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Lavelle, F., McKernan, C., Shrewsbury, V., Wolfson, J. A., Taylor, R. M., Duncanson, K., Martins, C. A., Elliott, C., & Collins, C. E. (2024). An online qualitative study exploring wants and needs for a cooking programme during pregnancy in the UK and Ireland. *Journal of Human Nutrition and Dietetics*. Advance online publication. <https://doi.org/10.1111/jhn.13307>

Published in:

Journal of Human Nutrition and Dietetics

Document Version:

Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:

[Link to publication record in Queen's University Belfast Research Portal](#)

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An online qualitative study exploring wants and needs for a cooking programme during pregnancy in the UK and Ireland

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Funding information

Association for Commonwealth Universities

Abstract

Background: Optimal maternal nutrition is associated with better pregnancy and infant outcomes. Culinary nutrition programmes have potential to improve diet quality during pregnancy. Therefore, this research aimed to understand the experiences of cooking and the wants and needs of pregnant women regarding a cooking and food skills programme in the United Kingdom (UK) and Republic of Ireland (ROI).

Methods: Online focus group discussions with pregnant women and those who had experienced a pregnancy in the UK or ROI were conducted between February and April 2022. Two researchers conducted a thematic analysis. Seven focus groups with ROI participants ($n = 24$) and six with UK participants ($n = 28$) were completed.

Results: Five themes were generated. These were (1) cooking during pregnancy: barriers, motivators and solutions; (2) food safety, stress and guilt; (3) need for cooking and food skills programmes and desired content; (4) programme structure; (5) barriers and facilitators to programme participation. Overall, there was support for a programme focusing on broad food skills, including planning, food storage, using leftovers and to manage pregnancy-specific physiological symptoms such as food aversions. Participants emphasised the importance of inclusivity for a diverse range of people and lifestyles for programme design and content.

Conclusions: Current findings support the use of digital technologies for culinary nutrition interventions, potentially combined with in-person sessions using a hybrid structure to enable the development of a support network.

KEYWORDS

cooking, culinary nutrition, e-health, hybrid intervention, pregnancy, qualitative

Highlights

- Thirteen online focus group discussions were conducted across the UK and Ireland.
- Five themes were generated around cooking during pregnancy and the content and structure of a cooking and food skills programme.
- There was support for an inclusive cooking programme that included a wide range of food-related skills.
- Participants believed the programme should be supported by the health services.
- There was support for the use of digital technologies, potentially combined with in-person sessions using a hybrid structure.

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INTRODUCTION

Pregnancy is a key life stage with unique health and nutrition needs.¹ Optimising maternal nutrition is essential due to the impact on pregnancy and infant outcomes, including appropriate gestational weight gain, reducing risk of gestational diabetes and hypertension and achieving healthy foetal growth and birth size.^{2–9} Although pre-pregnancy overweight and obesity are risk factors for excessive gestational weight gain, gestational diabetes and hypertensive disorders, overall diet quality and nutrient intakes are independent risk factors for numerous health outcomes.^{10,11} Enhancing nutritional status and supporting healthy dietary patterns during pregnancy are goals for everyone.

Numerous interventions targeting dietary intake have been conducted to improve nutritional status during pregnancy and perinatal outcomes, such as oral vitamin and mineral supplementation, fortified foods, nutrition education or dietary counselling, with varying levels of impact.^{12–15} However, relatively few have focused on nutrition skills such as cooking during pregnancy.¹⁶ Cooking is a key behaviour influencing dietary intake, given that cooking and food skills underpin the healthy meals recommended in global dietary guidelines.¹⁷ Yet cooking can be a notoriously difficult task for women with pregnancy-related symptoms such as morning sickness, nausea and fatigue.¹⁸ Although men are more involved in household chores such as cooking compared to previous decades,¹⁹ women still maintain the primary role of household meal preparation.²⁰ Whether or how these gender dynamics regarding household food preparation responsibilities may change during pregnancy needs exploration. It is possible to bypass the need for home cooking by consuming meals prepared outside the home. However, these foods are typically more energy dense and are higher in saturated fat, and sodium, and usually are more expensive.^{21,22} Additionally, cooking skills, food skills and the consumption of home-cooked meals have been associated with better diet quality in general population samples.^{23–27} Consequently, building skills and knowledge to support healthy cooking during pregnancy should be a key area of focus for nutrition interventions.

A recent review of culinary nutrition interventions across preconception, pregnancy and postpartum life stages showed promising results regarding improving cooking skills, diet quality and a range of health outcomes.¹⁶ However, limited interventions ($n=6$) were targeted at pregnant individuals, and of those only two were stand-alone cooking interventions. The review also highlighted the lack of rigor in intervention design. In line with the Medical Research Council's framework for designing complex interventions^{28,29} and the Cook-Ed model for planning, implementing and evaluating healthy cooking programmes,³⁰ it is vital to understand the specific difficulties faced during pregnancy regarding cooking and food preparation, and what individuals desire in a programme to target barriers and build

skills. Additionally, targeting interventions to specific population needs is essential for feasibility. Although there are some cultural similarities between the United Kingdom (UK) and the Republic of Ireland (ROI), there are also important points to highlight when considering food preparation and intake. The primary difference is scale, with Ireland's population of 5.1 million compared to the UK's 67.5 million, and differences in the choice and availability of food and grocery retailers. Traditionally, Ireland has had greater levels of domestic food preparation compared to the UK.³¹ Although domestic food preparation is declining in Ireland,³¹ recent research around food practices during the COVID-19 pandemic highlighted differences between the island of Ireland and Great Britain (an island of Ireland approach used for the research due to COVID regulations).³² Furthermore, ROI has maintained home economics as an option, the subject traditionally responsible for teaching cooking and food skills in the secondary level educational system.³³ Whereas, only Northern Ireland and Scotland in the UK have home economics still within their curriculum, and England and Wales have food technology, a subject more aligned to food design skills for industry, available up to general certificate of secondary education level. There has been a decline in teaching and availability since the removal of the subject as an examinable A-level subject.³⁴ The result of this change is that the majority of the UK population is not exposed to or does not have the choice to learn these skills through the educational system.³³ Therefore, the current research study aimed to explore experiences of cooking and food consumption. Furthermore, it aimed to understand the wants and needs of pregnant individuals to inform the development of a cooking and food skills programme, as well as regional differences, between the UK and ROI.

