

## SPECIAL FOCUS PAPER

# Digital Well-Being in Mobile Learning Technology: A Systematic Literature Review in Educational Environment

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## ABSTRACT

Post-COVID is among the most transformational periods during which human beings are acquainted with the utmost use of digital devices and tools. The wave has impacted most of the industries in one way or another, including the education sector, where the stakeholders are driven or compelled to integrate online modes to keep pace with the current trends. Nevertheless, as mobile learning continues to increase, well-being has become a current issue that should be studied in depth. The current connectivity, notifications, and extended screen time affect the cognitive, emotional, and social well-being of learners. With the introduction of mobile learning in most teaching environments, the interaction between the utilization of mobile technology and the idea of digital well-being must be comprehended in order to implement a sustainable learning ecosystem. This paper conducts a systematic literature review of 20 empirical and theoretical publications related to digital well-being in mobile learning technological contexts that were published between 2015 and 2025. In accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) principles, the scholarly databases, including Scopus and Web of Science, were searched systematically. The study also involves the use of the Telecom Regulatory Authority of India (TRAI) data for identifying the trends about mobile usage and a better understanding of the topic. The review evaluates the conceptualization of digital well-being; the variables that have affected the patterns of screen-time use, multi-tasking, online behaviors, cognitive load, and techno-stress; and the measures that have already been suggested to maintain the healthier digital habits of learners. Results indicate that although mobile learning technology is flexible, engaging, and provides individual learning patterns, it also presents a threat in terms of distraction, anxiety, fatigue, and short attention spans. There are also gaps in longitudinal evidence, cultural diversity samples, and intervention-based research. It has been recommended that digital well-being needs to be enhanced by incorporating digital self-regulation skills, adaptive interface design, and institutional policies.

## KEYWORDS

digital well-being, mobile learning, technology, screen time, transformation

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## 1 INTRODUCTION

With the transformational 21st century, digital technology has brought revolutionary changes at the global level, and digital components have become a necessity. One such component is mobile learning technologies in the educational sector. During COVID-19, online learning prevented a complete collapse of schooling systems, with distance learning modalities having a potential reach of over 1 billion learners [1], [2]. Apparently, the global wave of the pandemic COVID-19 has led to the adaptation of mobile learning technologies in the educational environment to the next level [3]. The UNESCO (United Nations Educational, Scientific, and Cultural Organization) Global Education Monitoring Report [1] points out that the past four decades have been the most influential in the introduction of change in the education sector through the assistance of Information and Communication Technologies (ICT). As per this report, around 87 percent of visually impaired adults claim that traditional assistive devices are starting to be substituted by accessible technology devices, which consequently testifies to the transformative power of digital platforms in inclusive education. Additionally, Massive Open Online Courses (MOOCs) have seen a massive growth in the number of learners in 2021, with over 220 million enrolled over the course of the year alone [1]. This growing wave of digital innovation has reshaped how learners access information, interact with content, and engage in personalized, flexible, and mobile-supported educational environments [4]. Talking about such expansions, one must also pay attention to pivotal regulatory, governance, and ethical issues, especially with the model of access based on subscriptions and data ownership, as well as the privacy of both students and academic employees [5]–[7].

This study focuses on understanding how mobile learning affects students' digital well-being, what challenges exist, what solutions are proposed, and what gaps must be addressed. It also highlights the need for more inclusive, comprehensive, and empirically tested approaches to protecting digital well-being in mobile-based education. It explores how digital well-being is conceptualized within mobile learning contexts and synthesizes evidence on both the positive and negative effects of mobile technology on students' psychological, physical, emotional, and social well-being. The following research questions are explored and answered throughout this paper:

- RQ1:** How is digital well-being conceptualized within mobile learning environments in existing educational research?
- RQ2:** What positive and negative effects of mobile learning technologies on learners' digital well-being have been reported in the literature?
- RQ3:** What factors influence digital well-being during mobile learning in educational settings?
- RQ4:** What strategies, interventions, or technological features have been proposed or implemented to support digital well-being in mobile learning environments?
- RQ5:** What research gaps and future directions exist in the study of digital well-being within mobile learning environments?

