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Families' expectations of an eHealth family-based cardiovascular disease-risk reduction programme

Bridie J. Kemp ^{1*}, David R. Thompson ¹, Karen McGuigan ¹, Chris J. Watson ², Neil Heron ³, Jayne V. Woodside ³, Francis K. Devaney¹, Nick Harrison¹, Danielle T. Neill⁴, David Cutting ⁴, and Chantal F. Ski ⁵

¹School of Nursing and Midwifery, Queen's University Belfast, Belfast BT9 7BL, UK; ²School of Medicine, Dentistry and Biomedical Sciences, Queen's University Belfast, Belfast, UK; ³Centre for Public Health, Queen's University Belfast, Belfast, UK; ⁴School of Electronics, Electrical Engineering and Computer Science, Queen's University Belfast, Belfast, UK; and ⁵Integrated Care Academy, University of Suffolk, Ipswich, UK

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Aim

Research has shown that families' participation in a cardiovascular disease (CVD) prevention programme could boost early adoption of healthy lifestyle behaviours in families. Behaviour-based, eHealth interventions are a potential means of achieving this. This study aimed to explore expectations of families—parents and children—at risk of CVD towards the design and functionality of an eHealth family-based CVD-risk reduction programme 'Health-e-Hearts'.

Methods and results

Three online focus groups were conducted with six families comprising at least one parent at risk of CVD and at least one child aged 5–17 years. The focus groups were video and audio recorded and transcribed. Content analysis was used to synthesize and identify key categories and subcategories regarding development of and engagement with an eHealth programme. Three categories emerged: experiences of health apps and devices; eHealth application needs of family members; and motivators for using an eHealth programme. Experiences included using health apps individually and inconsistently. Needs included personalization, free and easy-to-use, time efficient, and multiple content formats. Motivators for engaging with the programme included goal setting, rewards, and competition.

Conclusion

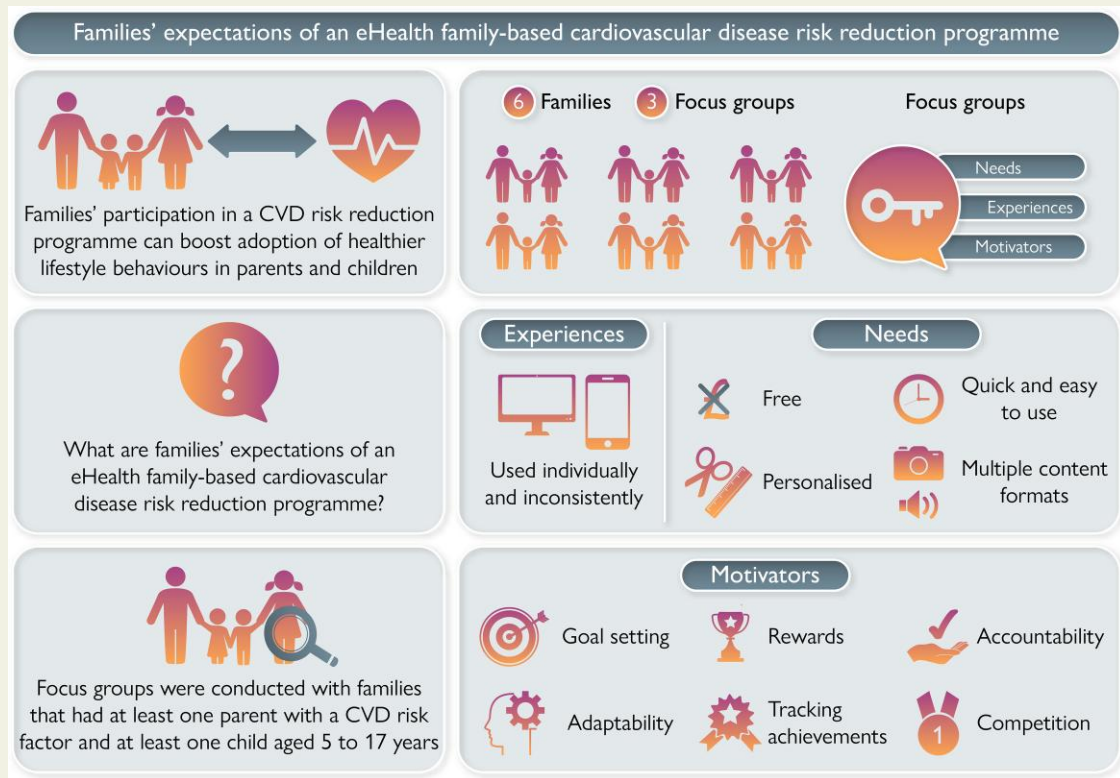
Families' expectations of an eHealth family-based CVD-risk reduction programme include the incorporation of personalized, easy-to-use design features and motivators for engaging with the programme. Family involvement in the development of an eHealth programme such as 'Health-e-Hearts' has the potential to boost early adoption of healthy lifestyle behaviours among all family members.

