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INTEGRATIVE LITERATURE REVIEW

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EDUCATIONAL TECHNOLOGIES AND SELF-CARE NEEDS IN HIGH-RISK PREGNANCY: AN INTEGRATIVE REVIEW

*Tecnologias educacionais e necessidades de autocuidado na gestação de alto risco: revisão integrativa**Tecnologías educativas y necesidades de autocuidado en el**embarazo de alto riesgo: una revisión integradora***Maria Eduarda Araújo Oliveira da Silva¹** **Yasmin Maria Gomes de Souza²** **Érica Nadir da Silva³** **Diego Augusto Lopes Oliveira⁴** **Natália Ramos Costa Pessoa⁵** **Ryanne Carolynne Marques Gomes Mendes⁶** 

RESUMO

Objetivo: identificar as tecnologias educacionais e as necessidades de autocuidado na gestação de alto risco. **Método:** revisão integrativa da literatura realizada no período de agosto de 2024 a janeiro de 2025. A busca dos estudos ocorreu nas bases de dados e bibliotecas virtuais: Pubmed/Medline, Scopus, SciELO, Biblioteca Virtual da Saúde, Web of Science, CINAHL e Embase.

Resultados: a amostra foi composta por 23 estudos que identificaram que a tecnologia educacional mais utilizada para promoção do autocuidado às gestantes de alto risco foi aplicativo para *smartphone*. Além disso, as necessidades de autocuidado mais evidenciadas nessa população foram: apoio psicológico, monitoramento da glicemia, hábitos alimentares saudáveis, prática de atividade física e cessação do tabagismo. **Conclusão:** as tecnologias educacionais são ferramentas que contribuem para a promoção do autocuidado a gestantes de alto risco e para a prevenção de desfechos gestacionais desfavoráveis.

DESCRITORES: Autocuidado; Gravidez de alto risco; Tecnologia educacional.

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ABSTRACT

Objective: to identify educational technologies and self-care needs in high-risk pregnancy. **Method:** an integrative literature review conducted from August 2024 to January 2025. The study search was performed in the following databases and virtual libraries: PubMed/Medline, Scopus, SciELO, Virtual Health Library, Web of Science, CINAHL, and Embase. **Results:** the sample consisted of 23 studies, which identified that the most commonly used educational technology for promoting self-care among high-risk pregnant women was a smartphone application. Additionally, the most highlighted self-care needs in this population were psychological support, blood glucose monitoring, healthy eating habits, physical activity, and smoking cessation. **Conclusion:** educational technologies are valuable tools for promoting self-care in high-risk pregnant women and preventing adverse pregnancy outcomes.

DESCRIPTORS: Self-care; High-risk pregnancy; Educational technology.

RESUMEN

Objetivo: identificar las tecnologías educativas y las necesidades de autocuidado en el embarazo de alto riesgo. **Método:** revisión integrativa de la literatura realizada entre agosto de 2024 y enero de 2025. La búsqueda de los estudios se llevó a cabo en las siguientes bases de datos y bibliotecas virtuales: PubMed/Medline, Scopus, SciELO, Biblioteca Virtual en Salud, Web of Science, CINAHL y Embase. **Resultados:** la muestra estuvo compuesta por 23 estudios, que identificaron que la tecnología educativa más utilizada para promover el autocuidado en mujeres embarazadas de alto riesgo fue una aplicación para teléfonos inteligentes. Además, las necesidades de autocuidado más destacadas en esta población fueron: apoyo psicológico, monitoreo de la glucemia, hábitos alimentarios saludables, práctica de actividad física y cesación del tabaquismo. **Conclusión:** las tecnologías educativas son herramientas valiosas para promover el autocuidado en mujeres embarazadas de alto riesgo y prevenir resultados gestacionales adversos.

DESCRIPTORES: Autocuidado; Embarazo de alto riesgo; Tecnología educativa.

