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Utilisation of the internet and support communities on Facebook for gestational diabetes mellitus self-management and empowerment: a cross-sectional online survey study

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ABSTRACT

The internet and social media are important resources for those diagnosed with gestational diabetes mellitus (GDM), the most common medical complication of pregnancy worldwide. However, to date, there has been limited research focused on GDM support communities on Facebook. This study aimed to identify characteristics of members of GDM support communities on Facebook, explore the uptake and value of the internet by the members of online support communities for GDM, and analyse how participation in these communities contributes to empowering experiences of healthcare. A cross-sectional online survey was completed by 340 women recruited from two peer-led closed Facebook groups focused on GDM in Australia. Most respondents searched for information about GDM online, found it important to access online health resources, and reported the usefulness of these resources with GDM decision-making. Around half indicated they had discussed information found online with a healthcare provider. Analysis via multiple linear regression demonstrated educational level, sense of shared experience and valuing information exchanged within GDM online support significantly predicted experiencing empowering outcomes from participating in a GDM online support community. These results indicate the value of such spaces for women with GDM and suggests an opportunity for healthcare providers to invest in formal outreach into GDM online support communities on Facebook. Further investigation exploring the benefits of self-organised and peer-led support would elucidate how participation improves adherence to treatment adherence, patient-provider relationships, and contributes to better outcomes for GDM.

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Introduction

Gestational diabetes mellitus (GDM) is defined as hyperglycaemia with onset or first recognition during pregnancy (Metzger & Coustan, 1998). It is currently the most common medical complication of pregnancy, with prevalence rising worldwide (McIntyre et al., 2019). In Australia, the prevalence among pregnant woman has more than doubled in less than a decade, from 8.3% in 2014 to 17.9% in 2021-22 (Australian Institute of Health Welfare, 2023b). Increased prevalence has significant consequences for the healthcare system, given more monitoring is required for GDM due to increased risk of developing adverse outcomes in pregnancy (Australian Institute of Health Welfare, 2023a). For women outside of major cities where maternity service provision is limited (Hoang et al., 2014), accessing healthcare entails additional financial and social burdens (Pilcher et al., 2014).

Emerging evidence suggests that the internet and social media are important resources for those diagnosed with GDM. In a systematic review of the effects of online support and social media communities on GDM, online support interventions were found to have a positive impact on promoting self-care and improving healthcare outcomes for women with GDM (Cheng et al., 2023). Our recent observational study examining the content of GDM online support communities on Facebook categorised six key topics posted by community members, with self-management most prevalent followed by clinical management, and posts were primarily categorised as informational help seeking (Pham et al., 2024). These findings also resonate with a 2021 qualitative study from the United Kingdom, where all participants active in a GDM support group on Facebook reported how valuable it was for dietary information and peer support (Edwards et al., 2021). These results, however, are tempered by studies that found women had concerns about the reliability of information about GDM found online and in social media groups (Safiee et al., 2023) and messaging on internet discussion boards about GDM can challenge efforts to prevent type 2 diabetes (Eades et al., 2020). More generally, a systematic review examining pregnant women and their information-seeking behaviour suggested the influence of education, with higher educated women more likely to seek advice online; the review also found few discussed this information with health professionals (Sayakhot & Carolan-Olah, 2016a).

In light of these findings about pregnant women's needs and the influence of factors such as education, eHealth literacy is likely to be a vital skill (C. D. Norman & Skinner, 2006a). eHealth literacy is defined as 'the ability to seek out, find, evaluate and appraise, integrate, and apply what is gained in electronic environments toward solving a health problem' (C. D. Norman & Skinner, 2006b), and is generally associated with better self-management and adherence (Kim et al., 2023). Given the morass of information online about GDM, skilful navigation is required, which is why some will seek out collective support, including more personalised advice from 'like-minded' women (Lupton & Maslen, 2019). One key study examining breast cancer, fibromyalgia and arthritis suggests that participation in online support communities contributes to the empowerment of patients with these conditions (van Uden-Kraan et al., 2009). Patient empowerment here refers to processes and outcomes at both individual and group level that enable people to develop a sense of control over their actions and decisions about their care (Johansson et al., 2021). To date, there has been limited comparable research focused on GDM. A qualitative study exploring a GDM support community on Facebook in the United Kingdom and Ireland found that women's interactions prompted them to appraise, contest, and co-create knowledge claims about GDM (Elton, 2022), which suggests how active participation can be empowering in managing the condition. More research focused on Facebook support communities can provide greater insight into the benefits, and how these communities contribute to women's sense of empowerment while coping with an acute condition during pregnancy.