MATERIALS AND METHODS

Theoretical positioning

This research project used a qualitative descriptive study design.³⁵ Researchers wanted to describe pregnant women's experiences of food, preparation (or lack thereof and the alternative products used to replace preparation) and consumption, as well as inform a cooking and food skills programme. The researchers adopted a relativist ontology (reality is not singular, based on past experiences, context, etc.³⁶) and a constructivist epistemology. This study focused on experiences of food and food preparation, as well as wants for a cooking programme. It was conducted with both interpretivism (knowledge is subjective and that participants' experiences and interpretations help create it) and pragmatic perspectives (focused on finding solutions to real-world problems) that can be used in combination.³⁷ An interpretivism approach was used for understanding general cooking behaviours.³⁶ A pragmatic approach was undertaken to create knowledge to inform the design of a cooking

intervention. Although individual interviews may be more common in interpretivist approaches, focus group interviews were chosen as they provide the opportunity for individuals to share their experiences,³⁵ as well as allow for interaction and debate, which is beneficial for programme design. Additionally, they were chosen to reduce potential stress on this vulnerable population group, as previous research has highlighted the observation of cooking is stressful for participants,³⁸ and discussion of food can induce stress in this population. Therefore, hearing the experiences of others could potentially help to reduce this.

Focus group recruitment

Pregnant women and those who have experienced pregnancy from the UK and the ROI were recruited via convenience and snowball sampling to take part in online focus group discussions. Recruitment methods included announcements in the form of an email circulated to university staff in Northern Ireland, researcher networks and contacts across the UK and ROI and through social media advertising across multiple platforms, including Twitter, Facebook and Instagram, that targeted individuals in ROI and across the UK. The eligibility criteria included participants being aged 18 years or older and currently pregnant (for the pregnancy groups) or recently pregnant (requested in the last year) (for the post-pregnancy groups). Every effort was made to include participants from a range of locations, occupational status and at different stages of pregnancy, with a small number of participants caring for babies and/or young children during the discussions. Focus groups were conducted online between February and April 2022, with times varying from morning to afternoon and evening, and held mid-week and on weekends to optimise attendance. Participants were offered a range of times and days and opted into a focus group discussion, thereby enabling a mixture of participants from different locations in each focus group. Sociodemographic, such as age, location (urban/rural classified by researchers on the size of the area the participants live in), education, occupation status and pregnancy and food-related characteristics (such as their cooking skills confidence)³⁹ were collected upon recruitment through a brief online survey.

Focus group procedures

Focus groups were conducted in accordance with the principles outlined in Kreuger.⁴⁰ The discussions were facilitated by a female postdoctoral research fellow experienced in focus group moderation (F.L.), who had previously undergone training in conducting qualitative research and facilitating numerous qualitative studies. The same researcher (F.L.) also managed the recruitment and participant queries. At the beginning of each focus group

discussion, the facilitator introduced herself and the purpose of the research, 'to learn about their experiences around food shopping and eating at this stage of life, that information may inform the development of a cooking and food skills program, and that the second part would be around their thoughts on convenience foods'. The focus groups followed a guided open-ended questioning route relating to cooking habits, experiences of cooking during pregnancy, followed by wants and needs around a cooking and food skills programme (Supporting Information: S1). In addition, a secondary element in the topic guide included views around convenience and ultra-processed foods (findings not presented). The focus group topic guide was based on previous research conducted in the USA¹⁸ and unpublished Brazilian research. To adhere with public health guidelines during the COVID-19 pandemic, all focus group discussions were conducted synchronously online and in line with guidance for virtual qualitative research.⁴¹ The moderator emphasised that all opinions and points were equally valid and for all participants to contribute as best as they could. All participants were assured of their confidentiality, and all discussions were recorded. Each discussion lasted between 60 and 102 min. Upon completion of the focus group, each participant was thanked and sent a £50/€50 voucher to compensate for their time. The study was conducted in accordance with the Declaration of Helsinki. All participants were aware that they could withdraw from the research study at any point and provided written and verbal consent. Reporting was guided by the consolidated criteria for reporting qualitative research (COREQ) checklist for interviews and focus groups.⁴² The study was approved by the Faculty of Medicine, Health and Life Sciences Research Ethics Committee at Queen's University Belfast (reference no.: MHLS 21_138).

Analysis of focus group transcripts

Focus group discussions were professionally transcribed verbatim and checked for accuracy by the moderator (F.L.). The transcripts were not returned to the participants for comment. Nvivo 12 software (QSR International Pty Ltd, Doncaster, Victoria, Australia) was used for analysis. A thematic analysis in line with Braun and Clarke⁴³ was undertaken. All transcripts were read and re-read to achieve data familiarisation. F.L. (a behavioural scientist) coded all transcripts. C.M.K. (a food scientist) independently coded a random three transcripts (23%). The coders had an initial high agreement of coding of the transcripts, with discrepancies discussed to verify their applicability to the data, and agreement reached on all codes. The next phases involved aggregation of codes into themes (F.L.), inspecting themes for overlap and, where necessary, refining themes (F.L., C.M.K.), ensuring that there were 'clear and identifiable distinctions' between the themes.⁴³ Typical views within each theme have been demonstrated through illustrative quotes that were extracted from the data. Based on Malterud

et al.,⁴⁴ the sample (52 participants across 13 focus group discussions) was assessed as having sufficient information power, given the focused aim and tight sample specificity (pregnant women or those who had experienced a pregnancy) of the study, and the experience of the moderator generated focused and rich data. A preliminary overview of the findings was provided to the participants. Sociodemographic data were summarised using descriptive statistics to describe the study population in SPSS v26 (IBM Corporation, Armonk, NY, USA, 2013).

