


STUDY PROTOCOL

Open Access



# Conversation cards for pregnancy: a protocol for a multi-method study

Angela S. Alberga<sup>1,2\*</sup> , Vida Forouhar<sup>1</sup>, Valentina Lurye<sup>3,4</sup>, Kristi B. Adamo<sup>5</sup>, Susan Avery<sup>6</sup>, Geoff D. C. Ball<sup>7</sup>, Biagina-Carla Farnesi<sup>8</sup>, Laura Gaudet<sup>9</sup>, Taniya S. Nagpal<sup>10</sup>, Helena Piccinini-Vallis<sup>11</sup>, Ximena Ramos Salas<sup>12</sup>, Ryan E. Rhodes<sup>13</sup>, Michael Vallis<sup>11</sup>, Jocelynn Cook<sup>14</sup>, Taryn M. Graham<sup>15</sup>, Karah Stanworth-Belleville<sup>16</sup> and Tamara R. Cohen<sup>2,3</sup>

## Abstract

**Background** Conversations regarding health behaviours, mental health, and socioeconomic contexts are recommended during prenatal visits to optimize maternal and fetal health outcomes. This study was designed to develop and evaluate the acceptability of a clinical dialogue tool called *Conversation Cards for Pregnancy* (*PregnancyCards* for short). *PregnancyCards* are being designed as a practical, person-centered clinical dialogue tool to empower pregnant individuals to talk with their prenatal care providers about potentially sensitive topics regarding health behaviours that are important to them during their prenatal visits.

**Methods** This two-step, 3-year, multi-method study, guided by the Obesity-Related Behavioural Interventions Trial (ORBIT) model, is grounded in the Capability, Opportunity, and Motivation (COM-B) framework for understanding behaviour. Pregnant individuals and prenatal care providers will be recruited by our partners from across Canada, in clinical and community settings. Step 1: Identify topics of interest related to health behaviours by conducting virtual semi-structured interviews with pregnant individuals (n ~ 20) and prenatal health care providers (n ~ 10–15) and by analyzing data using thematic analysis. Step 2: Topics generated in Step 1 will be used to create a prototype deck of *PregnancyCards* that will be evaluated in clinical settings with pregnant individuals (n ~ 40) to assess acceptability, appropriateness, and feasibility, and qualitative experiences of using the cards. Prenatal care providers (n ~ 15) will be recruited at one time point to capture their perceptions of usability, acceptability and likability of the prototype cards as well.

**Results** Currently, a total of 21 pregnant individuals and 14 prenatal care providers have already participated in Step 1 of this study. All participants (pregnant individuals and prenatal care providers) engaged in semi-structured interviews to determine the topics of interest related to health behaviours. Thematic analysis of interview data has been completed and the results informed the development of a prototype deck of *PregnancyCards*, which will be tested in Step 2.

**Discussion** We seek to gain a better understanding of pregnant individuals' perceived needs for conversations related to health behaviours and provide insight into the acceptability, appropriateness, and feasibility of *PregnancyCards* in clinical settings. *PregnancyCards* has the potential to serve as a practical clinical dialogue tool to help empower pregnant individuals and optimize discussions about health behaviours that matter to them during pregnancy. The two studies outlined in this protocol paper will inform future research to test the efficacy and effectiveness of *PregnancyCards* as a behavioural intervention aimed at improving health behaviours in pregnancy.

\*Correspondence:

Angela S. Alberga  
angela.alberga@concordia.ca

Full list of author information is available at the end of the article



© The Author(s) 2026. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

**Keywords** Pregnancy, Protocol, Dialogue tool, Conversation cards, Communication, Health behaviours, Gestational weight gain, Prenatal care providers, Prenatal education

## Background

Pregnancy is often considered a unique ‘window of opportunity’ for optimizing the health of the pregnant individual and the developing fetus to decrease the risk of potential complications and promote long-term maternal and child health. Unhealthy behaviours during pregnancy, such as unhealthy dietary habits, insufficient physical activity, alcohol consumption, smoking and substance use during pregnancy, are associated with an increased risk of adverse pregnancy outcomes [1, 2]. A variety of prenatal exposures and contextual factors can influence early life conditions for the newborn, and can be associated with an increased risk of non-communicable diseases such as obesity, type 2 diabetes, cardiovascular disease, and mental illness, as well as certain cancers, osteoporosis, and chronic obstructive lung disease [3–5]. Within prenatal care, gestational weight gain (GWG) is frequently used as a clinical indicator of maternal and fetal health; however, it represents an imperfect proxy for the complex biological [6], behavioural [7] and social processes [8] that influence maternal and fetal health. Rather than constituting a health behaviour itself, GWG is complex and is influenced by several intersecting psychosocial factors, many of which are beyond a person’s control (e.g., socioeconomic status, race/ethnicity, food insecurity) [9]. Despite the importance of health behaviours such as nutritious dietary intake, physical activity, good sleep, and stress management in promoting healthy pregnancies [10, 11], discussions about them in prenatal care are often limited [12–14].

Current models of prenatal care are predominantly focused on biomedical monitoring and detecting factors at risk of compromising maternal and fetal health. The time and resources available for behavioural counseling and integration of mental health and psychosocial contexts, are important, but are often limited and not discussed [12, 15]. If these conversations are initiated, health behaviours are often discussed in the context of weight gain, which is a sensitive topic given that individuals may have faced weight stigma and discrimination (negative attitudes and behaviours like shaming and blaming them for their weight) in the past and during pregnancy [16, 17]. As such, counselling about health behaviours is infrequent and often inadequate [18, 19]. Importantly, when pregnant individuals feel comfortable initiating conversations about health behaviours, prenatal care providers spend more time discussing goals and strategies [20], which can enhance self-efficacy, motivation, and

capability to engage in health behaviours during pregnancy [21–25]. Pregnancy therefore enables a window of opportunity for interventions to support a spectrum of health behaviours [1, 2] (beyond biomedical monitoring, risk detection and weight-related outcomes) to optimize short- and long-term health outcomes for the pregnant individual and their baby.

Clinical dialogue tools [26, 27] have been shown to empower patients to initiate discussions with clinicians on sensitive topics that matter to them [28–31], to optimize behaviour change without creating extra clinical burden for clinicians. Tools such as *CONversation Cards*® in pediatric healthcare settings and *Conversation Cards for Adolescents*® [28–30, 32] have improved communication leading to potential improved health benefits [33–35]. However, to our knowledge, there is no clinical dialogue tool that exists to help pregnant individuals engage in conversations about sensitive topics that are important to them with their prenatal care providers. Therefore, the purpose of this research is to create and refine a new dialogue tool called *Conversation Cards for Pregnancy (PregnancyCards for short)* and evaluate its acceptability for empowering pregnant individuals to discuss a range of health behaviours that matter to them during prenatal care visits. The objective of Step 1 (development) is to identify general topics of interest related to health behaviours that are important to pregnant individuals and prenatal care providers. Step 2 (refinement) will compile the topics from Step 1 into a prototype deck of *PregnancyCards* that will be evaluated by pregnant individuals in prenatal appointments to assess their acceptability, appropriateness, and feasibility, as well as their overall experience with using the *PregnancyCards* during their prenatal appointments. Perceptions of usability, acceptability and likability will also be evaluated by prenatal care providers in a survey at one timepoint.