The aims of the present study were to: (1) identify characteristics of members of GDM support communities on Facebook including their eHealth literacy and healthcare experience; (2) explore the uptake and value of the internet for GDM; and (3) analyse whether participation in GDM support communities on Facebook is associated with empowering outcomes.

Methods

A cross-sectional, online survey was deemed the most appropriate method for data collection given the research questions. The design was a web-based and self-administered survey using Qualtrics (2018).

Participants and recruitment

Participants were recruited from two peer-led closed online support communities on Facebook focused on GDM, founded and run voluntarily by independent individuals. These communities were chosen as they were the two largest Facebook groups focused on GDM in Australia at the time of data collection, with a combined membership of over 6500 users, comprising women with GDM or who have had it in the past. The first author requested permission from the administrators of both Facebook groups to join in order to conduct research; in her applications to join she disclosed having experienced GDM. Once permission was granted by the group administrators and the study commenced, a Facebook post promoting the study and inviting women to participate in the survey was shared across both communities, once per month for three months, from the end of 2018 to the start of 2019. The posts advertising the study included a brief overview of the study and a link to more information and the online survey. In these posts, the first author's positionality as someone who had experienced GDM was explicitly referenced. After clicking the survey link from the post, participants were directed to information about the study, and the informed consent and two eligibility screening questions. The inclusion criteria for the study were women aged 18 years or over, who have had at least one pregnancy with a diagnosis of GDM and joined a Facebook group for support with managing GDM. All participants provided voluntary informed consent and all survey responses were anonymous.

Ethical approval

Prior to the commencement of data collection, approval was sought and gained from Macquarie University's Human Research Ethics Committee (Reference number: 5201827734364).

Survey

Given the exploratory nature of our study, the survey included a range of questions including, wherever possible, validated and established measures. Prior to data collection, the survey was pilot tested with 12 people with content and methodological expertise; five had experienced GDM, two had experienced pregnancy and childbirth, and five were experts in survey design. Feedback received from pilot testing led to minor modifications to the survey. The full clinical name of GDM was rewritten as ‘gestational diabetes’ or ‘GD’ in the survey to align with terminology used more frequently within both of the Facebook groups. The survey questions used in this study are included in Appendix 1.

Data on sociodemographic characteristics were collected, including age, location, education level and pregnancy status. The survey included closed response questions about experiences of pregnancy and GDM, including the importance and usefulness of the internet and Facebook. Respondents answered questions on whether they discussed information about GDM found online with their healthcare providers, as well as established scales to assess eHealth literacy, healthcare experience, and empowerment; details of these scales, and adaptations made, are described below.

eHealth literacy

The eHealth Literacy Scale (eHEALS) was used to assess participants’ combined knowledge, comfort, and perceived skills at finding, evaluating, and applying electronic health information to health problems (C. D. Norman & Skinner, 2006a). The eHEALS has been validated, used in a wide variety of settings and populations, and translated into multiple languages (C. Norman, 2011). The eHEALS consists of eight items, measured on a 5-point Likert scale with response options ranging from ‘strongly disagree’ to ‘strongly agree.’ Total scores are summed to give a range from 8 to 40 with higher scores representing higher eHealth literacy. In addition, the eHEALS has two supplementary items to understand consumer interest in using eHealth in general, with the wording slightly adapted in the first of the two questions (i.e., ‘How useful do you feel the internet is (or was) in helping you make decisions about GD?’).

Healthcare experience

For healthcare experiences, we adapted the Picker Patient Experience (PPE) questionnaire, a widely used and validated tool originally developed with 15-items to measure patients’ experiences of in-patient care (Jenkinson et al., 2002). The PPE has been used across different settings and in conjunction with other questions and scales (Jenkinson et al., 2002). Modifications were made to the scale to suit the context of GDM healthcare, with two items condensed into one, and three other items omitted (e.g., ‘Were you ever in pain?’). Terminology from the original PPE including ‘doctor’ or ‘nurse’ was changed to the more general term ‘healthcare provider’, and specific references to GDM and insulin were included. Finally, ‘danger signals’ was changed to ‘signs’, as the former was considered to be potentially alarmist in this context. As with the original PPE, additive scoring was used, and each item was coded for statistical analysis as a dichotomous ‘problem score’, indicating the presence or absence of a problem (Jenkinson et al., 2002). A higher overall score indicated more problems experienced.