INTRODUCTION

According to the World Health Organization (WHO), digital health is a field of knowledge and practice associated with the development and use of digital technologies in health care. In this context, educational technologies are being used more and more, as they promote the sharing of knowledge and guidance, with the aim of promoting health and preventing diseases or illnesses.¹

Educational technologies are tools that enable the construction of knowledge and the transmission of information, in order to provide opportunities for self-care through the teaching-learning process. In the context of high-risk pregnancy, these tools can be used to promote the self-care of pregnant women, as they can help minimize the occurrence of unfavorable outcomes.²⁻³

Pregnancy is a physiological phenomenon which, in most cases, occurs without unfavorable outcomes for the mother and/or baby. However, when previous maternal illnesses are identified or even acquired during this period, such as pre-eclampsia, Systemic Arterial Hypertension (SAH) and Gestational Diabetes Mellitus (GDM), the risks to the health of the mother, fetus and/or newborn increase and, consequently, the pregnancy becomes high-risk.⁴

In high-risk pregnancies, promoting self-care is a way of combating or minimizing unfavourable gestational complications, since self-care corresponds to caring for oneself and is characterized by the development of actions that individuals carry out to maintain life, health and well-being.⁴

It is important to identify educational technologies and self-care needs in high-risk pregnancies, since a previous search of the scientific literature revealed gaps in knowledge on this subject. This research could help to fill these gaps.

In view of the above, its results could have a positive impact on maternal and child health, as they could support the implementation of interventions aimed at promoting self-care during pregnancy. This study aims to identify educational technologies and self-care needs in high-risk pregnancies.

METHOD

This is an integrative literature review, carried out between August 2024 and January 2025, through the following stages: 1) Identification of the topic; 2) Selection of the research question; 3) Establishment of inclusion and exclusion criteria; 4) Categorization of the data; and 5) Interpretation of the results and presentation of the review.⁵

The guiding question for the integrative review was constructed based on the PICO strategy, with P being the “Population” (High-risk pregnant women); I being the “Phenomenon of interest” (Self-care needs and Educational technologies); and Co being the “Context” (High-risk pregnancy): What are the educational technologies and self-care needs in high-risk pregnancy?

Primary or secondary studies were included, published in any language, with no time frame and which answered the research question. Protocols, letters to the editor, proceedings of scientific events, books, book chapters, theses, dissertations, monographs and editorials were excluded.

The search was carried out using remote access to the Virtual Private Network (VPN) of the Portal Periódicos of

the Coordination for the Improvement of Higher Education Personnel (CAPES), in the following databases and virtual libraries: Pubmed/Medline, Scopus, Scientific Electronic Library Online (SciELO), Virtual Health Library (BVS), Web of Science, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Embase.

The search strategy was initially used in Pubmed/Medline and adapted for other databases and virtual libraries, with descriptors in English, Spanish and Portuguese, indexed in the Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH). In addition, the descriptors were cross-referenced using the Boolean operators AND and OR for the additive and restrictive combination of terms, as shown in Table 1.

Chart I - Search strategies applied to databases and virtual libraries. Recife, PE, Brazil, 2025

| Database/Virtual Library | Strategy |
|--------------------------|--|
| Pubmed/Medline | <i>(Pregnancy, High-Risk OR Pregnancy Complications) AND (Self Care OR Self-Care Units) AND (Health Promotion OR Disease Prevention OR Educational Technology)</i> |
| Scopus | <i>(Pregnancy Complications) AND (Self Care) AND (Health Promotion) OR (Disease Prevention) OR (Educational Technology)</i> |
| SciELO | <i>ALL ((pregnancy, AND high-risk OR pregnancy AND complications AND self AND care OR self-care AND units AND health AND promotion OR disease AND prevention OR educational AND technology))</i> |
| BVS | <i>(Pregnancy Complications) AND (Self Care) AND (Health Promotion) OR (Disease Prevention) OR (Educational Technology)</i> |
| Web of Science | <i>ALL=((Pregnancy, High-Risk OR Pregnancy Complications) AND (Self Care OR Self-Care Units) AND (Health Promotion OR Disease Prevention OR Educational Technology))</i> |
| CINAHL | <i>(Pregnancy, High-Risk OR Pregnancy Complications) AND (Self Care OR Self-Care Units) AND (Health Promotion OR Disease Prevention OR Educational Technology)</i> |
| Embase | <i>((‘pregnancy complication’exp OR ‘pregnancy complication’) AND ‘self care’ AND ‘health promotion’ OR ‘prophylaxis’) AND ‘educational technology’</i> |

Source: Prepared by the authors

After carrying out the search, the studies were exported to the EndNote reference management software in order to remove duplicate articles. The studies were then sent to the Rayyan application, which also helped to remove duplicates, as well as archiving and organizing the studies. The titles and abstracts were then read by two independent researchers. The selected articles were read in full.

