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## Identifying mobile health technology experiences and preferences of low-income pregnant women with diabetes

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Keywords:	behavioral intervention, diabetes, mobile health, pregnancy, smartphone
Abstract:	<p><b>BACKGROUND:</b> Rapid expansion of mobile technology has resulted in the development of many mobile health ("mHealth") platforms for health monitoring and support. However, applicability, desirability, and tailoring of these platforms for pregnant women, particularly in populations who experience the greatest health inequities—such as women with diabetes mellitus (DM) and/or those with greater socioeconomic barriers—remains unknown. The objective is to understand low-income pregnant women's experiences and preferences for mHealth tools to support pregnancy and improve DM self-management.</p> <p><b>METHODS:</b> Low-income pregnant and postpartum women were included in individual interviews or focus groups; women with and without type 2 or gestational DM were included. Analysis was performed with the constant comparison method.</p> <p><b>RESULTS:</b> In this population of 45 (N=37 with DM) low-income, largely minority, pregnant and postpartum women, 100% reported access to smartphones and prior experience with apps. Interest in mHealth to support health and engagement during pregnancy was high. Preferences for general mHealth features included education that reduces uncertainty, support communities, visualizing progress, convenient access to information, and support for better management of pregnancy-related tasks. Preferred design elements included personalization, interactive features, and integrated graphics. Women with DM expressed multiple additional DM-specific needs, including support tools for DM self-management and self-regulation tasks.</p>

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	CONCLUSION: Pregnant and postpartum women, especially those with DM, desire mHealth technology to support engagement and improve health during pregnancy. Further work to develop mHealth interventions tailored for target populations remains a key step in reducing health inequities and promoting access to evidence-based perinatal health interventions.

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**Identifying mobile health technology experiences and preferences of low-income pregnant women with diabetes**

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**Abbreviations:** (DM) diabetes mellitus, (GDM) gestational diabetes mellitus, (T2DM) type 2 diabetes mellitus, (mHealth) mobile health, (app) application

**Key words:** behavioral intervention, diabetes, mobile health, pregnancy, smartphone

**Figure and Table Count:** 0 figures, 3 tables

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For Peer Review

**ABSTRACT**

BACKGROUND: Rapid expansion of mobile technology has resulted in the development of many mobile health ("mHealth") platforms for health monitoring and support. However, applicability, desirability, and tailoring of these platforms for pregnant women, particularly in populations who experience the greatest health inequities—such as women with diabetes mellitus (DM) and/or those with greater socioeconomic barriers—remains unknown. The objective is to understand low-income pregnant women's experiences and preferences for mHealth tools to support pregnancy and improve DM self-management.

METHODS: Low-income pregnant and postpartum women were included in individual interviews or focus groups; women with and without type 2 or gestational DM were included. Analysis was performed with the constant comparison method.

RESULTS: In this population of 45 (N=37 with DM) low-income, largely minority, pregnant and postpartum women, 100% reported access to smartphones and prior experience with apps. Interest in mHealth to support health and engagement during pregnancy was high. Preferences for general mHealth features included education that reduces uncertainty, support communities, visualizing progress, convenient access to information, and support for better management of pregnancy-related tasks. Preferred design elements included personalization, interactive features, and integrated graphics. Women with DM expressed multiple additional DM-specific needs, including support tools for DM self-management and self-regulation tasks.

CONCLUSION: Pregnant and postpartum women, especially those with DM, desire mHealth technology to support engagement and improve health during pregnancy. Further work to develop mHealth interventions tailored for target populations remains a

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key step in reducing health inequities and promoting access to evidence-based perinatal health interventions.

For Peer Review

## INTRODUCTION

The antenatal period is a time of increased learning requirements and health behavior change, especially among women with gestational diabetes mellitus (GDM) or type 2 diabetes mellitus (T2DM). Studies have noted knowledge gaps among pregnant women, which may negatively affect pregnancy outcomes,<sup>1-6</sup> making antenatal education and support an important consideration in prenatal care.<sup>7,8</sup> However, disparities still exist to prenatal care access, more specifically to quality prenatal care and education among minority and low-income pregnant women.<sup>9</sup> Studies of pregnant women's experiences indicate that interventions which support comprehensive, personalized education and behavior change could be beneficial.<sup>9-13</sup> Such interventions may be especially impactful for low-income and minority women who experience greater barriers to high quality care.