## Methods

### Study design

This multi-method research study will take place across multiple provinces in Canada, by recruiting in clinical and community settings, over the course of three years. This research is grounded in the Capability, Opportunity and Motivation (COM-B) [36] framework understanding that behaviour change is the result of three superordinate constructs: capability to perform the behaviour

(physical and psychological capability), opportunity to act (social influences, environmental context, and resource), and motivation to act (reflective and automatic motivation). To target behaviour change through interventions, not only must researchers and clinicians determine the motivation behind the behaviour, but also examine an individual's capability and opportunity to engage in the behaviour [37]. Previous studies using the COM-B model have adapted the model to understand the motivation, capability and opportunity for certain behaviours during pregnancy such as smoking cessation and alcohol consumption, dietary habits [38], and infant feeding practices [39] among diverse samples of pregnant women. In this study, COM-B guided the authors' writing of the research grant proposal to obtain funding to conduct this research and to create the interview guide and thematic analysis of results described in further detail below in Step 1.

This project is person-centered, which relies on meaningful involvement and participation of people with lived experiences (e.g. individuals who have experienced pregnancy) in decision-making and establishing research priorities. Allowing pregnant individuals the opportunity to help plan, develop, and manage a project as members of the research team ensures the voices of pregnant individuals are heard and their desired outcomes are supported and measured [40, 41].

This protocol paper describes the two steps of our multi-method project. The methods of the two steps are guided by the Obesity-Related Behavioral Intervention Trial (ORBIT) model [42], with a focus on Phase Ia) Define (Step 1 of this project), and Phase Ib) Refine (Step 2 of this project), of the ORBIT model. The ORBIT model provides the 'overarching roadmap' for the intervention development process, situating this formative work within the early-phase steps of behavioural intervention design. The results of our research to develop and refine the use of *PregnancyCards* will inform a proof-of-concept study and a pilot study as well as a future efficacy trial to test the effects of using *PregnancyCards* as a dialogue tool on patient engagement in health behaviours and on maternal and fetal health outcomes in clinical settings across Canada.

### **Step 1: Development of *PregnancyCards*—identifying topics that are important to pregnant individuals and prenatal care providers**

#### **Step 1 study design**

The aim of Step 1 is to identify the general topics of interest related to health behaviours that pregnant individuals and prenatal care providers want to talk about during clinical prenatal appointments. The primary outcome of Step 1 will be a list of topics of interest related to health

behaviours, or potentially other topics of interest relevant to prenatal care. Step 1 is a qualitative study.

#### **Participants**

Pregnant individuals will be eligible for this step of the study if they are in any trimester; health care providers will be eligible if they provide prenatal care for at least 6 months. We will recruit both English and/or French speaking pregnant individuals and providers. For this study, prenatal care providers will include family physicians, obstetricians, midwives and nurse practitioners. Pregnant individuals and prenatal care providers will be recruited from various cities across Canada (e.g., Montreal [QC], Vancouver and Victoria [BC], Edmonton [AB], Ottawa [ON], Kingston [ON], Halifax [NS] and St. John's [NL]). Recruitment strategies include word of mouth from our clinician partners, posters in hospitals and clinic waiting rooms, research partners' lab websites, Reach BC's list of research opportunities, Obesity Canada (OC) and the Society of Obstetricians and Gynaecologists of Canada (SOGC) websites, Équilibre's social media posts on Instagram and LinkedIn, newsletters and online social media platforms to their public and professional members, social media advertisements on Facebook, X (formerly Twitter), and Instagram (e.g., in mom and pregnancy groups, reposts from colleagues to their networks).

#### **Sample size justification**

Prenatal care providers will also be recruited through our partner networks OC, SOGC, ÉquiLibre and College of Family Physicians of Canada (CFPC). While we based our sample size on our team's previous work [43] and considered best practices for qualitative studies [44], our goal is to cease data collection once thematic saturation is reached [44, 45]. We will aim to conduct ~20 interviews with pregnant individuals and ~10–15 interviews with prenatal care providers. Previous work from our research team has shown that a 60% response rate is feasible for recruiting pregnant individuals [21, 46, 47] and prenatal care providers [46, 48] in studies with a survey design. We will recruit ~5 pregnant individuals to refine study processes and procedures by pilot testing the interview guide and surveys and adjusting questions (as needed) before data collection.

#### **Data collection**

Interested participants will be directed to complete an online screening survey through Qualtrics, a secure web-based online platform for research data collection supported by Concordia University and the University of British Columbia. The screening survey will

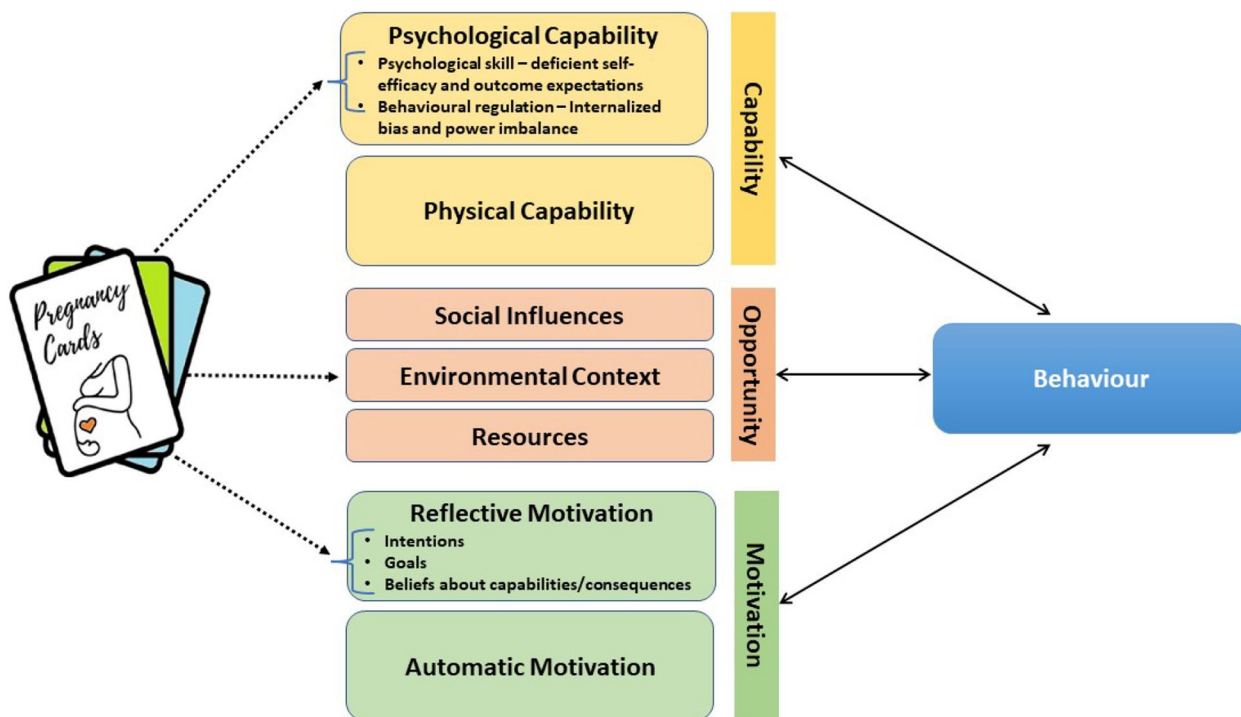
divide pregnant individuals and prenatal care providers into separate surveys and determine their eligibility to participate in the study. The screening questions for pregnant individuals consist of questions assessing the pregnancy status of participants (if they are currently pregnant or not), type (single vs. multiple fetuses), trimester and complications (Table 1 in the [Appendix](#)). Interested prenatal care providers will answer questions based on their specific profession and years of practice in prenatal care to determine eligibility (Table 1 in the [Appendix](#)). Once complete, if participants meet the inclusion criteria, the survey will automatically direct both groups to complete a sociodemographic questionnaire and provide their contact information to schedule the interview date and time. Individuals from both groups who do not meet the inclusion criteria will be automatically screened out of the study.