* Corresponding author. Email: bkemp01@qub.ac.uk

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Graphical Abstract



Keywords

eHealth • Family • Cardiovascular disease • Risk reduction • Behaviour change

Novelty

- To the best of our knowledge, this is the first study to describe the expectations of families at risk of CVD towards an eHealth family-based CVD-risk reduction programme.
- Families' expectations of an eHealth family-based CVD-risk reduction intervention are that it is personalized, easy to use and incorporates design features such as goal setting, rewards, and competition.
- Family involvement in the development of such interventions has potential to boost early adoption of healthy lifestyle behaviours among all family members.

Introduction

Cardiovascular disease (CVD) is the foremost cause of morbidity and mortality worldwide.¹ Most CVD-risk factors are controllable, including unhealthy diet, lack of physical activity, tobacco use, and alcohol consumption.¹ Typically, the more risk factors experienced, the greater the risk of developing CVD.² A shared family lifestyle of controllable risk factors such as unhealthy diets or lack of physical activity increases CVD risk in parents and children alike.³ There is a strong link between parental risk of CVD translating to their children in later life.⁴ For example, children of parents with obesity have a substantially greater risk of developing obesity in their adulthood, increasing their risk of developing CVD throughout their lifespan.³⁻⁷ With rising cases of both parents and children developing conditions

such as obesity and Type II diabetes annually,⁸ the shared risk of family members developing CVD is increased substantially each year.

In 2020, the World Health Organisation (WHO) strongly recommended investing in public health and cost-effective behavioural interventions for early CVD prevention, to tackle controllable risk factors.⁹ Recommendations included electronic health interventions. The WHO classifies electronic health (eHealth) as 'the cost-effective and secure use of information and communications technologies in support of health and health-related field'.¹⁰ eHealth interventions are characterized as 'eHealth technology specifically focused on intervening in an existing context by changing behaviour and/or cognitions'.¹¹ Consequently, eHealth interventions could offer a solution to improve controllable risk factors and reduce the development of CVD among adults and children. A recent systematic review of

family-based eHealth interventions found some evidence that such interventions have potential to improve CVD-risk factors in both parents and children, though higher quality, theory-driven studies are required to determine true effectiveness.¹² Effective components included goal setting, offering incentives, being theory based, and involving both parents and children.

The IDEAS (Ideate, DEsign, Assess, and Share) framework for developing eHealth interventions aims to combine fundamental elements of behaviour change theory, consideration of target-user requirements, quick and iterative development utilizing target-user feedback, stringent evaluation, and widespread dissemination.¹³ The framework comprises 10 pragmatic steps: empathize with target-users; specify target behaviour; ground in behavioural theory; ideate implementation strategies; prototype potential products; gather user feedback; build a minimum viable product; pilot efficacy and usability; evaluate in randomized controlled trial; and share intervention and findings.¹³

An in-depth understanding of the target population and the issue to be addressed is recommended to begin developing the intervention: to empathize with target-users.¹³ The aim of this study was to explore the expectations of families at risk of developing CVD towards the design and functionality of an eHealth family-based CVD-risk reduction programme 'Health-e-Hearts'.

Methods

Design

This qualitative study using focus groups formed the first stage in the development of an eHealth family-based CVD-risk reduction programme 'Health-e-Hearts', as recommended by the IDEAS framework.¹³ Data collection was carried out by the lead author, trained in qualitative research.