## 2 LITERATURE REVIEW

This literature review is drawn upon using the 20 articles that are open access and peer-reviewed. The articles selected are relevant to the use of digital mobile technologies. It is important to understand the scope of the reviewed studies before introducing the SLR findings. The chosen literature covers various educational

situations, learners, and technology, which provides information about the conceptualization of digital well-being as a norm. The way in which it is influenced and sustained in mobile learning settings in the international research is also addressed. Table 1 shows the articles selected and their key findings.

**Table 1.** Literature summary table

Author(s) & Year	Purpose/Focus	Methodology	Key Findings Related to Digital Well-Being/Mobile Learning	CASP Quality
Asikainen et al. (2020)	Learning profiles, burnout, and academic outcomes	Quantitative	Burnout linked with learning stress affecting digital well-being	High
Arity & Vesty (2020)	Authentic assessment using digital tools	Conceptual/chapter	Digital tools increase engagement and flow	Medium
Bates et al. (2020)	Potential of AI in higher education	Conceptual review	AI enhances personalization but poses well-being risks	Medium
Lajoie et al. (2020)	Emotions in technology-rich environments	Conceptual + empirical	Emotional regulation is central to digital well-being	High
Alhalafawy et al. (2021)	Adaptive mobile scaffolding	Experimental	Adaptive systems improved digital well-being	High
Rad et al. (2021)	Foundations of digital well-being	Book	Multidimensional construct of digital well-being	Medium
Hofer et al. (2021)	Online learning in crisis situations	Mixed-method reflection	Digital stress and coping mechanisms identified	High
Vanden Abeele (2021)	Digital well-being is dynamic	Theory paper	Digital well-being is relational and contextual	High
Vanden Abeele & Nguyen (2022)	Mobile connectivity & well-being	Editorial synthesis	Mobile use both enables and threatens well-being	Medium
Bhattacharya et al. (2023)	Digital well-being perspective	Review	Highlights risks/benefits of tech usage	Medium
Dutt (2023)	Examines digital risks, threats, and scams affecting user well-being	Conceptual/empirical analysis	Identifies digital risks as a significant contributor to stress, anxiety, and reduced digital well-being; highlights the need for protective and policy-level interventions.	Medium
Palalas & Doran (2023)	Digital wellness in online learning	Conceptual framework	Principles for promoting digital wellness	High
Webster (2024)	Impact of online learning post-COVID	Quantitative	Digital strain impacted academic well-being	High
Ossiannilsson (2024)	Well-being in open/blended learning	Conceptual	Well-being linked with openness & flexibility	Medium
Nagasundram et al. (2024)	Smartphone dependency in M-learning	Conference empirical	Overuse increases dependency, reducing well-being	Medium
Anthony (2025)	Predicting mobile phone use & well-being	Machine learning	ML predicts at-risk digital well-being patterns	High
Islambouli et al. (2025)	Negative impact of smartphones	Systematic review	Excessive smartphone uses harms well-being	High
Alruwaili et al. (2025)	Digital intelligence & well-being	Survey	Higher digital intelligence boosts digital well-being	High
Omeje & Ozonwu (2025)	Effects of ChatGPT on learning well-being	Commentary/empirical	AI supports learning, but can distract and reduce well-being	Medium
Vimala & Sheela (n.d.)	Predictive analytics for digital wellness	Deep learning design	DL model accurately predicts wellness indicators	Medium

Source: Compiled by authors.

## 2.1 Theoretical framework

In this study, researchers do not rely on one big theoretical framework but rather go for a combination of different theories and themes. Digital well-being is looked at from different angles, referring to the emotional, cognitive, behavioral, and social factors. The learners' motivation and autonomy in mobile learning environments are related to Self-Determination Theory [8], while the issues of distraction, multitasking, and overload are explained by Cognitive Load Theory [9]. Technology adoption and user participation are supported by the technology acceptance model [10]. The influence of the environment and context on digital well-being is viewed from an ecological systems perspective. This pluralistic approach allows the SLR to highlight the different theoretical perspectives that are influencing digital well-being in mobile learning research.

