# DIGITAL PSYCHODIAGNOSTICS: OPPORTUNITIES AND CHALLENGES IN CONTEMPORARY PRACTICE

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*Digital psychodiagnostics has emerged as a transformative approach in psychological assessment, integrating computer-based testing, mobile applications, ecological momentary assessment, digital phenotyping and AI-assisted tools. This article systematically reviews contemporary research to examine the opportunities and methodological challenges of digital psychological assessment. Through a critical analysis of empirical studies, systematic reviews and meta-analyses, key trends in accessibility, measurement precision, ecological validity and large-scale screening are identified. The findings highlight substantial advantages of digital tools, including remote and asynchronous testing, automated scoring, adaptive assessment, multimodal data collection and enhanced ecological validity. At the same time, the literature underscores significant methodological and ethical challenges, such as ensuring psychometric equivalence with traditional instruments, safeguarding sensitive data, addressing the digital divide, mitigating algorithmic bias in AI-supported assessment and adapting tools for diverse cultural contexts.*

*The review emphasizes that the rapid adoption of digital tools must be accompanied by rigorous validation, ethical oversight and professional training to maximize their potential while minimizing risks. The article concludes that digital psychodiagnostics offers unprecedented opportunities to enhance psychological assessment in both research and practice, but its successful implementation depends on integrating technological innovation with evidence-based methods and ethical responsibility. Future research should focus on standardization, inclusivity and longitudinal evaluation of digital tools across diverse populations.*

***Keywords:*** *digital psychodiagnostics, computer-based testing, digital phenotyping, ecological momentary assessment, AI in psychology.*

## Бігунова С. А., Верьовкіна О. Є. Цифрова психодіагностика: можливості та виклики сучасної практики

*Цифрова психодіагностика стала трансформаційним підходом у психологічному оцінюванні, інтегруючи комп'ютерне тестування, мобільні застосунки, екологічно моментальні оцінки, цифрову фенотипізацію та інструменти з підтримкою штучного інтелекту. У статті систематично проаналізовано сучасні дослідження з метою розгляду можливостей та методологічних викликів цифрової психологічної діагностики. На основі критичного аналізу емпіричних досліджень, систематичних оглядів та метааналізів виявлено ключові тенденції в доступності, точності вимірювань, екологічній валідності та масштабному скринінгу. Результати досліджень демонструють значні переваги цифрових інструментів, зокрема дистанційне та асинхронне тестування, автоматизоване оцінювання, адаптивні методи, збирання мультимодальних даних і підвищену екологічну валідність. Додатково підкреслюється потенціал цифрових систем для персоналізації оцінювання та більш гнучкого моніторингу психологічних змін у динаміці. Водночас у літературі підкреслено суттєві методологічні та етичні виклики, зокрема забезпечення психометричної еквівалентності з традиційними інструментами, захист чутливих даних, подолання цифрового розриву, зменшення алгоритмічних упереджень у системах зі штучним інтелектом та адаптацію інструментів до культурного різноманіття.*

*Огляд наголошує, що швидке впровадження цифрових інструментів повинно супроводжуватися ретельною валідацією, етичним наглядом та професійною підготовкою, щоб максимізувати їх потенціал та мінімізувати ризики. Комплексний аналіз підтверджує, що цифрова психодіагностика*

*відкриває безпрецедентні можливості для покращення психологічного оцінювання в дослідженнях і практиці, але її успішне використання залежить від поєднання технологічних інновацій з доказовими методами та етичною відповідальністю. Майбутні дослідження мають бути зосереджені на стандартизації, інклюзивності, довгостроковому оцінюванні цифрових інструментів і розробленні єдиних професійних стандартів.*

*Ключові слова: цифрова психодіагностика, комп'ютерне тестування, цифрова фенотипізація, екологічно моментальна оцінка, ШІ у психології.*

**Introduction.** The digitalization of psychological assessment has accelerated rapidly over the past decade, transforming how mental health professionals collect, interpret, and integrate diagnostic information. Researchers such as Bennett [3] emphasize that technological innovations are fundamentally reshaping psychological measurement by enabling computer-based administration and automated scoring methods that improve the precision, efficiency and accessibility of psychodiagnostic assessment. Fairburn and Patel [5] note that digital technology has substantially influenced psychological assessment and treatment, facilitating broader access and dissemination while introducing new methodological and ethical challenges. Today, mobile applications, online questionnaires, remote testing environments and artificial intelligence (AI)-assisted evaluation tools are increasingly integrated into professional workflows.

Despite these developments the field of digital psychodiagnostics remains conceptually fragmented and a comprehensive description of the topic as a coherent scientific field is still lacking. Another opportunity lies in collecting multimodal, real-time data. Smartphone-based self-report tools and digitized questionnaires facilitate frequent sampling, and continuous monitoring has been shown to enhance ecological validity. Martin-Key, Spadaro, Funnell, Barker, Schei, Tomasik and Bahn [15] conducted a systematic review of digital assessment tools, finding that many screening instruments (such as digitized versions of traditional questionnaires) demonstrate considerable variability in diagnostic accuracy, which underscores both the promise and the need for rigorous validation.

