Safefood

Food messaging to children and adolescents – What works?

Publication date: Nov 2025

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Foreword

In the modern world, children and adolescents are exposed to many different food messages at home, in their communities, at school and online. While there are a lot of food messages available, there is a lack of understanding of which food messaging strategies work.

This research aimed to:

- Identify effective food messaging strategies for children and adolescents on the island of Ireland
- Inform stakeholders (teachers, parents and club/camp leaders) on how to effectively communicate food messages

The research used a mixed-methods design, incorporating both qualitative and quantitative approaches. It had 4 distinct stages.

Stage 1 – Scoping and literature review

Firstly, we conducted a literature review, which collated models and approaches in food education, food and health messaging.

Stage 2 – Friendship pairs and focus groups (discussion pairs and groups)

Secondly, we conducted qualitative research with children (using friendship pairs) and adolescents (using focus groups) to explore their perceptions and attitudes on existing models and approaches to food education and food messaging.

Stage 3 – Online research

Thirdly, we undertook a quantitative online survey, and qualitative online interviews and focus group with key stakeholders (including teachers, parents, and club and camp leaders) to examine their views on food messaging to children and adolescents.

Stage 4 – Evidence-based recommendations

Finally, this research provided evidence-based recommendations on how to:

- Communicate food messages to children and adolescents

- Guide stakeholders on the most effective ways to communicate with children and adolescents to enable them to develop food literacy skills
- Provide scientific advice to help to shape future approaches to the co-creation and design of interventions for children and adolescents.

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- The research team: Dr Anne Moorhead (principal investigator), Dr Fiona Quigley (project researcher), Dr Ruth Price, Dr Lynsey Hollywood, Professor Alison Gallagher (Ulster University, Northern Ireland); Dr Elaine Mooney and Dr Amanda McCloat (Atlantic Technological University, St Angela's, Ireland)

- Dr Louise Lynch, Researcher, Ulster University, who supported the project team in the final few months

- Everyone who participated in the Expert Advisory Steering Group

- All participants who took part in the friendship pairs, the focus groups, the interviews and the online survey

Executive summary

There is an abundance of food messaging available for children and adolescents on the island of Ireland, but little evidence on which food messaging strategies are effective and why. Food messaging means talking about or sharing information about food, such as what we eat, how we eat, and what's in our food, to help people improve healthier eating.

Research project aims

This research project identified effective food message strategies for children and adolescents to support stakeholders, including Safefood, in developing more effective programmes, interventions and campaigns, with age-appropriate and developmentally appropriate food messaging.

Key stakeholders in this research are teachers/educators, parents, and camp and club leaders on the island of Ireland.

Research design overview

This research was a mixed-methods study, conducted in 4 stages.

Stage 1: Scoping and literature review

Literature review and collation of models and approaches in food education and in food and health messaging.

Stage 2: Qualitative research with children

Stage 2 involved speaking to friendship pairs (discussions in pairs of friends) with children (12 pairs, (n=24) and focus groups (6, n=46) (discussion groups) with adolescents to obtain their perceptions and attitudes on existing models and approaches to food education and food messaging.

Stage 3: Quantitative and qualitative research with stakeholders

During stage 3, we conducted online surveys (n=272) and online interviews (n=12), focus groups (6, n=31) with stakeholders (teachers, parents, camp/club leaders), to examine their views on food messaging to children and adolescents.

Stage 4: Recommendations and dissemination

In total, 385 people participated in this research:

- 70 children and adolescents took part in interviews or focus groups
- 43 stakeholders were interviewed or took part in focus groups
- 272 stakeholders completed an online survey

Participants came from both rural and urban locations across the island of Ireland. The data collected reflects a balance of age, gender and socio-economic class.

Stage 1: Scoping and literature review

Nutrition education helps to reduce health risks, but families face challenges understanding food messaging in today's complex food environment.

We reviewed the food messaging strategies and nutrition education interventions used to improve nutrition knowledge and healthy eating behaviours for children and adolescents aged 2 to 18 years.

In our review, we examined 51 articles using qualitative content analysis and focused on the 2 project aims:

1. Food messaging strategies
2. Intervention approaches

Most reviews showed several positive outcomes for increasing nutrition knowledge and improving healthy behaviours among children and adolescents. However, the overall impact of food messaging and nutrition education is dependent on several variable and inter-related factors, such as, access to affordable healthy food, and support with developing practical food skills.

The interventions studied took place in various countries and included settings such as:

- Schools
- After-school activities
- The wider community
- Healthcare facilities
- Daycare centres
- Farmers' markets
- Online and social media

The participants were children and adolescents aged from 2 to 18 years.

This review demonstrated that there is mixed evidence with positive outcomes of food messaging and nutrition education interventions to improve nutrition knowledge and healthier eating behaviours for children and adolescents aged from 2 to 18 years.

Food messaging strategies were included as part of nutrition education programmes. Food messaging was more effective when part of a multicomponent approach with socio-environmental, educational and structural strategies, such as the provision of food.

Stage 2: Qualitative research with children

This stage explored the experiences, perceptions and attitudes of children (4-11 years) and adolescents (12-18 years) on existing models and approaches to food and nutrition education, as well as food messaging on the island of Ireland.