## 3 MATERIALS AND METHODS

This paper uses a systematic literature review supplemented with secondary data analysis using the Telecom Regulatory Authority of India (TRAI) dataset. For the systematic literature review, open-access and peer-reviewed articles were selected using PRISMA guidelines [11] to maintain transparency and replicability. The articles were searched using the open-source libraries and repositories such as Scopus, Web of Science, Google Scholar, Frontiers, PubMed, etc. The Boolean search string was employed to get suitable results. The following search string was used for searching: (“digital well-being” OR “digital wellness”) AND (“mobile learning” OR m-learning OR “mobile technology” OR “smartphone learning”) AND (education OR “learning environments”).

Below are the inclusion criteria for the selection of the articles included in the literature.

- Published between 2015 and 2025
- Peer-reviewed and open-access
- Focus on digital well-being and mobile learning
- Studies conducted in educational environments

Apart from the above-mentioned inclusion criteria, we have the following exclusion criteria:

- Opinion papers
- Studies focused only on general smartphone use (not learning)

The screening process involved the initial search of the research papers using the Boolean string mentioned above. The initial search yielded 270 research articles. Removal of duplicates in the next step left 105 papers. On further screening, non-open-access articles were removed, which left 51 articles for consideration. Upon using CASP on those 51 articles, only 20 articles showed a high or medium level of inclusivity. Thus, at last, 20 articles were used for the SLR as shown in Figure 1.