Interview questions (Tables 5 and 6 in the [Appendix](#)) will be grounded in the COM-B model [36] (Fig. 1) to explore participants' experiences, perceived barriers and facilitators that capture their Capabilities, Opportunities and Motivation to discuss health behaviours during pregnancy with prenatal care providers. For example, questions addressed psychological and physical capability (*e.g.*, knowledge and skills), social and physical opportunity (*e.g.*, environmental and interpersonal factors), and reflective, and automatic motivation (*e.g.*, beliefs,

emotions, and priorities). Table 5 in the [Appendix](#) provides examples of questions aligned with these COM-B domains. Questions were purposely general and did not specifically ask about a certain health behaviour in order to have these concepts be driven organically from participants. Qualitative data will be collected from semi-structured interviews lasting ~30 min using a licensed version of Zoom that will be recorded and facilitated by trained graduate students. Interviews will be offered in English or French, according to the participants' preferred language. Semi-structured interviews collect qualitative, open-ended data and explore participants' thoughts, feelings, and beliefs about a particular topic, including personal and sensitive topics [49, 50], which includes health behaviours during pregnancy.

**Data analysis**

English and French Zoom audio recordings will be transcribed verbatim by a licensed transcription service and imported into the qualitative data management software program NVivo 1.0 (2020, QSR International, Melbourne, Australia) for analysis by trained graduate students. The French interview data will be transcribed verbatim in French, and once the research team has the French transcription, they will translate it into English so that all data will be analyzed in English by a trained graduate student using Thematic Analysis [51,



**Fig. 1** COM-B guiding the development and evaluation of Conversation Cards for pregnant individuals (PregnancyCards)

52]. Coding will employ both deductive and inductive approaches. Deductive codes will be informed by the COM-B model and the broad categories embedded in the semi-structured interview guide, while inductive coding will allow for the identification of new themes emerging from the data beyond these predefined categories. Participant recruitment and data analysis will continue until data saturation is achieved, or until the point where no new data on health topics have surfaced and all themes have been identified.

### Outcomes

The data collected from the interviews in Step 1 will consist of a broad list of topics related to health behaviours that are important to both pregnant individuals and prenatal care providers. The wording of the statements provided by the participants will not be modified; however, if necessary, the research team members will meet to clarify wording before developing the themes that will comprise the deck of cards described in Step 2 below.

## Step 2: Refinement of PregnancyCards: evaluate the acceptability, appropriateness and feasibility of the cards in prenatal care settings

### Step 2 Study design

Guided by the ORBIT model [42], this phase employs a multi-methods approach to evaluate the acceptability, appropriateness, and feasibility of using the cards during prenatal care appointments from the perspective of pregnant individuals, as well as prenatal care providers' overall perceptions of their usability, acceptability, and likability. We will monitor recruitment speed and fidelity of the data collection protocol using observational data from the study team to evaluate whether our planned recruitment strategies and procedures were practical and achievable to move on to the next phase of the research process. Acceptability, appropriateness and feasibility from the perspective of pregnant individuals will be assessed following Weiner et al.'s implementation outcome measures [Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM)] [53]. We will also assess whether *PregnancyCards* will improve conversations, if there are any unintended side-effects of using these cards and perceptions of equity of using these cards in prenatal care appointments informed by the Acceptability, Practicability, Effectiveness, Affordability, Side-effects, Equity (APEASE) criteria [37]. We will recruit a small sample of pregnant individuals ( $n \sim 40$ ) to participate in an experimental single group pre- and

post-test design by completing online surveys to assess acceptability, appropriateness and feasibility, along with their qualitative experiences of using *PregnancyCards* in prenatal appointments (Tables 2 and 3 in the Appendix). We will also recruit a small sample of prenatal care providers ( $n \sim 15$ ) to participate in a one-time survey to assess their perceived usability, acceptability and likability.

### Participants

Pregnant individuals (>18 years old) will be included if they are <18 weeks' gestation and speak English and/or French. Individuals with high-risk pregnancies (pregnancies that involve higher health risks for both the fetus and the pregnant individual, (e.g., preeclampsia, gestational diabetes, twin pregnancies) or who are living with other pre-existing conditions (e.g., cardiovascular disease, cancer, immunocompromised states) will not be eligible to participate in Step 2. Individuals with high-risk pregnancies are excluded because their standard of care differs substantially from routine prenatal care. These conditions typically require intensive medical management and targeted counseling on nutrition, physical activity, and other behaviours [54], which could confound the evaluation of *PregnancyCards* as a general communication tool in routine prenatal care. Additionally, high-risk appointments often prioritise clinical management, leaving less time for broader health behaviour discussions, which may bias usability and acceptability findings [55]. Also, if participants develop a complication during the study classifying their pregnancy as high risk (e.g., preeclampsia, gestational diabetes), they will be excluded from the study as their standards of care will likely change. Pregnant individuals will be recruited using similar methods described in Step 1 above. Participants who took part in Step 1 are not eligible for Step 2 to minimize bias and ensure authentic evaluation of the *PregnancyCards*. Step 1 participants contributed to identifying health behaviour topics that informed the card development; including them in Step 2 could influence their interaction with the cards and lead to overly favourable responses. Additionally, excluding individuals with prior knowledge of the tool or study objectives allowed us to capture genuine first impressions and usability feedback. This approach will strengthen the validity of our findings and enhance generalizability by reducing the risk of prior exposure influencing participants' perceptions.

Given the challenges of recruiting prenatal care providers, we will recruit a smaller sample of prenatal care providers to complete a brief survey to assess their perceptions of usability, acceptability and likability at one timepoint. Prenatal care providers will be recruited with the help of a

partner, The Society of Gynecologists and Obstetricians of Canada (SOGC). They will disseminate our survey to over a thousand gynecologists and obstetricians who are members of SOGC that have previously indicated that they are willing to participate in research. Alongside the help of SOGC, the research team will use their networks of clinicians to disseminate the survey.

### Sample size justification

Since this study is not designed to evaluate efficacy, formal sample size calculations are not required [56, 57]. Based on previous studies [21, 46, 47, 58], we will aim to recruit ~40 pregnant individuals and ~15 prenatal care providers to participate in this Step 2 of this research process. Importantly, this Step 2 will provide the data necessary to refine this tool for potential use in clinical settings and understand how to mitigate challenges before we eventually launch a proof-of-concept study. If the proof-of-concept study is positive, we will conduct a pilot study which will test *PregnancyCards* as a clinical dialogue tool intervention to address health behaviours compared to a usual care control group (ORBIT model Phase II preliminary testing) [42] and refine intervention components before launching an efficacy trial and eventual effectiveness research.