Empowerment from participating in a GDM support community on Facebook

To examine whether participation in GDM online support communities has an empowering effect on self-management, we drew items from a previous study which examined the empowerment of patients participating in online patient support groups (van Uden-Kraan et al., 2009). The original survey consisted of two overarching domains, 'empowering processes' (29 items) and 'empowering outcomes' (38 items), as well as several sub-domains relating to information exchange, emotional support, and feelings about health-care provision and treatment. As the survey was originally developed with patients with breast cancer, fibromyalgia and arthritis, we selected and adapted 25 items that were most relevant to the specific aims of our study on GDM. Questions were answered on a four-point Likert-type scale ranging from 'seldom to never' (1) to 'often' (4). In the original survey development paper, only internal consistency reliability (using Cronbach's α) was reported with no investigation into the construct validity of the survey domains. Given this lack of prior investigation, and our modifications to the original scale, we conducted a preliminary exploratory factor analysis (EFA) and internal consistency to uncover the underlying factors, rather than a confirmatory factor analysis which tests a predefined set of factors.

Our analyses supported an amended 19-item three-factor solution with the domains: 'sense of shared experience', 'value of information exchanged', and 'empowering outcomes' (see Appendix 2 for details). These subscales were largely based on the original domains and sub-domains, with the first factor ('sense of shared experience', 5 items) describing activities that occur in an online support community such as encountering emotional support and receiving recognition; the second factor ('value of information exchanged', 7 items) describes the extent to which participants find the information exchanged in an online support community relevant and useful; and the third factor ('empowering outcomes', 7 items) describes the empowering outcomes of participation in an online support community including feeling better informed, more confident in the relationship with one's healthcare provider, and having increased optimism and sense of control over the future. The score for each subscale was calculated by averaging its items, with higher scores indicating higher empowerment.

Data analysis

All statistical analyses were carried out using IBM SPSS Statistics 29.0 software package. For analyses, age was treated as a continuous variable and education was categorised into five levels (1. Less than year 12. 2. High school. 3. Vocational qualification. 4. Bachelor's degree. 5. Postgraduate degree). Location, based on postcode data, was dichotomised as 'regional/remote' and 'major cities' using ABS classifications (coded into dummy variables '0' and '1') (Australian Bureau of Statistics, 2016).

In addressing Aim 1, descriptive statistics were used to summarise characteristics of respondents. In addressing Aim 2, descriptive statistics were used to summarise respondents' interest in eHealth and discussions about internet use with healthcare providers. Finally, in addressing Aim 3, an exploratory analysis was performed using multiple linear regression to determine predictors of empowering outcomes (the dependent variable). All independent variables were entered into the regression model: age, location, education, eHEALS score, PPE score, as well as the individual scores for 'sense of shared experience' and 'value of information exchanged'. The variance inflation factor (VIF) was inspected for evidence of multicollinearity, with a VIF less than 5 meaning no evidence of a multicollinearity problem. All tests were two-sided, and *p*-values less than .05 were regarded as statistically significant.

Results

A total of 412 survey responses were received. The data were screened to remove insufficiently completed surveys, resulting in 340 survey responses being included for analysis. The American Association for Public Opinion Research (The American Association for Public Opinion Research, 2023) defines 'partials' as cases that respond to more than 50% of all applicable questions. However, we determined that completing two-thirds (66%) was more applicable as the criterion for inclusion in the present study, as this threshold encompassed most of the essential questions, including both closed- and open-ended questions about GDM healthcare experience, internet use, and joining an online support community on Facebook.

Aim 1: characteristics of respondents

Respondent characteristics are presented in Table 1. The mean age was 32.1 years (SD 4.7), and ages ranged from 20 to 45 years. Most of the women participating were Australian-born (84.7%, *n* = 288/340). Around two-thirds lived in major cities (67.3%, *n* = 224/333), with one-third living in a regional/remote area (32.7%, *n* = 109/333). Just over half of the respondents had a university education (50.2%, *n* = 148/295). Almost two-thirds (65.1%, *n* = 222/340) were currently pregnant.

Table 1. Selected respondent characteristics.

Characteristics	*N* (%)
Age group	
20–25 y	26 (7.2)
26–30 y	97 (28.4)
31–35 y	139 (41.5)
36–40y	64 (18.8)
41–45y	14 (4.1)
Birthplace	
Australia	288 (84.7)
Other	52 (15.3)
Location	
Major cities	224 (67.3)
Regional/remote	109 (32.7)
Education level	
Less than year 12	21 (7.1)
High school	29 (9.8)
Vocational qualification	97 (32.9)
Bachelor's degree	80 (27.1)
Postgraduate degree	68 (23.1)
Current pregnancy status	
Yes	222 (65.3)
No	118 (34.7)

*Note. Columns may not equal total N due to missing demographic responses.

eHealth literacy

Electronic health literacy was measured using the eHEALS scale, in which higher scores represent higher eHealth literacy. The range of scores for the sample (*n* = 328) was 8–40, and an overall mean of 30.2 (SD = 6.3).