RESULTS

Seven focus groups were conducted with ROI participants ($n = 24$) and six with UK participants ($n = 28$). UK groups included participants from Northern Ireland ($n = 14$), England ($n = 13$) and Wales ($n = 1$). Additional

potential participants expressed interest in taking part in the study (ROI: $n = 22$; UK: $n = 37$) and were not included due to study capacity or not being available for any of the allotted discussion times. Mean gestational age (weeks) in women who were pregnant was (ROI) 22.56 (standard deviation [SD] 8.63) and (UK) 26.21 (SD 7.80). All participants identified as female. An overview of participant characteristics is presented in Table 1.

Overview of focus group themes

Through thematic analysis of the transcripts, five themes were generated and are discussed below: (1) cooking during pregnancy: barriers, motivators and solutions; (2) food safety, stress and guilt; (3) need for a cooking and food skills programme and desired content; (4) programme structure; and (5) barriers and facilitators to

TABLE 1 Participant characteristics of women participating in focus groups regarding cooking programmes in pregnancy for both the Republic of Ireland (ROI) and the United Kingdom (UK).

Characteristics	Pregnancy groups UK ($N = 28$)	ROI ($N = 16$)	Previous pregnancy groups ROI ($N = 8$)
Number of groups	6	5	2
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>Mean (SD)</i>
Age (years)	32.71 (5.53)	34.06 (4.52)	31.00 (3.85)
Cooking skills confidence	73.64 (16.39)	72.13 (17.18)	71.63 (10.70)
	<i>N (%)</i>	<i>N (%)</i>	<i>N (%)</i>
<i>Location^a</i>			
Urban	21 (75.0)	8 (50.0)	2 (25.0)
Rural	7 (25.0)	8 (50.0)	5 (62.5)
<i>Current number of children</i>			
0	16 (57.1)	10 (62.5)	0 (0)
1	6 (21.4)	3 (18.8)	5 (62.5)
2	6 (21.4)	2 (12.5)	3 (37.5)
3	0 (0)	1 (6.3)	0 (0)
<i>Education</i>			
Less than university	7 (25.0)	1 (6.3)	1 (12.5)
University	21 (75.0)	15 (93.8)	7 (87.5)
<i>Occupation status</i>			
Full-time paid work	20 (71.4)	11 (68.8)	1 (12.5)
Part-time paid work	5 (17.8)	5 (31.3)	0 (0)
Maternity leave	1 (3.6)	0 (0)	7 (87.5)
Unemployed	1 (3.6)	0 (0)	0 (0)
Full-time homemaker	1 (3.6)	0 (0)	0 (0)

^aOne previous pregnancy (PP) group participant did not complete the question in relation to the area she lived in (size), therefore could not be categorised as urban or rural.

taking part in a programme. Exemplar quotations are used to illustrate the key thematic findings, and where relevant, differences between UK and ROI participants are noted.

Cooking during pregnancy: barriers, motivators and solutions

The majority of participants from both regions described having the primary responsibility for meal preparation before and during pregnancy. However, UK participants reported more overall involvement of partners in cooking. Although the majority of participants reported that they enjoyed the cooking process, they indicated that planning, organisation and preparation required before cooking were deterrents.

'Okay, I would say we're fairly evenly matched in our skill set when it comes to cooking. But I think as X says, it kind of depends who's maybe working from home that day or who gets home earlier or who has more time? Who doesn't have something on, would be generally how we've kind of split the load, so if one of us has busier work, the other one probably picks up the slack with the cooking.'

UK Focus Group 3

Many participants from both regions expressed barriers to cooking during pregnancy, particularly during the first trimester. For most participants, normal cooking practices reportedly resumed from trimester two. However, some noted that these barriers were consistent throughout their entire pregnancy. The most prevalent barriers expressed in both regions were food aversions and nausea or sickness. Generally, the smell of food tended to be extremely off-putting for participants, with meat being a particular food group that participants reported struggling to cook or consume during pregnancy.

'Yeah, I think I'd agree with that... I find it was sort of meats especially like sausages, bacon... there was a period in time where just the smell of it would nearly make me gag and even sort of chicken as well and I love chicken.' ROI Post pregnancy Focus Group 2

Further barriers to cooking that participants described during pregnancy included fatigue, heartburn, pain and inability to plan ahead due to uncertainty of what food they would be able to consume once it was prepared, for example, due to sudden aversions or feelings of nausea. Some participants mentioned having to reduce consumption of certain foods, such as reducing

intake of 'rare' meat, which also impacted the type of meals they cooked. To overcome these cooking barriers, the primary solution participants proposed was snacking. Participants focused on trying to consume some food as snacks, which tended to be plain and beige-coloured foods, such as toast, cheese and crackers. Snacking was reportedly used to try to overcome nausea when they could not face a full meal, or during the night when some would wake feeling nauseous.

'From when I woke up one morning to [when] I went to sleep at night I was nauseous and then if I woke up in the middle of night to pee, I was also nauseous then. So, lots of, packets of crackers all over my house... just I hate crackers now.' ROI Focus Group 2

Some UK participants mentioned using convenience and takeaway food to overcome barriers to cooking during pregnancy.