Study participants

Inclusion criteria for the study were families with: (i) at least one parent who currently, or previously, had at least one CVD-related risk factor, including overweight or obesity, high cholesterol, type II diabetes, high blood pressure, smoked, or had an abnormal sleeping pattern (such as nightshifts or slept <6.5 hours per night¹⁴); and (ii) at least one child aged 5–17 years old.

Participant recruitment

A purposive sampling technique was utilized to specifically target families at risk of developing CVD. Participants were recruited through social media posts (Facebook and Twitter), local primary school electronic newsletters, and recruitment posters in local supermarkets. Families who registered their interest on a website were contacted by a member of the research team who provided study information sheets (parent and child versions) and an online written consent form for parents to complete on behalf of their family.

Procedure

Data collection

Participants were provided with information sheets outlining the study aims and participation requirements. One parent from each family participating in the focus group was asked to complete a sociodemographic questionnaire and a copy of the short-form General Self-Efficacy Scale,¹⁵ Short-Form 12 Health Survey,¹⁶ Hospital Anxiety and Depression scale,¹⁷ and Multidimensional Scale of Perceived Social Support.¹⁸ This

was in order to determine parents' acceptability of the questionnaires for later use when evaluating the prototype of the programme.

Focus groups

Focus groups were conducted with participants via Microsoft Teams, facilitated by a member of the research team and directed using a topic guide ([supplementary material online](#)) that was co-constructed with a project advisory group, made up of relevant stakeholders. Each question was supported with multiple prompts and written in language acceptable for both children and parents, to ensure understanding. Facilitators ensured all participants had an opportunity to contribute, and clarification was sought if further information was required. All focus groups were video and audio recorded to assist transcription.

Questionnaires

Questionnaires were chosen according to reliability, validity, and previous use in CVD populations.^{19,20} One parent from each family completed the questionnaires. Self-efficacy was measured using the Short-Form General Self-Efficacy Scale,¹⁵ a 6-item measure consisting of a 4-point scale, a score range of 6–24, with a higher score indicative of greater levels of self-efficacy. Quality of life was measured using the Short-Form 12-item Health Survey,¹⁶ a score range of 12–48, with a higher score indicative of a better quality of life. Anxiety and depression were measured using the Hospital Anxiety and Depression Scale,¹⁷ a 14-item measure consisting of a 4-point scale, a score range of 0–42, with a higher score indicative of worse symptoms. Finally, social support was measured using the Multidimensional Scale of Perceived Social Support,¹⁸ a 12-item measure consisting of a 7-point scale, a score range of 7–84, with higher scores indicative of greater levels of perceived social support.

Ethical considerations

The study conforms with the principles outlined in the Declaration of Helsinki.²¹ Ethical approval was obtained from the Queen's University Belfast Faculty Research Ethics Committee (MHLS 20_49). Participants provided both written and verbal consent prior to commencing the study and their details and recordings were held in accordance with General Data Protection Regulations, and once anonymized were deleted.

Data analysis

Qualitative analyses

Data were analysed verbatim and anonymized to ensure confidentiality of participants. Families were given a family number, and each member a corresponding number, e.g. Family1, parent/child. Once data were transcribed, qualitative content analysis was carried out using an inductive approach to code directly from the transcribed text.²² Frequency and context of codes were reported across the focus groups.^{22–24} The transcripts were open coded, codes were then collected into subcategories, and eventually final categories emerged.²⁵ Coding was carried out by one member of the research team (B.J.K.), and peer-checked by three additional research team members (C.F.S., D.R.T., and K.M.) to agree on final categories and subcategories, ensuring consensus and consistency.

Quantitative analyses

Descriptive analyses using SPSS (version 26) were performed on data from the questionnaires to determine their mean, standard deviation, and minimum and maximum score.

Results

Demographic information

Six families ($N = 17$) participated in three online focus groups, two families per group. Demographic information of participants is summarized in [Table 1](#). Most parents and children were females (70.5%). The mean age of parents and children was 42 and 11 years, respectively. The mean body mass index of parents was 27.4 kg/m^2 .