Healthcare experience

Using the adapted PPE scale, in which a higher overall score represents more problems experienced, scores for the sample (*n* = 340) ranged from 0 to 11, with a mean of 5.0 (SD = 2.9).

Aim 2: Usefulness of the internet for GDM

Respondents' general interest in using eHealth was measured with the eHEALS supplementary questions. When asked about accessing health resources on the internet, 89.1% (*n* = 301/338) indicated it was important/very important, and 94.1% (*n* = 320/340) responded 'yes' to searching for information about GDM on the internet. Three quarters of respondents (75.7%, *n* = 256/338) indicated the internet was useful/very useful in helping with decision-making about GDM.

Responses for whether participants had or intended to discuss information found online with their healthcare providers is presented in Table 2. Around half of the respondents (50.6%, *n* = 162/320) indicated they had discussed information found online with a healthcare provider. However, around a third (35.6%, *n* = 114/320) did not feel the need to and 6.9% (*n* = 22/320) indicated they had not felt comfortable doing so. When asked whether a healthcare provider discussed online sources with them, almost half of respondents reported 'no' (49.1%, *n* = 167/340), just under a quarter chose 'yes' without qualification (23.5%, *n* = 80/340), while 11.5% (*n* = 39/340) selected 'yes, they directed me towards some sources but cautioned me about others' and 'yes, but they cautioned me about relying on online sources' was selected by 5.9% (*n* = 20/340). In one respondent's answer in 'other', she described differing opinions within her healthcare provider team: 'My GP recommended a Facebook support group, but my OB and diabetes educator weren't really on board with the idea of online resources.'

Table 2. Self-reported discussions with a healthcare provider (HCP) about finding GDM information online.

Characteristics	*n* (%)*
Discussed information found online with a HCP	
Yes	162 (50.6%)
No, I haven't needed to	114 (35.6%)
No, I haven't felt comfortable doing this	22 (6.9%)
Not yet, but I intend to	13 (4.1%)
I can't recall / other	7 (2.2%)
HCP discussed information found online with patient	
No	167 (49.1%)
Yes, they directed me towards online sources	80 (23.5%)
Yes, but they cautioned me about relying on online sources	20 (5.9%)
Yes, they directed me towards some sources but cautioned me about others	39 (11.5%)
I can't recall	28 (8.2%)
Other	6 (1.8%)

*Note. Sub-totals may not equal total N due to missing responses.

Table 3. Regression analysis for variables predicting empowerment outcomes.

	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	*t*	Sig.	Lower Bound	Upper Bound
Age	0.002	0.007	0.01	0.209	0.835	−0.013	0.016
Location	−0.061	0.07	−0.04	−0.876	0.382	−0.199	0.077
Education level	−0.091	0.03	−0.148	−3.051	0.003*	−0.149	−0.032
eHEALS	0.009	0.006	0.073	1.515	0.131	−0.003	0.02
PPE	0.011	0.011	0.044	0.941	0.348	−0.012	0.033
Sense of shared experience	0.416	0.061	0.377	6.776	<.001*	0.295	0.537
Value of information exchanged	0.435	0.073	0.332	5.979	<.001*	0.292	0.578

*Significant result; location (0 = regional/remote, 1 = major cities); education level (1 = Less than year 12, 2 = High school, 3 = Vocational qualification, 4 = Bachelor's degree, 5 = Postgraduate degree).

Aim 3: Impact of participation in GDM online support communities on Facebook on empowerment

A collinearity diagnosis showed no multicollinearity for all independent variables. The result of the linear multiple regression is shown in Table 3. After adjusted analysis, education level (β = −.15), sense of shared experience (β = .38) and value of information exchanged (β = ·33) were the strongest predictors of empowerment outcomes from a GDM online support community.

Discussion

This is one of the few published studies to survey women in-depth about their use of the internet and social media for GDM. The findings confirm the importance of GDM online support communities, such as those on Facebook, as readily available sources of informational and emotional support.

The demographic profile of the sample indicated the majority of respondents were born in Australia and overall were a more educated cohort than average, as around 83% of respondents had a non-school qualification; currently around 74% of women aged 20–44 have a non-school qualification (Australian Bureau of Statistics, 2023). Our findings indicated that being more educated was significantly negatively associated with feeling empowered from participating in a GDM online community on Facebook, which suggests that the benefits to participating in GDM online support communities, in terms of empowerment, are experienced to a greater extent by those who are less educated. It has been reported that women with higher education levels are more likely to seek advice online (Sayakhot & Carolan-Olah, 2016b), which accords with our sample; however, it is worth noting this does not necessarily include social media, and our findings suggest that they derive less benefit from this use.