'I've eaten more of them [convenience food] since being pregnant. Before I... wouldn't, I'd always cook fresh but now when I'm pregnant. I'm like, I just can't face cooking.' UK Focus Group 4

The primary motivators for cooking during pregnancy expressed in both regions were related to health concerns and nourishment for the growing baby. Participants described tailoring their diet or cooking habits for concerns around gestational diabetes, especially if they had friends who had experienced it, as well as the presence of or to prevent iron deficiency.

'Just like because my sweet tooth... I do crave a lot of sugar, so I would. My friend had that gestational diabetes, and it was just a concern. The first time [pregnancy] and then this time, my sweet tooth is even worse that it would make me conscious of like, trying not to eat just as many cakes and sweets and things like that, but I don't have it [gestational diabetes]'. UK Focus Group 3

Additionally, some participants reflected on the fact that their food intake should nourish their baby and were trying to overcome the barriers to ensure that the baby received a wide range of nutrients. This included making conscious efforts not to resort to the beige foods, such as toast, and trying to 'make up' for those foods during the first trimester with extra vegetables moving forward.

'I guess, I have a... more heightened awareness about like, what we're having. Like, I think it's a really positive thing... I'm making this now for me and my baby. And you know,

I'm nourishing this little one... I feel quite empowered I suppose if that makes sense. I'm kind of motivated... I got this amazing green stuff'. ROI Focus Group 3

Food safety, stress and guilt

In relation to the food that should be avoided during pregnancy, participants' perceptions and behaviours tended to fall into two categories: those who consumed the foods anyway and those who avoided them completely. ROI participants described a greater inclination to avoiding the foods completely. Additionally, those who avoided the food completely appeared to be those in earlier stages of their pregnancy, those in their first pregnancy or who had previously experienced fertility problems or miscarriages.

'I think when it's your first, you're definitely... regimented to the rulebook. Like, scared to eat too much tuna in the week because of the mercury level or something'. ROI Focus Group 1

Participants who consumed the food anyway tended to also be later into their pregnancy, or it was not their first pregnancy.

'...we went out for dinnerand I basically got a one of those sizzling plates, and it was just all seafood. And I thought, sure we'll be okay. Do you know first time around with [Baby 1], I would never have even considered it. But I was like well I had a wee [small] bit when I was pregnant with him and he's grand. So yeah, I think I'm definitely more relaxed second time around'. UK Focus Group 3

Participants acknowledged and were frustrated by the mixed messages they received in relation to what food was deemed 'safe' to eat, including messages from their health care providers, as well as regionally.

'I worked in London until a few months ago. So, like coming back here [Ireland], then... my advice had to change to fit well with the HSE [Irish Health Service]. Even though we're the same people... why is it so different... say with the eggs, like if they're quality approved in the UK, that's fine. So, that's personally what I'm doing... if they're quality approved, and I'm happy to have a runny poached egg now'. ROI Focus Group 4

This reportedly further added to the stress, anxiety and guilt participants felt around attempting to follow all the 'rules' in relation to food safety and nutrition. Participants discussed the pressure to follow guidance and when hearing something new or different 'beating themselves up' over it.

'Yeah, I was the same reading all the things I got, I did find myself getting a bit stressed as well. And oh, you can't do this. You can't do that ...I would have loved my cheeses or, you know, my deli meats, my steaks... or the runny eggs..., I was just a bit stressed about it all... it's not worth it [eating the food] for the stress or the mind games... And so I found the stress of that... hard and difficult. And so it's probably a moderation thing ...but yeah, I struggled with the stress or the guilt, like of like breaking the rule...'. ROI Focus Group 5

Need for a cooking and food skills programme and desired content

The majority of participants felt that a pregnancy-specific cooking and food programme would be beneficial, especially for first-time mothers.

'So yeah, definitely. I think it is a good idea for first time mums'. UK Focus Group 6

Some participants who felt they were highly skilled thought a programme would be useful only if it provided new and/or higher-level skills for them or provided pregnancy-specific nutrition information that they were interested in. Participants suggested that the programme content could be tailored to needs or differing levels based on initial skill of participants.

'I'm wondering if, would you have to have them at different levels? You know, maybe there are people out there who would want like a more basic one. Whereas I know myself, like, I feel like I have a lot of skills. So, if someone stood with me and told me how to chop an onion, I'd be like, no thank you I know what I'm doing. But other people could maybe really want that, you know, so I'm wondering if there was a program would it be like various skill sets and stuff'. UK Focus Group 3

Participants believed it was important that the content was evidence based and to provide them with evidence so that they understand the rationale behind why they are being told not to eat certain foods, as well as promote the reasons or benefits of eating certain

foods. Additionally, participants felt that language used should be positive and inclusive, taking into account different pregnancy journeys.

'Yeah, the kind of evidence based, kind of, you know, WHO or one of the big organisations... according to the NICE guidelines, or whatever the NHS recommends, because it does seem to change every year. And you read one thing, and then there's something else to conflict it the next week, whether it's about egg yolks or cholesterol, or I feel like I can't keep up definitely'. UK Focus Group 2

Participants from both regions expressed similar desires in terms of content for a programme. An overview of suggested important topics is presented in Table 2, with the most frequently mentioned topics listed first.

Programme structure

In terms of programme structure, the need for flexibility was stressed. Participants emphasised the importance of having flexibility around missing classes or lessons, with a possible mechanism for catch-up being a recording to watch later, and some flexibility around programme timing.