Questionnaires

All questionnaires were completed prior to the focus groups. One question out of 44 was missed by one parent. The mean time to complete all questionnaires was 13 minutes. Overall, parents reported satisfactory general self-efficacy and quality of life, moderate anxiety and depression, and good perceived social support ([Table 2](#)).

Focus groups

Content analysis yielded three key categories: (i) experiences of eHealth apps and devices; (ii) eHealth application needs of family members; and (iii) motivators when using such a programme.

Category 1: Experiences of health apps and devices

Individual health tracking

Nearly all participants had some experience of using an app or device to track their health ($n = 15$, 88.2%). Of those 15 participants, 14 tracked only their own health, and not the health of the rest of the family.

'So I tend to use Garmin, and [my wife] tends to use Garmin and Strava and then [my child] has a Fitbit.' (F1, parent)

Table 1 Family demographics

Demographic	Parent(s)	Child(ren)
No. per focus group	$N = 9$	$N = 8$
Sex	$F = n6$ $M = n3$	$F = n6$ $M = n2$
Mean age \pm standard deviation	42.6 years \pm 5.3	11.1 years \pm 4.8
Mean BMI (kg/m^2) \pm standard deviation	$27.4 \text{ kg/m}^2 \pm 4.9$	55th centile
Average BMI category	Overweight	Healthy
Units of alcohol drank per week (range per family)	1–50	N/A
Abnormal sleeping pattern	$n = 1$	N/A
High cholesterol ^a	$n = 2$	N/A
High blood pressure ^a	$n = 2$	N/A
Smoke	$n = 1$	N/A
Higher education ^a	$n = 6$	N/A
Household income	£30 000–£140 000	N/A

n , number; BMI, body mass index.

^aAt least one parent in the family, including parents who did not attend the focus group.

Table 2 Psychosocial profile of parents

Survey	GSES	SF-12	HADS	MSPSS
Survey score range	6–24 ^a	12–48 ^a	0–42	7–84 ^a
Mean score \pm standard deviation	19.17 \pm 2.04	32.67 \pm 1.21	8.83 \pm 5.35	77 \pm 9.81
Participant score range (min score–max score)	16–22	31–34	2–17	60–84
Incomplete data	1	0	0	0

GSES, General Self-efficacy Scale; SF-12, Short-Form 12-item Health Survey; HADS, Hospital Anxiety and Depression Scale; MSPSS, Multidimensional Scale of Perceived Social Support; min, minimum; max, maximum.

^aHigher score indicative of a better condition.

'I would have tracked all those kind of things really mostly for myself and [my husband], not really for the kids though.' (F5, parent)

The one parent who said they checked their child's device, predominantly checked their child's steps and sleep.

Inconsistent health tracking

Of the 15 participants whom did track their health using an eHealth app or device, nearly all stated inconsistent use of such devices and apps, both children and adults equally.

'...and we're on and off, everything that we kind of do is for a very short length of time. So, even [my child] sometimes goes through phases of the Fitbit and using the app on it to track her steps and that kind of thing...' (F2, parent)

Children aged 11 years and younger do not engage as well with health apps and devices

Of the four families with a child who used an eHealth app or device, parents stated their child did not engage with the app or device for very long. Those children's ages were 6, 7, 10, and 11 years old.

'[My child] is only seven and never really engaged with the app actually, and hasn't really engaged with the Fitbit at all. [They] got one and it was a bit of a novelty day at the start. You know, when it was great looking at how many steps [they] had done, but it wore off very quickly.' (F1, parent)

The children older than 11 years (13–17 years) stated they used their apps or devices more frequently than the younger children, although not consistently either.

'Yeah, I used to use it a lot more than I do now, but I did use the app for a long time 'cause on it you can also like get friends on the Fitbit app and everything.' (F2, child)

Category 2: eHealth application needs of family members

Openness to using an eHealth family-based CVD-risk reduction programme

Parents, in particular, were keen to get involved in an eHealth programme for their families. Five parents were in agreement, they

felt such a programme would be beneficial for them to keep an eye on their children's overall health, including checking steps, activity levels, sleep, and diet.

'And as you know it's mainly for me as a mum. You know, tracking my kids' activities? And their diet and their sleep... And you know, so for me to be able to keep a track of [their] requirements, [their] body, basically and the same for [my other child].' (F4, parent)

Two other parents liked the idea that such a programme could bring the family together, to learn and share on a single platform.

