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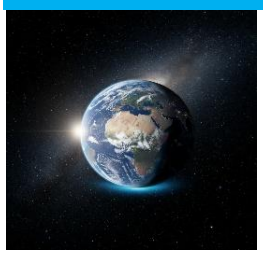

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Use of mobile applications in the self-management of gestational diabetes mellitus: a narrative review

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Abstract

INTRODUCTION AND PURPOSE:

Gestational diabetes mellitus (GDM) is an increasingly common pregnancy-related metabolic disorder associated with maternal and perinatal morbidity and an elevated long-term risk of type 2 diabetes. Effective management relies on structured glucose monitoring, medical nutrition therapy and adequate physical activity, with pharmacotherapy required when lifestyle measures alone do not achieve glycaemic targets. Sustained self-management is often difficult, particularly when access to specialist care and structured diabetes education is limited. Mobile health technologies offer new options to support daily GDM management. This narrative review summarises recent evidence on smartphone-based applications for GDM self-management, focusing on core functions, clinical effectiveness and patient-reported outcomes, as well as key implementation challenges.

BRIEF DESCRIPTION OF THE STATE OF KNOWLEDGE:

GDM-specific applications support glucose logging, graphical feedback, alerts, lifestyle counselling and secure communication with health-care professionals. These tools appear feasible and acceptable, with high user satisfaction and reports of greater convenience, perceived support and better understanding of GDM. Quantitative data generally indicate non-inferior glycaemic control compared with conventional care, with some improvements in postprandial glucose and selected maternal and neonatal outcomes, although the evidence base remains limited.

SUMMARY (CONCLUSION):

Available data support smartphone-based applications as a promising adjunct to standard GDM care, reinforcing key elements of self-management and enabling flexible remote surveillance.

Further multicentre trials and detailed evaluation of features that sustain engagement and improve clinically meaningful outcomes are required, together with user-centred design and careful integration of digital decision-support into antenatal and postpartum diabetes care.

KEYWORDS (MeSH): Diabetes, Gestational; Mobile Applications; Self Care; Telemedicine; Remote Patient Monitoring

INTRODUCTION AND PURPOSE

Gestational diabetes mellitus (GDM) is a metabolic disorder defined by hyperglycaemia first identified during pregnancy, most often in the second or third trimester.[1–3] It is usually diagnosed using standardized biochemical testing, most commonly an oral glucose tolerance test (OGTT) performed between 24 and 28 weeks of gestation, with earlier assessment recommended in women at increased risk. The global prevalence of GDM has risen steadily, involving a substantial proportion of pregnancies worldwide, and is expected to continue to climb in parallel with advancing maternal age and the growing burden of overweight and obesity among women of reproductive age.

GDM is associated with several maternal complications, including pregnancy-induced hypertension and preeclampsia, and women with a history of GDM are at high risk of GDM recurrence in subsequent pregnancies. Furthermore, GDM is a strong predictor of future type 2 diabetes mellitus, with the excess risk remaining markedly elevated for more than three decades after the index pregnancy.[2–4] Maternal hyperglycaemia in GDM is also associated with adverse fetal and neonatal outcomes, including macrosomia, neonatal hypoglycaemia, hyperbilirubinaemia, polycythaemia, respiratory distress and shoulder dystocia.

Given the growing prevalence and associated complications of GDM, there is a critical need for effective strategies to support glycaemic control and self-management during pregnancy, which typically involves monitoring blood glucose levels, following individually tailored nutritional advice and maintaining a regular exercise routine.[1,3,6–8,25,26] Studies have shown that women who actively engage in self-management practices can significantly improve their glycaemic control, thereby reducing the likelihood of complications.[3,4,6–8] However, many women face challenges in adhering to self-management protocols due to insufficient information, limited social support and restricted access to care, underscoring the need for innovative solutions to empower patients in managing their condition.