'I think just to add more on a logistics perspective, perhaps offering flexibility around time... sometimes courses are always at a certain time and for some people, it's impossible to attend a course at that time. And that means that you're out, you can't attend, full stop. So, if there's a level of flexibility around, I don't know, maybe the same course ran on different days at different times, or the ability to access remotely or to recordings or stuff like that, I think that would be useful'. UK Focus Group 4

Additionally, the importance of the programme in developing a support network with other mothers was emphasised, suggesting that the programme focus should not be solely on cooking. Creating a support network would allow for future reassurance and sharing tips beyond the programme and could potentially generate new relationships, in particular for first-time mothers. Participants felt that no matter the format, for example, online or in-person, the support element was a vital component.

'It's online or whatever. But also having a little bit of like a family vibe, where, because I mean, I certainly felt very isolated and very alone in sort of the fourth trimester when I

was just with me and baby, and because I'm quite far away from a town as well. Like, I can't just go for a walk or whatever and meet up with friends. So maybe some sort of online hub'. ROI Focus Group 1

Furthermore, it was felt the programme should be connected to antenatal services or their respective health services, that is, the Health Services Executive (HSE) and the National Health Service (NHS). This endorsement from the health services was seen as important for programme uptake and to increase programme accessibility.

'I think if it was incorporated through your antenatal classes or through hospitals, or it would probably have more accessibility... I think would open it up to a lot, a lot of people and different cultures as well, you've, you know, you've also gone to the hospital. So, and yeah, I think if it was incorporated, it would be [in] antenatal classes in the hospital, it'd be [a] good idea too'. ROI Focus Group 5

The majority of participants in both regions felt that the programme should be delivered early in pregnancy, or as early as possible, taking into consideration the first-trimester challenges. Generally, early-to-mid pregnancy was seen as optimal, with some support for access to the programme throughout the pregnancy, potentially through providing an information resource and recipes or access to videos. Additionally, within both regions, there was debate around the inclusion of partners in the programme, with some believing their partners would have no interest, whereas others believed it could potentially be a more inclusive activity for partners compared to other pregnancy-related classes. It was suggested that there could be some scope for partners to participate or that certain classes or elements could include a partner.

'I suppose it depends on the person. Like if your partner was really good at cooking, they may not see the benefit whereas if, like, for example, my partner he could probably do with like, as much as I show him it might be better coming from someone else... even if there's a few simple dishes to add to your [their] repertoire.... So, I think it would be good to have the other half there'. UK Focus Group 1

Finally, the biggest difference between regions in terms of programme structure related to the programme format. ROI participants preferred an online programme

TABLE 2 Overview of desired programme content.

Topic	Explanation	Exemplar quotation
Planning, storage, batch cooking and use of leftovers	Information around meal planning, batch cooking ideas, correct storage to increase food longevity, as well proper freezing/thawing procedures, using leftovers or meal components in different meals, overall reducing food waste and maximising meals out of ingredients, in turn, assisting with budgeting.	<i>'Not just the cooking process, it's the storage afterwards, because maybe the mum won't want to eat straight away... So, storage, longevity, can you freeze, can you make a big batch and freeze some?'</i> ROI Focus Group 1
Cultural and dietary inclusivity	Awareness of cultural diversity and providing information and example recipes for different cultures. Dietary diversity as well with the inclusion of example vegetarian meals.	<i>'I think as inclusive, it's important to be interested in everyone's diet. Because I've got diabetes, obviously, if things aren't going to be suitable for me. Some people that have meat, some people are vegetarian, vegan. They eat Halal or Kosher, you know, so I think it's important to have alternatives'.</i> UK Focus Group 4
Making quick and easy 'convenience' meals	Creating healthy meals that are quick and/or that can be stored in a freezer as a homemade 'convenience meal'. Information around creating healthy alternatives for convenience food and/or snacks and baking. Nutrition information around convenience/ultra-processed food. Examples of quick and easy (not a long list of ingredients) meals.	<i>'Easy meals that don't involve long prep time and you know, yeah, I guess just convenient meals that are easy to freeze and defrost and all that stuff'.</i> ROI Focus Group 4 <i>'Keeping it healthy but a bit quicker'.</i> UK Focus Group 3
How to adapt recipes for: (a) pregnancy aversions and/or safety; (b) family preferences	How to adapt recipes or specific components of a recipe for pregnancy aversions and/or safety concerns, examples of adaptations. Information around alternative ingredients and what can be substituted for what other ingredients. Examples and information around creating one meal and how to adapt for family preferences, including children weaning and/or toddlers.	<i>'Yeah, easily adaptable so ones where you could maybe use a meat substitute, or as I've said before...fish recipes... That was that would be helpful'.</i> UK Focus Group 6 <i>'So I think variants would be a good idea... I loved chilli and garlic before but just doesn't agree with me, that so like just different seasoning options that I wouldn't be familiar with... But if someone said, oh, you can actually replace that or put a bit of oregano instead, that's lovely you know, I think those kind of things are, are helpful'.</i> ROI Focus Group 5
Specific nutrition/important food for different stages of pregnancy and post-pregnancy	Nutrition and food tips for the different trimesters, including the postpartum period. Information around beneficial foods (not solely focused on foods that cannot be consumed) for different stages of pregnancy, as well as pregnancy issues such as iron deficiencies and haemorrhoids.	<i>'But also, I remember in my first trimester, I think all my good habits actually kicks in fully, kind of in the beginning of second trimester, when like, things settle down a little bit, you know, no nausea, you kind of learn how to how to manage heartburn and everything. And that's how...the kind of information starts to settle in and we started to really kind of put emphasis on food... I'm entering the third trimester now, ... my needs, in terms of food are gonna change again, because we need to kind of, like support all of that. So, it's almost like every trimester might have like a block or something'.</i> ROI Focus Group 4
Feeding baby and children	Further information on child-friendly meals and child nutrition, including information for breastfeeding (and tips for maternal nutrition to promote milk) and weaning stages.	<i>'Yeah, could be like even highlights, you know, like, for mothers who breastfeed for mothers with toddlers, you know, first time mums'.</i> ROI Focus Group 1

or hybrid structure, whereas UK participants preferred an in-person or hybrid structure.