Overall, the electronic health literacy of respondents was within the range of 27-40, which is considered sufficient (Wångdahl et al., 2020), with a reported mean eHEALS score similar to women in other recent study settings including Korea (Lee & Lee, 2022), Turkey (Korkmaz Aslan et al., 2024) and the United States (Robinson-Whelen et al., 2023). Interestingly, there is research which indicates that individual literacy has no influence on patients' perceptions of the usefulness of, and their satisfaction with, using online health communities (Wu, 2018). Given the growing problem of misinformation on the internet and social media platforms such as Facebook, however, electronic health literacy skills arguably continue to be valuable. Our study suggests that women with GDM do take quality of information online into account, with part of this appraisal process involving discussion with a healthcare provider, which just over half of the sample (50.6%) indicated they had done.

Our findings also resonate with the results of a systematic review on the role of online communities as a driver for patient empowerment (Johansson et al., 2021). The same review concluded that online support communities serve as a complementary resource to formal healthcare, helping patients get more out of consultations with their providers and gain insight from relevant peers (Johansson et al., 2021). The findings extend this point, suggesting that this benefit of participation in online support communities, at least for women with GDM, is based on valuing the information exchanged and feeling a sense of shared experience with others in the community. Virtual support for GDM is worthy of more attention, given it is an acute condition increasing in prevalence that demands additional support. There is also increasing evidence of the efficacy of nurses and midwives becoming involved in online health communities for antenatal care (Chatwin et al., 2021; McCarthy et al., 2020; Morse & Brown, 2023). One systematic review, for example, found that physician-patient communication can be enhanced by developing patients' eHealth literacy in online health communities where both patients and physicians participate (Lu & Zhang, 2021). Although there are many benefits, there are also challenges for healthcare professionals to be involved in such contexts, such as personal and professional risk (Morse & Brown, 2023), managing insufficient key information from users, and the difficulty of providing information and emotional support simultaneously (Atanasova et al., 2017).

A sense of shared experience and value of information exchanged being the strongest predictors of experiencing empowerment from a GDM online support community, extends the conclusions of van Uden-Kraan et al. (2009) that empowering outcomes could be predicted partially on the basis of the processes that took place in the online support groups. Our preliminary validation using EFA also suggests the potential opportunity to develop a shorter measure of empowerment processes and outcomes in online health communities, given the evidence of reliability and structural validity in the three empowerment subscales with items adapted from van Uden-Kraan et al. (2009). Research in the future should include other groups and conditions to confirm the model, before undertaking a confirmatory factor analysis to finalise the instrument.

Strengths and limitations

A key strength of this study is that it was a sample from across the country, with representation from regional and remote areas and not just major cites. However, a key limitation is that it was a sample with self-selected survey respondents, who were also more educated than the general population, and largely Australian-born. Thus, findings are not necessarily generalisable to other populations, within or outside of Australia. These demographics point to gaps to address in the future to ensure a more representative sample of the population; for example, current research suggests a potentially higher at-risk profile for GDM for women who migrate (Kragelund Nielsen et al., 2023), and little is known about their internet use in this context.

Practice implications

As many women with GDM do discuss what they find online with their healthcare providers, healthcare providers and services could consider leveraging off patient initiative, by finding ways to collaborate with existing online support communities such as those on Facebook, and specifically those focused on GDM. Further investigation exploring the benefits of women's self-organisation and peer-led support in GDM online communities would be illuminating to discover exactly *how* such online support communities are an adjunct to both clinical- and self-management, and whether participation in such communities has impacts on, for example, improved adherence to clinical advice for managing GDM, improved patient-provider relationships and better health outcomes overall. As the present study relied on self-reports from women, conducting a similar study with healthcare providers involved with GDM care would be useful to triangulate findings.

Although the findings emphasise the value of online communities on Facebook, it has also attracted considerable concern as a social media platform. While Facebook has increasingly invested in its Groups function over time (Facebook, 2017), it has also acknowledged the ongoing problem of misinformation in such groups (Facebook, 2020). Privacy and safety continues to be chief among users' concerns with the platform (Noveck et al., 2021). More recently, Facebook has attracted criticism with the discontinuation of its fact checking program (Lewandowsky, 202, p. 5). The reality remains that Facebook is a commercial entity (owned by Meta Platforms) and although there are pragmatic reasons for healthcare providers to engage with GDM online support communities, with a ready and interested audience in need of informational and emotional support, caution is nonetheless required given the ever evolving risks involved with being on social media platforms for both individuals as well as organisations.