Mobile health (mHealth) has been used successfully in a variety of populations—including pregnant women—to promote behavior change.<sup>14-21</sup> Mobile phones are widely accessible among low income populations,<sup>22,23</sup> and studies indicate that pregnant women have both access to and interest in mHealth interventions,<sup>11,12,24-26</sup> supporting these tools as attractive options for antenatal and postpartum health interventions. However, more research is needed to optimize mHealth interventions for pregnancy. Interactions with mobile technology and trust in information from mobile or internet sources vary by race and socioeconomic status.<sup>27-29</sup> Additionally, little is known about the effect of mHealth interventions for pregnant women with DM,<sup>17</sup> despite increased requirements for health behavior change necessary in a pregnancy complicated by DM.<sup>30-33</sup>

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3 Thus, our goal was to conduct an in-depth qualitative investigation to  
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5 understand the experiences and preferences of low-income pregnant women with DM  
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7 regarding the use of mHealth apps to support pregnancy and reduce inequities in  
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9 healthcare and health outcomes. In order to understand the compounded barriers that  
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11 low-income pregnant women with DM face, we specifically investigated how mHealth  
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13 platforms may be used to improve DM management.  
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## 18 METHODS

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20 This qualitative study investigated the mHealth preferences of a diverse group  
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22 pregnant women with and without GDM or T2DM. Data were compiled from a  
23  
24 multiphase investigation of a novel mHealth tool for use by women with DM during  
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26 pregnancy. All study activities were approved by the Northwestern University  
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28 Institutional Review Board. All participants provided written, informed consent and  
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30 were compensated with gift cards.  
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34 Participants were recruited from two obstetrics and gynecology practices at  
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36 Northwestern Memorial Hospital in Chicago, Illinois from April 2018 to August 2019.  
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38 Individuals were eligible for participation if they were at least 18 years old, were able to  
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40 participate in English, were low-income (defined below), and were pregnant or recently  
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42 postpartum (within 6 weeks of delivery). Patients with and without GDM or T2DM were  
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44 eligible to participate, although the focus of investigation, and thus recruitment, was on  
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46 women with DM. Low-income status was defined as having public insurance or total  
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48 household income less than 200% of the federal poverty line. Trained research  
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50 personnel conducted focus groups and individual interviews, depending on the  
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52 investigation phase. Semi-structured interview guides encouraged candid conversations.  
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3 The goal of the primary study was to test early phases of the novel mHealth tool; this  
4 analysis addresses broader mHealth preferences that were probed during each phase of  
5 study.  
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10 Interview guides featured questions on general mHealth desires, familiarity with  
11 mHealth technology, and perspectives on DM-specific mHealth features and  
12 preferences (when applicable). Interviews lasted 30-60 minutes and were digitally  
13 recorded, transcribed verbatim, and uploaded to a secure qualitative data storage  
14 platform (dedoose.com). Transcripts were analyzed using the constant comparative  
15 method.<sup>34</sup> Two independent research assistants iteratively read half of the transcripts  
16 and noted recurring concepts called subthemes. All subthemes were discussed with the  
17 larger team and were organized into overarching themes. Themes and subthemes were  
18 compiled into a codebook, which was utilized to code all remaining transcripts after  
19 assuring agreement amongst team members. A Dedoose “Training Center” test was  
20 conducted to determine the Pooled Cohen’s Kappa coefficient, a value summarizing  
21 agreement between the test-takers across a selected sample of codes.  
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37 Results include themes and subthemes regarding the preferences, experiences,  
38 and knowledge about mHealth among low-income pregnant women, including those  
39 with DM.  
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## 45 RESULTS