Using qualitative methodology, we collected data from friendship pairs with children and from focus groups with adolescents to learn about their experiences, perceptions and attitudes on existing models and approaches on food messaging.

Data were collected from schools across the island of Ireland and included different groups in terms of social class, age, region and rural/urban locations. The data were analysed using thematic analysis, which is a data analysis technique that identifies common patterns and meanings in the interviews and focus groups.

Using data from 12 friendship pairs (n=10 males, n=14 females; mean age 8 (SD (standard deviation) SD2.0)yr) and 6 focus groups (n=16 males, n=30 females, mean age 15 (SD1.6)yr), 3 overarching themes were identified.

1. Food messages that made the most impact
2. Food messaging through surveillance and monitoring
3. Ideas to improve food messaging and nutrition education

Overall, children and adolescents reported mixed experiences, perceptions and attitudes to food and nutrition education, and to food messaging.

They recalled food messages from social media, schools, sports coaches and family. They noted that the most impactful messages included an element of fun and practical components, such as cooking, tasting and gardening.

They had an awareness and a basic knowledge of nutrition and food messaging, such as:

- ‘You need to drink more water if you are exercising.’
- ‘Eat vegetables with this meal as you’ve had enough pizza this week.’
- ‘That’s too much sugar.’
- ‘We only have treats in our lunch boxes on Fridays.’

There was an indication that social media platforms, such as YouTube, Instagram and TikTok, present both potential harms and potential benefits on the attitudes to and knowledge of nutrition, and subsequent dietary behaviours among children and adolescents.

This research found that children and adolescents had mixed experiences, perceptions and attitudes to food and nutrition education, and food messaging. Although children and adolescents may be aware of the healthy eating guidelines, there appeared to be a gap in translating this knowledge into practical everyday use.

Food and nutrition education, and food messaging for children and adolescents, needs to be consistently and repeatedly communicated with simple, clear messages, using practical and fun methods in partnership with schools and families. It also needs to take account of the potential harm and benefits of social media.

Stage 3: Quantitative and qualitative research with stakeholders

This stage examined the views of stakeholders on food messaging to children and adolescents, using a quantitative online survey and qualitative interviews and focus groups.

Quantitative online survey

Quantitative online survey was completed by a range of stakeholders:

- Teachers/Educators
- Parents
- Club and camp leaders

They answered questions on:

- The use of food messages
- Types of messages
- Modes of the messages
- How the messages impact on food behaviour of children
- What the children like and do not like
- What works and does not work

In total, 272 stakeholders completed the online survey.

Key highlights from the online survey with the stakeholders reporting:

- More familiarity with food messages that were more commonly repeated in their environment or on food packaging, such as drinking water and eating wholegrains for health.
- Less familiar with more restrictive or difficult to implement food messages, such as eat more beans and pulses and recommended calorie intake.

- Affordability of healthy food and lack of time to prepare healthy meals were the top reported barriers to healthy eating in the families.

- Most reported memorable factors for food messaging were repetition, age-related, sports-related and hobby- or interest-related. The least reported were fear-related, gender-related or identity-related factors.
- Most reported information sources children use for food messages were peers, friends, family and social media influencers/creators.
- Most reported information sources for adolescents were influencers/brand ambassadors, streaming services and online advertising. The least reported were for online courses, books, and leaflets/magazines/newspapers.
- Most reported methods of delivering food messages for children and adolescents were peer role modelling, cooking classes, healthy school meals and family cooking days/nights.
- Children and adolescents respond differently to food messages depending on how and where they receive the messages, for example, in schools, at home or at clubs/camps. Therefore, the place where the food messages occur really matters.

There were some differences reported between Northern Ireland (NI) and Ireland, as well as stakeholder roles:

- To create effective food messaging campaigns, the stakeholders in NI showed a slight preference for digital, interactive tools and influencer-driven social media campaigns, that integrated music and impactful calls to action.
- In Ireland, school-based initiatives and structured messaging through institutional programmes were slightly preferred, with a balance between digital and traditional channels for accessible, regionally aligned dietary messages.

Overall, the way information is shared and the methods or channels used for food messaging depend on the stakeholders' role and their available resources. This means that specific food messaging campaigns need to take these factors into account.

The design of future food message campaigns, that is, short-term focused nutrition communication, needs to consider the:

- Age group of the children and adolescents
- Context
- Place of the campaign.

Qualitative research

For the qualitative research, we collected in-depth data from:

- 6 focus groups with parents (n=31)
- 6 interviews with teachers
- 6 interviews with club and camp leaders

The findings are organised around 3 overarching themes.

1. Effective strategies employed in food messaging and nutrition education
2. Challenges to effective food messaging and how they are overcome
3. Harnessing external influences to enhance food messaging

The findings included discussion from parents of younger children on the importance of meal preparation and access to ‘treat foods’, while parents of adolescents focused on cooking skills for independence.

Teachers stated that tailoring nutrition education to developmental levels worked well, especially with younger students who learned best through sensory activities and with adolescents who were developing critical thinking about food choices.