'I suppose like there's nothing that shows the family's health as a unit or brings it all together.' (F3, parent)

Free programme/content

Three parents stated they previously used apps because they were free or had a free trial, and were more likely to use a free app.

'... I would happily use free app for exercising.' (F6, parent)

Structure

Four parents mentioned that they and their children found structure in the form of routine essential, particularly for their children to make healthy choices. One parent referred to their children's choices during the COVID-19 lockdown, without the structure of school.

'For us over lockdown, they have probably made less healthy choices because they didn't have that structure of being in school.' (F1, parent)

Parents stated their child enjoyed structured and scheduled physical activity.

'...And it's a scheduled you know, rather than just right, let's try and burn off energy and have you running about and exercising.' (F3, parent)

Additionally, one parent thought structure in an eHealth programme would assist them to reach their goal and track their progress.

'...but as I said to give it a bit of structure and to make sure that you have reached your goal and you just want to do better every day to track it... but to give it a bit more structure, yeah would be nice, yeah.' (F4, parent)

Personalized

Personalization was discussed in terms of what participants currently liked about eHealth apps and devices used, and also what they would like to see in a newly developed programme. Ensuring the programme met the needs of each family was pertinent across families.

'Based on their abilities or their baseline to begin with.' (F6, parent)

Different content formats

All six families gave thoughts on the different ways that content could be accessed and presented in the programme. Games, videos, and audio files such as a podcast were the most potent suggestions.

'The only thing I liked was the games ... Yeah!! Games, games, I love games!' (F3, child)

'I personally feel online learning in terms of a free recording video.' (F4, parent)

'I agree with podcast will be so like maybe examples or case studies or people there... someone who's suffered from ill health or whatever issues might be mental health, stress, fitness, bad nutrition.' (F6, parent)

Easy to use

Participants ($n = 4$) were very clear that they needed a programme that would be easy to set up or use.

'Not too complicated and not take too much time, so as long as you know, quick, easy.' (F6, parent)

Time efficient

Participants were also clear they wanted a time efficient programme. The consensus around time spent using the programme was the shorter, the better.

'I know, we're talking about the kids and kids need to think a shorter period of time.' (F1, parent)

'Was gonna say probably 5 or 10 minutes for your health shouldn't be a slog but it is.' (F5, parent)

Additional information available

The final expectation from families was additional information available for participants if they wish to access it. Participants provided multiple suggestions as to what they would like and what would be helpful to have available.

'Something set to control that would probably be helpful. You know even just to tell you what to get in your shopping every week.' (F2, parent)

Category 3: Motivators for using such a programme

Goal setting

Five out of six of the families thought goal setting would be an essential motivator when using the eHealth programme. Participants liked the idea of small, frequent goals, as well as goals that fit into their individual family's lives, and seeing how far they are from reaching their goals.

'If that was visible to them somewhere on an app or something that they were getting close to that goal. That might be an encouraging thing.' (F2, parent)

Rewards

Participants mentioned how rewards and incentives could help to motivate them throughout the programme. Six participants also gave suggestions as to what those rewards could be, and once again, how they could be personalized to individuals or families.

'Yeah, I think definitely getting a reward at the end of something would like make you want to do it more.' (F2, child)

Accountability/tracking progress

When referring to accountability and tracking progress, participants stated accountability could make them more aware of their actions, such as eating habits, physical activity, and steps. When participants

mentioned tracking, they spoke about what they would like to track, and why it could motivate them.

'I'm able to keep a track of it and it will motivate me to work harder. And also not only for myself, but for the three of us as well.' (F4, parent)

Adaptability

Ensuring the programme could be adapted to each family's needs was another crucial factor that participants said would help to motivate them throughout the programme.

'Something that's child friendly and that can be adapted, you know? For your own family goals.' (F1, parent)

Success and achievements

Participants stated being able to see their success and achievements would help to keep them motivated throughout the programme. They also provided suggestions as to what success and achievements could be, including stickers, and seeing progression of achievements.