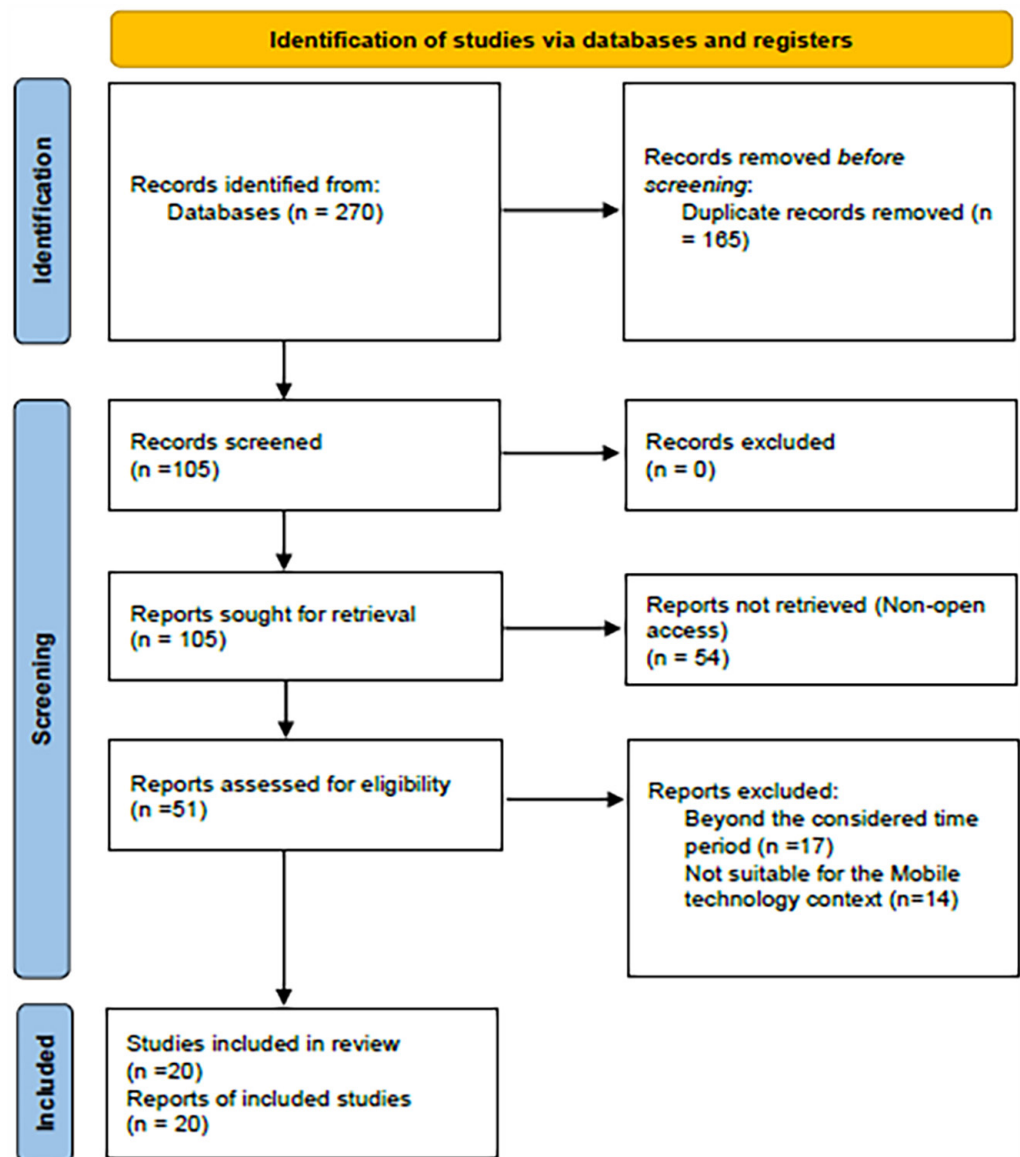


Fig. 1. PRISMA flowchart

Source: Compiled by authors.

To complement the SLR findings, the study also incorporates secondary quantitative data analysis using publicly available datasets from the TRAI. This data was employed to create descriptive graphs to show national patterns in the use of mobile internet, smartphone penetration, and digital consumption. This review and analysis of secondary data provides the possibility of having a deeper insight into the effect of the rising mobile connectivity on digital well-being in the educational setting. All analyses were conducted ethically using open-source data with no direct human participation.

## 4 RESULTS

This section of the paper is divided into two parts. The first part discusses the qualitative insights derived from the literature review, and the next part is the discussion where TRAI data is included and elaborated upon.

## 4.1 Qualitative findings

This review set out to elucidate the digital well-being concept, its factors, and impacts in mobile learning environments, grounded in the five research questions. The findings indicate that digital well-being is a complex concept formed by the design of the technology, the behaviors of the learners, the expectations of institutions, and the wider social contexts.

RQ1 aimed at studying how the concept of digital well-being was mentioned in literature. On the whole, no uniform view on the definition of digital well-being is present in the reviewed studies; the concept of digital well-being can be considered through the prism of different disciplines. Others primarily focus on emotional and psychological factors, e.g., stress, burnout, or anxiety, whereas others make the behavioral balance and healthy use of tech their priority [12]. The approaches that have been introduced due to the TAM or theories of engagement [13] and others view digital well-being as a satisfaction product, interface design, and perceived usefulness. Combining these views presents the picture of digital well-being as the best powerless case of a multidimensional construct that reframes emotional health, behavioral regulation, cognitive functioning, and digital literacy [14]–[17].

RQ2 delved into mobile learning's impact on digital well-being and identified both positive and negative effects. The evidence presented a clear dichotomy. The use of mobile technologies, on the one hand, allows for the enhancement of access, flexibility, and even the ruling power of one's mood as well as the engagement if they are employed deliberately and effectively [18]. Processing less stressful and more fun educational practices through gamified learning tools is one of the reasons why students benefit from personalized content and continuous connectivity. However, it is the other way around when the use of technology is not controlled and managed properly; the end-user gets overwhelmed and fatigued mentally, and this impacts their overall health [19]–[21]. Pandemic-related research also points to the more stress-inducing nature of the situation where the boundaries between studying and resting have become blurred; it can be inferred that mobile learning dimensions can be a source of emotional tension in case they are not governed wisely [21]–[24].