The absence of unified frameworks makes it difficult for practitioners to navigate the fast-growing number of tools while ensuring methodological rigor and ethical responsibility. Martin-Key et al. [15] also highlight the high risk of bias in most digital assessment studies, raising important concerns about measurement reliability, study design and the interpretive validity of such tools. Thus, a deeper, systematic analysis is required. The rapid spread of digital tools has outpaced theoretical reflection, creating a need for comprehensive research that integrates psychometric, ethical, methodological and practical perspectives.

Therefore, **the aim of this article** is to examine the opportunities, challenges and future directions of digital psychodiagnostics by synthesizing contemporary scientific findings and identifying key trends. The article provides an analytical overview of digital assessment technologies, discusses unresolved issues and outlines priorities for future investigation and professional development.

**Methods of the Research.** This study draws on a comprehensive examination of the literature on digital psychodiagnostics, focusing on computer-based testing, mobile and AI-assisted assessments, digital phenotyping and ecological momentary assessment. The research involved systematically collecting and reviewing empirical studies, meta-analyses and systematic reviews to identify major developments, methodological strengths and weaknesses and ethical considerations in the field. In addition, the study included categorizing and comparing existing digital assessment tools to evaluate their contributions to accessibility, accuracy, ecological validity and cultural adaptability in psychological practice.

**The Results of the Research.** One of the most frequently mentioned advantages in scholarly literature is the significantly expanded accessibility of psychological assessment. Carlbring, Andersson, Cuijper, Riper, Hedman-Lagerlöf [9] demonstrate that digital platforms allow individuals to complete assessments remotely, which is particularly beneficial for clients who face geographical, physical or financial barriers. Tele-assessment removes the need for travel, reduces waiting times, and permits psychologists to reach populations that would otherwise remain underserved.

Digital tools also support asynchronous testing, allowing individuals to complete assessments at times that suit them while enabling psychologists to review results later. This flexibility can increase engagement, reduce scheduling bottlenecks, and improve the reach of psychological assessment. Fairburn and Patel [5] emphasize that digital technology expands the dissemination of psychological assessment and interventions, enabling broader access and reducing barriers for underserved or hard-to-reach groups. Building on this, Knapp, Cohen, Nicholas, Mohr, Carlo, Skerl and Lattie [8] report that asynchronous digital tools in community mental health settings increased client engagement and allowed efficient data collection across geographically and demographically varied populations. More recently, Martin-Key et al. [15] indicate that remote digital testing can enhance participation rates and facilitate access for more diverse populations, improving the representativeness of study samples.

One of the most significant methodological advantages of digital tools lies in automated scoring. According to Wright and Hopwood [18], computer-based scoring eliminates manual errors and increases standardization, leading to more reliable outcomes. Automated scoring systems ensure consistency across administrations and allow for faster feedback.

Adaptive testing – particularly those based on Item Response Theory (IRT) – offers significant methodological advantages for digital psychodiagnostics. Van der Linden and Glas [4] provide a comprehensive overview of adaptive testing, emphasizing how item selection algorithms dynamically adjust question difficulty in real time to maximize measurement precision while minimizing test length. Building on this, Bennett [3] highlights that computerized adaptive testing reduces manual scoring errors and ensures consistent, reliable results across administrations. Moreover, Kyllonen [10] notes that adaptive approaches are particularly valuable for assessing complex or "hard-to-measure" cognitive and emotional skills, improving test efficiency and user experience. These features are especially important in clinical settings, where clients may experience fatigue or distress during testing sessions.

Digital psychodiagnostics enables the collection of complex, multimodal data unavailable through traditional paper-based testing. Mobile applications and wearable devices gather behavioural and physiological information such as: heart rate variability, movement patterns, sleep cycles, typing dynamics, speech characteristics, geolocation data (indicating social engagement or avoidance).

This approach, often called 'digital phenotyping', provides insight into daily functioning and behavioural patterns by continuously collecting real-world data through smartphones, wearable devices and sensors. Torous, Kiang, Lorme, Onnela [14] highlight that such data can capture fluctuations in mood, activity and social interaction throughout the day, offering a more granular and ecologically valid perspective than traditional retrospective self-reports. Similarly, Insel [7] emphasizes that digital phenotyping enables objective monitoring of behaviour in naturalistic settings, enhancing both the precision and relevance of psychological assessment for research and clinical applications.

Ecological momentary assessment (EMA), enabled by smartphones, provides micro-level data on psychological states in real time. Studies show that EMA increases sensitivity to momentary fluctuations in mood, stress and cognition, which traditional retrospective measures may miss [17]. Torous et al. [14] demonstrate that smartphone-based EMA can collect both active self-report data and passive sensor-based behavioural data, thereby offering a richer, ecologically valid picture of individuals' daily functioning. For example, mood variations, social interactions or activity patterns can be tracked throughout the day instead of relying on retrospective summaries.