Conclusion

In the face of an increasingly complex information landscape on the world wide web and social media, our study provides evidence for the usefulness of GDM online communities in supporting some women in their self-management of GDM and contributing to a greater sense of empowerment in their interactions with their healthcare providers. Future research opportunities include improving survey instruments as well as further exploration of patient-provider relationships with respect to discussions about GDM resources online and social media. Finally, our study points to an important opportunity for formal outreach into online communities on Facebook for those actively seeking additional informational and emotional support for GDM.

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Disclosure statement

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Louise A. Ellis is an Associate Professor who leads an internationally regarded Complex Systems and Implementation Science research stream at the Australian Institute of Health Innovation, Macquarie University. Associate Professor Ellis has a clinical background as a registered Psychologist (>10 years), with expertise in mental health, hospital organisational culture, systems resilience, and the application of complexity and implementation science to healthcare improvement. Associate Professor Ellis also brings strong methodological expertise in survey development and validation, and in mixed-methods research and evaluation studies.

Jeffrey Braithwaite is a leading health services and systems researcher with an international reputation for his work investigating and contributing to systems improvement. He has expertise in researching the culture and structure of acute settings, leadership, management and change in health sector organisations, quality and safety in health care, accreditation and surveying processes in international context and the restructuring of health services. Professor Braithwaite is well known for bringing management and leadership concepts and evidence into the clinical arena and he has published extensively (more than 900 refereed contributions, and over 1,500 total publications) about organisational, social and team approaches to care which has raised the importance of these in Australia and internationally. Professor Braithwaite is the recipient as at 2025 of career research funding of AUD$230 million across 142 grants.

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Appendices

Appendix 1

Table A1. Survey instrument.

Qu#	Area/sub area	Question text	Answer options/format
1	Demographics/age	What is your age (in years)?	Open ended two digit numerical
2	Demographics/country	Which country do you live in?	*Select one:* –Australia –Other (please specify):
3	Demographics/location	What is your postcode in Australia?	Open ended four digit numerical
4	Demographics/birthplace	In which country were you born?	*Select one:* –Australia –Other (please specify):
5	Demographics/language	Do you speak a language other than English at home?	*Select one:* –No, English only –Yes. Please specify which language(s):
6	Demographics/education	What is the highest level of education that you have completed? If you are currently studying, but have not completed a qualification, please answer with the highest level you have completed.	*Select one:* –Less than year 12 –Year 12 (HSC) or equivalent –TAFE qualification, technical, trade certificate, diploma or equivalent –Bachelors degree –Postgraduate degree or higher –Don't know
7	Experience of diagnosis	In just a few words, how do you feel about your diagnosis of GD?	Open ended text
8	Pregnancy/current status	Are you currently pregnant?	*Select one:* –Yes –No
9	Pregnancy/GDM	Have you been diagnosed with GD with your current pregnancy?	*Select one:* –Yes –No –Not yet
10	Pregnancy/first time mother	Is this your first continuing pregnancy?	*Select one:* –Yes –No
11	Internet/GDM information	Have you searched for and found information on the internet about GD?	*Select one:* –Yes –No, I haven't needed to –Not yet, but I intend to –I can't recall
12	Internet/discussion with healthcare provider	Have you discussed this information you found online with a healthcare provider?	*Select one:* –Yes –No, I haven't needed to –No, I haven't felt comfortable doing this

(*Continued*).

Table A1. Continued.

Qu#	Area/sub area	Question text	Answer options/format
			–Not yet, but I intend to –I can't recall –Other (please explain):
13	Internet/discussion with healthcare provider	Has a healthcare provider discussed online sources for information and support of GD and pregnancy (e.g., websites, social media or apps)?	*Select one:* –Yes, they directed me towards online sources –Yes, they directed me towards some sources but cautioned me about others –Yes, but they cautioned me about relying on online sources –No I can't recall –Other (please explain):
14	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	When you had important questions about GD to ask a healthcare provider, did you get answers you could understand?	*Select one:* –Yes, always –Yes, sometimes –No I had no need to ask
15	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	Sometimes one healthcare provider will say one thing about GD and another will say something quite different. Did this happen to you?	*Select one:* –Yes, often –Yes, sometimes –No
16	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	If you had any anxieties or fears about GD or its treatment, did you discuss them with a healthcare provider	*Select one:* –Yes, completely –Yes, to some extent –No I didn't have any anxieties or fears
17	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	Did healthcare providers involved with your GD care ever talk in front of you as if you weren't there?	*Select one:* –Yes, often –Yes, sometimes –No
18	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	Did you want to be more involved in decisions made about your GD care and treatment?	*Select one:* –Yes, definitely –Yes, to some extent –No
19	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	Overall, did you feel you were treated with respect and dignity in relation to your GD?	*Select one:* –Yes, always –Yes, sometimes –No
20	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	If your family or someone else close to you wanted to talk to a healthcare provider about your GD, did they have enough opportunity to do so?	*Select one:* –Yes, definitely –Yes, to some extent –No –No family or friends were involved –My family didn't want or need information –I didn't want my family or friends to talk to healthcare providers
21	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	Did a healthcare provider give your family or someone close to you all the information they needed to help you manage GD?	*Select one:* –Yes, definitely –Yes, to some extent –No –No family or friends were involved –My family or friends didn't want or need information
22		Did a healthcare provider explain the purpose of the medicines (e.g., insulin,	*Select one:* –Yes, completely