### Data collection

Interested pregnant participants will be linked to an online screening survey through Qualtrics to determine eligibility, consent and collect demographic data (Table 2 in the [Appendix](#)). Once pregnant individuals have consented to participate in this study, if they are eligible according to the screening survey, they will be automatically directed to the demographic section of the survey which will ask them to complete baseline questions to assess sociodemographics and health behaviours. Once pregnant individuals have completed the baseline online survey, they will receive copies of the *PregnancyCards* by mail or email (PDF version) according to their preference (which will be indicated at the end of the survey). Pregnant individuals will be asked to read through the deck of *PregnancyCards* and use them with their providers at their next prenatal appointment. Since there are many prenatal appointments during pregnancy (~13 visits pre-COVID)[59], participants will be asked to use the *PregnancyCards* as often as possible during their appointments. The pregnant participant can choose which of the *PregnancyCards* they would like to select, and they can be integrated into prenatal visits at their discretion. The cards are not meant to replace routine conversations but rather function as optional prompts to aid pregnant individuals to initiate conversations about topics that are important to them. Ideally, the first-person phrasing and simple language of the cards will allow pregnant individuals

to identify a card/cards that resonate with them. Pregnant participants can introduce a card when asked if they have questions or reference a card to highlight a topic that might have otherwise been overlooked.

After every prenatal appointment, pregnant participants will be prompted to answer questions on card usage and card selection through Qualtrics (see Table 2 in the [Appendix](#) for all measures that will be used in Step 2). At one of their last prenatal appointments around 35–37 weeks' gestation, participants will complete an online exit survey consisting of questions on acceptability, appropriateness and feasibility. Participants will also respond to an adapted version of the 6-item COM-B questionnaire, to assess their self-perceived capability, opportunity and motivation to use the cards [36, 37, 60]. Additionally, qualitative open-ended survey questions will be included to capture their overall experience of using *PregnancyCards*.

Interested prenatal care providers will have a chance to review the deck of cards and complete a brief online survey at one timepoint through Qualtrics. This survey will consist of a series of open and closed-ended questions assessing the perceived usability (*e.g.*, how helpful do you think this tool would be in discussing important topics with your patients?), acceptability (*e.g.*, how receptive would you be to patients using this tool with you in your clinical practice?), and likeability (*e.g.*, how satisfied are you with the appearance/aesthetics of the cards?). Closed-ended questions will be rated on 5-point Likert Scale from 1 ('strongly disagree') to 5 ('strongly agree'). After completing the survey, a trained graduate student will gather the responses and begin analysis. Answers to open-ended questions will be analyzed and used to refine the *PregnancyCards* before moving onto the next research step.

### Outcomes

This study will assess the acceptability, appropriateness and feasibility of the cards by pregnant individuals in prenatal care settings, and perceived usability, acceptability, and likability by prenatal care providers. The results will then inform the research team on how to refine the prototype deck of cards before moving on to the possibility of launching a proof-of-concept study and, next, a pilot trial. The future pilot trial would aim to assess the preliminary effects of the *PregnancyCards* dialogue tool as a potential intervention on self-efficacy, perceived capability, motivation, and opportunity to use the cards, and engagement in health behaviours. These results will inform the research team on how to plan for future efficacy and effectiveness trials. We will monitor recruitment, sample size targets, and fidelity to the research protocol with observational data from the study team to

determine if a more refined proof-of-concept trial is necessary before moving on to the intended efficacy trial [61, 62]. Future reporting of the trial will follow the SPIRIT guidelines for pilot and feasibility trials from the EQUATOR network [63].

#### Data analysis

Analysis will include descriptive statistics reporting frequencies of card use and card topics chosen, as well as acceptability, appropriateness, and feasibility (from pregnant individuals) (Table 3 in the [Appendix](#)) and perceived usability, acceptability, and likeability (from prenatal care providers) (Table 4 in the [Appendix](#)). A thematic analysis of qualitative open-ended questions related to overall impressions and experiences will also be performed. Exploratory analyses will be run to explore secondary outcomes: COM-B.

#### Results: progress to date

Thus far, Step 1 of this project is complete as we have reached the targets for recruitment of pregnant individuals and prenatal care providers. Semi-structured interviews were conducted with 21 English and French speaking pregnant individuals and 14 English and French speaking prenatal care providers from Ontario, Quebec, Alberta, British Columbia, Saskatchewan, and Nova Scotia. Recruitment began in July 2023 and ended in March 2024, when thematic saturation of topics shared in the interviews was reached. Four interviews were conducted with French-speaking participants (two pregnant individuals and two prenatal care providers), of which the French transcripts have been translated into English. Preliminary coding of all transcripts is complete and thematic data analysis is currently underway. The results from the qualitative interviews from Step 1 were presented at a national conference (Canadian Nutrition Society; 2025) and the manuscript is currently being prepared for submission to an academic peer-reviewed journal in 2026.

#### Discussion

To our knowledge, clinical dialogue tools that aim to empower pregnant individuals to feel confident in guiding conversations with their prenatal care providers about sensitive topics that are important to them do not exist. Including both the pregnant individual and provider voice in designing these conversation cards will allow for a more comprehensive overview of health priorities in prenatal settings. Recruitment of prenatal care providers, however, continues to be a challenge due to time constraints and limited availability. The research team is well-positioned to address this challenge as our team consists of a diverse group of family physicians, obstetricians, representatives from the SOGC and other groups who collaborate with

prenatal care providers across the country and can pool their networks together for recruitment efforts. While this research project aims to highlight both the patient and provider voice, our ultimate goal is to determine if *PregnancyCards* can be a useful tool for individuals who are pregnant to navigate their clinical appointments and feel empowered in pregnancy to initiate conversations about health behaviours that are most important to them. Ultimately, future research will include proof-of-concept studies, pilot studies, and efficacy and effectiveness research to examine the impact of implementing *PregnancyCards* as a clinical dialogue tool in prenatal healthcare appointments. This includes future research to understand if the tool should remain as a physical card, or be offered simultaneously as a digital tool and whether additional cards should be created to address postpartum concerns. Future research should consider creating a tool specific to the needs of individuals with pregnancies of higher risks. Future research should also consider working with equity-deserving and marginalized communities who may have more specific needs for conversation cards to explore barriers and enablers to conversations and enable culturally safe and appropriate co-design methods and implementation.

## Appendix

**Table 1** Variables that will be measured in Step 1

Concepts	Questionnaire/tool	Baseline
Screening questions to determine eligibility	<p><b>For pregnant individuals:</b> Pregnancy status, gestation week, pregnancy-related health issues, pregnancy type, preferred/first language</p> <p><b>For prenatal care providers:</b> Specific profession, years of experience as a prenatal care provider, preferred/first language</p>	✓
Socio-demographics	<p><b>For pregnant individuals:</b> Health literacy, age, ethnicity, sex, gender, education, household income, employment status, pre-pregnancy weight (to ensure body diversity in sample characteristics), current weight, current weight perception, perception of gestational weight gain, current height, parity, preferred/first language, province or territory receiving prenatal care</p> <p><b>For prenatal care providers:</b> Age, ethnicity, sex, gender, province or territory for practice, current weight and height, preferred/first language</p>	✓