The expanding role of digital solutions in clinical care has created new possibilities for supporting women in the day-to-day management of pregnancy-related glucose disorders such as GDM.[9–15,18–22,27] Digital health tools delivered via smartphones are increasingly used to assist diabetes care by allowing frequent review of real-time glucose monitoring, strengthening women's involvement in their treatment and enabling better communication with healthcare providers, thereby enhancing self-efficacy in managing GDM.[9–14,18–20,27] By providing real-time feedback and personalized recommendations, these apps can facilitate better decision-making and adherence to health guidelines.[9–12,18–20,27]

Despite the promise of mobile technology, there remains a gap in understanding how these applications can be effectively integrated into routine prenatal care.[9–12,16–18,21,22] Furthermore, the clinical impact of mobile app–based interventions in improving health outcomes for women with GDM is still under investigation, warranting a comprehensive review of the current literature.[9–15,18–22] The primary aim of this narrative literature review is therefore to assess the current state of research regarding the use of mobile applications in the self-management of GDM.[9–15,18–22] This review explores the effectiveness of these applications, user engagement and potential barriers to their use, with the goal of providing clinically relevant evidence for practitioners and health-system decision-makers.[9–22,25–27]

RESEARCH QUESTIONS

1. What features of mobile applications are most beneficial for self-management of GDM?
2. How do mobile applications impact glycaemic control and overall health outcomes in women with GDM?
3. What are the barriers to the effective use of mobile applications in managing GDM?

MATERIAL AND METHODS

SEARCH STRATEGY

This narrative review was conducted using a structured electronic search of major biomedical databases, including PubMed/MEDLINE and Scopus, to identify empirical studies evaluating mobile or smartphone-based applications used in the self-management of gestational diabetes mellitus.[9–13,16] The search was limited to articles published within the last 5 years and combined Medical Subject Headings (MeSH) and free-text terms related to GDM, mobile health and self-management, such as "gestational diabetes mellitus", "gestational diabetes",

"mobile health", "mHealth", "smartphone application", "mobile app*", "self-management" and "telemedicine".[9–13,16] Boolean operators were applied to construct search strings analogous to those used in contemporary scoping and systematic reviews of GDM apps and eHealth.[9–13,16]

INCLUSION AND EXCLUSION CRITERIA

Studies were eligible for inclusion if they: (1) involved pregnant women diagnosed with GDM according to recognised diagnostic criteria; (2) evaluated a mobile or smartphone-based application explicitly intended to support self-management or remote monitoring of GDM (for example, apps used for blood glucose logging, lifestyle support or bidirectional communication with clinicians); and (3) reported at least one outcome related to app use, such as glycaemic indices, maternal or neonatal outcomes, user engagement, usability or perceived barriers and facilitators.[9–15,18–22] Interventional designs (randomised controlled trials, feasibility or pilot trials) and observational or qualitative studies (including mixed-methods and user-experience studies) were included, reflecting the diversity of study designs in the current literature.[9–15,18–22] Exclusion criteria comprised editorials, commentaries, protocols without outcome data, conference abstracts without full reports, studies focusing exclusively on postpartum type 2 diabetes prevention without an antenatal GDM component and non-smartphone-based telemonitoring systems (for example, purely telephone-based care).[9–15,18–22]

DATA EXTRACTION AND ANALYSIS

From each included article, data were extracted into a structured template capturing study characteristics (country, setting, design, sample size), participant demographics and GDM diagnostic criteria, details of the mobile application (core functions, theoretical framework, degree of integration with routine care) and outcomes aligned with the research questions: app features relevant to self-management, effects on glycaemic control and maternal or neonatal outcomes, and barriers and facilitators to app use.Given the anticipated heterogeneity of interventions and outcome measures, the primary synthesis was narrative and thematic rather than meta-analytic. Effect estimates from randomised and quasi-experimental studies were summarised descriptively to indicate the direction and magnitude of impact where feasible, while qualitative and mixed-methods data were analysed thematically to identify recurrent themes regarding beneficial app features, patient engagement and barriers to effective implementation.

RESULTS AND DESCRIPTION OF THE STATE OF KNOWLEDGE

OVERVIEW OF MOBILE APPLICATIONS FOR GDM

Recent work has catalogued a growing range of smartphone applications designed to support self-management and remote surveillance of GDM.[9–12,18–22,27] A scoping review in JMIR Diabetes identified multiple mHealth solutions that enable women to record capillary blood glucose values, track diet and physical activity, and transfer data for remote review by health-care professionals. These apps are typically used as adjuncts to standard antenatal diabetes services, with the aim of shifting routine monitoring and some elements of education from in-person visits to digitally mediated interactions.[9–12,14,19,20]