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47 During this study period, 46 women consented to participate. Participants were  
48 majority non-Hispanic Black (61%) and 87% received public insurance. Eighty-seven  
49 percent (N=40) had T2DM or GDM (Table 1). All participants reported smartphone  
50 access and familiarity with apps. After thematic analysis, the resulting Pooled Cohen’s  
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3 Kappa coefficient was 0.91 from a sample of 2-4 code applications per subtheme (44  
4 excerpts total), indicating high interrater reliability.  
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7 Themes regarding pregnant participants' mHealth preferences were categorized  
8 based on whether the theme was unique to DM. Results are described below;  
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10 exemplary quotations are found in Tables 2 and 3.  
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### 16 General mHealth preferences

#### 17 **App as reference for "normal" pregnancy**

##### 18 *Guides expectations of maternal pregnancy progression to reduce uncertainty*

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21 When queried about their favorite features of pregnancy apps, many  
22 participants reported using the app as a reference for a typical pregnancy. Participants  
23 expressed uncertainty about expectations during pregnancy and found apps to be  
24 helpful resources. As one participant said, "I just go in there and look up 32 weeks and  
25 then it be like you'll start feeling back pain and all that, so it's a really helpful app." Apps  
26 reassured users about the physical changes and emotional fluctuations during  
27 pregnancy, and they provided a source of information to individuals who may have  
28 diminished access to care and other support systems.  
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##### 43 *Information on fetal development*

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45 Apps were used as a reference for the expected progression of fetal  
46 development, which was perceived to be engaging and educational. For example, apps  
47 reported fetal milestones, such as the development of a heart. One participant said,  
48 "The app basically it goes week by week with pregnancy [...] you have like videos of  
49 what to expect [...] Like if your baby is growing its ears or whatever the case may be..."  
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### *Alter frequency and content of provider interactions*

Using apps to find information to avoid or delay the next prenatal appointment, or to augment information already given, was a prominent theme. When access to providers was inadequate, participants reported using apps to fill the gap. One participant reported that "...for a good month I wasn't able to go to the doctor and like I had the app to you know keep me walking through it." Participants reported finding information on apps shortened appointment times and in some cases it "save[d] me a lot of doctors' appointments." Some used apps to clarify information, to find questions to ask during appointments, and to learn what would happen at each appointment. However, it is essential to note that many participants did not consider apps an adequate alternative to appointments. In most cases, women felt the information they found needed to be corroborated by a healthcare professional.

### **Social network**

#### *Receive advice from other women*

The potential for social interaction and crowd-sourced answers within mHealth platforms was widely appreciated in our cohort. In prior experiences with mHealth related to pregnancy, women asked and/or answered questions in forums, joined "birth month clubs," participated in polls, and sometimes read responses rather than interacting directly. Participants appreciated the opportunity to know "what other moms think," often in cases of concern about bodily changes (e.g. stretch marks), or when trying different remedies for pregnancy symptoms (e.g. lemons for nausea). Quicker response times and more diverse opinions were benefits of crowd-sourced

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3 information. Notably, some participants reported that these forums or polls motivated  
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5 their daily interaction with apps.  
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### 10 *Universalization of experience*

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12 Social interaction through apps also provided support and validation during  
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14 pregnancy, particularly during perceived stressful experiences. Women often sought  
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16 evidence that “it’s not just me” or that they weren’t “crazy.” Participants reported being  
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18 comforted by stories of “real” women, particularly for other women experiencing  
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20 complications such as DM. For example, one participant said, “It felt good ‘cause I’m like  
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22 okay, so I’m not the only one experiencing this...”  
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### 28 **App as informational tool**

#### 29 *Clear and concise information*

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32 Our cohort appreciated when information provided in apps was given in non-  
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34 academic terms, was presented clearly, and was engaging. One participant described an  
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36 app she used: “it’ll give me tips on... like the baby is the size of an orange this week. The  
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38 doctor wouldn’t... put it in those words or give me that type of visual description.”  
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40 Information provided by apps was described as “plain and simple” while interactions  
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42 with healthcare professionals were recounted differently; “sometimes the doctors,  
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44 they’re giving you all these big words and you’re just like oh okay. Can you put it into  
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46 English now?” Apps also made video or visual learning options available. As one  
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48 participant reported, “if you don’t wanna read it... it’s a woman literally explaining it to  
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50 you and basically reading it to you.”  
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### *Repository for resources*