Data was collected using an instrument designed for this research, with the following variables relating to the studies:

title, year of publication, country of publication, objective, method, level of evidence, methodological rigor and self-care needs of high-risk pregnant women.

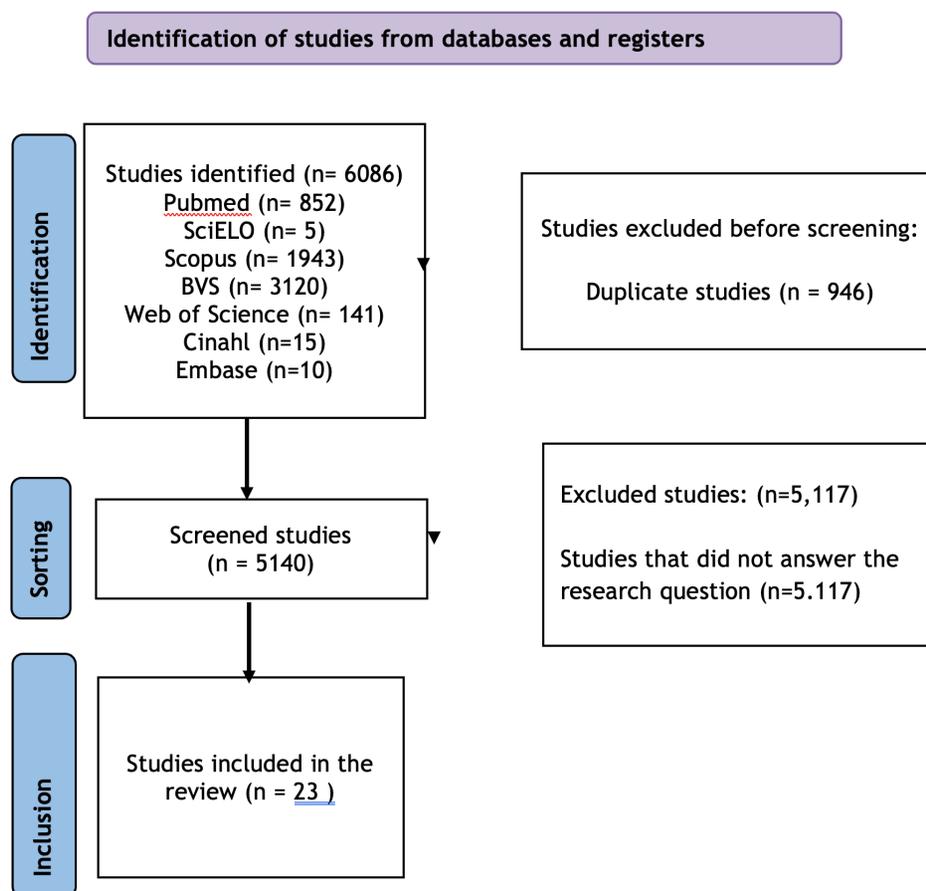
The results were interpreted, analyzed and presented descriptively through a discussion based on the scientific literature. The level of evidence of the studies was defined according to the guide to evidence-based practice in nursing: Level I - systematic review, meta-analysis or clinical guidelines of randomized controlled clinical trials; Level II - randomized

controlled clinical trial; Level III - evidence from well-designed clinical trials without randomization; Level IV - well-designed cohort and case-control study; Level V - systematic review of descriptive and qualitative studies; Level VI - descriptive or qualitative study; and Level VII - opinion of authorities and/

or expert report. ⁶ Methodological rigor was assessed using the Critical Appraisal Skills Program (CASP).

The description of the search and selection of studies will be presented in the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) flowchart (Figure 1).

Figure 1 - PRISMA flowchart. Recife, PE, Brazil, 2025



RESULTS

Twenty-three studies were selected to make up the final sample. The majority were published in 2007 (n=3; 13.04%), 2015 (n=3; 13.04%) and 2017 (n=3; 13.04%), in the United Kingdom (n=6; 30.43%). In addition, the descriptive study, which corresponds to level of evidence VI, was the most prevalent (n= 11; 60.86%).