Core functional features commonly include structured glucose logging (often with Bluetooth transfer from glucometers), graphical display of glycaemic trends, automated alerts for out-of-range values and asynchronous or synchronous messaging with clinicians.[9–12,18–20] Many applications incorporate educational modules on nutrition, physical activity and insulin use, sometimes tailored to language or cultural background, as illustrated by the Pregnant+ app, which provides automated transfer of glucose measurements and culturally adapted dietary advice in several languages. Some systems add behaviour-change components such as reminders, goal-setting and motivational messages to reinforce adherence to recommended lifestyle and treatment plans.[9–13,18–20,22,27]

User engagement and usability have been explored in both interventional and qualitative studies.[9–13,16–18,21,22] The GDM app scoping review reported generally high patient satisfaction, with women valuing the convenience, perceived support and possibility of more continuous monitoring.[10,16–18] However, systematic reviews of eHealth and mHealth for GDM self-management have also highlighted usability limitations, technical difficulties and variable design quality, underlining the need for iterative, user-centred development.[16–18,21,22]

EFFECTIVENESS OF MOBILE APPLICATIONS

Evidence from randomised controlled trials, pilot studies and meta-analyses suggests that smartphone-based interventions can achieve at least non-inferior glycaemic outcomes compared with standard face-to-face care and may confer additional benefits in some

settings.[9–15,19,20] In the JMIR Diabetes scoping review, roughly half of the included studies reported improvements in overall glycaemic control among app users, and none demonstrated inferiority of app-assisted pathways relative to usual care in terms of glycaemic targets.[9,10,12–15] Maternal and perinatal outcomes in app-supported groups were generally comparable to those observed under conventional care, with some reports of reduced clinic visits and resource use.[11–15,19,20]

A pilot observational study of a tailored smartphone-assisted pathway (GDMapp) found that women using the app had fewer instances of above-threshold glycaemic values and improved postprandial glucose control, while app-based care remained non-inferior in terms of adverse maternal, birth and neonatal outcomes. A meta-analysis of smartphone-based lifestyle interventions in GDM reported that such interventions improved patient compliance and reduced neonatal intensive care unit admissions, although the overall certainty of evidence ranged from low to moderate. More recently, a meta-analysis comparing smartphone application-based self-management with conventional face-to-face diabetic care concluded that app-based interventions were an acceptable alternative and suggested possible reductions in adverse maternal and neonatal outcomes, again with variable evidence quality.

USER EXPERIENCE, SATISFACTION AND BARRIERS TO USE

Qualitative and mixed-methods research has enriched understanding of how women with GDM experience digital self-management tools.[7,16–18,21,22] Systematic reviews and interview studies report that convenience, perceived usefulness, increased independence, peer support and the sense of being consistently monitored by health-care professionals are major facilitators of eHealth use. Women frequently describe feeling more empowered and better informed when using apps that provide clear feedback on glucose values and practical guidance on diet and activity.[7,16–18,21,22]

At the same time, the same body of work highlights a wide range of barriers to sustained engagement.[7,16–18,21,22] Reported challenges include usability problems (complex interfaces, poor navigation), technical issues (connectivity failures, device incompatibility), concerns about data privacy and security, lack of emotional support, uncertainty about data accuracy and limited adoption or endorsement of digital systems by health-care professionals.[7,16–18,21,22] Some users describe difficulty integrating frequent logging and

app interactions into busy daily routines, and a subset experience increased anxiety due to constant monitoring and alerts, emphasising that successful implementation requires attention to usability, support and alignment with both patient and provider expectations.[7,16–18,21,22]

COMPARATIVE ANALYSIS WITH TRADITIONAL SELF-MANAGEMENT

Traditional GDM management is based on structured education, paper-based or simple electronic glucose diaries and periodic clinic visits to review glycaemic profiles, diet and weight gain. This model relies on intermittent contact with health-care professionals to adjust lifestyle recommendations and pharmacotherapy, and its effectiveness can be limited by time, travel and resource constraints.[1–3,6,7]

Smartphone-assisted care offers several theoretical and observed advantages over this traditional approach.[9–15,19,20] Digital tools can automate data capture and aggregation, provide near real-time feedback on glucose values and lifestyle behaviours, and reduce the need for frequent in-person visits, which may be particularly beneficial for women who face geographic, time or resource limitations.[9–15] Continuous remote surveillance may allow earlier identification of deteriorating glycaemic control and more timely adjustment of therapy, while maintaining maternal and neonatal outcomes that are at least comparable to those achieved with conventional face-to-face care.[9–15,19,20]

FUTURE DIRECTIONS AND INNOVATIONS

Future development of mobile applications for GDM is increasingly oriented towards more personalised, intelligent and integrated systems. Contemporary projects apply user-centred design and mixed-methods approaches to iteratively refine digital toolkits, patient-facing apps and clinical dashboards so that they align with the needs and preferences of women with GDM and their clinicians. Co-design work consistently highlights functionality, clear visualisation of glucose data, culturally appropriate educational content and well-calibrated notifications as core features of acceptable and engaging tools for pregnant women.