**Table 2** Variables that will be measured in Step 2 among pregnant individuals

Topic	Variables measured/questions asked	Baseline	At every prenatal appointment	Follow-up at min 37 weeks +
Socio-demographics	Age, ethnicity, sex, gender, education, household income, employment status, pre-pregnancy weight, current weight and height (to ensure body diversity in sample characteristics), current weight perception, perception of gestational weight gain, province or territory receiving prenatal care, parity	✓		
Card usage (Yes/no and option for open-ended "if no to above, please specify why:")	Did you use the cards that were provided to you at your latest prenatal appointment?		✓	✓
Card choices (open-ended)	Which cards were selected? Which of the ones selected were actually discussed?		✓	✓
Card appearance satisfaction (likert scale 1–5 and option for open-ended)	How satisfied were you with the appearance/aesthetics of the cards?			✓
Does <i>PregnancyCards</i> help improve conversations? (likert scale 1–5)	How much did <i>PregnancyCards</i> help improve conversations between you and your prenatal care provider, around sensitive and/or important topics?			✓
Side-effects/safety (likert scale 1–5 and option for open-ended)	Do you think using <i>PregnancyCards</i> created any negative outcomes in your care?			✓
Equity (likert scale 1–5 and option for open-ended)	Do you think <i>PregnancyCards</i> were designed in a way that is useful for people from different backgrounds (e.g., language, education, cultural preferences)?			✓
Motivation to use the cards (likert scale 1–5)	Assessing motivation of participants to use the cards through a 6-item self-evaluation COM questionnaire (grounded in COM-B model)			✓
Capability to use the cards (likert scale 1–5)	Assessing participants' perceived capability to use the cards through a 6-item self-evaluation COM questionnaire (grounded in COM-B model)			✓
Perceived opportunity to use the cards (likert scale 1–5)	Assessing participants' perceived opportunity to use the cards through a 6-item self-evaluation COM questionnaire (grounded in COM-B model)			✓
Overall experience using the cards (open-ended)	Qualitative open-ended questions about overall experience using the cards			✓

The questions about side-effects, equity and "Does *PregnancyCards* help improve conversations?" were informed by and modified from the APEASE criteria [37] and capability, opportunity and motivation questions were informed by the COM-B model [36, 37]

**Table 3** Acceptability, appropriateness and feasibility questions that will be used in Step 2 among pregnant individuals

<b>Acceptability of Intervention Measure (AIM)</b>	<b>Completely disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Completely agree</b>
1. PregnancyCards meets my approval	①	②	③	④	⑤
2. PregnancyCards is appealing to me	①	②	③	④	⑤
3. I like PregnancyCards	①	②	③	④	⑤
4. I welcome using PregnancyCards in my future prenatal appointments	①	②	③	④	⑤
<b>Intervention Appropriateness Measure (IAM)</b>	<b>Completely disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Completely agree</b>
1. Using PregnancyCards to talk about health behaviours seems fitting	①	②	③	④	⑤
2. Using PregnancyCards to talk about health behaviours seems suitable	①	②	③	④	⑤
3. Using PregnancyCards to talk about health behaviours seems applicable	①	②	③	④	⑤
4. Using PregnancyCards seems like a good match to talk about health behaviours	①	②	③	④	⑤
<b>Feasibility of Intervention Measure (FIM)</b>	<b>Completely disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Completely agree</b>
1. Using PregnancyCards to talk about health behaviours seems implementable in prenatal appointments	①	②	③	④	⑤
2. Using PregnancyCards to talk about health behaviours seems possible in prenatal appointments	①	②	③	④	⑤
3. Using PregnancyCards to talk about health behaviours seems doable in prenatal appointments	①	②	③	④	⑤
4. Using PregnancyCards to talk about health behaviours seems easy to use in prenatal appointments	①	②	③	④	⑤

Acceptability, appropriateness and feasibility questions were modified from Weiner et al. [53]

**Table 4** Variables that will be measured in Step 2 among prenatal care providers

<b>Topic</b>	<b>Variables measured/questions asked</b>
Socio-demographics	Age, ethnicity, sex, gender, employment status, years of experience
Usability (likert scale 1–5)	How helpful do you think this tool would be in discussing important topics with your patients?
Acceptability (likert scale 1–5)	How receptive would you be to patients using this tool with you in your clinical practice?
Likability (likert scale 1–5 and open-ended)	How satisfied are you with the appearance/aesthetics of the cards? Would you change anything about the appearance/aesthetics of the cards?
Overall perceived experience (open-ended)	Please leave any other general comments you might have regarding the PregnancyCards and/or this research project:

**Table 5** Step 1 Interview guide questions for pregnant individuals

---

Theoretical Framework of Capability, Opportunity and Motivation for Behaviour Change (COM-B model) (three components – six subcomponents)  
 Psychological & Physical Capability, Physical and Social Opportunity, and Reflective and Automatic Motivation

1	<i>Psychological Capability</i>	What are the topics that you have discussed with your prenatal care provider during pregnancy? (hear about their experience)
2	<i>Reflective Motivation</i>	Of those topics, which are THE MOST important to you? (probe: <i>Why are these the most important?</i> )
3	<i>Social Opportunity</i>	What are the topics that you and your prenatal care provider have not discussed? (the topics that you believe are important to talk about?) (hear about what is not being discussed)
4	<i>Social Opportunity</i>	What makes it difficult for you to talk to your prenatal care provider about topics that are important to you? (Follow-up questions can probe from answers to question 1, we can build from their answers)
5	<i>Social Opportunity</i>	What makes it easy for you to talk to your prenatal care provider about topics that are important to you? (Follow-up questions can probe from answers to question 1, we can build from their answers)
6	<i>Social Opportunity</i>	What do you think can help improve conversations with your prenatal care provider on important topics that matter to you during your pregnancy? (Probe: <i>What alternative sources do you consult? Follow-up questions can probe about other prenatal care providers, family, friends, other resources, internet, smart phone applications</i> )
7	<i>Automatic Motivation</i>	Are there topics that make you feel uneasy/not comfortable when you discuss them with your prenatal care provider during pregnancy? (Probe: <i>are there concerns or worries that you have during pregnancy that are difficult to bring up?</i> ) (Provide examples: <i>depression, anxiety, stress, relationship with partner, sex, alcohol or other substance use, bowel movements, GI issues, sleep problems, body-related changes, fears, pains, difficulty with movements, eating or food related issues</i> )
8	<i>Psychological Capability</i>	What makes these topics more difficult to discuss?
9	<i>Reflective Motivation/Social Opportunity</i>	What are some things you wish your prenatal care provider would do (or currently does) to help you feel comfortable when discussing these topics?
10	<i>Physical Capability</i>	Are there any changes you've experienced with your body that you wish to share with your prenatal care provider, but you did not? (Probe: <i>was weight gain during pregnancy one of the topics that was important for you to discuss with your prenatal care provider?</i> ) (Probe: <i>is there any reason why you have not brought up the topic of weight gain with your prenatal care provider?</i> )
11	<i>Reflective Motivation</i>	Are there any topics that are important to you that were not mentioned in our discussion that you would like to add, or would you like to add onto something that was previously discussed?