Respondent 2: 'Everything has gone so online, I feel like saying online, because it is just so

much easier. When you just have to click the Zoom link'

Respondent 4: 'Because even if it was like a cooking class style, and you just knew in

advance what you needed to have in your house, but you kind of follow along...' ROI Focus Group 2

For ROI participants, an online programme provided ease, simplicity and continuous access, as well the essential flexibility component. On the contrary, UK participants emphasised the connection and interaction generated through an in-person setting.

'Certainly, at the moment, like [in-person] group sounds nice because you don't have much interaction. We've just done all our antenatal classes and you don't get that chat afterwards because it's all on Zoom. And everyone just goes alright, bye bye. So, like we haven't had connections with other people that are expecting so it can be quite lonely sometimes.' UK Focus Group 5

Barriers and facilitators to taking part in a programme

Participants identified a number of barriers and facilitators to taking part in a programme. The main barriers included logistics (e.g., time, access, parking), pregnancy-related factors such as fatigue and nausea, and childcare.

'I think if it were in person, and you were actively following somebody it would be very difficult to try and mind your child at the same time. Whereas if you're at home... she's very clearly minding a child comfortably and paying attention to this at the same time... I just think yeah like the effort of having to travel somewhere now. Find parking, remember, you have to pay for parking... I just think that that's just, just so much stress these days.' ROI Focus Group 2

The main facilitators included the development of a support network, links to health services (could help with cost/time off work to attend), and if they could have the baby/children cared for during it (e.g., online) or could bring baby (in-person).

'I would agree with X, I would just say, like support wise maybe just someone minding the baby, if you've had it... or maybe if you can bring the baby along because it won't really do much while you're there probably. But yeah, I would agree with X, it's the social aspect, like anything to meet people. Like, chance of me making a friend or connecting with somebody, like, you're going to be up for that anyway.' UK Focus Group 1

Cost was seen as both a barrier and a facilitator. Participants would be willing to pay a reasonable price for the programme. However, there are also a number of associated costs with pregnancy. Therefore, the link with health services was seen as beneficial and to potentially allow free access and increasing programme accessibility or to subsidise the programme. ROI participants felt that if the programme was not within the HSE, some cost should be claimable back from health insurers, to incentivise enrolment.

'I'd be willing to pay for it. I mean, I paid... [for] the antenatal classes. So, you can do them for free in the hospital, like on a weekly basis, or you can do... a condensed course in a day that you pay for... if it was something similar, you know, I'd be happy to pay for it... maybe your health insurance might cover certain parts of it as well.' ROI Focus Group 4

DISCUSSION

This online focus group study explored cooking behaviours and desires around a cooking and food skills programme during pregnancy. Findings from this qualitative research study highlight issues related to early-stage planning and issues faced in early pregnancy, including difficulties around food preparation and consumption. Simultaneously, overwhelming support for a cooking programme focused on this important phase in the life course was confirmed. Additionally, desired programme content and structure were identified.

The online nature of the study, a necessary adaption to conducting research during the COVID-19 pandemic,⁴⁵⁻⁴⁷ allowed a broad range of participants from the UK and ROI to take part in the research. This enabled insights around similarities and differences between these regions, providing both regions with the opportunity to contribute their perceptions around desired content and initial elements of co-creation.⁴⁸ The focus on the UK and ROI highlights the importance of this early stage of investigation for planning interventions. The geographical proximity could potentially lead researchers to consider the populations' behaviour similarities and, therefore, apply the same intervention in both regions. However, this research highlights that although there may be shared similarities between regions, there are also distinct differences, such as opinions on partner involvement in the programme, preferred programme format and delivery mode. This supports the need for intervention tailoring and adaption to population group needs,⁴⁹ including within neighbouring regions.

One of the major differences between the regions was in the proposed programme formatting, with UK

participants preferring an in-person format and ROI participants preferring an online programme. Both regions were open to a hybrid programme, with elements of both online and in-person structure. Digital or virtually delivered interventions, known as e-health, m-health or telehealth, are a growing area that has been shown to be feasible, useful and effective in behavioural interventions.⁵⁰ Additionally, they have been found to be cost saving or cost-effective, which is likely to be appealing if a programme was to be delivered through the health services.⁵¹ The COVID-19 pandemic has brought attention to and accelerated interest and capacity for delivery of health-focused preventive, primary and secondary care through virtual mediums.^{52–54} Additionally, with the surge in digital and technology usage during and since the pandemic,^{55,56} it is logical that there is a greater capability among individuals to participate in such interventions. Prior to the pandemic, there were a limited number of nutrition-focused interventions delivered virtually.⁵⁰ However, with global reported increases in culinary behaviours during the pandemic,³² and video technology shown to be an acceptable method for facilitating cooking skills development,⁵⁷ delivering culinary interventions virtually may be an optimal nutrition strategy. Since the pandemic, virtual culinary interventions have been successfully piloted in children,^{58,59} clinical groups^{60,61}, with neurodiverse adolescents^{62,63} and in health professionals.⁶⁴ In addition, this mode of delivery has been suggested as a potential mechanism for use during post-pregnancy¹⁶ and may be useful for those experiencing extensive pregnancy symptoms, such as nausea and fatigue.

