# Collective prenatal care facilitated by educational technology: perception of pregnant women

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**Abstract** *This article aims to explore the perception of pregnant women regarding collective prenatal care facilitated by educational technology, in the light of complexity thinking. Qualitative, exploratory and descriptive study conducted between August and November 2022. The participants were 19 pregnant women from a Family Health Strategy in the central region of the State of Rio Grande do Sul. Data were collected through individual interviews following prenatal meetings and analyzed using thematic analysis. The analysis of the data revealed three thematic axes: Prenatal care: the necessary reconnection of knowledge; Collective prenatal care: collaborative (re)construction of experiences and practices; and Educational technology: tool to foster self-reflection and self-knowledge. Collective prenatal care, facilitated by educational technology, can promote better practices in the pregnancy-postpartum journey by creating collaborative and shared environments for knowledge construction and enabling autonomous and informed decision-making.*

**Key words** *Prenatal Care, Primary Health Care, Health Education, Qualitative Research*

## Introduction

Pregnancy is a unique and intricate process in the life of a woman and her family. Every pregnant woman has a distinct organization that involves physical, emotional, social, economic and cultural aspects[1]. Therefore, the gestational period requires unique and multidimensional perception and assistance on the part of professionals, especially in the context of Primary Health Care (PHC). Research indicates that high-quality prenatal care is associated with favorable obstetric outcomes, while inadequate care may result in unfavorable outcomes in labor, childbirth, postpartum, and in the healthy development of the child[2-5].

The Ministry of Health has set the objective of reducing the maternal mortality rate by 51.7% by 2030[6]. However, how can this goal be accomplished? How can prenatal care be improved? Which new approaches and guidelines should be considered and promoted within the context of Primary Health Care (PHC)? Which educational technologies can (re)signify prenatal care? Despite the dedicated efforts of PHC teams, maternal and infant mortality rates remain high in various regions of Brazil.

Collective prenatal care, conducted with a multidisciplinary approach that includes doctors, nurses, dentists, and other healthcare professionals, is recognized as a practice that promotes meaningful and high-quality care, by reshaping traditional teaching and learning approaches focused on professionals. Previous studies have indicated that collective prenatal care is enhanced by educational technologies and relies on horizontal and dialogic interactions. This approach serves as a valuable tool for fostering dialogue and empowering pregnant women and their companions to make autonomous decisions[7-10].

The conception of collective prenatal care as a dialogical and collaborative approach that considers the user/pregnant woman as a singular and multidimensional being assumes that only an expanded and complex understanding of prenatal care/assistance can promote interactive processes, foster associations, and yield favorable outcomes. In this context, collective prenatal care must be regarded as a complex phenomenon that gives meaning to the diverse journeys of users/ pregnant women, while also giving purpose to their own existence, based on their unique and intrinsic experiences[11,12].

In the pursuit of a comprehensive and multidimensional understanding of prenatal care, and with the intention of contributing to the institutionalization of a complex thinking that distinguishes, amplifies, and contextualizes subjects, this study aims to explore the perception of pregnant women regarding collective prenatal care facilitated by educational technology, in the light of complexity thinking.

Complexity theory is rooted in the thinking of Edgar Morin, who is regarded as one of the key theorists in this field. According to Morin, complexity or *complexus* is understood as everything that is woven together and that evokes at least more than one circumstance or possibility of interaction. It is understood that both the knowledge of the whole depends on the parts, and the knowledge of the parts depends on the whole[13,14].

## Methods

### Study type

Qualitative research grounded on complexity thinking, following a methodological path that encourages researchers to engage in a process of learning, invention, and (re)creation, employing interpretative and investigative processes[15]. The qualitative method was chosen due to its ability to embrace the uniqueness and multidimensionality of prenatal care as guiding principle, facilitating expanded connections with various fields of knowledge, recognizing the voice of the user/ pregnant woman as a central figure, and providing support for decision-making in health planning and management[16].