RQ3, on the other hand, tried to find factors that might have the biggest impact on the digital well-being situation. The data flagged several determinants as recurrently identified. Digital detoxification practices and developing IT knowledge come out as the two most important aspects that are able to reduce digital stress [19], [24]. Those students who are digitally literate and self-disciplined report little or no negative effects, whereas those with the opposite traits suffer great hardships and pain. Technology design is another major influence on well-being: usability, interface complexity, feedback systems, and the frequency of notifications are all relevant to how learners respond emotionally and cognitively to mobile learning [23]. Contextual factors include institutional workload, assessment design, and online communication culture, all of which are shaping student expectations and informing levels of stress. Social comparison processes linked to social media use also impact mental health [21], [25].

RQ4 examined the strategies or interventions that can help promote digital well-being. Limited intervention-oriented empirical research existed. Activities related to digital detox enhanced the psychological well-being, whereas coping mechanisms and balanced task designs enhanced the ability of the learners to cope with the digital overload [26]. Disengagement was also decreased by the use of gamification when used purposefully to motivate people. However, at the present time,

the study also fails to address numerous explicit forms of wellness-related digital interventions, including workload management, setting limits and notifications, and digital safety education [17], [19]. This shows that there is a huge gap when it comes to practical, scalable strategies for digital well-being improvement in the educational setting [27], [28].

At some point, RQ5 identified numerous gaps in the study and gave future directions. These limitations of the existing evidence are noted in the review. The majority of the research works consist of cross-sectional self-reporting information, which makes it difficult to comprehend the risks in the long term. Up to now, much research has been conducted in the field of university students, whereas hardly any attention has been paid to school children, the rural population, and individuals with low levels of digital literacy. Furthermore, the development of frameworks that will take institutional policy, cultural circumstances, and objective behavior measures is strongly demanded. There is limited literature on examining the role of national-level patterns of the digital infrastructure as a determinant of digital well-being, including access inequity, based on Indian TRAI data. It can be seen that the future work should be designed in a manner that would incorporate longitudinal, experimental, and mixed-method designs, dissimilar populations, and considerations at the policy level [29]. Table 2, given below, lists the major research gaps and future implications as identified with the help of the literature.

**Table 2.** Research gaps and future implications

Research Gap	Description	Implication for Future Research
No unified definition of Digital Well-Being in mobile learning	Studies conceptualize digital well-being differently—stress [19], burnout [19], distraction [21], engagement [24]—without a standard framework [14].	Develop a multidimensional, validated digital well-being model specific to mobile learning.
Limited empirical evidence connecting specific mobile-learning features to well-being outcomes	Few studies examine which app features (notifications, micro-learning, gamification, interface load) affect student well-being [26], [28].	Conduct feature-level experiments to identify design elements that support or harm well-being.
Scarcity of longitudinal research	Most studies use cross-sectional surveys; the long-term impact on stress, burnout, and emotional health is unknown [19], [25], [27].	Use longitudinal or repeated-measures designs to track digital well-being over time.
Underrepresentation of vulnerable learner groups	Research focuses mainly on university students; rural, low-income, disabled, and school-level learners are overlooked [19], [17], [22].	Include diverse populations to understand contextual and socioeconomic variations in digital well-being.
Over-reliance on self-report data	Most studies collect self-reports, lacking behavioral analytics (screen time, usage patterns, interaction logs) [19], [17], [21].	Combine self-report with objective device/data analytics for accuracy.
Very limited evaluation of interventions	Few studies test actionable strategies such as digital detox, notification management, coping training, or wellness apps [17], [15].	Develop and empirically test structured interventions to improve well-being.
Lack of culturally or regionally comparative studies	Research does not account for cultural, digital access, and social norms, especially relevant for India, despite TRAI data showing rapid adoption [12].	Conduct cross-cultural or India-specific research integrating national digital access data.
Minimal focus on policy-level or institutional digital-wellness guidelines	Institutions adopt mobile learning but lack policies on digital workload, screen-time limits, communication boundaries, or assessment frequency [20], [27].	Explore and evaluate institutional digital-well-being policies and governance models.