Parents, teachers, and club leaders face numerous challenges in promoting healthy eating, including:

- Time constraints
- Financial barriers
- Competing messages from advertising and social media

Also discussed were topics such as:

- Managing ‘fussy’ eating in younger children
- The influence of social media on adolescents’ choices
- Socio-economic disparities
- Misinformation
- Pressures from gym culture

All groups recognise that external influences strongly impact adolescents' eating habits, but also present opportunities to promote positive choices.

By tailoring approaches to developmental stages, parents, teachers, and club and camp leaders can effectively use both media and peer influence to engage children and adolescents, making healthy eating both appealing and relevant to their interests and social environments.

Across all groups, it was found that there needs to be a focus on practical, engaging, and age-appropriate strategies to encourage healthy eating, with parents, teachers, and club and camp leaders acting as role models and using methods that encourage active participation.

Stage 4: Recommendations and dissemination

The proposed recommendations for communicating food messages to children and adolescents are:

Communication of recommended food messages by age groups for children and adolescents

Age group (years)	**Recommended food messaging**	**Channels/ sources**
2-3	Simple, positive messages about trying new foods, focusing on playful elements. For example, 'Carrots help you see like a superhero!'	Family, friends, peers, TV ads, streaming
4-6	Messages that use stories and characters, focusing on adventure and exploration. For example, 'Broccoli gives you the strength of a brave explorer!'	Family, friends, peers, TV advertising, streaming
7-9	Link food choices to a variety of activities they enjoy. For example, 'Milk helps you build strong bones for your favourite activities.'	Family, friends, peers, TV ads, streaming
10-12	Emphasise the benefits on mood, energy, and performance in various activities. For example, 'Eating a variety of foods helps you feel good for sports, studying, or hanging out with friends.'	Family, friends, peers, TV advertising, streaming

13-15	Focus on independence, confidence, and personal health goals. For example, 'Fuel your body with nutritious food to feel confident and strong,' or 'Healthy eating supports your goals, whether in sports, arts, or other interests'.	Friends, peers, social media (TikTok, YouTube), influencers, streaming, online advertising
16-18	Provide facts and encourage critical thinking and debate, appealing to varied interests. For example, 'Understand how different food support your energy, strength, and creativity.'	Friends, peers, social media (TikTok, YouTube), influencers, streaming, online advertising

Campaign and messaging design recommendations

- Co-create food messaging, such as campaigns or educational topics, with a diverse representation of the target audience and related stakeholders, especially with children and adolescents who can experience marginalisation, those from all socio-economic backgrounds, and those of higher weight.
- Use multicomponent campaigns, such as Food Dudes and Eat Them to Defeat Them.
- Including supporting structures, such as policy change, environmental change and support across communities, families, schools and clubs and camps work better than one-off, fragmented campaigns.
- Include reinforcing experiential learning components such as tasting, cooking and gardening.
- Target a specific dietary goal as part of a broader campaign, such as How to achieve ‘5-a-day’ as part of a broader healthier eating campaign.
- Ensure anyone delivering the campaign has adequate time, training and support.

Effective food messaging strategies

- Consider messages that are clear, memorable and achievable.
- Consider 'gain-framed' approaches, that is, positive and supportive messages focusing on health benefits.
- Use messages tailored to the target audience that are interesting, relevant and important to them.
- Adopt a consistent repetition approach across multiple sources and/channels, for example, on posters in schools and communities or use TV and online sources. These messages should by reinforced by parents, guardians and club and camp leaders.
- Use clear examples and demonstrations on how to achieve the behaviour, for example, when providing recipes or advice on what to include in meals.
- Encourage stakeholders to consistently provide role modelling of the desired behaviour.
- Consider the impact and role of peer modelling and peer-led messaging, taking care to ensure that the messaging is disseminated (or shared) accurately.

Implementation

Food environment and social media influence

Consider:

- How the food environment and social media influence might support the food message.
- How to differentiate food that appears to be healthier or more attractive because of the way it is marketed or packaged.

Food used in food messages

Could there be taste barriers for children and adolescents? If there are, explore ways to address them.

Selective eaters

Achieving behaviour change through food messaging can be more challenging for some than others. Selective eating, also referred to as 'food fussiness', can be a normative childhood behaviour, so it is important to consider how to provide supports for families who may have 'fussy eaters'.

Cost and resources

Consider what type of financial or resource barriers might affect the success of the overall message.

What works less well

- Fear-based or authoritative messaging pressurising children or adolescents
- One-off, fragmented food messaging that is not supported by the environment or key relationships

Guidance to stakeholders on the most effective ways to communicate with children and adolescents to enable them to develop food literacy skills

Food messaging is mediated via a number of different stakeholder groups. The evidence-based guidance for each of the different stakeholders is as follows.

1. Messaging via schools (teachers)

- To consider the role of the school environment in reinforcing healthier food messages through:
    a) School policies on food
    b) The availability and access to healthier food
    c) Consistent messaging across the curriculum
- To continue being role models for healthier food messages and creating positivity around healthier eating.

2. Messaging via parents and guardians

- To explore additional strategies for engaging families with schools in food messaging and nutrition education, such as creating a multi-generational cookbook or involving parents and grandparents in the community.
- To consider strategies for reinforcing positive and healthier eating food messaging to:
    a) Support younger children in discovering eating habits that work for them and gradually build familiarity with nourishing foods.
    b) Introduce new tastes and foods to children and adolescents regularly.
    c) Guide children's relationship with food through positive education rather than overly focusing on restrictions.
    d) Involve children and adolescents in planning, meal preparation and cooking, where resources and time allow.
    e) Maintain at least some structured mealtimes a few days a week.

