfulness scale was suitable in unifactorial.



**Figure 3.** *CFA Model of Digital Mindfulness Scale*

**Reliability and convergent validity**

For measuring reliability Cronbach's alpha reliability analysis is used (Koufteros, 1999). Results

of present study shows Cronbach alpha value =.82, which indicates good internal consistency (Hair et al., 2018).

**Table 5:** *Item total correlation of Digital mindfulness scale*

Digital mindfulness scale	
Item	<i>r</i>
5	.564**
7	.540**
8	.580**
9	.520**
10	.614**
11	.547**
14	.604**
21	.555**
23	.538**
24	.474**
25	.630**
26	.473**
27	.581**
31	.474**

\*\**P*<0.01

Table 3 shows the item-total correlation analysis indicates all 14 items show significantly positive correlation with score of the total, correlation coefficients (*r*) ranging from .473\*\* to .630\*\*, reflecting that each item contributes well to overall construct.

#### Convergent validity

Pearson correlation supported the convergent validity of digital mindfulness scale. Results revealed that digital mindfulness is positively correlated with life satisfaction whereas, negatively correlated with psychological distress.

**Table 6: Correlation Matrix of Digital Mindfulness scale, Psychological Distress and Life Satisfaction**

Variables	<i>M</i>	<i>SD</i>	1	2	3
1 Digital Mindfulness	50.85	7.95	1	-.253**	.472**
2 Psychological distress	23.06	8.61		1	-.322**
3 Life satisfaction	23.76	6.32			1

Note. \*\**p*<.01, *M*= Mean, *SD*= Standard deviation

#### Discussion

Digital technology has transformed several areas of everyday life, in digital world where technology become necessity and rarely leave our hands. From the moment we wake up to the time we go to bed, screens dominate attention. Technology increases productivity, creativity, and communication, on the other hand there is risk for digital addiction, anxiety, sleep disruption, and a constant sense of urgency. There is need to assess individual's digital Mindful use of technology to check whether they

use technology purposely and consciously, instead of automatically or reactively. The purpose of this study is to develop and validate a scale for Digital Mindfulness.

Exploratory factor analysis (EFA) revealed a unidimensional structure of the Digital Mindfulness Scale, with 14 items loading satisfactorily on a single factor. All retained items demonstrated factor loadings above the acceptable threshold of 0.40, indicating fair to very good loadings. The single-factor solution was further supported by parallel

analysis and scree plot examination, suggesting that digital mindfulness operates as a coherent and unified construct. The extracted factor accounted for 30.34% of the total variance, which is considered acceptable for psychological scale development, particularly for newly developed constructs (Xie & DeVellis, 1992).

A reliability analysis showed Cronbach's alpha = 0.82 suggests the scale has good internal consistency. Item-total correlation analysis further confirmed that all items contributed meaningfully to the overall construct, with statistically significant correlations ranging from 0.47 to 0.63. These findings suggest that the items are homogeneous and collectively capture the core aspects of digital mindfulness.

Confirmatory factor analysis (CFA) provided additional support for the factorial validity of the DMS. The goodness-of-fit indices demonstrated an adequate to good model fit, as indicated by acceptable values of chi-square, CFI, TLI, NFI, and RMSEA. All standardized factor loadings exceeded the recommended cutoff value of 0.50 (Hair et al., 2010), highlighting the stability and robustness of the measurement model. Together, the EFA and CFA results confirm the structural validity of the scale (Worthington & Whittaker, 2016).

Convergent and discriminant validity was established through correlation analyses with psychological distress and life satisfaction. Digital mindfulness is positive correlation with life satisfaction ( $r = .47$ ) and negative correlation with psychological distress ( $r = -.25$ ), these values are within the range of Funder and Ozer's (2019) effect size guidelines. This supports the scale's convergent and divergent validity. These findings are consistent with theoretical literature that, more aware and conscious use digital technology will enhance well-being while reduce distress. The observed relationships reinforce the relevance of digital

mindfulness as a protective psychological resource in the context of increasing digital engagement.

Overall, the results indicate that the Digital Mindfulness Scale reliable and valid for assessing individuals' mindful use of digital technology.

### **Implication**

The Digital Mindfulness Scale can be effectively used by psychologists, counselors, educators, and mental health professionals to assess individuals' awareness and regulation of digital technology use. It can use as a screening tool to identify individuals at risk of problematic or mindless digital engagement more prone to having psychological distress. In educational settings, the scale can be employed to evaluate students' digital habits and inform interventions aimed at promoting healthy and mindful technology use. In clinical contexts, it can be integrated into assessment batteries to monitor clients' digital behaviors and to evaluate the effectiveness of digital detox or mindfulness-based interventions. Research Implications the DMS provides a standardized instrument for future research exploring digital mindfulness across different populations, age groups, and cultural contexts. At an organizational and policy level, the scale may inform the development of digital well-being programs and guidelines aimed at promoting balanced and mindful technology use in workplaces and communities.

### **Limitation and Recommendations**

While this study offers insights into digital mindfulness, it has limitations. The cross-sectional design provides a snapshot, so longitudinal studies are needed to track changes over time. Moreover, the use of non-probability sample, may not represent the whole population that limit generalization of study finding. Future research should include diverse cultural, socioeconomic, and educational backgrounds. Due to short time

convergent validity was established with just two constructs thus, it is also recommended to find correlation with various construct for further validation.

### Conclusion

The present study successfully developed and validated a 14-item Digital Mindfulness Scale with strong psychometric properties. The scale demonstrated a clear unidimensional structure, good internal consistency, and satisfactory construct, convergent, and discriminant validity. The findings suggest that digital mindfulness is a measurable and meaningful construct that is positively associated with life satisfaction and negatively associated with psychological distress. Given the rapid integration of digital technologies into everyday life, the availability of a valid and reliable measure of digital mindfulness is timely and important. The Digital Mindfulness Scale offers researchers and practitioners a concise and effective tool to assess mindful engagement with digital environments. Overall, the scale contributes to the growing literature on digital well-being and provides a foundation for future research and intervention development

### Ethics statement

The study received approval from SZABIST University's Ethics Committee and was conducted as per local regulations and institutional requirement. Participants gave their written consent to take part in the study.

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No funding was received for this research,

### Conflict of interest

The authors disclose no conflict of interest

### Author contribution

**Author 1:** Idea generation, writing & drafting manuscript, Data collection and analysis

**Author 2:** Supervise and guiding, expert review

### Data availability statement

Data will be available upon reasonable request

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