Source: Compiled by authors.

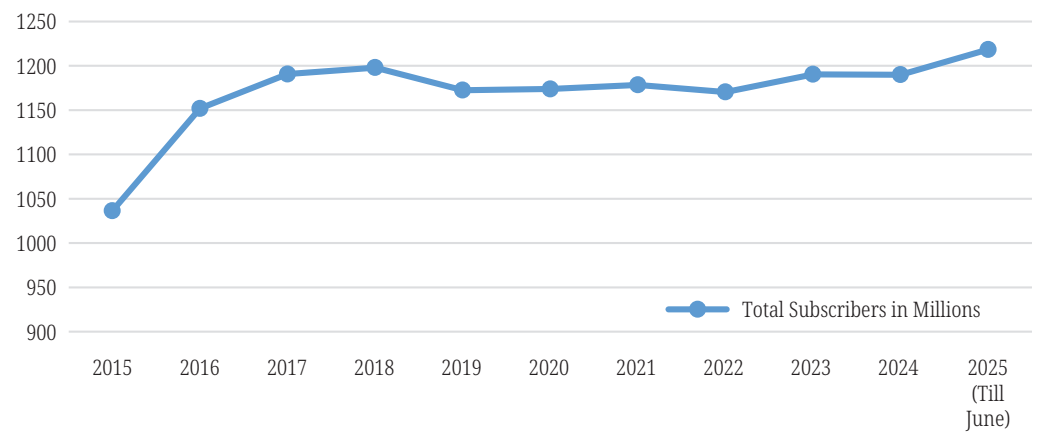
The studies show additional constraints beyond the table's identified gaps. The existing frameworks fail to include essential moderating factors, which include visibility, trust, and satisfaction, that hinder the model's ability to operate effectively [30]. Research studies limit their geographical boundaries, which prevents the establishment of a worldwide research framework and requires in-depth research about specific countries [31]. The personalized learning paths and instant feedback from assessments and gamification for better understanding, along with better engagement, remain insufficiently studied [32]. The demographic studies mainly focus on gender, while they fail to consider important factors, which include age and experience [33]. While digital risks are linked to reduced well-being, empirical assessment of protective and policy-level interventions remains limited [34].

To sum up, the qualitative synthesis shows that in mobile learning, digital well-being is not just one thing, but rather the outcome of a very complex interaction that includes personal capacities, technological environments, and structural conditions. Furthermore, mobile learning also has its drawbacks when it comes to learner well-being; thus, it requires proper design, balanced academic expectations, and evidence-based strategies in the case of learners. Hence, the present research urges the creation of all-encompassing digital wellness frameworks that correspond to the modern-day situation of ever-increasingly mobile-dependent educational ecosystems.