3. Messaging via club and camp leaders

To reinforce and consolidate healthy food messages that children and adolescents already receive:

a) Ensure staff and external experts have adequate training to speak to specific age groups about nutrition
b) Review the current level of 'supplement talk' (such as how adolescents discuss nutrition supplements to help their sports performance) to determine if evidence-based information is available to adolescents under 18 years, especially regarding protein, magnesium and creatine.

Scientific advice to inform future approaches to co-creation and design of interventions for children and adolescents

We propose a rights-based approach to involving children and adolescents in the design of nutrition policy and associated campaigns. The rights-based approach is informed by international treaties such as the United Nations Convention on the Rights of the Child (UNCRC) and the European Child Guarantee. Children and adolescents have a right to be involved in decisions affecting their nutrition-related health in a way that reflects their age, makes it easy for them to participate and ensures that their voices are heard.

Future food messaging campaigns need to be:

- Age-appropriate
- Context-specific
- Place-focused

Conclusion

This project found that effective food messaging relies on multicomponent campaigns and education supported by appropriate stakeholders (teachers, parents and club and camp leaders). Messages should be age-appropriate, context-specific and place-focused (multi-contexts and multi-place), repeated consistently for reinforcement, and facilitated by a supportive food environment. A whole systems approach to food messaging is required, that is, campaigns with multiple contexts and across multiple settings.

1. Introduction

Food literacy is a valuable life skill that is often associated with improved overall health and diet quality. It encompasses a broad range of knowledge, skills and attitudes towards food, which gives due cognisance to the social and wider environmental dimensions of eating alongside an individual's skills and abilities. Therefore, developing food literacy skills early in life is shown to have a positive association with cooking attitude and behaviours, health and diet quality in later life (Lavelle et al. 2016).

Food literacy can also include what individuals understand and how they take meaning from food messages, which impacts what they do and how they behave. Food messages need to be clear and understood by the target audience they are aimed at for any behaviour change to happen, such as making healthy eating choices. Closing the communication gap requires considering children and adolescents' perspectives, experiences and needs, and finding solutions that support them to make improved behavioural choices (NCBI, 2016). Additionally, research has demonstrated that key adults, such as teachers and parents, play a central role in food messaging effectiveness with children and adolescents (Mc Cloat & Caraher, 2020; 2019). Specifically, the role of the mother has been consistently identified as a primary source of learning during early life (Lavelle et al. 2019).

Although there is consensus on the importance of developing food literacy skills, the mode and means by which these skills can positively impact food-related behaviours is currently much debated and under-researched.

This research addresses this gap by examining food messaging to children aged 2 to 12 and adolescents aged 13 to 18, considering what works, and identifying good practices on the island of Ireland. This research project also collates the evidence and best practice models and approaches on food messaging and food education internationally, along with the views of stakeholders in food education.

Overall aim

To identify effective food messaging strategies for children and adolescents on the island of Ireland, to inform stakeholders on how to communicate food messages.

Objectives

1. To critique the literature on food education and food messaging aimed at children (2-12 years) and adolescents (13-18 years)
2. To collate international models and approaches to food education and food messages for children (2-12 years) and adolescents (13-18 years)
3. To obtain the perceptions and attitudes of children (2-12 years) and adolescents (13-18 years) to existing models and approaches to food education and food messaging
4. To examine the views of a range of stakeholders on food messaging to children and adolescents
5. To provide recommendations on how to communicate food messages to children and adolescents

A review of the wider literature on food messaging and food education aimed at children (2-12 years) and adolescents (13-18 years) was critical to understanding the current research in this area. This initial review provided the research team with a list of international models and approaches to food messaging and food education for children and adolescents.

These models and approaches were then discussed and evaluated with children and adolescents to determine good practices. The views of the key stakeholders on food messaging to children and adolescents were also collated.

Interview guides explored what families think about healthy eating and food practices at home. They also examined the messaging framework around healthy eating in schools, after-school activities, clubs and camps.

The findings identified 2 key outcomes:

1. Recommendations on how to communicate food messages to children and adolescents
2. Clear guidance to stakeholders on the most effective ways to communicate to children and adolescents to help them develop food literacy skills

The findings from this research can influence both practice and policy by providing guidance that can be used to improve current public health programmes and develop new programmes and campaigns.

Additionally, these findings can support organisations to scale up their best practices and strategies to address children's and adolescents' food education needs and support the development of food literacy among children and adolescents on the island of Ireland.

Finally, the findings can inform future approaches to co-creating and co-designing interventions for children and adolescents.

2. Methods

This mixed-methods project on effective food messaging strategies for children and adolescents on the island of Ireland was conducted in 4 stages to provide a comprehensive understanding of the topic. It will now be discussed in depth.

Research design

This research employed a mixed-methods design, using both qualitative and quantitative methods, to explore and examine food education and food messaging internationally for children (2-12 years) and adolescents (13-18 years).

A mixed-methods design approach was considered the most effective way to explore food education and messaging for children and adolescents and achieve the aim and objectives of the research.