### Research context and sample

The research was developed in an FHS (Family Health Strategy), located in the central region of the State of Rio Grande do Sul (RS), Brazil. This FHS was selected due to its involvement in an expanded action research initiative supported by the Research Program for the Unified Health System (PPSUS), which aims to enhance the quality of prenatal care in the central region of RS.

The participants were 19 pregnant women who were selected for convenience and who responded positively to the invitation. The inclusion criteria were being pregnant and receiving prenatal care at the specified FHS within a predetermined data collection period. Exclusion criteria were pregnant women who were not regularly attending prenatal meetings at the FHS or were under the age of 18. Two pregnant women de-

clined to participate due to unavailability of time to participate in data collection. The initial contact with the pregnant women occurred in person, during their prenatal consultations, and was conducted by the researchers working at the unit during the study period.

### Procedures

Collective prenatal care in the mentioned FHS was facilitated by an educational technology in the form of a flowchart called "Cátia's Prenatal Care," which was previously developed and validated by the same researchers and is depicted in Figure 1.

The collective prenatal care was conducted between August and November 2022 and comprised a total of four meetings, which were facilitated by two researchers who had prior academic and research experience within the selected FHS. Each meeting lasted approximately two hours and was audio-recorded for further analysis. The sessions were conducted in a designated collective room at the FHS, where chairs were arranged in a circle to foster interaction among participants. Alongside the audio recordings, the observer recorded information in a field diary to support data analysis.

The coordinator's role involved organizing the room and managing the dynamics of the meetings. The observer, who received a scientific initiation scholarship, was responsible for documenting the dynamics of the sessions, assisting in the discussions, monitoring the recording equipment, and collaborating with the coordinator to control the duration of the meetings. Chart 1 provides a detailed overview of the systematization of the sessions.

### Data collection technique

After the conclusion of the collective prenatal meetings, the 19 pregnant women who participated in the study were interviewed. The interviews had an average duration of 30 minutes each and were conducted in a private room at the FHS, on previously scheduled dates and times. The interviews followed a set of guiding questions that had been pretested with two pregnant women, which included: "How was your experience participating in the collective prenatal care?", "What were your perceptions of the educational technology - the flowchart 'Cátia's Prenatal Care'?", "What would you do differently in future meetings?". The interviews were audio-recorded and later transcribed by the researchers. It should be noted that data saturation was not addressed in this study.

### Data analysis technique

Thematic analysis was employed to analyze the data, aiming to identify concepts and relationships within the raw data and organize them into a theoretical exploratory framework. The analysis involved three stages: pre-analysis - exhaustive reading of the data; exploration of the material; and interpretation of the data. In the second stage, the material was explored to identify the nuclei of meaning and comprehend the discourse. The analytical process focused on identifying significant words and expressions by organizing and reducing the content of the speeches, describing their characteristics, and defining categories. The treatment of results and interpretation, the third stage of the analysis, consisted in the definition of thematic axes or analytical categories by combining the nuclei of meanings[17] and using the principles of complexity thinking to foster new intervention approaches.

### Ethical aspects

The project was approved by the Research Ethics Committee under CAAE 53319116.5.0000.5306 and opinion 4.253.922. The ethical guidelines for research, outlined in Resolution No. 466/2012 of the National Health Council, were followed throughout the research process[18]. Participants' anonymity was maintained by identifying their speeches with the letter "G" followed by a number corresponding to the order of the statements: G1, G2... G19.

## Results

The mean age of the 19 participants was 23 years old. Among them, eight were primiparous and the others had more than two children; seven had a normal delivery and the others had a cesarean section; nine had previous experiences in the supplementary/private health network. Regarding education, the majority had completed high school. The three most prevalent professions among the participants, listed in descending order, were sales assistant, technical course student and general services assistant.