One significant benefit of apps was their accessibility. Apps were described as “easy” and “straightforward,” often in contrast to the greater internet. One participant noted that mobile apps “just narrows it down,” while Google resulted in “a bunch of different links and a bunch of different information.” Our cohort not only appreciated the simplicity of finding information on apps, but also their potential as a centralized source of pregnancy- or DM-related educational materials. Ideally, many expressed, they wanted “everything in one app.”

### **Support for management of pregnancy tasks**

#### *Task-based logistical support*

Participants reported that they valued apps that supported pregnancy- and DM-related tasks. For example, women appreciated alerts for doctor’s appointments and medication timing, as well as reminders about when to come fasting to appointments or when to make recommended dietary changes. Women described reminder functions as “helpful” and like a “backup brain.” Women also appreciated practical support with tasks such as exercising during pregnancy or selecting a pediatrician.

#### *Centralized location for PHI*

Our cohort appreciated that apps could serve as a repository for personal health information (PHI) in addition to being pregnancy resources. For example, women liked having a centralized location for information about their medications, doctors, tests completed throughout pregnancy, and gestational age. Some favored using pregnancy apps to access PHI and message health care providers over health portals provided by

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2  
3 their hospital. As one participant expressed, "...you can go into the portal too, but I  
4 don't wanna have to do that. I would rather pull up the app, get my information and be  
5 done."  
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## 10 11 12 **Visual features**

### 13 *Visual goal tracking*

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16 Participants expressed desires for visual goal tracking and encouragement to  
17 provide positive reinforcement for health behavior changes. As one woman said, "...if  
18 I'm on track, shoot me up a little happy face emoji or something...to just encourage me  
19 along." Our cohort desired support through visual goal tracking between appointments;  
20 as one participant put it: "I wish that I could log in my own personal trends and be able  
21 to see it on a graph for my blood sugars, I feel like having it be more interactive, less  
22 reading maybe ...and more interactive options." Some participants favored visual  
23 encouragement catered at their goal of a health pregnancy:  
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34 *"I think for goals, maybe instead of a trophy, something to do with pregnancy,*  
35 *maybe baby shoes...My goal is healthy babies....So maybe changing that....just*  
36 *remind ourselves this is what we're working for. Babies out of our tummies and*  
37 *healthy."*  
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### 46 *Using graphics to personalize experience*

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48 Participants' preferences for personalization were diverse. Many desired the  
49 ability to add images of themselves or their ultrasound images to pregnancy apps;  
50 others desired the ability to reorganize app sections and menus. Cultural representation  
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3 in pregnancy application icons was a concern. One participant described her feelings  
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5 about an app icon:

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7 *“I mean like she’s a pale brown-haired woman. I’m not pale and I’m not brown*  
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9 *haired, so it’s like okay that’s not me at all...I think it’s always hard when you*  
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11 *pick a picture of a woman because we look all so different...if I saw that in...the*  
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13 *app store, like that little icon, I wouldn’t probably pick it.”*  
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### 16 17 18 *Interactive features promote engagement*

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20 Visually interesting graphics and interactive features were favored among our  
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22 cohort and were described as drivers of engagement with apps. Participants reported  
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24 interest in bright colors with high-quality graphics, describing these features as ones  
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26 that make applications “more personable” and “less sterile.” Video content, as opposed  
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28 to text, was often preferred and deemed “easier to absorb.” Participants enjoyed  
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30 features such as group polling, question boards, and mini-quizzes. Additionally, many  
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32 women who used apps for pregnancy liked graphically seeing fetal growth compared to  
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34 common objects, reporting that these visuals were often the reason they checked their  
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36 pregnancy app daily.  
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### 43 Diabetes-specific mHealth preferences