---

**Table 6** Step 1 Interview guide questions for prenatal care providers

Theoretical Framework of Capability, Opportunity and Motivation for Behavior Change (COM-B model) (three components – six subcomponents) Psychological & Physical Capability, Physical and Social Opportunity, and Reflective and Automatic Motivation)		
1	<i>Psychological Capability</i>	What are the topics that you currently discuss with your patients who have pregnancies without complications?
2	<i>Psychological Capability</i>	Of those topics, which are THE most important? (probe: <i>Why are these the most important?</i> )
3	<i>Social Opportunity/Psychological Capability</i>	What are some topics that you do not discuss with your pregnant patients, but you believe are important to discuss? (hear about what topics are not being discussed)
4	<i>Social/Physical Opportunity</i>	What makes it difficult for you to talk about these topics with your patients? (Probe: <i>is there anything about your knowledge or skills sets that makes it harder for you to talk about some of these topics? Follow-up questions can probe from answers to question 1, we can build from their answers</i> )
5	<i>Social/Physical Opportunity</i>	What makes it easy for you to talk about these topics with your patients? (Follow-up questions can probe from answers to question 1, we can build from their answers) (Probe: <i>are there certain topics that are easier to discuss with patients that you have seen for a long time vs those you have just started seeing?</i> )
6	<i>Reflective Motivation</i> <i>/Social Opportunity</i>	What do you think can help you feel more confident in discussing these topics with your pregnant patients? (Probe: <i>Do you use any resources to help guide your conversations? (Follow-up questions can probe about internet or if there are other sources/alternative sources they consult?)</i> )
7	<i>Physical Opportunity</i>	What are some topics you wish you would have time to talk about during your clinical appointments with your pregnant patients, but you rarely do
8	<i>Automatic Motivation</i>	What are some topics that you wish your pregnant patients would bring up to you on their own that they rarely bring up?
9	<i>Social Opportunity/Automatic Motivation</i>	Are there topics that make you feel uneasy/uncomfortable when you discuss them with your pregnant patients? (Probe: <i>are there concerns or worries that you have for your patients during pregnancy that are difficult to bring up?</i> ) (Provide examples: <i>depression, anxiety, stress, relationship with partner, sex, alcohol or other substance use, bowel movements, GI issues, sleep problems, body-related changes, fears, pains, difficulty with movements, eating or food related issues</i> )
10	<i>Social Opportunity</i>	What makes these topics more sensitive or uneasy to discuss with your pregnant patients? (Probe: <i>do you feel more or less comfortable discussing a sensitive topic when your pregnant patient brings it up themselves?</i> )
11	<i>Reflective Motivation</i>	Is there anything you do to help your pregnant patients feel comfortable having discussions about sensitive issues/topics?
12	<i>Physical Capability</i>	Would you like to address body changes with your pregnant patients, but you feel uncomfortable doing so?
13	<i>Reflective Motivation</i>	Are there any topics that are important to you that were not mentioned in our discussion that you would like to add, or would you like to add onto something that was previously discussed?

**Abbreviations**

GWG	Gestational Weight Gain
PCP	Prenatal Care Provider
CFPC	College of Family Physicians of Canada (although I think you only used it once, so probably not necessary to use it at all)
SOGC	Society of Obstetricians and Gynaecologists

**Acknowledgements**

The authors gratefully acknowledge Amanda DiGironimo for sharing her perspective as a person with lived experience of pregnancy in the study conception and design phase. The authors also thank Leila Jamshidi for formatting and adding references to the original draft of this protocol paper. We are also grateful to Emma Orsini for critically revising the manuscript.

**Authors' contributions**

ASA and TC conceived the idea for this study based on previous work by GDCB and CF. ASA, TC, KA, GDCB, B-CF, LG, TSN, HP-V, RR, JC, XRS, TG, ADG, KS-B contributed to the methods and design of the study. ASA and TC drafted the

original grant proposal that informed this protocol paper. VF, and VL assisted with the writing and formatting of the original draft of this paper. VF and VL collected, analyzed and interpreted the data from Step 1. All authors contributed in writing and critical revision of the paper. The primary and secondary outcomes described herein will be led by Co-principal investigators ASA and TC and their students in collaboration with the entire research team. Other manuscript ideas will likely surface over the course of the project and will be discussed with the whole research team before final manuscript approval.

**Funding**

The authors gratefully acknowledge the Canadian Institutes of Health Research for funding this research project (#459787; Co-PIs Alberga & Cohen). ASA gratefully acknowledges her past Chercheur Boursier Junior 1 and 2 Awards from Les Fonds de Recherche du Québec Santé during the earlier stages of this work and is currently supported by a Canadian Institutes of Health Research (CIHR) Implementation Science Chair in Youth Health and a Tier 2 Concordia University Research Chair. GDCB was supported by an Alberta Health Services Chair in Obesity Research.

**Data availability**

The datasets that will be used and/or analyzed during the current study will be available from the corresponding author upon reasonable request.

**Declarations****Ethics approval and consent to participate**

Ethics approval for this study was received by the Concordia University Human Research Ethics Committee in 2021 (Ethics certificate number: 30015952). All participants who will volunteer to take part in this study will complete and electronically sign an informed consent form prior to participation. All methods in this study will be carried out in accordance with the Declaration of Helsinki.

**Consent for publication**

Not applicable.

**Competing interests**

TC, VF, VL, KA, SA, CF, LG, TSN, HP-V, RR, JC, TG, ADG, KS-B declare that they have no competing interests. ASA has received speaker honoraria from Boehringer Ingelheim and speaker and consulting honoraria from Obesity Canada unrelated to this work. GDCCB collaborated with Obesity Canada to develop and market *Conversation Cards*<sup>®</sup> and *Conversation Cards for Teens*<sup>®</sup>. XRS is an affiliated researcher at Lund University in Sweden and runs an independent research and policy consulting agency. XRS' consulting activities are not related to the current work.

**Author details**

<sup>1</sup>Department of Health, Kinesiology, and Applied Physiology, Concordia University, Montreal, QC, Canada. <sup>2</sup>Department of Pediatrics, Faculty of Medicine and Health Sciences, McGill University, Montreal, Canada. <sup>3</sup>Faculty of Land and Food Systems, Nutrition and Health, University of British Columbia, Vancouver, BC, Canada. <sup>4</sup>BC Children's Hospital Research Institute, Healthy Starts, Vancouver, BC, Canada. <sup>5</sup>Faculty of Health Sciences, School of Human Kinetics, University of Ottawa, Ottawa, ON, Canada. <sup>6</sup>Faculty of Medicine, Memorial University of Newfoundland, St. John's, NF, Canada. <sup>7</sup>Department of Pediatrics, University of Alberta, Edmonton, AB, Canada. <sup>8</sup>McGill University Health Center, Montreal, QC, Canada. <sup>9</sup>Queens University, Ottawa, ON, Canada. <sup>10</sup>Faculty of Kinesiology, Sport, and Recreation, University of Alberta, Edmonton, AB, Canada. <sup>11</sup>Department of Family Medicine, Dalhousie University, Halifax, NS, Canada. <sup>12</sup>Department of Psychology, Lund University, Lund, Sweden. <sup>13</sup>School of Exercise Science, Physical and Health Education, University of Victoria, Victoria, BC, Canada. <sup>14</sup>The Society of Obstetricians and Gynecologists of Canada, Ottawa, Canada. <sup>15</sup>Toronto, ON, Canada. <sup>16</sup>Équilibrium, Montreal, QC, Canada.