Despite its advantages, digital psychodiagnostics faces substantial methodological and ethical challenges. A major concern is whether digital tests measure psychological constructs equivalently to traditional paper-based versions. The meta-analysis by Gwaltney, Shields, and Shiffman [6] demonstrates that although electronic and paper-and-pencil formats often yield similar overall scores, test performance can still be influenced by device-related and contextual factors. These include differences in screen size and resolution, interface design, and the testing environment, all of which may alter response behaviour. For

example, reading from screens may affect comprehension, touchscreen responding differs from paper-based motor patterns, and remote or at-home testing increases the likelihood of environmental distractions that reduce standardization. Consequently, digital versions of established assessment instruments require independent validation and standardization rather than assuming equivalence with their traditional formats.

Digital assessments often take place outside controlled clinical settings, which introduces significant variability. Fairburn and Patel [5] emphasize that digital tools used in everyday environments – homes, workplaces, or public spaces – are subject to noise, interruptions, and multitasking, all of which may influence performance and reduce the reliability of results. Knapp et al. [8] similarly report that remote assessment in community settings complicates standardization because psychologists cannot ensure that test-takers follow instructions consistently or remain fully focused. Martin-Key et al. [15] further highlight that the lack of environmental control in remote or mobile testing increases the risk of bias, including the possibility of external assistance, cheating, or consulting additional resources.

Digital psychodiagnostics involves the storage and transmission of highly sensitive psychological information, which raises significant ethical and legal concerns. Luxton, Nelson, and Maheu [2016] stress that digital mental-health tools must comply with rigorous data protection standards, including encryption, secure transmission protocols, and regulated storage practices. Martinez-Martin and Kreitmair [2018] note that risks arise from the use of third-party servers, ambiguities in data ownership and the possibility of unauthorized access to user information. Mohr, Weingardt, Reddy and Schueller [2017] further highlight that automated scoring systems and cloud-based assessment platforms may lack transparency regarding how data are processed and who controls long-term storage. Together, these concerns underscore the need for clear guidelines, informed consent procedures, and enhanced cybersecurity measures in digital psychodiagnostic practice.

Access to digital tools is not universal. Individuals from lower socioeconomic backgrounds, older adults and people with limited digital literacy may experience significant barriers when completing online assessments. Fairburn and Patel [2017] note that digital mental-health tools can unintentionally exclude users who lack technological skills or reliable internet access, thereby limiting the reach and fairness of psychological services. Knapp et al. [8] similarly report that access to devices, stable connectivity and user-friendly platforms remains uneven across community populations, affecting participation in digital assessments. Torous et al. [14] further emphasize that the digital divide may exacerbate existing mental-health disparities, underscoring the need for inclusive design and equitable access in digital psychodiagnostic practices.

AI-enhanced diagnostic tools show considerable promise in analyzing speech, facial expressions and behavioural patterns, offering opportunities for more continuous and fine-grained assessment. However, research cautions that these systems can produce biased or unreliable outputs when trained on non-representative datasets. Vollmer, Mateen, Bohner, Király, Ghani, Jonsson, Cumbers, Jonas, McAllister, Myles, Granger, Birse, Branson, Moons, Collins, Ioannidis, Holmes and Hemingway [12] argue that algorithmic bias remains a major challenge in clinical AI, as models may inadvertently reproduce demographic or cultural inequalities present in the training data.

Moreover, recent reviews emphasize significant risks associated with relying on these systems. Poudel, Jakhar, Mohan, Nepal [1] note that algorithmic bias can emerge when AI models are trained on datasets that do not sufficiently represent the diversity of mental-health populations. As a result, diagnostic accuracy may vary across demographic groups. Similarly, Rzyczniok, Kopczyński, Rasińska, Matusik, Jachimczak and Bala [2] warn that automated interpretations may oversimplify complex psychological phenomena, increasing the likelihood of misclassification or inappropriate recommendations if psychologists rely on AI outputs without careful scrutiny. These concerns highlight the need for transparent model development, representative training datasets and strong clinical oversight in AI-supported psychodiagnostics.

Furthermore, digital assessments developed in one cultural context may not generalize to another. Such elements as interface layout, visual symbols, culturally specific examples, reading

direction and cognitive styles can all influence performance. Wright and Hopwood [18] underscore the importance of culturally sensitive adaptation procedures, including re-standardization and cognitive pre-testing.

**Conclusions**. Digital psychodiagnostics represents a transformative direction in psychological science and practice. The integration of computer-based testing, mobile assessments, digital phenotyping and AI-assisted analysis expands the potential of psychological diagnostics. The results of the current analysis demonstrate substantial opportunities, including increased accessibility, improved measurement precision, richer multimodal datasets, greater ecological validity and new possibilities for large-scale screening.

At the same time, the field faces serious challenges: ensuring psychometric equivalence, protecting sensitive data, reducing digital inequalities, preventing algorithmic bias and addressing cultural adaptation issues. Researchers consistently emphasize that technological development must be accompanied by methodological rigor, ethical responsibility and continuous professional training.

Overall, digital psychodiagnostics represents a rapidly evolving area of psychological science. Continued research, careful validation and ethical implementation will be essential to fully realize its potential and ensure that digital tools enhance assessment, intervention, and clinical decision-making across diverse populations.

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