In-depth interviews and focus groups offered the opportunity to collect data on the experiences and perspectives of the target audience (children and adolescents) regarding food messaging. Insights were also collected from the key adults in their lives, such as parents, teachers and club and camp leaders who provided unique perspectives.

An online survey supported the research by gathering broader opinions and attitudes on the topic. This allowed for comparison with the qualitative data and a more comprehensive understanding of the subject.

This approach also supported the important initial stages of identifying, compiling and reviewing models for examining and exploring the perspectives of children, adolescents, and key stakeholders regarding food messaging directed at these groups.

The research was conducted in these 4 stages.

Stage 1: Scoping and review

A systematic mapping of the literature was conducted to review, identify and collate relevant models and approaches in food education and food messaging targeted at children and adolescents. This helped to formulate questions and content for discussion during data collection.

Stage 2: Qualitative data collection with children

Qualitative data collection with children using friendship pairs and focus groups with adolescents.

Stage 3: Quantitative and qualitative data collection with stakeholders

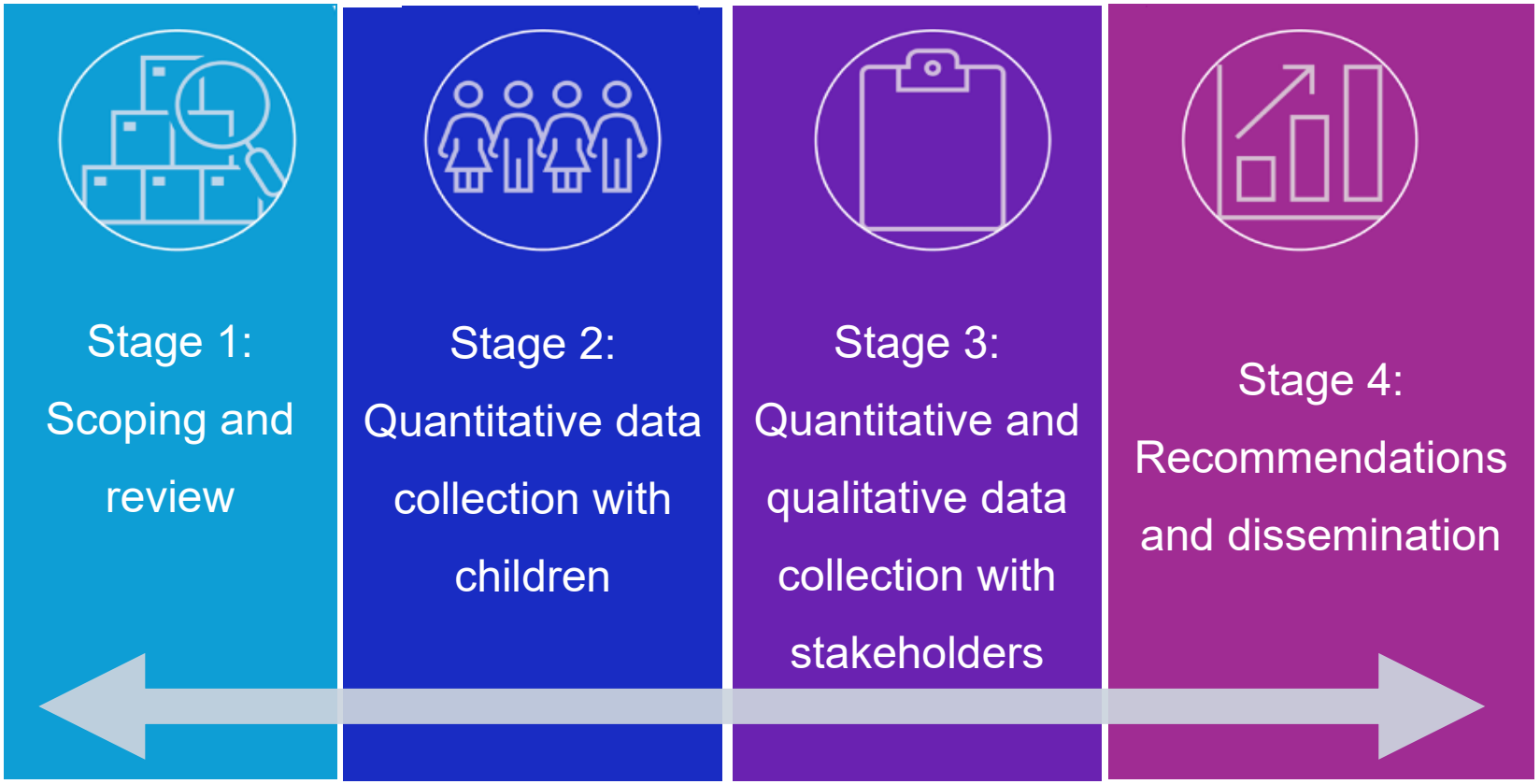
Quantitative data collection through online surveys and qualitative data collection through semi-structured one-to-one interviews and focus groups with key stakeholders through an online platform).

Stage 4: Recommendations and dissemination

This stage involved providing recommendations for stakeholders based on the findings from the mixed-methods analysis. Key dissemination activities will include final reporting, attending conferences and publishing original articles in a peer-reviewed journal (.