Received: 27 November 2024 Accepted: 22 February 2026

Published online: 10 April 2026

**References**

- Teede HJ, Bailey C, Moran LJ, Bahri Khomami M, Enticott J, Ranasinha S, et al. Association of antenatal diet and physical activity-based interventions with gestational weight gain and pregnancy outcomes: a systematic review and meta-analysis. *JAMA Intern Med.* 2022;182(2):106.
- Heslehurst N, Hayes L, Jones D, Newham J, Olajide J, McLeman L, McParlin C, De Brun C, Azevedo L. The effectiveness of smoking cessation, alcohol reduction, diet and physical activity interventions in changing behaviours during pregnancy: a systematic review of systematic reviews. *Drehmer M, editor. PLoS ONE.* 2020;15(5):e0232774.
- Barker DJP. The origins of the developmental origins theory. *J Intern Med.* 2007;261(5):412–7.
- Rubin LP. Historical perspective of developmental origins of health and disease in humans. In: Tollefsbol TO, editor. *The epigenome and developmental origins of health and disease* [Internet]. Elsevier; 2016. [cited 2023 Jun 14]. p. 17–32. Available from: <https://linkinghub.elsevier.com/retrieve/pii/B9780128013830000025>.
- Baird J, Jacob C, Barker M, Fall CHD, Hanson M, Harvey NC, et al. Developmental origins of health and disease: a lifecourse approach to the prevention of non-communicable diseases. *Healthcare.* 2017;5(1):14.
- Gomes J, Au F, Basak A, Cakmak S, Vincent R, Kumarathasan P. Maternal blood biomarkers and adverse pregnancy outcomes: a systematic review and meta-analysis. *Crit Rev Toxicol.* 2019;49(6):461–78.
- Hayes L, McParlin C, Azevedo LB, Jones D, Newham J, Olajide J, et al. The effectiveness of smoking cessation, alcohol reduction, diet and physical activity interventions in improving maternal and infant health outcomes: a systematic review of meta-analyses. *Nutrients.* 2021;13(3):1036.
- Neerland C, Slaughter-Acey J, Behrens K, Clausen AM, Usset T, Bilal-Roby S, et al. An evidence map for social and structural determinants for maternal morbidity and mortality: a systematic review. *Obstet Gynecol.* 2024;143(3):383–92.
- Zhou M, Peng X, Yi H, Tang S, You H. Determinants of excessive gestational weight gain: a systematic review and meta-analysis. *Arch Public Health.* 2022;80(1):129.
- Craemer K, Sampene E, Safdar N, Antony K, Wautlet C. Nutrition and exercise strategies to prevent excessive pregnancy weight gain: a meta-analysis. *AJP Rep.* 2019;09(01):e92-120.
- Muktabhant B, Lawrie TA, Lumbiganon P, Laopaiboon M. Diet or exercise, or both, for preventing excessive weight gain in pregnancy. *Cochrane Pregnancy and Childbirth Group, editor. Cochrane Database of Systematic Reviews.* 2015;2015(6). Available from: <https://doi.org/10.1002/14651858.CD007145.pub3>.
- Lorenz L, Krebs F, Nawabi F, Alayli A, Stock S. Preventive counseling in routine prenatal care—a qualitative study of pregnant women's perspectives on a lifestyle intervention, contrasted with the experiences of healthcare providers. *Int J Environ Res Public Health.* 2022;19(10):6122.
- Weeks A, Halili L, Liu RH, Deonandan R, Adamo KB. Gestational weight gain counselling gaps as perceived by pregnant women and new mothers: findings from the electronic maternal health survey. *Women Birth.* 2020;33(1):e88-94.
- Weeks A, Liu RH, Ferraro ZM, Deonandan R, Adamo KB. Inconsistent weight communication among prenatal healthcare providers and patients: a narrative review. *Obstet Gynecol Surv.* 2018;73(8):486–99.
- Newson L, Bould K, Aspin-Wood B, Sinclair L, Ikramullah Z, Abayomi J. The lived experiences of women exploring a healthy lifestyle, gestational weight gain and physical activity throughout pregnancy. *Health Expect.* 2022;25(4):1717–29.
- Incollingo Rodriguez AC, Smieszek SM, Nippert KE, Tomiyama AJ. Pregnant and postpartum women's experiences of weight stigma in healthcare. *BMC Pregnancy Childbirth.* 2020;20(1):499.
- Hailu H, Skouteris H, Incollingo Rodriguez AC, Galvin E, Hill B. Drivers and facilitators of weight stigma among preconception, pregnant, and postpartum women: a systematic review. *Obesity Reviews.* 2024;e13710.
- Stengel MR, Kraschnewski JL, Hwang SW, Kjerulf KH, Chuang CH. "What my doctor didn't tell me": examining health care provider advice to overweight and obese pregnant women on gestational weight gain and physical activity. *Womens Health Issues.* 2012;22(6):e535–40.
- Okafor UB, Goon DT. Physical activity advice and counselling by healthcare providers: a scoping review. *Healthcare (Basel).* 2021;9(5):609.
- Washington Cole KO, Roter DL. Starting the conversation: patient initiation of weight-related behavioral counseling during pregnancy. *Patient Educ Couns.* 2016;99(10):1603–10.
- Halili L, Liu RH, Weeks A, Deonandan R, Adamo KB. High maternal self-efficacy is associated with meeting Institute of Medicine gestational weight gain recommendations. *Babalola S, editor. PLoS ONE.* 2019;14(12):e0226301.
- Kapadia MZ, Gaston A, Van Blyderveen S, Schmidt L, Beyene J, McDonald H, et al. Psychological antecedents of excess gestational weight gain: a systematic review. *BMC Pregnancy Childbirth.* 2015;15(1):107.
- Olson CM, Strawderman MS, Graham ML. Use of an online diet goal-setting tool: relationships with gestational weight gain. *Journal of nutrition education and behavior.* 2019;51(4):391–9.
- Kim HK, Niederdeppe J, Graham M, Olson C, Gay G. Effects of online self-regulation activities on physical activity among pregnant and early postpartum women. *J Health Commun.* 2015;20(10):1115–24.
- Yee LM, McGuire JM, Taylor SM, Niznik CM, Simon MA. Factors promoting diabetes self-care among low-income, minority pregnant women. *J Perinatol.* 2016;36(1):13–8.
- Jensen NK, Pals RA, Willaig I. The use of dialogue tools to promote dialogue-based and person-centred patient education for people with type 2 diabetes. *Chron Illn.* 2016;12(2):145–56.