## 4.2 Quantitative findings

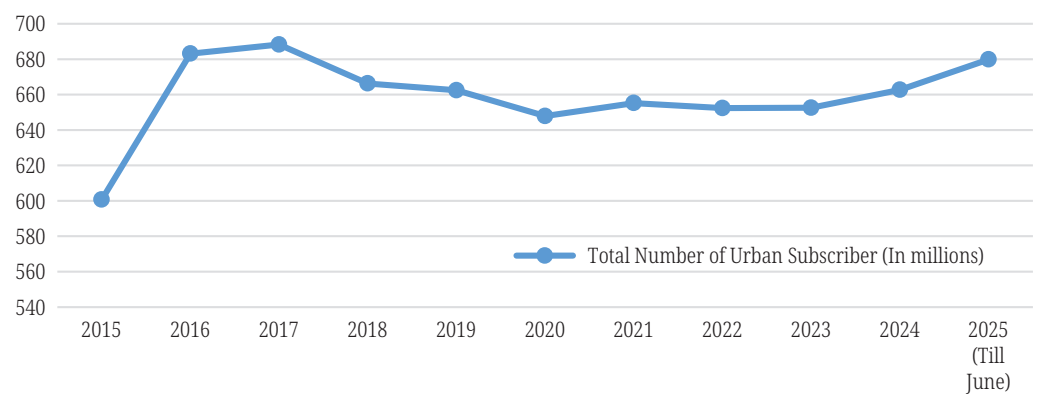
Along with the SLR, this section also utilizes TRAI's data on national mobile subscriptions in India [35]. The rapid digital penetration, the e-commerce revolution [36], the huge youth population, and the high acceptance of mobile learning platforms were some of the considerations in selecting India as a country for study. These national trends provide a relevant and data-rich context for the investigation of the impact of access, connectivity, and digital intensity on digital well-being outcomes. Data shows that there will be a steady increase in total mobile subscribers from 2015 to 2025. The number of mobile subscribers in India went up from 1036 million in 2015 to 1218 million by mid-2025, as shown in Figure 2. This long-term trend points to an increasing reliance on mobile devices for communication, education, and online learning. However, it is also the case that the urban-rural digital access gap is very wide and entrenched. This gap has significant consequences in terms of the fairness of mobile learning and digital well-being. The number of urban users presents a fluctuating pattern that is possibly driven by market factors, as indicated in Figure 3, while in the rural areas, a much steadier and linear growth is observed, indicating better access but at a slower overall scale, as shown in Figure 4. The slower growth in rural areas implies that rural learners may have to cope with more connectivity stress and have less access to digital learning. The trends reveal the impact of COVID-19 as the number of rural subscribers increased from 509.99 million in 2019 to 525.92 million in 2020. This also suggests that schools' closure caused emergency digital adoption that was the need of the hour. On the other hand, the decline in subscribers from urban areas during the same period points to a change in pattern, either owing to migration or financial crisis. Total subscribers

have been consistent around 1.17 to 1.19 billion during the period from 2018 to 2023, reflecting market saturation. The saturated markets largely intensify the competition for consumers' attention, thus giving rise to more digital content, learning apps, and notifications, which in turn may cause digital stress to consumers. The period of 2024–2025 has already seen a rise, as indicated in Figure 5, in the form of the percentage of urban and rural subscribers in the year 2025. Also, the total number of subscribers has increased from 1189.92 million to 1218.36 million, which is taken as a sign of revived digital outreach. This may be because of different reasons such as lower costs of data packages, introduction of 5G, government efforts, and increased need for online courses. The more subscribers, the more likely one can be exposed to mobile learning, though, on the other hand, he/she may also feel screen time overload, pressure to multitask, tiredness of notifications, and the stress of always being connected. Urban and rural differences suggest that risks of digital well-being do not exist evenly, and the rural students may need to endure poorer bandwidth, worse quality gadgets, and develop higher frustration and cognitive burden.



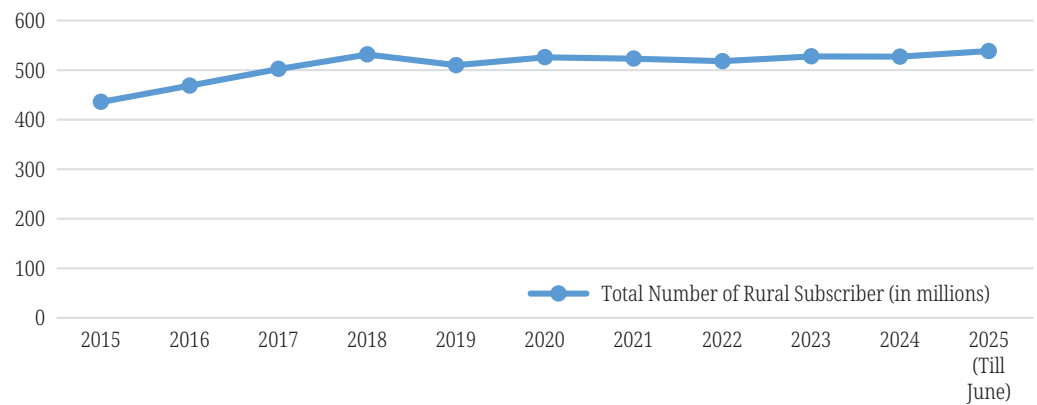
**Fig. 2.** Total number of subscribers in millions in India during 2015–2025 (Till June)

Source: Analyzed by authors.