#### 44 **Logistical support for diabetes management**

##### 45 *Glucose tracking and food/carbohydrate logs*

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48 Members of our cohort with DM preferred apps that could help with glucose  
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50 tracking, carbohydrate intake, and food logging. Participants desired an app to track  
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52 blood sugar so they would “not have to worry about carrying a book around or finding a  
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3 pen,” and so they could add notes about foods or incidents related to abnormal blood  
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5 sugars. Many also felt that apps could help them understand and track their daily  
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7 carbohydrate intake. They reported difficulty understanding daily “limits,” and preferred  
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9 their phones as easy record-keepers: “it was good to have it right on my phone [than] to  
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11 have it in my brain.” Desires for food logging was more varied; while some participants  
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13 preferred apps with food logging, others found it time-intensive.  
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### 18 *Weight and exercise tracking*

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20 While less commonly discussed, some participants appreciated features for  
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22 tracking exercise and weight, which they found encouraging. Similar to other health  
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24 tracking features, participants wanted to have a comprehensive log available on their  
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26 phones to show health providers.  
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### 32 *Reminders and alarms*

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34 Members of our cohort with DM were vocal about preferring an app that would  
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36 help them track and remember DM management tasks. Centralization was a common  
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38 request; participants wanted an app that “gives you everything,” and “would love it if  
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40 [apps] could do everything in one spot” rather than visiting separate apps, portals, or  
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42 web-based resources. Desired features included automated reminders to take insulin,  
43  
44 check glucose, and eat meals/snacks, as well as the ability to add personalized alarms  
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46 and reminders, even complex management reminders. For example, one participant  
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48 said, “I would like for it to be able to remind me...if your [glucose] level is this,  
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50 remember you can do this and you can do that.”  
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## Logistical support for self-regulation

### *Responsive nutrition information*

Participants with DM wanted information about healthy foods during pregnancy, ideas for recipes and snacks, and personalized feedback on their food choices. Our cohort preferred responsive technology that could help them “notice trends” about food intake and blood sugar, indicate whether they had been “on track” for the day, and offer suggestions if not. Personalization requests included suggestions for “dealing with the cravings,” making child-friendly recipes, and providing culturally diverse recipes that incorporate DM guidelines for medical nutritional therapy.

### *Real-time communication with providers*

A mainstay of perinatal DM therapy is regular communication with providers about glucose monitoring results and other aspects of perinatal DM care. Many participants expressed that they had more frequent questions and concerns than their appointments were spaced to handle, making app-facilitated timely communication with providers appealing. Real-time provider feedback on diet and blood sugars was also favored. One participant desired a way to share her glucose readings in real time with her provider so that “they can reach out to you and be like [...] let’s schedule a visit a little bit earlier so you can come in and I can help you get back on track...”

## DISCUSSION

Few studies have investigated mHealth preferences among pregnant women who experience increased burdens of care – such as those with DM – or preferences of women with increased barriers to care – such as those with low income. This study

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2  
3 provides a novel perspective regarding women's experiences with apps during  
4 pregnancy, as well as their preferences for future directions in pregnancy- and DM-  
5 specific app development. As has been seen previously,<sup>17,19,35-38 24,25</sup> this cohort found  
6 apps to be accessible and acceptable sources of information about pregnancy and DM.  
7  
8 Participants expressed a preference for apps over other sources of information,  
9 including internet sites and provider visits, highlighting the need for apps to include  
10 reliable educational information. Suggestions included the use of interactive, simple  
11 features to support the health behavior needs of patients with and without DM.  
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21 These findings provide useful patient-centered feedback for the development of  
22 DM-specific pregnancy apps. For example, pregnancy apps may include interactive  
23 features to engage women in learning about and monitoring their pregnancies, which  
24 may be particularly helpful in complex learning or high maternal health need states,  
25 such as DM. Future apps should consider how to ensure that presentation of content  
26 promotes increased health literacy and engagement, including straightforward  
27 language, videos, and graphics. Such consideration is necessary to maximize the  
28 potential of apps as tools to decrease inequities in access to high-quality prenatal care  
29 and improve health outcomes.<sup>39</sup>  
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41 A strength of our study is the inclusion of a diverse patient population from a  
42 large urban medical center. Additionally, our study design allowed us to investigate  
43 patient mHealth preferences in women with and without a DM diagnosis in order to  
44 examine a broad range of mHealth experiences and preferences, including DM-specific  
45 topics, with the intention to elevate overall perinatal health. This study is limited in its  
46 generalizability due to inclusion of participants from a single center. However, the  
47 strengths of qualitative work allow for richer, in-depth descriptions of patients' lived  
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3 experiences that can offer insight into the characteristics that render mHealth apps  
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5 useful. Additionally, participant lack of comment on a certain topic may not indicate an  
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7 absence of an opinion and may instead indicate a lack of an explicit query.  
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## 10 11 12 CONCLUSIONS