(*Continued*).

Table A1. Continued.

Qu#	Area/sub area	Question text	Answer options/format
	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	metformin) you were to take or administer at home in a way you could understand?	–Yes, to some extent –No I didn't need an explanation –I had no medicines
23	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	Did a healthcare provider tell you about potential medication side effects to watch for when you went home?	*Select one:* –Yes, completely –Yes, to some extent –No I didn't need an explanation
24	Experience of the health system/PPE adaptation (Jenkinson et al., 2002)	Did a healthcare provider tell you about signs to watch out for regarding GD or treatment?	*Select one:* –Yes, completely –Yes, to some extent –No
25	Experience of the health system	If you would like to make any comments about your experiences interacting with healthcare professionals in receiving care for GD please use the space below. We would like to know about them.	Open ended text
26	Internet/eHealth literacy measured with eHEALS (C. D. Norman & Skinner, 2006a)	We would like to ask you about your experience using the internet, including social media, for health information. For each statement, please select which response best reflects your opinion and experience right now.	*Likert scale: 1 (strongly disagree)–5 (strongly agree)* –I know what health resources are available on the internet. –I know where to find helpful health resources on the internet. –I know how to find helpful health resources on the internet. –I know how to use the internet to answer my questions about health. –I know how to use the health information I find on the internet to help me. –I have the skills I need to evaluate the health resources I find on the internet. –I can tell high quality health resources from low quality health resources on the internet. –I feel confident in using information from the internet to make health decisions.
27	Internet/eHEALS supplementary questions (C. D. Norman & Skinner, 2006a)	How useful do you feel the internet is (or was) in helping you make decisions about GD?	*Select one:* –Not useful at all –Not useful –Unsure –Useful –Very useful
28	Internet/eHEALS supplementary questions (C. D. Norman & Skinner, 2006a)	How important is it for you to be able to access health resources on the internet?	*Select one:* –Not important at all –Not important –Unsure –Important –Very important
29	Internet/information	What information about GD have you accessed on the internet? Please select all that apply.	*Select as many as apply:* –Factsheets –Tips for managing GD –Risks of GD for you –Risks of GD for your baby –Information about insulin
30	Facebook/membership	Have you signed up to a Facebook group for support with managing GD?	*Select one:* –Yes –No

(*Continued*).

Table A1. Continued.

Qu#	Area/sub area	Question text	Answer options/format
31	Facebook/membership	Can you explain exactly what led you to join a GD Facebook group?	Open-ended text
32	Facebook/administration	Are you a moderator/admin of a GD Facebook group?	*Select one:* –Yes –No
33	Facebook/administration	In just a few sentences, what led you to taking on moderating duties in this group?	Open-ended text
34	Facebook/value of information exchanged (van Uden-Kraan et al., 2009)	The information and tips exchanged in a GD Facebook group are …	*Likert scale: 1 (seldom to never)–5 (often)* –Understandable –Valuable –Usable –New –Applicable to my present situation –Reliable –Correct
35	Facebook/sense of shared experience (van Uden-Kraan et al., 2009)	Does it ever happen in a GD Facebook group that …	*Likert scale: 1 (seldom to never)–5 (often)* –You recognise yourself in the stories of other group members? –You experience the sense of 'not being the only one'? –Others are an example to you? –You realise that you are not so bad off after all? –You can be an example to others? –You can offer advice and support to others? –Someone in the group is empathic? –Someone in the group reassures you? –Someone offers you sound advice?
36	Facebook/empowering outcomes (van Uden-Kraan et al., 2009)	Through my participation in a GD Facebook group …	*Likert scale: 1 (seldom to never)–5 (often)* –I feel like I have more (correct) knowledge at my disposal to deal better with my GD –I am more knowledgeable about which questions to ask my healthcare providers –I have more courage to raise matters with my healthcare providers –I am more able to oppose my healthcare providers –I understand the information provided by my healthcare providers better –I can stick to my treatment regime better –I am more able to follow the guidelines and advice of my healthcare providers –I feel I am more skilled at dealing well with my GD

(*Continued*).