However, some limitations to virtual delivery include a reduced or no facilitator feedback on appropriate technique, potential lack of opportunity for questions or clarifications (depending on live or pre-recorded delivery and capacity of follow-up question routes), appropriate pacing (although some adaptations could be considered during live sessions or the possibility of re-watching sections and working at own pace with a video). Additionally, children can act as a distraction in the kitchen,⁶⁵ which may be a barrier to participating. However, as highlighted in this study, the participants were able to partake in the focus group while caring for their children, whereas they would require childcare and incur further expense for in-person participation. Furthermore, one aspect that may be missing with a solely virtual approach is social connectedness, an aspect stressed by participants in this study as being a vital programme component. This ‘social’ aspect has been highlighted as a missing element in a children's cooking intervention⁵⁹ conducted online and has been highlighted as a key programme strength and benefit in in-person cooking programmes.⁶⁶ Although the intervention was effective and made efforts to promote connection through social media, which was shown to be useful for

engagement and recruitment in other nutrition online interventions,⁶⁷ the children's intervention still missed a social element. This highlights that targeting the delivery for the audience needs further supports the development of a hybrid programme structure. Hybrid would allow for in-person connection but also enable those wanting to attend from afar to do so. It would also allow catch-up using videos for those who miss sessions, supporting another essential aspect shown in this study: the need for flexibility. Using a platform for a programme that allows the use of different features such as videos, activities, recipes, interaction, similar to massive open online course (MOOC). A MOOC has been previously used to deliver a broad nutrition and cooking course.⁶⁸ Tailoring such a programme to focus on pregnancy and post-pregnancy, combined with localised in-person cooking sessions, could succeed in having both a broad reach and developing that network of peers.

Social support plays a major role in providing emotional empathy and understanding, acting as a source of information, and impacting the physical and mental health of mothers.⁶⁹ Social media and general mobile health apps have been shown to be effective in pregnancy care for physical and mental health,^{69,70} but many publicly available apps are of poor quality and contain inappropriate and/or non-evidence-based advice.^{71,72} To enable the flexibility required in a cooking programme as highlighted by the participants in the current study, a hybrid approach likely needs to have both in-person and video options, as well as catch-up opportunities. For those who desire to complete the programme solely online, it is important to build that social network opportunity into the programme using different strategies, such as closed social media groups or group chats.

Another essential component to consider in the development of a cooking programme to ensure broad accessibility and promote uptake is endorsement and promotion by the respective health services, namely the HSE and NHS. This is a key concept to consider as the participants highlighted that endorsement from these services would promote engagement from a broader range of participants from different socio-economic and educational backgrounds. Additionally, financial support from these services through incorporation of participation into usual pregnancy care would increase access to the programme. Alternatively, ROI participants were open to some associated costs being passed on to the participant. However, they did not believe the burden for the full course cost should fall on them, as pregnancy health care is already expensive. They suggested that some of the costs should be recovered through health insurance funds, similar to other pregnancy care courses that have a cost. Ensuring access to and promoting the programme for all individuals experiencing pregnancy is vital, as social inequalities in engaging with pregnancy care are prevalent.^{73–76} Government support for a

cooking programme could be a simple yet effective tool for promoting positive family nutrition and, simultaneously, extending the programme's reach by ensuring its accessibility.

Interestingly, although there was support for a 'cooking' programme during pregnancy and cooking skills underpinned the desired content suggested by participants, 'cooking' was not the primary focus. Participants in this study had similar cooking skills confidence to an Irish sample of parents who engaged in another study on cooking,⁷⁷ which may imply that the participants already had a high engagement with cooking and skills. This is in line with the participants' primarily higher education status, as education has been associated with higher cooking and food skills confidence,²⁴ and therefore, individuals with a lower education may prefer a focus on different or additional skills. Some participants noted that the programme may be suitable for new mothers, or that they would be more interested in higher-level skills or difficult recipes. Broad 'food skills' such as planning, storage and using leftovers to prepare new meals were considered key features for this content.³⁹ Food skills alongside cooking skills are also components of food agency, which may be a concept to focus on, as it is important for successful implementation of food procurement and preparation in daily life.^{78,79} If the primary goal of the programme is to improve maternal nutrition, focusing on these aspects that are of interest to the participants, while also important in terms of optimising pregnancy nutrition, is important for engagement, it may mean that how the programme is advertised could be tailored to experience level. Additionally, higher food skills have been associated with a higher diet quality.²⁷ Therefore, this would support the primary goal. Additionally, these skills help to reduce food waste and, in turn, promote healthy sustainable and economical diets.⁸⁰ Furthermore, participants had a desire for inclusive content, including learning about different cultures for health and sustainable reasons, believing that this would help with a wider engagement of participants. Similar desires for quick and easy meals, as found in the broader cooking literature,^{81,82} were also found in this particular group. However, specific pregnancy content was also put forward as being important, such as adapting recipes for pregnancy aversions and safety, maintaining family preferences. Safety considerations were particularly emphasised by participants who were experiencing their first pregnancy or had previous pregnancy loss, which are similar to a US study.¹⁸ Additionally, both the physical and mental burden of balancing family meal preparation with pregnancy factors has been previously stressed,¹⁸ and inclusion of strategies to help facilitate this would be beneficial. The participants in the current study expressed frustration with what they perceived as mixed messages around food safety, including from health care professionals within their health systems. The close proximity

between the regions creates confusion around different messages related to dietary intake, for example, eggs. Although there are global variations in standards for food safety and processing,⁸³ standards between the regions should have historically been similar considering the shared regulations of the European Union (EU) and a high level of trade.⁸⁴ This emphasises the importance of providing the information and rationale behind the food safety messages, so individuals can make informed choices in their consumption of food products.