After organizing and analyzing the data, three thematic axes were identified: Prenatal

**CÁTIA'S PRENATAL CARE**
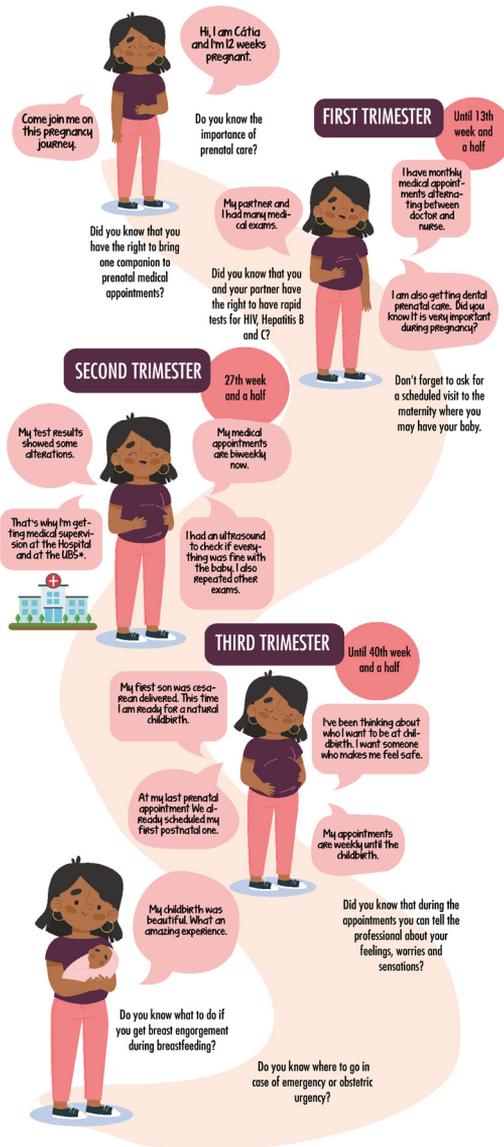
**Figure 1.** Educational technology in flowchart format "Cátia's Prenatal Care".

Source: Authors.

care: the necessary reconnection of knowledge; Collective prenatal care: collaborative (re)construction of experiences and practices; and Educational technology: tool to foster self-reflection and self-knowledge.

## Prenatal care: the necessary reconnection of knowledge

The participants acknowledged the significance of collective prenatal care within the PHC setting. They drew comparisons between this prenatal care and their experiences in the private/supplementary health network, where professionals did not share knowledge and consultations were predominantly led by physicians. In this context, they recognized the importance and quality of prenatal care in the Unified Health System (SUS), which is characterized by its welcoming approach, integrated care, and collaborative work among health team professionals:

*My prenatal care went really well. Now I have appointments with different professionals. I got a better understanding of what I need to do* (G1).

*In my previous pregnancy, I opted for private care. But now, I'm using the SUS, and I'm enjoying the team. I have nothing to complain about. So far, my expectations have been met, and I don't have any complaints* (G3).

The need to reconnect professional knowledges in prenatal care, which had been fragmented due to the biomedical model, was evident in the speeches of several participants, particularly when comparing services and professional practices:

*The professionals here talk to each other. When the Nurse has doubts about prenatal care, he talks to the doctor. I felt welcomed by everyone here* (G4).

*I like the consultations at the SUS. They [team] guide everything. When my test results indicated changes in my diabetes, they immediately gave me guidance on my diet, told me to go for walks, and do some exercises. They even asked me what I was already doing. They guided me; it was just like in the private system, with my first child* (G10).

*Things are so different now. I asked all the questions, and everyone helped me out. It's not like when there is just a doctor who has very little time to answer all my questions* (G15).