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14 The adoption of evidence-based mHealth technology to support the health of  
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16 low-income pregnant women with DM may be one novel approach to reduce disparities  
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18 in DM-related perinatal outcomes. In this study, participants expressed desires for an  
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20 engaging and personally-tailored mHealth app to assist with pregnancy tasks, educate  
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22 on healthy pregnancy progression, and connect with others. DM-specific preferences  
23  
24 included glucose, diet, and weight tracking in addition to support for managing  
25  
26 appointments, medications, and other DM tasks. Future work should center on mHealth  
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28 preferences, particularly those of women with increased barriers to care access, in order  
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30 to create effective interventions to support pregnancy and improve DM self-  
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32 management.  
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research design, performed the interviews, assisted with analysis, and edited the manuscript. CN supported the scientific design, provided clinical and technical knowledge for the analysis, and edited the manuscript. LMY wrote the grants that funded this work, conceived the scientific design, supervised with data analysis, provided the technical knowledge for the manuscript, and edited the manuscript.

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Table 1. Cohort characteristics (*N* = 46)

Characteristic	N (%) or mean ± SD
Age, years	31 ± 6
Race/ethnicity	
Non-Hispanic Black	28 (61%)
Non-Hispanic White	5 (10%)
Hispanic	13 (28%)
Type 2 or gestational diabetes mellitus	40 (87%)
Publicly-funded prenatal care	40 (87%)

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Table 2. mHealth features preferred by low-income pregnant women

Theme	Subtheme	Example quote
Reference for “normal” pregnancy	Guides expectations of maternal pregnancy progression	“Yeah. Like I said it helped me with questions, even though I would have had questions, some of the questions I wouldn’t have even thought of so it gave me the idea to ask and then like every week is a different set of questions that you can ask your doctor, so that helped too. [...] it gave me more knowledge on pregnancy, so I know a lot of people that are pregnant now, so they’re like oh my back is always hurting, so I’m able to be like yeah, well that’s normal. Like I have a little bit of knowledge on it because I went through it and then I also have the background for it. Like I’ve seen it so.”
	Information on fetal development	“...you’re at your five month, six months, this is what your baby is doing. This is the developmental stage for your baby, you know? He’s got eyes now, he’s got ears and [...] instead of seeing okay, I’m 20 weeks and you thinking in your head, I have a baby in me so everything is developed, but technically you know maybe the heart may not be fully developed and the ears or something [...] so this is what you should be suspecting at one month, you know?”
	Alters frequency and/or content of provider interactions	“That you know like [the app] gives you important information that you think of and then maybe you don’t wanna ask your doctor and then that app tells you, so that way you don’t have to ask no more. If you feel like shy asking your doctor, then that app helps a lot.”
Social network	Receive advice from other women	“What I like about it is there’s not just an article. I’m actually, it’s actually women who are actually experiencing it and if it’s, I mean everything doesn’t work for everybody because everybody is different. But I feel like if you have certain women that are, that this is working for and this is what they’re suggesting and I think it’s. You know, it’s okay to give it, to give it a try. And because it’s someone that’s actually, that’s experiencing it. Rather than you’re reading an article that’s saying, well this is a study that we did. That, I think that helps me.”
	Universalization of pregnancy experience	“It really feels good because I get to see and compare but even though everybody’s pregnancy and body is different, it’s still you know sometimes if we have something similar that you see someone else is going through, you’re like oh okay, so that’s probably why I was feeling that way or you know something like that.”
App as	Clear and concise	“No, I think those [messages] are perfect. They’re not too long. They’re straight to the point. It kind of you