An overview of the 4 stages is outlined in Figure 1.

Figure 1: Overview of the 4 stages



Stage 1: Scoping and review

Mapping the literature

During this research stage, models and approaches in food education and food messaging were identified, reviewed and collated. The purpose of this literature review was to examine what is known across the literature base and critique the findings on food messaging and food education for children (2-12 years) and adolescents (13-18 years).

Due to the vast number of published papers in this area, it was decided that to access the evidence base comprehensively, a 'review of reviews' would be conducted using a systematic approach. This review was informed by the methodology outlined in the World Health Organization (WHO) review of evidence related to the Nutrition-Friendly Schools initiative (WHO, 2021).

Searches

This research methodology used the PRISMA guidelines (Moher et al. 2006) to conduct a systematic search of the literature. Database searching took place on 21 April 2023 and included: Medline, CINAHL, Embase, SCOPUS and PubMed. Search concepts and subject index terms are detailed in Table 1.

Table 1: Search concepts for the literature review

Search concepts	Subject index terms
1. 'food' or 'nutrition' – mapped to subject headings	Child, Adolescent, Nutrition, Feeding, Education, Schools, Family
2. 'messaging' or 'communication' or 'education' – mapped to subject headings	Child, Adolescent, Nutrition, Feeding, Education, Schools, Family
3. 'primary school' or 'elementary school' or 'post-primary school' or 'secondary school' – mapped to subject headings and keyword search	Child, Adolescent, Nutrition, Feeding, Education, Schools, Family

An example of a search strategy that was used (OVID/Medline) is provided in Table 2.

Table 2: Ovid/Medline search strategy

Step	Activity
1.	"diet, food, and nutrition"/ or “food”/
2.	Communication/
3.	Education/ or Health Education/
4.	((food or nutrition or diet or eat*) adj2 (messag* or educ* or communic* or promotion or literacy*))
5.	2 and 3
6.	1 and 5
7.	4 or 6
8.	adolescent/ or child/ or child, preschool/
9.	(child* or adolescen* or youth or young people or teen*)
10.	Schools/
11.	8 or 9
12.	(primary school or elementary school or secondary school or high school or post-primary school or post-primary school or club* or societ* or community or media or TV or television)
13.	10 or 12
14.	7 and 11 and 13
15.	limit 14 to (English language and yr="2013 -Current" and ("review" or "systematic review"))

Screening and extraction

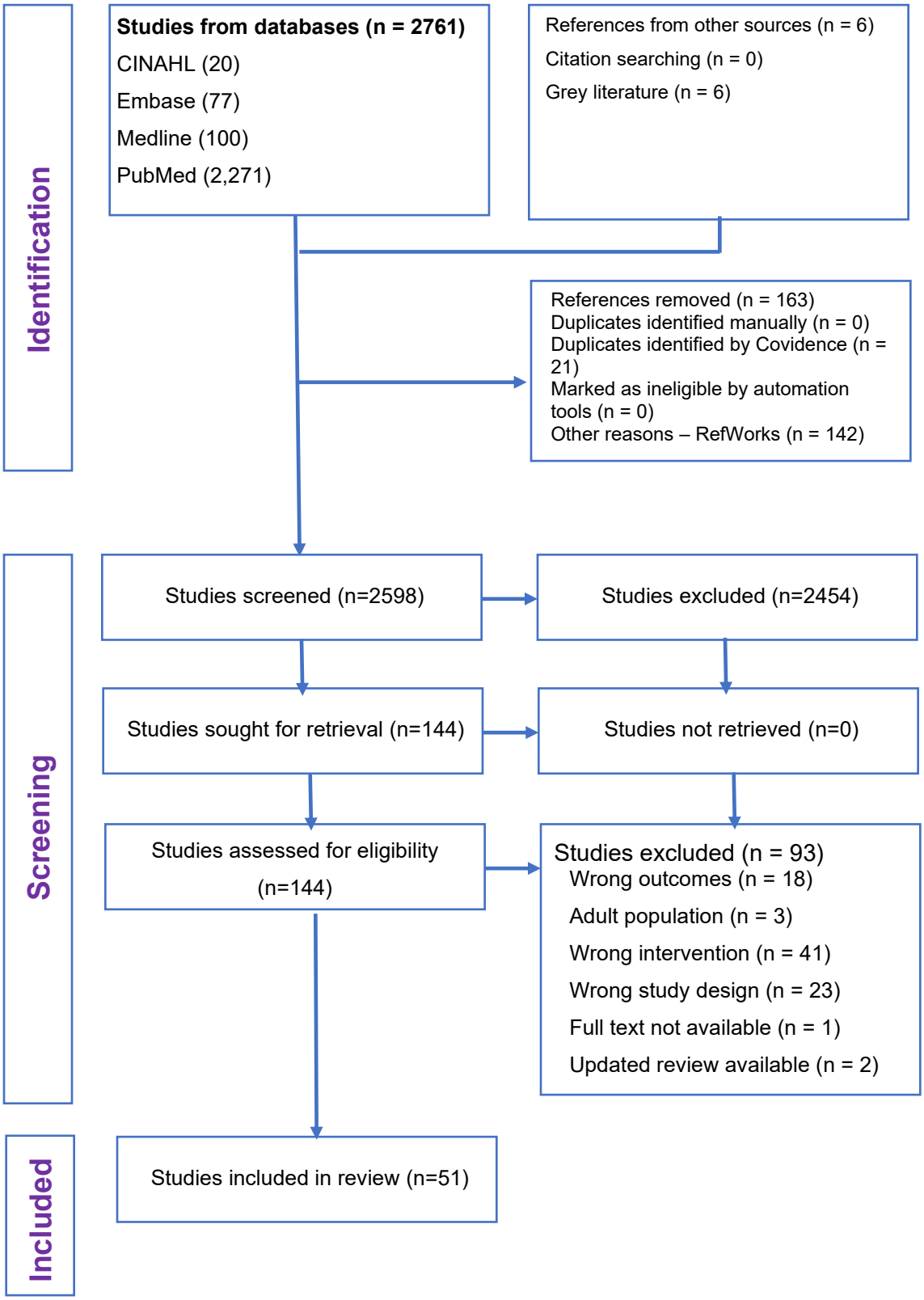
The selection criteria were chosen using the Population, Intervention, Comparison, Outcomes and Study (PICOS) framework and are presented in Table 3. With the aid of the online software Covidence (licensed from the Faculty of Life and Health Sciences, Ulster University), search results were uploaded for reviewing, sorting and extraction.