Beyond usability-focused refinements, emerging research is exploring how artificial intelligence and advanced analytics can strengthen risk stratification and individualised decision-support in GDM care. Systematic reviews and modelling studies indicate that

machine-learning methods can predict the onset of GDM and adverse outcomes such as large-for-gestational-age infants, and can assist in optimising management decisions, thereby illustrating the potential for more tailored recommendations. Early proof-of-concept models could ultimately be embedded within mobile platforms to inform personalised dietary, activity or pharmacological advice in near real time. In parallel, authors consistently call for large, high-quality randomised controlled trials, longer-term follow-up including postpartum outcomes and type 2 diabetes risk, and technical solutions that ensure seamless interoperability between app-generated data, electronic health records and telemedicine systems, in order to establish the clinical and cost-effectiveness of these digital pathways.[9–15,19–22]

DISCUSSION

INTERPRETATION OF FINDINGS

Across recent trials, observational studies and reviews, smartphone-based interventions for GDM consistently demonstrate non-inferior glycaemic outcomes compared with conventional face-to-face care, and several studies report modest improvements in postprandial glucose control, gestational weight gain and neonatal outcomes.[9–15,19,20] App-assisted pathways allow remote upload of glucose measurements, lifestyle data and other relevant parameters, which clinicians can review to guide treatment, and approximately half of the studies in the JMIR Diabetes scoping review reported improved overall glycaemic control among app users.[9,10,12–15] At the same time, qualitative syntheses indicate that women value the convenience, continuous monitoring and perceived support offered by these tools, describing enhanced autonomy and better understanding of their condition.[7,10,16–18,21,22]

IMPLICATIONS FOR PRACTICE

For clinicians, the emerging evidence supports cautious integration of smartphone-based tools as part of a structured, multidisciplinary model of GDM care.[9–15,19,20,26] App-assisted self-management pathways can reduce the burden of in-person visits, facilitate more timely adjustment of dietary and pharmacological interventions and provide ongoing educational and behavioural support between appointments.[9–15] When selecting or recommending applications, health-care providers should prioritise platforms that offer reliable glucose data capture, clear visualisations, secure bidirectional communication and evidence-based educational content tailored to the cultural and linguistic context of their patient population, as exemplified by the Pregnant+ app. At the system level, incorporating mobile applications into routine antenatal diabetes services will require careful consideration of patients' digital literacy,

reliable access to suitable devices and the internet and, where feasible, integration with existing electronic health record systems.[7,16–18,21,22] Implementation plans should encompass staff training, clearly defined workflows for reviewing and acting on app-generated data and robust governance frameworks covering data security, privacy and medico-legal responsibilities.[16–18,21,22] In resource-constrained settings or clinics with high patient volumes, well-designed and appropriately implemented mHealth solutions may help prioritise in-person consultations for women with suboptimal glycaemic control, while providing safe and structured remote monitoring for those with stable parameters.[11–15,19,20]

LIMITATIONS OF THE REVIEW

This narrative review is subject to several limitations that reflect the underlying evidence.[9–15,19,20] The included studies are heterogeneous in design, sample size, app functionality and outcome measures, which limits the ability to make firm comparative statements or to quantify effect sizes across interventions.[9–15,19,20] Many trials are single-centre feasibility or pilot studies with relatively small cohorts, short follow-up and limited power to detect differences in clinically important maternal and neonatal endpoints.[9–15,19,20] Most interventional mHealth studies for gestational diabetes have been conducted in high-income or upper-middle-income settings, so evidence from low- and middle-income countries remains limited and context-specific barriers such as device access, connectivity and system capacity are not yet well characterised.[9–15,19,20] Qualitative work provides valuable insights into usability and acceptability, but typically draws on small samples from single, research-intensive centres, which restricts generalisability to the wider GDM population.[7,16–18,21,22] In addition, the rapid evolution of mobile technologies means that apps evaluated in earlier studies may differ substantially from their current versions, limiting the direct applicability of published usability and effectiveness data to contemporary platforms.[9–13,18–22]