The participants' speeches revealed a paradox between the care received in the Unified Health System (SUS) and in the private sector, which was often associated with a narrow, linear, and fragmented perspective, in which the quality of care in private services was perceived as superior. This perception is also demonstrated in the following statements, where participants emphasize the importance of the prenatal consultations conducted by both nurses and doctors, highlighting the specific expertise of each professional:

**Chart 1.** Systematization of collective prenatal care meetings.

| | Step | Description | Time |
|---|---|---|---|
| 1st | Opening | Organization of the environment, exhibition of the Flowchart "Cátia's Prenatal Care" (colorful canvas banner measuring 90cm x 120cm), and reception of participants. | 10 minutes |
| 2nd | Mingling | A mingling activity was conducted to foster a sense of closeness, lightness and motivation to actively participate in the other steps. | 10 minutes |
| 3rd | Constructivist dialogic dynamics | The coordinator presented or reviewed the objectives of the meeting, emphasized the importance of the participation of each member and highlighted the relevance of collective prenatal care. Next, the flowchart "Cátia's Prenatal Care" was presented and the participants were invited to read it silently. Afterwards, the participants were asked to volunteer to read a topic of the flowchart out loud. Subsequently, they were encouraged to share their anxieties, fears, and expectations based on their daily experiences, and sufficient time was provided for each participant to express their feelings. | 60 minutes |
| 4th | Critical-reflective analysis | A critical-reflective process was conducted to promote autonomy and commitment to decision-making. A general synthesis of the work was presented, along with considerations and suggestions for the next meeting. | 10 minutes |
| 5th | Closure | Finally, a get-together was held with all participants to strengthen the bond and engagement in the scheduled activities. | 30 minutes |

Source: Authors.

*In private system, there is no such thing [nursing consultation], it's only the doctor (G2).*

*I thought it was just a consultation with the doctor, because until then I had been using the private system, and everything was with the doctor. But in the SUS, it's different. I see that it's both a doctor and a nurse, alternating (G11).*

*One month I see the nurse, and the next month I see the doctor. And now, with the 15-day consultations, they alternate. And there is the weekly consultations, one with a nurse and the next with a doctor. I find it really interesting (G13).*

*Then there are two professional opinions, and they also discuss certain things, especially in cases of high-risk pregnancies. Sometimes the nurse has a better understanding, and they can clarify each other's doubts (G16).*

The speeches indicate that the referral for consultations and prenatal exams in the SUS demonstrated a closer and more welcoming approach, while in the supplementary health network this process followed a traditional and hierarchical approach. The statements below clearly demonstrate that the pregnant women yearned for interactive and dialogic spaces, where their concerns, doubts, and fears could be listened to and addressed:

*I had an ultrasound in private care. I was treated very poorly. I left without any explanation from the team or from the doctor (G2).*

*I really like the care provided by the SUS, you know, the team is very caring. The exams are explained, everything is discussed (G5).*

*Despite many people complaining and making comparisons, I'm being well taken care of in the SUS. I have nothing to complain about (G13).*

Similarly, the speeches emphasized the importance of agile, dynamic, and effective processes that save time and resources of pregnant women, preventing them from navigating through multiple professionals and sectors. In the same vein, the participants recognized the importance of the "consultation time", which should not be limited to questions and answers but should expand to understand the context and individuality of each pregnant woman:

*There at the SUS, I was well taken care of. Everything went smoothly, and I didn't have to go to different departments like I did the first time (G2).*

*When I have to get exams, they already schedule them, including the dentist appointment. When I arrive, there's a thorough medical screening. It's not just a quick question and answer session. It's a comprehensive consultation to address all my doubts (G12).*

Another aspect emphasized by the participants is the number of tests requested. Despite recognizing the quality of care in the SUS, the participants mentioned that fewer tests were requested compared to private services. This in-

dicates a narrow and reductionist perception of health, in which quality is measured solely by the number of exams and interventions:

*I think that they don't request many ultrasounds. I think they should ask for more to track the baby's size and weight, because the SUS usually requests just one* (G8).

*In the private sector, the doctor is always requesting more tests* (G3).

*Things take a while at the SUS, so I think that if everything looks fine in the first ultrasound, they don't ask for more. The first ultrasound is important to check everything and see if the baby has any abnormalities* (G7).