27. Haugstvedt A, Hernar I, Graue M, Strandberg RB, Stangeland Lie S, Sigurdottir AK, Richards D, Kolltveit B -C. H. Nurses' and physicians' experiences with diabetes consultations and the use of dialogue tools in the DiaPROM pilot trial: a qualitative study. *Diabet Med*. 2021;38(6). Available from: <https://doi.org/10.1111/dme.14419>.
28. Ball GDC, Farnesi BC, Newton AS, Holt NL, Geller J, Sharma AM, et al. Join the conversation! The development and preliminary application of conversation cards in pediatric weight management. *J Nutr Educ Behav*. 2013;45(5):476–8.
29. Kebbe M, Damanhoury S, Browne N, Dyson MP, McHugh TLF, Ball GDC. Barriers to and enablers of healthy lifestyle behaviours in adolescents with obesity: a scoping review and stakeholder consultation: Behaviours of adolescents with obesity. *Obes Rev*. 2017;18(12):1439–53.
30. Kebbe M, Farmer A, Dyson MP, Scott SD, McHugh TLF, Lappa S, et al. Feasibility, user experiences, and preliminary effect of Conversation Cards for Adolescents© on collaborative goal-setting and behavior change: protocol for a pilot randomized controlled trial. *Pilot Feasibility Stud*. 2019;5(1):149.
31. Pennington J. Unusual partnerships and new ways of working in diabetes. 2006;10(7):4.
32. Kebbe M, Perez A, Buchholz A, McHugh TLF, Scott SS, Richard C, Mohipp C, Dyson MP, Ball GDC. Barriers and enablers for adopting lifestyle behavior changes in adolescents with obesity: a multi-centre, qualitative study. Lozano-Sufategui L, editor. *PLoS ONE*. 2018;13(12):e0209219.
33. Farnesi BC, Ball GDC, Newton AS. Family-health professional relations in pediatric weight management: an integrative review: Family-health professional relations. *Pediatr Obes*. 2012;7(3):175–86.
34. Farnesi BC, Newton AS, Holt NL, Sharma AM, Ball GDC. Exploring collaboration between clinicians and parents to optimize pediatric weight management. *Patient Educ Couns*. 2012;87(1):10–7.
35. Kebbe M, Perez A, Buchholz A, McHugh TLF, Scott SD, Richard C, et al. *Conversation cards for Adolescents*®: a patient-centered communication and behavior change tool for adolescents with obesity and health care providers. *J Commun Healthc*. 2020;13(2):79–88.
36. West R, Michie S. A brief introduction to the COM-B Model of behaviour and the PRIME Theory of motivation. *Qeios*. 2020; Available from: <https://www.qeios.com/read/article/565>. Cited 2022 Dec 9.
37. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci*. 2011;6(1):42.
38. Lee A, Belski R, Radcliffe J, Newton M. What do pregnant women know about the healthy eating guidelines for pregnancy? A web-based questionnaire. *Matern Child Health J*. 2016;20(10):2179–88.
39. Russell CG, Taki S, Azadi L, Campbell KJ, Laws R, Elliott R, et al. A qualitative study of the infant feeding beliefs and behaviours of mothers with low educational attainment. *BMC Pediatr*. 2016;16(1):69.
40. Canadian Institutes of Health Research. Strategy for patient-oriented research: patient engagement framework. Ottawa (ON): Canadian Institutes of Health Research; 2014. Available from: <https://cchr-irsc.gc.ca/e/48413.html#a6>. Accessed 2023 Jun 7.
41. Frisch N, Atherton P, Doyle-Waters MM, MacLeod MLP, Mallidou A, Sheane V, et al. Patient-oriented research competencies in health (PORCH) for researchers, patients, healthcare providers, and decision-makers: results of a scoping review. *Res Involv Engagem*. 2020;6(1):4.
42. Czajkowski SM, Powell LH, Adler N, Naar-King S, Reynolds KD, Hunter CM, et al. From ideas to efficacy: the ORBIT model for developing behavioral treatments for chronic diseases. *Health Psychol*. 2015;34(10):971–82.
43. Murray-Davis B, Grenier L, Atkinson SA, Mottola MF, Wahoush O, Thabane L, et al. Experiences regarding nutrition and exercise among women during early postpartum: a qualitative grounded theory study. *BMC Pregnancy Childbirth*. 2019;19(1):368.
44. Guest G, Namey E, McKenna K. How many focus groups are enough? Building an evidence base for nonprobability sample sizes. *Field Methods*. 2017;29(1):3–22.
45. Sandelowski M. Sample size in qualitative research. *Res Nurs Health*. 1995;18(2):179–83.
46. Piccinini-Vallis H. Clinician self-efficacy in initiating discussions about gestational weight gain. *Can Fam Physician*. 2017;63(7):e341–9.
47. Wen SW, White RR, Rybak N, Gaudet LM, Robson S, Hague W, Simms-Stewart D, Carroli G, Smith G, Fraser WD, Wells G, Davidge ST, Kingdom J, Coyle D, Fergusson D, Corsi DJ, Champagne J, Sabri E, Ramsay T, Mol BWJ, Oudijk MA, Walker MC. Effect of high dose folic acid supplementation in pregnancy on pre-eclampsia (FACT): double blind, phase III, randomised controlled, international, multicentre trial. *BMJ*. 2018;k3478.
48. Ferraro ZM, Boehm KS, Gaudet L, Adamo KB. Counseling about gestational weight gain and healthy lifestyle during pregnancy: Canadian maternity care providers' self-evaluation. *Int J Womens Health*. 2013;5:629.
49. DeJonckheere M, Vaughn LM. Semistructured interviewing in primary care research: a balance of relationship and rigour. *Fam Med Com Health*. 2019;7(2):e000057.
50. DiCicco-Bloom B, Crabtree BF. The qualitative research interview. *Med Educ*. 2006;40(4):314–21.
51. Fereday J, Muir-Cochrane E. Demonstrating rigor using thematic analysis: a hybrid approach of inductive and deductive coding and theme development. *Int J Qual Methods*. 2006;5(1):80–92.
52. Ahern KJ. Ten tips for reflexive bracketing. *Qual Health Res*. 1999;9(3):407–11.
53. Weiner BJ, Lewis CC, Stanick C, Powell BJ, Dorsey CN, Clary AS, Boynton MH, Halko H. Psychometric assessment of three newly developed implementation outcome measures. *Implementation science*. 2017;12(1):108.
54. Coco L, Giannone TT, Zarbo G. Management of high-risk pregnancy. *Minerva Ginecol*. 2014;66(4):383–9.
55. Yeoh PL, Hornetz K, Dahlui M. Antenatal care utilisation and content between low-risk and high-risk pregnant women. *PLoS ONE*. 2016;11(3):e0152167.
56. Abbott JH. The distinction between randomized clinical trials (RCTs) and preliminary feasibility and pilot studies: what they are and are not. *J Orthop Sports Phys Ther*. 2014;44(8):555–8.
57. Sim J. Should treatment effects be estimated in pilot and feasibility studies? *Pilot Feasibility Stud*. 2019;5(1):107.
58. Billingham SA, Whitehead AL, Julious SA. An audit of sample sizes for pilot and feasibility trials being undertaken in the United Kingdom registered in the United Kingdom Clinical Research Network database. *BMC Med Res Methodol*. 2013;13(1):104.
59. Public Health Agency of Canada. Chapter 1: Executive summary – What mothers say: The Maternity Experiences Survey – Pregnancy. Ottawa (ON): Public Health Agency of Canada; 2009. Available from: <https://www.canada.ca/en/public-health/services/injury-prevention/health-surveillance-epidemiology-division/maternal-infant-health/canadian-maternity-experiences-survey/pregnancy.html>. Accessed 2022 Dec 9.
60. Keyworth C, Epton T, Goldthorpe J, Calam R, Armitage CJ. Acceptability, reliability, and validity of a brief measure of capabilities, opportunities, and motivations ("COM-B"). *Br J Health Psychol*. 2020;25(3):474–501.
61. Avery KNL, Williamson PR, Gamble C, O'Connell Francischetto E, Metcalfe C, Davidson P, et al. Informing efficient randomised controlled trials: exploration of challenges in developing progression criteria for internal pilot studies. *BMJ Open*. 2017;7(2):e013537.
62. Powell LH, Kaufmann PG, Freedland KE. Feasibility and pilot studies. In: Behavioral clinical trials for chronic diseases. Cham: Springer International Publishing; 2021. p. 147–67. Available from: [https://doi.org/10.1007/978-3-030-39330-4\\_7](https://doi.org/10.1007/978-3-030-39330-4_7).
63. EQUATOR Network | Enhancing the QUALity and Transparency Of Health Research. Available from: <https://www.equator-network.org/>. Cited 2024 Nov 26.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.