GAPS IN LITERATURE

Several important gaps remain. Robust, multicentre randomised controlled trials with adequate sample sizes are needed to determine the long-term impact of app-supported GDM care on maternal and neonatal outcomes, health-care utilisation and cost-effectiveness.[9–15,19–22] Evidence on sustained engagement beyond pregnancy and the role of GDM apps in postpartum follow-up and type 2 diabetes prevention is sparse.[9–15,19–22] There is also a need for more rigorous evaluation of user-centred design approaches, including culturally and linguistically tailored interventions, to understand how specific app features influence engagement and clinical outcomes in diverse populations.[18–22,27] Furthermore, while early work has begun

to explore artificial intelligence and predictive analytics in GDM management, these innovations remain largely at the proof-of-concept stage, and their safety, acceptability and real-world effectiveness are not yet established. Future research should also address structural factors such as digital inequality and clinician workload, examining how to deploy mobile applications in ways that reduce rather than exacerbate disparities in care.[7,16–18,21–24] Addressing these gaps will be essential for moving from promising pilot data to confident recommendations on the routine use of mobile applications in the self-management of gestational diabetes mellitus.[9–15,19–24]

CONCLUSIONS

Current evidence suggests that mobile applications are a feasible and acceptable complement to conventional GDM care, with growing but still limited data indicating benefits for self-management, glycaemic outcomes and selected neonatal indicators.[9–15,19,20] Smartphone-based interventions support key elements of GDM self-management, including structured glucose monitoring, lifestyle modification and bidirectional communication with clinicians, and they can facilitate remote surveillance without compromising safety.[9–15,19,20] Women frequently report that such tools enhance convenience, perceived support and understanding of their condition, although usability issues, technical problems, privacy concerns and variable clinician engagement remain important obstacles to sustained use.[7,10,16–18,21,22] Future work should focus on adequately powered multicentre randomised controlled trials, studies in more diverse health-system contexts and rigorous evaluation of specific app features that drive engagement and clinical benefit.[9–15,19–24] Particular priorities include interventions tailored to women with limited digital resources, user-centred design incorporating behaviour-change techniques and robust assessment of emerging functions such as artificial intelligence-based decision support.[18–24,27] Overall, mobile applications currently represent a promising digital modality to support self-management of gestational diabetes mellitus by enabling more continuous monitoring, personalised feedback and flexible communication within multidisciplinary care pathways.[9–15,19–24,27] Their optimal use will depend on closing key evidence gaps, improving usability and equity and integrating mHealth solutions into coherent antenatal and postpartum diabetes management strategies rather than treating them as stand-alone technological add-ons.[9–15,19–24,27]

DISCLOSURE

AUTHOR CONTRIBUTION

Conceptualization: Anna Izabela Garbacz; methodology: Anna Izabela Garbacz, Agnieszka Brzozowska, Agnieszka Radziwonka; investigation:Anna Izabela Garbacz, Patrycja Anna Borowiecka, Gabriela Stondzik, Aleksandra Karolina Węglarz, Bartłomiej Maciej Wrochna; data curation: Paweł Kosiorek, Ada Niezgoda; writing—original draft preparation: Anna Izabela Garbacz, Tomasz J. Majszyk, Jacek Głuski, Paweł Kosiorek; writing—review and editing: Anna Izabela Garbacz, Tomasz J. Majszyk, Jacek Głuski, Paweł Kosiorek, Bartłomiej Maciej Wrochna; supervision: Anna Izabela Garbacz. All authors have read and agreed to the published version of the manuscript.

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INFORMED CONSENT STATEMENT

Not applicable. This article does not report any new data collected directly from human participants.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article, as no new datasets were generated or analysed. All data used in this narrative review were obtained from previously published articles indexed in PubMed and Scopus.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest related to the subject matter of this manuscript.

DECLARATION OF THE USE OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

While preparing this manuscript, the authors used the Perplexity tool to enhance language quality and readability. After using this tool, the authors thoroughly reviewed and edited the text as necessary and accept full responsibility for the scientific content of the publication.