*I think there should be more ultrasounds to monitor the baby, to see how the baby is positioned, if they in a breech or transverse lie, and to determine if a c-section is necessary or if everything is within the normal range for a vaginal delivery, you know?* (G11).

*There aren't many prenatal exams. They didn't explain it to me. But I can't complain about the care provided by the SUS* (G17).

The speeches revealed a continuous process of comparison between the prenatal care provided in the public and in the private healthcare systems, as well as between consultations with doctors and nurses. This indicates a dichotomous and fragmented thinking both in professional practice and in the perspectives of the users.

### Collective prenatal care: collaborative (re)construction of experiences and practices

The participants described the collective prenatal meetings as spaces where they constructed, learned, and shared knowledge and practices, and as platforms for reinforcing collective ideas and beliefs. In the context, collective prenatal care is seen as an approach that values self-knowledge, self-understanding, and collaborative work, skills that can contribute to overcoming alienation and passivity:

*There are several mothers, and they help each other with their doubts. I thought it was really cool. These meetings should happen all the time, especially for those first-time moms who have lots of questions. I'm a mom for the second time, but it's been eleven years. Things have changed a lot, I thought it was really cool* (G6).

*Everyone shares their stories, and sometimes there's someone feeling a bit down, but they realize they're not alone. It's like a support system, and everyone talks about their experiences* (G12).

*It is a moment to talk only about pregnancy. It is very welcoming and motivating, it's like therapy. You can talk, ask any questions you have, and discuss what you think is right or wrong. It even encourages conversations with your spouse, which is really cool* (G13).

Many participants mentioned the method and dynamics of the meetings, which were considered to stimulate new meanings and learning. It was observed that, apart from the information and programmatic content, the ambiance, reception, and collaborative nature of the meetings should also be taken into account:

*A conversation circle like this makes us very comfortable. I enjoyed the part we shared perceptions and experiences* (G7).

*I felt very comfortable in the group. We all had our doubts, and we learned together. Sometimes, there are questions that slip our minds, and we find the answers through what our friends here say* (G19).

Other participants expressed the desire to meet the different members of the multidisciplinary team, as they understood that each professional has a unique knowledge and can contribute to a more comprehensive understanding of prenatal care. This demonstrates a forward-looking perspective on the production of knowledge, with opportunities for both professionals and users to teach and learn collectively:

*I wanted to get to know the whole team, have a different team member in every meeting. The nurses and doctors stay there, but I'd like to meet and talk to everyone* (G14).

The research participants demonstrated willingness and openness to embrace new learning opportunities. From this perspective, collective prenatal care is seen as a strategy that encourages innovative approaches to prenatal care, contributing to the emancipation and autonomy of pregnant women.

### Educational technology: tool to induce self-reflection and self-knowledge

In the perception of the participants, the flowchart/technology "Cátia's Prenatal Care" enhanced discussions and learning at both individual and collective levels. The flowchart facilitated the visualization of the pregnancy-postpartum journey, going beyond the gestation phase. They acknowledge that the technology sparked questions, increased participation, and facilitated the exchange of experiences, while also (re)constructing knowledge and practices:

*It was important, it helped me understand. The flowchart is about the importance of beginning prenatal care early in pregnancy and it also has a section about syphilis. It explains the path and the importance of receiving prenatal care from the beginning* (G12).

*With my first child, I had a C-section, but it made me realize that that doesn't automatically mean my second child will also be delivered that way. If everything goes well, and the baby is in the right position, and I am healthy, I don't necessarily need to have a C-section just because my first delivery was like that. Sometimes, even if the first pregnancy was a normal delivery, the second may have complications such as the baby being in a breech or transverse lie, which increases the risk of needing a C-section* (G16).