The educational technology most used to promote self-care for this population was a smartphone app (n=3; 21.73%). With regard to the self-care needs of high-risk pregnant women, the most emphasized were: psychological support, blood glucose monitoring, healthy eating habits, physical activity and smoking cessation (Chart 2).

Table 2 - Summary of the results from the study sample.

| Title, year and country of publication | Study method/Level of evidence | Self-care needs/ Educational technology |
|--|--|---|
| <i>Maternal blood pressure adaptation in the first trimester of pregnancy (2010, United States).⁷</i> | Method: Retrospective comparative study. Level of evidence: Level IV | Educational technology: not specified. Self-care needs: regular monitoring of blood pressure; recognition of the signs of hypertension; adherence to medical advice. |
| <i>Smoking cessation in pregnancy: a self-help approach (1985, United States).⁸</i> | Method: Experimental study. Level of evidence: Level II | Educational technology: information leaflets and practical guides. Self-care needs: smoking cessation. |
| <i>The effect of education through mobile phone short message service on promoting self-care in pre-diabetic pregnant women: A randomized controlled trial (2020, Iran).⁹</i> | Method: Randomized clinical trial. Level of evidence: Level II | Educational technology: Short Message Service (SMS). Self-care needs: regular physical activity; adopting healthy eating habits; monitoring capillary glycemia. |
| <i>Is intensive counseling in maternity care feasible and effective in promoting physical activity among women at risk for gestational diabetes? Secondary analysis of a cluster randomized NELLI study in Finland (2012, Finland).¹⁰</i> | Method: Experimental study. Level of evidence: Level II | Educational technology: not specified. Self-care needs: regular physical activity to prevent gestational diabetes; ongoing guidance and support. |
| <i>Development, feasibility and acceptability of a self-efficacy-enhancing smartphone application among pregnant women with gestational diabetes mellitus: single-arm pilot clinical trial (2022, Oman).¹¹</i> | Method: Intervention study. Level of evidence: Level III | Educational technology: smartphone application. Self-care needs: monitoring blood glucose levels; healthy habits to prevent complications; adherence to treatment. |
| <i>Service evaluation of diabetes management during pregnancy in a regional maternity hospital: potential scope for increased self-management and remote patient monitoring through mHealth solutions (2019, United Kingdom).¹²</i> | Method: Descriptive study. Level of evidence: Level VI | Educational technology: use of mobile devices. Self-care needs: practicing healthy habits. |
| <i>Setting and techniques for monitoring blood pressure during pregnancy (2020, United Kingdom).¹³</i> | Method: Systematic review of randomized clinical trials. Level of evidence: Level I | Educational technology: not specified. Self-care needs: blood pressure monitoring. |
| <i>Antenatal management of gestational diabetes mellitus can improve neonatal outcomes (2016, Australia).¹⁴</i> | Method: Cross-sectional study. Level of evidence: Level VI | Educational technology: not specified. Self-care needs: adherence to specific diets; physical exercise; regular monitoring of glucose levels. |
| <i>Prenatal psychological distress and access to mental health care in the ELFE cohort (2015, France).¹⁵</i> | Method: Cross-sectional study. Level of evidence: Level VI | Educational technology: not specified. Needs: continuous psychological support during pregnancy; early identification of psychological stress. |