'If that was visible to them somewhere on an app or something that they were getting close to that goal. That might be an encouraging thing.' (F2, parent)

Competition

Finally, participants mentioned that an element of competition within the programme could be good motivation for families. Half of the participants stated they were motivated by competition, either with themselves or with others, and how competition could bring families together in the programme.

'I think competition's probably hit the nail on the head for especially for some people in our house, everything's a competition. Absolutely everything. So, if you had something that we could all do together would be very good.' (F3, parent)

Discussion

This study aimed to explore the expectations of families at risk of CVD towards the design and functionality of an eHealth CVD-risk reduction programme, 'Health-e-Hearts' in the development stage. Overall, we found that families were receptive to the concept of the 'Health-e-Hearts' programme. This was informed by their experiences of eHealth apps and devices and their needs and motivations to use such a programme. To our knowledge, this is the first study to explore the expectations of families at risk of CVD towards the development of such a programme.

We found that although most participants had previously used an eHealth app or device to track their health, they had tracked their own individual health, not their family's health. However, families were receptive to the idea a family-based eHealth programme to reduce CVD risk. Currently, there are very few apps or online programmes available that are specifically designed for families to complete together to improve their health and reduce CVD risk. One of the few family-based health programmes available is FAMILI, an app based on improving mental and physical health of families (<https://famli.health/>). Although FAMILI appears well received by previous users, the app is not directed at CVD-risk reduction nor is it theory based or free to use. These points reflect the unique

contributions and findings of our study and indicate that family-based eHealth apps and programmes could be used to introduce families to an acceptable means of CVD-risk reduction and health improvement.

Families in the focus groups reported their previous health tracking as inconsistent, with children aged 11 years and younger found to not engage with such apps and devices as well as older children. This finding was generally consistent with results from a recent systematic review of eHealth family-based interventions to reduce CVD risk, which reported a significant improvement in body mass index of children aged 12 years and older, yet not in children 11 years and younger.¹² These outcomes suggest that more investigation is required to identify a better form of engagement with eHealth programmes for children aged 11 years and younger in order to gain optimal benefits.

In our study, several components were deemed desirable for a newly developed eHealth application, including the programme and content being free, structured around making healthier choices, personalized to each family, having different content formats available, being easy to use, time efficient, and having additional information available if requested. In August 2021, between 93.6 and 96.9% of downloaded mobile apps were free to download,²⁶ showing more free apps are downloaded than paid apps. In 2017, a survey reviewing digital transformation found that 80–90% of consumers aged 18–64 years found personalization and personalized experiences appealing.²⁷ It has also been highlighted that people tend to choose 'quick and easy' methods for improving their health, despite such methods not always being effective or evidence based.²⁸ By understanding what the target population wants,¹³ intervention developers can incorporate elements of participant's current thinking and combine it with evidenced-based information to meet the needs of both the target population and address the health issues needing resolved.

Finally, families provided suggestions on what they felt would be valuable motivators for engaging throughout the programme, including goal setting, rewards, tracking progress, and competition to encourage whole family participation. Such motivators are behavioural change techniques.²⁹

Limitations and strengths

There are some limitations to this study. Firstly, the sample size was small due to constraints imposed during the COVID-19 pandemic. Also, as families had to have a relatively high level of familiarity with technology, these factors limit the generalizability of our findings. Secondly, while children were involved in the online focus groups alongside their parents, it was difficult to engage the children as much as their parents. Future research should consider alternative approaches to enhance engagement with children, such as children-only focus groups. The key strength of this study is the involvement of target-users and relevant stakeholders in developing an eHealth family-based CVD-risk reduction programme.

Conclusion

To our knowledge, this study is the first to report the expectations of families at risk of CVD towards the development of an eHealth family-based CVD-risk reduction programme. Families' expectations of such a programme include it being personalized and easy to use

and incorporating design features such as goal setting, rewards, and competition. Such ingredients have the potential for an eHealth family-based programme to boost early adoption of healthy lifestyle behaviours among all family members.

Supplementary material

Supplementary material is available at *European Journal of Cardiovascular Nursing* online.

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Conflict of interest: None declared.

Data availability

The data that support the findings of this study are available from the corresponding author, B.J.K., upon reasonable request.

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