Table 3: PICOS tool for inclusion criteria

Population	Intervention	Comparison	Outcomes	Project design
Children and adolescents aged 2 to 18 years	Nutrition education, food messaging or a combination of both	Exposed vs. non-exposed or when participants were their own controls	Nutrition knowledge or healthy eating behaviours	Any type of review conducted in the last 10 years

The screening of the papers was conducted independently by Dr Fiona Quigley (FQ) and Dr Anne Moorhead (AM) using Covidence (25). In total, 2,761 papers were identified, and after the screening criteria were applied, 51 papers were selected (Figure 2).

Figure 2: PRISMA flow diagram for the selection of studies (n=51) -



FQ extracted data from the included studies using a Covidence template. The form captured project characteristics, participant demographics, review details, outcome measures and key results. A second reviewer, AM, verified the data by checking for missing or unclear data. The extracted data were identified and coded using a custom Microsoft Excel spreadsheet.

Quality assessment

The Assessment of Multiple Systematic Reviews (AMSTAR2) method (Shea et al. 2017) was used to assess the quality of the umbrella reviews, meta-analyses and systematic reviews (n=44). The remaining reviews (n=7) used the Critical Appraisal Skills Programme (CASP) checklist for systematic reviews (CASP, 2018). The quality assessment was completed by 2 researchers – Dr Louise Lynch (LL) and FQ – independently and then agreed upon.

The AMSTAR2 assessment (n=44) showed mixed results, with some low-quality (n=9) studies, predominantly moderate-quality (n=23) studies and a range of high-quality (n=12) studies.

The CASP review (n=7) showed variations in the quality levels. The quality appraisal results indicate the need to interpret results with caution.

Stage 2: Qualitative data collection with children and adolescents

Participants and sampling

This second stage aimed to explore existing models and approaches to food education and food messages with children (5-12 years) and adolescents (13-18 years) to obtain data on their perspectives.

To obtain a wide array of perspectives from different groups, data were collected from children and adolescents in NI and Ireland. The process involved purposive sampling of those from urban and rural settings, socio-economic status, age, and region. (During stage 3 of the study, key stakeholders provided their perspectives on food education and food messaging for children aged 2 to 4 years). The target sampling included schools in NI and Ireland, covering urban and rural locations.

In addition to purposive sampling, snowball sampling was employed to increase participation (Clark et al. 2021). The selection criteria for the children and adolescents are outlined in Table 4.

Table 4: Selection criteria for the qualitative friendship pairs with children and focus groups with adolescents

Inclusion criteria	Children or adolescents in participating primary and post-primary schools who were willing to participate, able to provide informed consent or where parental consent was provided.
Exclusion criteria	No individual consent was provided No parental consent was provided

Recruitment

School principals working in primary and post-primary schools in NI were contacted by email, followed by a phone call, to invite their schools to participate in this study.
The recruitment email attached a participant information sheet for parents, as well as age-appropriate participant information sheets for the children and adolescents.

Schools that confirmed they would like to participate provided written permission by email. A recruitment email was then sent to parents, inviting their children to participate and seeking permission for the data collection to be held in their child's school.

For all children participating in this research, after written consent was obtained from the parents, individual consent was also obtained. Adolescents who were 18 provided consent themselves. All participants were given a £20 Amazon voucher as a token of appreciation for their participation.

Data collection approaches and procedures

Two different approaches were identified for primary data collection among the children and adolescents to ensure maximum participation and engagement and to support the collection of rich data.

The first approach, using friendship pairs, was carried out with primary school children. The second approach involved focus groups for adolescents. All the friendship pairs and focus groups in NI and Ireland were completed within school settings.

Friendship pairs

Friendship pairs as an approach have been used successfully with primary school children in previous research by members of the research team (Safefood Family Eating Out Events report (10-2009).