| Title, year and country of publication | Study method/Level of evidence | Self-care needs/ Educational technology |
|---|---|---|
| <i>Changing perspectives in pre-existing diabetes and obesity in pregnancy: maternal and infant short- and long-term outcomes (2014, United States).</i> ¹⁶ | Method: Literature review. Level of evidence: Level VI | Educational technology: not specified. Self-care needs: regular monitoring of glucose levels; adherence to specific diets; adequate physical activity. |
| <i>Successful interventions for smoking cessation in pregnancy (2007, United States).</i> ¹⁷ | Method: Literature review. Level of evidence: Level VI | Educational technology: telephone counseling sessions. Self-care needs: smoking cessation; psychological support. |
| <i>Management of type 1 diabetes in pregnancy: update on lifestyle, pharmacological treatment, and novel technologies for achieving glycaemic targets (2023, United Kingdom).</i> ¹⁸ | Method: Literature review. Level of evidence: Level VI | Educational technology: not specified. Self-care needs: continuous blood glucose monitoring; specific dietary adjustments; adequate physical activity. |
| <i>Becoming the best mom that I can: women's experiences of managing depression during pregnancy—a qualitative study (2007, Canada).</i> ¹⁹ | Method: Qualitative study. Level of evidence: Level VI | Educational technology: not specified. Self-care needs: recognizing the mental health problem. |
| <i>The impact of obstetric risk factors and socioeconomic characteristics on utilization of antenatal care (1998, Sweden).</i> ²⁰ | Method: Case-control study. Level of evidence: IV | Educational technology: not specified. Self-care needs: adequate monitoring of maternal health; access to regular antenatal care; psychological and social support. |
| <i>Australian Pregnant Women's Awareness of Gestational Weight Gain and Dietary Guidelines: Opportunity for Action (2016, Australia).</i> ²¹ | Method: Cross-sectional study. Level VI | Educational technology: not specified. Self-care needs: education about adequate gestational weight gain; continuous monitoring of weight gain during pregnancy. |
| <i>Mobile App for Women with Gestational Diabetes: A Study Protocol for a Multicenter Randomized Clinical Trial (2017, Norway).</i> ²² | Method: Randomized clinical trial. Level of evidence: Level II | Educational technology: Pregnant+ mobile application. Self-care needs: continuous blood glucose monitoring; psychological support; education on healthy eating. |
| <i>Lifestyle interventions for the treatment of women with gestational diabetes (2017, New Zealand).</i> ²³ | Method: Systematic review. Level of evidence: Level I | Educational technology: not specified. Self-care needs: adherence to dietary guidelines; regular physical activity; monitoring blood glucose levels. |
| <i>Mobile health as a primary mode of intervention for women at risk of or diagnosed with gestational diabetes mellitus: a scoping review (2022, United Kingdom).</i> ²⁴ | Method: Scoping review. Level of evidence: Level VI | Educational technology: mobile applications. Self-care needs: continuous blood glucose monitoring; psychological support; education on healthy eating; adequate physical activity. |

| Title, year and country of publication | Study method/Level of evidence | Self-care needs/ Educational technology |
|--|---|---|
| <i>The management of type 1 and type 2 diabetes in pregnancy (2015, United Kingdom).²⁵</i> | Method: Literature review. Level of evidence: Level VI | Educational technology: not specified. Self-care needs: rigorous monitoring of blood glucose levels. |
| <i>A survey of knowledge, attitude and practice of malaria management among pregnant women from two health care facilities in Nigeria (2007, Nigeria).²⁶</i> | Method: Cross-sectional study. Level of evidence: Level IV | Educational technology: not specified. Self-care needs: education on malaria prevention and treatment; proper use of mosquito nets and repellents; regular medical follow-up; adherence to prescribed treatment. |
| <i>A randomized lifestyle intervention preventing gestational diabetes: effects on self-rated health from pregnancy to postpartum (2018, Finland).²⁷</i> | Method: Randomized clinical trial. Level of evidence: Level II | Educational technology: not specified. Self-care needs: education about healthy eating; promotion of regular physical activity; psychological support. |
| <i>A psychometric systematic review of self-report instruments to identify anxiety in pregnancy (2015, United Kingdom).²⁸</i> | Method: Systematic review. Level of evidence: Level V | Educational technology: not specified. Self-care needs: mental health monitoring; psychological support; stress management education. |
| <i>Remote monitoring of blood pressure to reduce the risk of preeclampsia related complications with an innovative use of mobile technology (2016, United Kingdom).²⁹</i> | Method: Intervention study. Level of evidence: Level III | Educational technology: mobile technology for remote blood pressure monitoring. Self-care needs: regular monitoring of blood pressure; education about signs and symptoms of hypertension; psychological support; regular medical follow-up. |

Source: prepared by the authors.