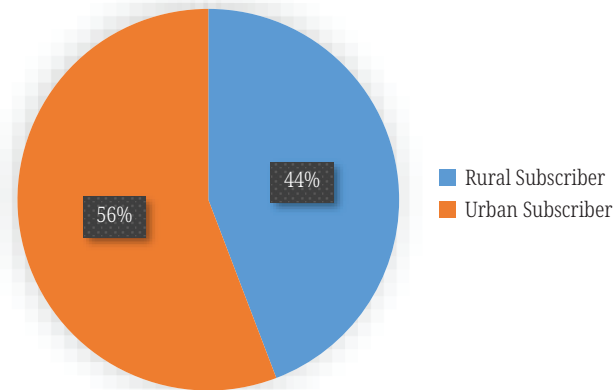
**Fig. 3.** Total number of urban subscribers (In millions) during 2015–2025

Source: Analyzed by authors.



**Fig. 4.** Total number of rural subscribers (In millions) during 2015–2025

Source: Analyzed by authors.



**Fig. 5.** Percentage of subscribers in rural and urban areas in the year 2025

Source: Analyzed by authors.

## 5 DISCUSSION & RECOMMENDATIONS

Creating a standard definition of the concept called “digital well-being” in mobile learning is imperative. The schools and researchers should agree upon a comprehensive framework that would cover all four aspects of digital experience in mobile learning: emotional, cognitive, behavioral, and social [14], [15], [16]. This will result in the studies being more comparable and clearer. Furthermore, the principles of digital well-being need to be part of the instructional design process. There are some ways in which the teachers can ease the cognitive burden on the students that include avoiding sending unimportant notices, considering the distribution of assessment loads, using shorter micro-learning activities, and applying the features that help maintain focus and lessen distractions [18], [24]. The educational institutions should specify the range of screen time allowed, the hours when online presence is expected, the schedule for breaks, and the limits on mobile learning activities that are compulsory [20], [22], [27]. All these measures will contribute to cutting down the use of mobile devices as well as keeping students’ morale high. Similarly, schools can implement privacy-respecting technology that would monitor students’ screen time, the way they use their devices, and how often they switch between tasks, along with the frequency of digital fatigue [21], [28]. This will give the

school accurate information regarding the students' mental state. Moreover, institutions can also apply privacy-respecting tools that observe parameters such as the duration of screen use, the pattern of usage, and the digital fatigue signs. Upcoming studies and regulations should highlight the situation of the students coming from rural or low-income families; the first-generation ones; those with disabilities; and those with high-stress levels [19], [20], [17]. The digital detox method, gamified motivation, and stress management training, which are all empirically tested methods, should be made a part of the academic support services [17], [15]. Priestly test programs should be conducted by institutions to determine how effective they are in the respective settings.

## 6 CONCLUSION

This study, as part of a systematic literature review, as well as national mobile subscriber statistics available from the TRAI, attempts to examine the digital well-being factor in mobile learning. This paper concluded that digital well-being is a complex concept predetermined by the emotional, behavioral, and technological factors. Despite the numerous benefits such as accessibility, flexibility, and engagement, there are also a number of threats that are associated with mobile learning, such as digital fatigue, lack of focus, information overload, and stress levels, particularly among the less digitally savvy or poorly connected individuals. The Indian digital trends reveal that digital growth is occurring at a rapid rate, yet it is not distributed evenly among the rural and urban regions, which once again highlights the argument that access conditions continue to contribute significantly to determining the well-being of the learners. During the review, all the research questions revealed conceptual confusion, little intervention-based evidence, and no longitudinal or inclusive studies taking place. Hence, sustainable mobile learning would necessitate technology that's intentionally designed, academic expectations that are balanced, and policies that are context-sensitive. Lastly, the digital well-being of the learners should be regarded as the main prerequisite for mobile learning environments that are effective, equitable, and psychologically healthy.

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