Other testimonies demonstrated that the "Cátia's Prenatal Care" flowchart brought the pregnant woman closer to her existential reality and guided her on a journey of self-reflection and self-evaluation. The technology also allowed for a comprehensive understanding of the journey, involving the partner and family in the gestational process, which is not a solitary journey, but one shared with all individuals and sectors of the network, including the maternity ward:

*The way they organized it, including the first trimester, was interesting. It clarified that concept of having one appointment with the nurse and another with the doctor. This was something that confused me in the beginning, but it got clearer when I looked at this flowchart* (G5).

*I think it's really cool that the flowchart explains the whole process, including the tests that the pregnant woman and her husband can take, and the option to always have a companion. These were things that I didn't know before* (G9).

*It contains information that sometimes pregnant women don't know or forget to ask, like I didn't know about the maternity ward, I didn't know about it* (G13).

Educational technologies, such as the flowchart in this case, have the capacity to go beyond an informative approach, transcending the content. Apart from offering enhanced interactivity through its self-explanatory nature, the technology facilitated a process of self-reflection and self-discovery, strengthening the autonomy and empowerment of pregnant women. This aspect was evident in the participants' speeches, as they highlighted how the flowchart provided them with tools and empowerment to know the questions they should and/or could ask healthcare professionals:

*When I looked at this flowchart, I could see myself in the journey and it made me reflect. There were some things I already knew, but others I didn't, and the flowchart helped me identify the questions I could ask* (G2).

*It clears up doubts, whether the person knows or not. Sometimes pregnant women feel embarrassed about asking questions or unsure if they're doing something correctly. There are things in the flowchart that, if not addressed by the professional, you leave with doubts* (G13).

*I could see myself in this path. It seems like it has become easier to understand what I need to do* (G16).

According to the participants' speeches, the flowchart "Cátia's Prenatal Care" was a valuable integrative tool that enhanced new knowledge and facilitated self-training processes. From this perspective, technologies play a crucial role in providing guidance and security for pregnant women regarding the path they should follow and, consequently, increase adherence to prenatal consultations:

*It helps ensure proper prenatal care, making sure we don't miss any appointments and follow the guidelines provided by the professionals* (G8).

*I see a lot of pregnant women feeling lost. Sometimes they don't know how many weeks along they are. This flowchart is really helpful there [in the waiting room], it brings awareness and knowledge. It reminds us of things we need to know, things we forgot and things to ask about* (G18).

Collective prenatal consultations, supported by educational technologies, promote increased involvement, proactivity, and empowerment among pregnant women and other individuals involved in the journey. Therefore, these educational technologies help promoting a pregnancy-postpartum journey with a sense of lightness, participation, and collaboration. To achieve this objective, it is essential to rethink intervention approaches and have the courage to break away from traditional hegemonic methods.

## Discussion

The findings of this research show that the prenatal care provided by the FHS has made progress in ambiance and reception, while also fostering dialogue between professionals and users and valuing and involving companions/family members in decision-making processes[19-21]. However, it is still necessary to institutionalize a complex-systemic approach, exploring new possibilities and

investments that consider both the individuality and multidimensionality of prenatal care.

However, it is important not to reduce and fragment prenatal care into a specific and linear period or stage, as this may lead to new forms of oversimplification. Prenatal care should recognize the user/pregnant woman as a complex being that is part of a family and of social, economic, political, and cultural systems[22]. Beyond pregnancy itself, the user/pregnant woman is a unique individual who deserves to be welcomed and understood within the context of multidimensional factors, which include the interconnectedness of events, actions, interactions, feedbacks, determinants, and contingencies that shape our phenomenal world[23].

From this perspective, collective prenatal care should be seen as a complex phenomenon that gives meaning to the diverse movements of the pregnant woman, her companion, and family, as well as to the existential phase itself[11,12]. As a result, prenatal care goes beyond the set of consultations, exams, and meetings, and instead embraces the diversity of experiences and expands into the ability to create meaning, empowerment, and autonomy in decision-making[24].