Table A1. Continued.

Qu#	Area/sub area	Question text	Answer options/format
			–I feel more in charge of the course of my GD
37	Facebook	Are there any other issues you would like to raise about being part of a GD Facebook group?	Open ended text

Appendix 2

To measure the empowering effect of participating in a GDM online community on Facebook, an EFA was employed with maximum likelihood estimation and varimax factor rotation on 25 items in our survey. Significant item-factor loading was set at coefficient level of 0.4 to maximise identification of candidate factor items, in line with the recommendation that only variables with loadings of 0.4 and above are interpreted (Howard, 2016).

Results

The KMO value was 0.92 and Bartlett's test of sphericity was significant (approximately Chi-2 = 4462; df = 300; $P < .001$), indicating that the inter-correlation matrix was appropriate for factor analysis. Four factors had eigenvalues greater than one; together, the four factors explained 62.6% of the variance. Table A1 presents the item-factor loadings, with values below 0.4 suppressed.

For further analysis, several items were removed because they cross-loaded onto three factors (i.e., FB14, FB15, FB17); in addition, two items were removed because the factor loadings were below 0.4 (i.e., FB13, FB20). After item exclusions, Factor 1 had 5 items, Factor 2 had 7 items and Factor 3 had 7 items; Factor 4 was excluded altogether from further analysis due to insufficient items.

Cronbach's α for the three remaining hypothesised subscales were calculated to examine internal reliability. The Cronbach's α for Factors 1–3 were 0.81, 0.86 and 0.92, respectively, which all indicate good reliability and internal consistency with the constructs in question. Finally, the overall Cronbach's α value for the remaining items was computed at 0.93.

Table A2. Exploratory factor loadings in relation to participation of a GDM online community on Facebook.

		Factors			
Code	Questions	F1	F2	F3	F4
FB1	The information and tips exchanged in a GD Facebook group are understandable		.50		
FB2	The information and tips exchanged in a GD Facebook group are valuable		.63		
FB3	The information and tips exchanged in a GD Facebook group are usable		.72		
FB4	The information and tips exchanged in a GD Facebook group are new		.55		
FB5	The information and tips exchanged in a GD Facebook group are applicable to my present situation		.54		
FB6	The information and tips exchanged in a GD Facebook group are reliable		.74		
FB7	The information and tips exchanged in a GD Facebook group are correct		.62		
FB8	Does it ever happen in a GD Facebook group that you recognise yourself in the stories of other group members?	.63			
FB9	Does it ever happen in a GD Facebook group that you experience the sense of 'not being the only one'?	.66			
FB10	Does it ever happen in a GD Facebook group that others are an example to you?	.66			
FB11	Does it ever happen in a GD Facebook group that you realise that you are not so bad off after all?	.55			
FB12	Does it ever happen in a GD Facebook group that you can be an example to others?	.46			
FB13	Does it ever happen in a GD Facebook group that you can offer advice and support to others?				
FB14	Does it ever happen in a GD Facebook group that someone in the group is empathic?	.49			.40
FB15	Does it ever happen in a GD Facebook group that someone in the group reassures you?	.40			.74

(*Continued*).

Table A2. Continued.

		Factors			
Code	Questions	F1	F2	F3	F4
FB16	Does it ever happen in a GD Facebook group that someone offers you sound advice?				.66
FB17	Through my participation in a GD Facebook group I feel like I have more (correct) knowledge at my disposal to deal better with my GD		.50	.45	
FB18	Through my participation in a GD Facebook group I am more knowledgeable about which questions to ask my healthcare providers			.58	
FB19	Through my participation in a GD Facebook group I have more courage to raise matters with my healthcare providers			.66	
FB20	Through my participation in a GD Facebook group I am more able to oppose my healthcare providers				
FB21	Through my participation in a GD Facebook group I understand the information provided by my healthcare providers better			.64	
FB22	Through my participation in a GD Facebook group I can stick to my treatment regime better			.73	
FB23	Through my participation in a GD Facebook group I am more able to follow the guidelines and advice of my healthcare providers			.74	
FB24	Through my participation in a GD Facebook group I feel I am more skilled at dealing well with my GD			.79	
FB25	Through my participation in a GD Facebook group I feel more in charge of the course of my GD			.75	