DISCUSSION

Most of them were published more than five years ago, which shows that there is little interest in developing research on this subject. In addition, although there is a diversity of countries of publication, none of them were carried out in Brazil. However, around 15% of pregnancies in the country are high-risk, which corresponds to approximately 470,000 pregnancies a year, and this is an important public health problem in the country.³⁰

This study identified educational technologies and self-care needs to promote self-care for high-risk pregnant women. The most common self-care needs in this group were psychological support, blood glucose monitoring, healthy eating habits, physical activity and smoking cessation.^{9-12,14-18,20,22-25,27-28}

Two studies in the sample state that stress is a predominant factor in high-risk pregnant women, which can lead to gestational complications and harm to the mother and fetus.^{15,28} In view of this, one form of self-care used for emotional control is psychological support, which can be carried out through guidance on emotional control, with a view to reducing stress and anxiety in pregnant women.²⁴

Monitoring blood glucose is also a self-care need experienced by the group under study, according to the research found. This monitoring occurs mainly in pregnant women diagnosed with GDM. In addition to strict blood glucose control, they need to incorporate self-care routines, physical activity and healthy eating habits. Therefore, guidance and incentives for healthy practices should take place at all prenatal consultations.^{10,14-15,25}

In addition, physical activity and healthy eating habits can also help prevent other pathologies and clinical conditions, such as hypertensive syndromes, obesity, overweight, dyslipidemia, among others.³¹

Smoking cessation during pregnancy is also a practice encouraged in actions to promote self-care,^{8,17} since it can cause complications such as prematurity, alterations in the development of the fetus' brain and restricted uterine growth.³¹

The results of this study show a trend towards the use of educational technologies to support the health and education of pregnant women, which can be explained by the fact that these tools are powerful instruments for promoting autonomy, constant monitoring and health education.⁹

Most of the studies in the sample indicate that the use of educational technologies, such as smartphone apps, can improve the monitoring of conditions such as gestational hypertension, GDM, smoking, drug use and other complications associated with high-risk pregnancy.^{9,11-12,22,24,29} These technological resources allow pregnant women to monitor their conditions and keep a digital diary of symptoms, which can facilitate the early detection of complications.¹¹

However, it is clear that these applications were developed in foreign countries,^{9,11-12,22,24,29} and adaptations are needed for their use in the Brazilian scenario, given the particularities and the lack of studies carried out in Brazil in the sample.

One study points out that the construction of educational technologies to promote self-care for high-risk pregnant women has great potential to improve control over their health, reduce complications and promote health education. However, for these technologies to be truly effective, they need to be adapted to the individual needs of pregnant women.²⁴

Although the literature suggests that many high-risk pregnant women are willing to use technological resources, acceptance of new technologies can be affected by various factors, such as levels of digital literacy, internet access and confidence in the platforms used. Pregnant women of advanced maternal age, or those with little familiarity with the use of smartphones and apps, may find it difficult to navigate technological platforms, which could compromise the success of the intervention.⁹

It is important that these technological platforms are aligned with traditional educational support. Technologies for promoting self-care offer advantages such as remote monitoring and personalization of care; however, studies show that they should not replace face-to-face follow-up with a health professional, especially in the case of high-risk pregnant women.^{8,13}

The integration of educational technology with traditional monitoring shows promising results. In addition, consultations should be used as an opportunity to include technology in the promotion of self-care, through teaching about the use of the tool and health education about its importance.¹⁸

In this study, information leaflets and practical guides were also the educational technologies used in educational support,⁸ but these were the least prevalent, which reinforces the fact that printed tools are being used less and less.

The data from this study also points to the need to assess the long-term impact of educational technologies. Most of the studies in the sample focus on the immediate effects of these technologies, such as improved monitoring and computerization.¹⁸ However, it is essential to investigate how the use of these tools can affect maternal and neonatal health in terms of reducing postpartum complications or the impact on fetal development.

All the educational technologies highlighted emphasized the promotion of self-care. These pregnant women face physical, emotional and social challenges that demand special attention to their individual needs. Women's autonomy is strengthened when they understand the care needed to make informed decisions about their health, since many do not have detailed knowledge of their clinical conditions and possible complications.¹¹

CONCLUSION

Educational technologies and the self-care needs of high-risk pregnant women were identified. Smartphone apps were the most prominent technologies, while psychological support, blood glucose monitoring, healthy eating habits, physical activity and smoking cessation were the most prevalent self-care needs.

A limitation of the study is the diversity of methods used in the studies that made up the sample, which may have led to a variety in the synthesis of results.

The findings contribute to strengthening health education actions for high-risk pregnant women, with a view to promoting health and preventing gestational problems. Furthermore, further research is suggested to assess the long-term impact of these technologies on maternal and neonatal health.

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