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informational tool	information	know shoots straight to it, so I think they're good."
	Repository for resources	"I would rather pull up the app, get my information and be done"
Support for management of pregnancy tasks	Task-based logistical support	"Because it let me know when I'm getting close, what should I be doing at this time, what should I be consuming and eating all this, for the doctor's appointment, just help me out to remember, so it's very convenient because I forget a lot, I forget a lot."
	Centralized location for PHI	"First of all let me put my name in there. I know it may be the simplest thing, but you know that makes a lot of difference, like for real. You know I like to put my name in there, be able to put my own information in there, be able to put my medications in there. That's another big thing. Be able to put medications in there. Easy, not hard. You know be able to do that and of course the doctor's information..."
Visual features	Visual goal tracking	"Maybe could be like a chart or like they do with Apple Health where there's like rings and stuff and knock things out or you like close the ring, like you're getting closer. I think visual definitely good, lot of people are visual seers, okay, I'm getting close to my goal and I think that's motivation, something very visual."
	Graphics personalize experience	"Yeah. I really think that picture stuff would be cool. Because I was like I can't take my own picture. Ya know? Put myself in there."
	Interactive features promote engagement	"It tells you like here, they're trying to say week 38, day 6, the baby's size is compared to a fruit, vegetable, a cute little funny animal or an object. It gives you a countdown, but what I used this app for is the video, a weekly video where a lady sits in front of the camera. She explains to you what your baby is going through that week. It's very brief and short. What I used the Pregnancy Plus Health app for, it gives you more of a visual, like a 3D kind of, like if you type in you're 39 weeks you can get an image of what your baby looks like or you can type in a 2D scan here or you can get the 3D and it basically compares your baby in size by fruits or vegetables..."

Table 3. Diabetes-specific mHealth features preferred by low-income pregnant women

Theme	Subtheme	Example quote
Diabetes health management support	Glucose tracking and food logs	"I would like a centralized place though to track sugar, food intake, something that's gonna notify me when I need to take my blood sugars, yeah. "
	Exercise tracking	"I like to track my activity too so there are some apps like the S Help app or something like that so if you walk a certain amount of miles today it will track that so I would like it to do something like that so it would just track my activity where your daily goal is to be active for 60 minutes you didn't do that today you only did 30 minutes of activity so bump it up a little bit or something."
	Weight tracking	"I think it would be the weight tracker just because it will like tell you how much you weigh and gives you like a whole graph, if you're over where, under where your good weight, like I really like that because I was just like am I too big for this pregnancy or it was just very helpful. I'm like okay. And it tells you like you gained this much weight this week or you know you're supposed to gain this much."
	Reminders and alarms	"That's nice, the alarm is nice because sometimes I do forget to check my sugars."
Logistical support for self-regulation	Responsive nutrition information	"Something I can, they can let me know, okay, you're giving me suggestions but what if my, the suggestions that you're giving me, maybe my sugar may be high or something like that and you're saying well, maybe you should try this, this and that but I'm already at a 400 sugar so your suggestion wouldn't be the same as that."
	Real-time communication with providers	"So if I'm constantly checking my sugar and if I'm inputting it on this, I shouldn't have to bring in my insulin log to my hospital because it's already on my phone, and I can just show them oh well this is my log for the whole week. You know so that'll eliminate stuff or like the machine I have, well see it's not connected with this hospital. I have to get it set up for this one, but the insulin I have, the monitor I have, it's connected to a hospital and it's connected to a doctor or some nurse or something. So I can click on my machine, contact somebody and then they'll call my phone and say well, your sugar was extremely high this time. You need to do this or we recommend you go in to the hospital."

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