In this context, it is crucial to strengthen networks and collaborative spaces to develop new intervention approaches that are more horizontal, dialogic, and centered on the pregnant woman/user, thus enabling shared and progressive learning processes. In addition to relying on certainties and absolute truths, it is important for healthcare professionals to use educational technologies to spark new questions and foster creative imagination, generating alternative experiences and opportunities for dialogue with diverse individuals[25].

A collective prenatal care grounded in complexity thinking enhances health promotion efforts, fosters the exchange of knowledge and practices, encourages multidisciplinary teamwork, and empowers the pregnant woman as the central figure in her own pregnancy-postpartum journey[22]. A systemic-complexity approach is important in this context, as it emphasizes relationships, interactions, and systemic associations to address and propose forward-looking strategies.

The results of the research demonstrate that prenatal care requires professional approaches that go beyond the interventionist biomedical model. It is crucial that the pregnant woman is welcomed, supported, and empowered in her initiatives and life perspectives throughout the entire journey. In this regard, it is important

for healthcare professionals to be attuned and trained to understand the various dynamics and emotions associated with this phase, thereby empowering the pregnant woman as the central figure in her own narrative[26].

Conceiving assistance and collective prenatal care from the perspective of complexity thinking challenges the historical hegemonic tradition in the obstetric field, characterized by prescriptive and hierarchical dynamics, where a subject-object relationship prevailed. In this traditional vertical model, the pregnant woman was not encouraged to be autonomous and make decisions[1,22]. (Re)constructing this model requires that health professionals not only embrace new educational approaches and technologies, but also undergo a reform or evolution of their mindset, resulting in a new professional-user relationship.

Based on the findings of this study, collective prenatal care offers an interactive and collaborative approach that can promote positive obstetric practices, with active involvement of all individuals as agents and central figures in a new path towards positive outcomes in the pregnancy-postpartum journey. In this perspective, it is important that healthcare professionals are trained and committed to the process of constructing shared and collaborative knowledge and practices[27,28].

Collective prenatal care, facilitated by educational technologies, promotes positive experiences by creating a platform for discussion and exchange of knowledge, involving partners and family members in the pregnancy journey, and empowering the pregnant woman as the central figure in the pregnancy-postpartum journey. This innovative approach to knowledge production, characterized by its circular and interactive nature, promotes horizontal relationships, interactivity, and effective healthcare processes[29].

A previous study demonstrated that collective prenatal care is an important space for sharing experiences and building social networks among pregnant women[30]. The findings of current research further support this notion, indicating that collective prenatal care, facilitated by the educational technology "Cátia's Prenatal Care" promoted effective, transparent, and ongoing communication between facilitators and pregnant women, as well as between pregnant women and their companions.

The limited number of participants and the fact that the study was conducted in a single FHS did now allow general conclusions regarding the different educational technologies. Future stud-

ies with a broader scope should be conducted to further investigate these factors. Additionally, future projects should explore the implementation of diverse educational technologies as supportive tools for collective prenatal care.

## Conclusion

Collective prenatal care, facilitated by educational technology, can promote better practices in the pregnancy-postpartum journey by creating collaborative and shared environments for knowledge construction and enabling autonomous and informed decision-making. Therefore, it is essential to invest in new intervention approaches that allow pregnant women to perceive themselves as central figures in their pregnancy-postpartum journey.

Although the promotion of collaborative spaces for knowledge construction remains a challenge for health professionals and others, educational technologies must be recognized as catalysts for new intervention approaches. These technologies allow greater interactivity and sharing of knowledge and practices between professionals and users.

## Collaborations

DS Backes worked on the conception and design; wrote the article and did the critical review and approved the final version. LS Medeiros worked on the conception and design; wrote the article and did the critical review and approved the final version. AC Veiga worked on the conception and design; wrote the article and did the critical review and approved the final version. JS Colomé worked on the project; wrote the article and approved the final version. MTS Backes worked on the project; wrote the article and approved the final version. MR Santos worked on the conception and design; wrote the article and did the critical review and approved the final version. C Zamberlam worked on the conception and design; wrote the article and did the critical review and approved the final version.

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