REFERENCES

1. American Diabetes Association Professional Practice Committee. 2. Classification and diagnosis of diabetes: Standards of medical care in diabetes-2022. Diabetes Care. 2022;45(Suppl 1):S17-38. doi:10.2337/dc22-S002. PMID:34964875.
2. Sweeting A, Hannah W, Backman H, Catalano P, Feghali M, Herman WH, et al. Epidemiology and management of gestational diabetes. Lancet. 2024;404(10448):175-92. doi:10.1016/S0140-6736(24)00825-0. PMID:38909620.
3. Kunarathnam V, Vadakekut ES, Mahdy H. Gestational diabetes. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan–. Updated 2025 Sep 15. Available from: https://www.ncbi.nlm.nih.gov/books/NBK545196/.
4. Lu Y, Huang J, Yan J, Wei Q, He M, Yuan C, et al. Meta-analysis of risk factors for recurrent gestational diabetes mellitus. BMC Pregnancy Childbirth. 2025;25(1):257. doi:10.1186/s12884-025-07367-9. PMID:40057727.
5. Pan Y, Gu R, Wang J, Li Q, Zhang Y, Xu Y, et al. Gestational diabetes mellitus recurrence rate and risk factors: A systematic review and meta-analysis. Diabetes Res Clin Pract. 2025;230:112949. doi:10.1016/j.diabres.2025.112949. PMID:41130422.
6. Mukherjee SM, Dawson A. Diabetes: How to manage gestational diabetes mellitus. Drugs Context. 2022;11:2021-9-12. doi:10.7573/dic.2021-9-12. PMID:35775071.
7. Guo S, Liu D, Bi X, Feng Y, Zhang K, Jiang J, et al. Barriers and facilitators to self-management among women with gestational diabetes: A systematic review using the COM-B model. Midwifery. 2024;138:104141. doi:10.1016/j.midw.2024.104141. PMID:39178483.
8. Vasile FC, Preda A, Ștefan AG, Vladu MI, Forțofoiu MC, Clenciu D, Gheorghe IO, et al. An update of medical nutrition therapy in gestational diabetes mellitus. J Diabetes Res. 2021;2021:5266919. doi:10.1155/2021/5266919. PMID:34840988.
9. Eberle C, Loehnert M, Stichling S. Effectiveness of specific mobile health applications (mHealth-apps) in gestational diabetes mellitus: A systematic review.

BMC Pregnancy Childbirth. 2021;21(1):808. doi:10.1186/s12884-021-04274-7. PMID:34865645.

10. Smyth S, Curtin E, Tully E, Molphy Z, Breathnach F. Smartphone apps for surveillance of gestational diabetes: Scoping review. JMIR Diabetes. 2022;7(4):e38910. doi:10.2196/38910. PMID:36409549.
11. Yew TW, Chi C, Chan SY, van Dam RM, Whitton C, Lim CS, et al. A randomized controlled trial to evaluate the effects of a smartphone application-based lifestyle coaching program on gestational weight gain, glycemic control, and maternal and neonatal outcomes in women with gestational diabetes mellitus: The SMART-GDM study. Diabetes Care. 2021;44(2):456-63. doi:10.2337/dc20-1216. PMID:33184151.
12. Smyth S, Molphy Z, Tully E, Boland F, Breathnach FM. Impact of a novel smartphone application for remote monitoring of gestational diabetes on glycaemic control and birth outcomes: A pilot observational study. Sci Rep. 2025;15(1):23724. doi:10.1038/s41598-025-08755-z. PMID:40610624.
13. Wang H, Jiang Y, Wiley J, Ge L. Effectiveness of smartphone-based lifestyle interventions on women with gestational diabetes: A systematic review and meta-analysis of randomized controlled trials. Psychol Res Behav Manag. 2022;15:3541-59. doi:10.2147/PRBM.S389562. PMID:36505668.
14. El Seifi OS, Younis FE, Ibrahim Y, Begum SB, Ahmed SF, Zayed ES, et al. Telemedicine and gestational diabetes mellitus: Systematic review and meta-analysis. Cureus. 2024;16(10):e71907. doi:10.7759/cureus.71907. PMID:39564055.
15. Yue SW, Zhou J, Li L, Guo JY, Xu J, Qiao J, et al. Effectiveness of remote monitoring for glycemic control on maternal-fetal outcomes in women with gestational diabetes mellitus: A meta-analysis. Birth. 2024;51(1):13-27. doi:10.1111/birt.12769. PMID:37789580.
16. Safiee L, Rough DJ, Whitford H. Barriers to and facilitators of using eHealth to support gestational diabetes mellitus self-management: Systematic literature review of perceptions of health care professionals and women with gestational diabetes mellitus. J Med Internet Res. 2022;24(10):e39689. doi:10.2196/39689. PMID:36301613.
17. Safiee L, Rough D, George P, Mudenha R. Baseline perceptions of women with gestational diabetes mellitus and health care professionals about digital gestational diabetes mellitus self-management health care technologies: Interview study among