The desired programme content also reflected challenges of cooking during pregnancy, such as nausea due to aversions and developing recipes specifically for these, as well as the adaptations to traditional recipes to help manage this but maintain good nutrition. The struggle to overcome these physiological symptoms of pregnancy was also found in a US sample¹⁸ and is a potent barrier to cooking during pregnancy. Participants also discussed their strategies around eating beige or plain foods and compensating with extra vegetable consumption at later stages in pregnancy. In extreme cases such as hyperemesis gravidarum, these physiological symptoms are very severe and can have negative foetal outcomes.⁸⁵ Some research suggests that crunchy, sweet uncooked foods, such as watermelon or apple may be most tolerated in hyperemesis gravidarum.⁸⁶ Future research should investigate how well these foods are tolerated in general pregnancy and food preparation advice, and recipes could be designed to include these types of food for earlier stages of pregnancy. This would help to alleviate or curtail associated guilt with consuming a beige diet early on in pregnancy.

Essential programme content would be to focus on positive engagement with cooking and food, as pregnant individuals have been shown to experience an abundance of guilt about eating and weight management during pregnancy.⁸⁷⁻⁹⁰ The intertwined nature of the feelings of guilt and perceptions on motherhood and not being the 'ideal' mother⁹¹ may impact the mother's mental well-being. The programme could potentially offer pregnant women a supportive network that anchored in providing a rich source of credible and relatable information to enable them to make informed food choices.

Strengths and limitations

There are a number of strengths to the current research. 'Problem identification' is an essential initial stage in the Medical Research Council's framework for developing complex interventions, which should not be underestimated.²⁸ A qualitative approach, as used in this study, is an effective and useful tool for gathering perceptions around the issue and for determining the barriers and needs of those most affected by the problem.²⁹ Furthermore, this can be used to inform the design and content of the intervention.²⁹ The online

approach of this study has numerous advantages, such as location and time flexibility and not needing to arrange child minding. Further, it is a cost-effective approach and allows for a greater geographic reach and diversity of participants.⁹²⁻⁹⁴ To ensure consistency and reliability, one researcher facilitated all focus group interviews. Confirmability was enhanced through verbatim transcription. Coding was conducted by two researchers to strengthen dependability, credibility and interpretive validity.⁹⁵ Some limitations to conducting the research online must also be considered, including potential low response rates, less identifiable non-verbal cues and exclusion of those who may be less technologically inclined.^{92,96,97} However, with the increase in use of technology during the pandemic, this limitation may no longer be as prevalent.⁵⁵ Transferability of this study was enhanced by recruiting a diverse sample of participants from the UK and ROI; although as participants were grouped as UK participants, consideration must be given to cultural and systematic differences that may exist between the UK countries. Additionally, the majority of participants in this sample had a higher education level; further research in those with a lower education may identify additional factors or challenges for consideration in a cooking programme during pregnancy. Although there may be selection bias around liking to cook and/or having high cooking skills confidence, similar levels of cooking skills confidence have been seen in previous samples in the regions,⁹⁸

which may help to mitigate this concern. Finally, partners were not included in this study. However, understanding more about partners' needs for cooking education during pregnancy may better help support women and the developing child, particularly women who do not have capacity to prepare or cook foods for themselves.

CONCLUSION

The current research study used online focus groups to investigate perceptions and experiences on cooking during pregnancy and desires for a cooking programme. Findings emphasised the importance of exploring specific needs for interventions in different geographic regions. Additionally, it supported the use of digital technologies for provision of cooking interventions, potentially in combination with in-person session using a hybrid structure to enable the development of a support network. Furthermore, although there was support expressed for a cooking programme, and cooking skills underpinned the desired content, the desired focus was more on developing broad food skills, such as planning, storage and using leftovers. There was also support for inclusive content and to manage pregnancy-specific physiological symptoms, such as food aversions. The current study highlighted specific content and delivery methods for developing an engaging culinary programme

for pregnancy. Having additional support from health services could mean programmes have a wide reach, in turn, contributing to optimising maternal nutrition at this key life stage.

AUTHOR CONTRIBUTIONS

Funding acquisition: Fiona Lavelle, Christopher Elliott, Clare E. Collins. Conceptualisation: Kerith Duncanson, Vanessa Shrewsbury, Julia A. Wolfson, Fiona Lavelle, Clare E. Collins, Carla A. Martins. Methodology: Kerith Duncanson, Vanessa Shrewsbury, Julia A. Wolfson, Fiona Lavelle. Formal analysis: Fiona Lavelle and Claire McKernan. Investigation: Fiona Lavelle. Data curation: Fiona Lavelle. Writing—original draft preparation: Fiona Lavelle. Writing—review and editing: Claire McKernan, Vanessa Shrewsbury, Julia A. Wolfson, Rachael M. Taylor, Kerith Duncanson, Carla A. Martins, Christopher Elliott, Clare E. Collins. Project administration: Fiona Lavelle.

ACKNOWLEDGEMENTS

The authors would like to acknowledge and thank all the women who took part in the study for their time and for sharing their insights. Fiona Lavelle received a post-doctoral fellowship from the Association for Commonwealth Universities to conduct this research. The funders had no role in the design of the study; the collection, analyses or interpretation of the data; the writing of the manuscript; or in the decision to publish the results.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

TRANSPARENCY DECLARATION

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The reporting of this work is compliant with COREQ guidelines. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

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PEER REVIEW

The peer review history for this article is available at <https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/jhn.13307>.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Lavelle F, McKernan C, Shrewsbury V, Wolfson JA, Taylor RM, Duncanson K, et al. An online qualitative study exploring wants and needs for a cooking programme during pregnancy in the UK and Ireland. *J Hum Nutr Diet.* 2024;1–16.
<https://doi.org/10.1111/jhn.13307>