patients and health care professionals. JMIR Hum Factors. 2023;10:e51691. doi:10.2196/51691. PMID:38113070.

18. Birati Y, Yefet E, Perlitz Y, Shehadeh N, Spitzer S. Cultural and digital health literacy appropriateness of app- and web-based systems designed for pregnant women with gestational diabetes mellitus: Scoping review. J Med Internet Res. 2022;24(10):e37844. doi:10.2196/37844. PMID:36240008.
19. Garnweidner-Holme L, Henriksen L, Torheim LE, Lukasse M. Effect of the Pregnant+ smartphone app on the dietary behavior of women with gestational diabetes mellitus: Secondary analysis of a randomized controlled trial. JMIR Mhealth Uhealth. 2020;8(11):e18614. doi:10.2196/18614. PMID:33146620.
20. Borgen I, Småstuen MC, Jacobsen AF, Garnweidner-Holme LM, Fayyad S, Noll J, et al. Effect of the Pregnant+ smartphone application in women with gestational diabetes mellitus: A randomised controlled trial in Norway. BMJ Open. 2019;9(11):e030884. doi:10.1136/bmjopen-2019-030884. PMID:31719080.
21. Kirkwood JR, Dickson J, Stevens M, Manataki A, Lindsay RS, Wake DJ, et al. The user-centered design of a clinical dashboard and patient-facing app for gestational diabetes. J Diabetes Sci Technol. 2024 Nov 29:19322968241301792. doi:10.1177/19322968241301792. Epub ahead of print. PMID:39611393.
22. Nunes ML, Félix B, Nunes F, Santos I. Systematic development and refinement of a user-centered evidence-based digital toolkit for supporting self-care in gestational diabetes mellitus. Sci Rep. 2025;15(1):12009. doi:10.1038/s41598-025-96318-7. PMID:40199963.
23. AlSaad R, Elhenidy A, Tabassum A, Odeh N, AboArqoub E, Odeh A, et al. Artificial intelligence in gestational diabetes care: A systematic review. J Diabetes Sci Technol. 2025 Aug 25:19322968251355967. doi:10.1177/19322968251355967. Epub ahead of print. PMID:40855734.
24. Kang M, Zhu C, Lai M, Weng J, Zhuang Y, He H, et al. Machine learning-based prediction of large-for-gestational-age infants in mothers with gestational diabetes mellitus. J Clin Endocrinol Metab. 2025;110(5):e1631-9. doi:10.1210/clinem/dgae475. PMID:39011974
25. Kuźniar A, Wąsiewicz E, Szawica D, Fularska K, Oleszko M. Exercise and pregnancy - review of literature and current recommendations. J Educ Health Sport [Internet]. 2023 Mar. 17 [cited 2026 Feb. 9];15(1):35-42. Available from: https://apcz.umk.pl/JEHS/article/view/42853

26. ZYGMUNY-SIEMBIDA, Ewelina, WRÓBLEWSKI, Hubert, ZIMNA, Aleksandra, WRÓBLEWSKA, Kinga, KOZDRA, Magdalena, PIASEK, Laura & OSIŃSKA, Aleksandra. The Gestational diabetes mellitus - pathogenesis, diagnosis, treatment and prognosis. Quality in Sport. 2023;11(1):11-15. eISSN 2450-3118. DOI https://dx.doi.org/10.12775/QS.2023.11.01.001
27. Grądzik Anna, Gorajek Anna, Osiejewska Aleksandra, Wojtachnio Dominika, Nowakowska Izabela, Bartoszewicz Jakub. The popularity and usability of mobile applications for women and expecting mothers. Journal of Education, Health and Sport. 2022;12(8):378-382. eISSN 2391-8306. DOI http://dx.doi.org/10.12775/JEHS.2022.12.08.039