The friendship pairs consist of 2 children, self-selected, so they are comfortable speaking and being honest with each other. Children were recruited from 4 NI schools (2 urban and 2 rural) and 8 schools in Ireland (4 urban and 4 rural). Data collection took place in a classroom in the school that was a suitable environment and designed for child safeguarding. A teacher or principal was present throughout the data collection.

Participants were welcomed and told how the process would work. Verbal consent was obtained, and data collection began with a short icebreaker. After a fun activity was completed, and when the children appeared comfortable, they were given visual copies of the models and approaches to food education and food messages (both hard copies and online). The children were asked for their opinions and perspectives.

The friendship pairs data collection lasted approximately 15 to 30 minutes. The sessions were audio recorded for later transcription. Children were thanked, and staff were informed that data collection had ended.

Focus groups

Focus groups were chosen as they are a developmentally appropriate method to use with adolescents to discuss models and approaches on food education and food messages (Creswell & Creswell, 2018).

The focus groups with adolescents took place in post-primary schools, 2 in NI (one urban and one rural) and 4 in Ireland (2 urban and 2 rural). The focus groups consisted of 6 to 8 adolescents (Clark et al. 2021).

Similar to the primary school procedures, data collection took place in a meeting room in the school, which was a suitable environment and designed for child safeguarding. A teacher or principal was present throughout data collection. The participants were welcomed and told how the process would work. Verbal consent was obtained, and data collection began.

Participants were provided with visual copies of the models and approaches on food education and food messages in hard copies and online. Participants were asked for their opinions, and a discussion took place on the topic of food education and food messaging. Focus groups lasted approximately one hour.

The research team tried to ensure equal participation for all members of the focus groups and ensure that any peer pressure was managed to ensure a comfortable and safe space for all participants. This was achieved by having an experienced focus group facilitator, carefully worded questions, and interactive tasks and activities to encourage group participation.

Interview guide

The food models discussed were the commonly used curriculum models in schools on the island of Ireland, namely the Eatwell Guide (NI) and the Food Pyramid (Ireland). These models were identified following consultation with the project's expert panel, as well as from internet searches, and were sourced from official government documents.

Questions were devised based on these models. For example, children and adolescents were asked to hold and review them and then discuss what they considered were the strengths and limitations of each of the models and approaches. Participants were also asked if they used them and why.

Stage 3: Quantitative and qualitative data collection with stakeholders

Participants and sampling

This third stage collected data through an online survey. It explored existing models and approaches on food education and food messages with key stakeholders to obtain data on their perspectives and views as key adults in children's and adolescents' lives.

To obtain diverse perspectives, qualitative data were collected from key stakeholders in NI and Ireland and included purposive sampling of those from urban and rural settings and across different socio-economic statuses, ages, and regions. Snowball sampling was used to increase participation (Clark et al. 2021).

Convenience sampling was used for the online survey with stakeholders. Data were collected in NI and Ireland with a target of 100 parents, 100 teachers, and 50 club or camp leaders, with a

Northern Ireland to Ireland ratio of 1:2. The selection criteria for the qualitative and quantitative data collection with key stakeholders are outlined in Table 5.

Table 5: Selection criteria for the quantitative data collection with key stakeholders

Inclusion criteria	Teachers or other educators and parents of children and adolescents Lives on the island of Ireland Able to provide informed consent
Exclusion criteria	No consent provided

Recruitment

Key stakeholders were recruited using a range of methods, including sending invitations to the parents and teachers from the participating schools with a link to the survey URL. Schools and universities also shared social media posts on Twitter, Facebook and Instagram. Participants identified themselves on the survey as either a parent, teacher, club or camp leader.

Focus group and interview participants were recruited in a similar manner, that is, through social media posts as well as through professional networks. Those who were interested were sent a participant information sheet, and those willing to take part gave their consent to take part in a focus group consisting of 4 to 6 participants or a one-to-one interview.

The research included focus groups with parents, 2 focus groups from NI (one urban and one rural) and 4 focus groups from Ireland (2 urban and 2 rural). Interviews with teachers took place in participating schools, 2 in NI (one urban and one rural) and 4 in Ireland (2 urban and 2 rural), and also with club and camp leaders, 2 in NI (one urban and one rural) and 4 in Ireland (2 urban and 2 rural). All participants received a £20 Amazon voucher as a token of appreciation for their participation.

Part A: Online survey

Questionnaire

For the online survey, questions focused on food messaging, such as:

- Do they use food messages?
- What types of messages do they use?

- How food messages are delivered?
- How did the food messages impact upon the children's behaviour?
- What do the children like and not like?
- What works and what does not work?

Each section of the survey contained several statements and used Likert scales for measuring frequency and agreement. The questions for this survey were developed based on the literature review in stage one. The online survey was hosted on MS Forms (Ulster University licence).

Data collection and procedures

For the survey, participants were sent a URL which contained the participant information sheet. Those willing to participate consented by ticking a check box with a consent statement at the beginning. The participants completed the online survey in a single session, which took approximately 10 minutes.

Part B: Focus groups and interviews

Focus groups and interview guide

Stakeholders were asked a series of questions to understand how families think about healthy eating and food practices at home. Participants were asked about the food messages they observed children and adolescents receiving. They were also asked about the framework of school messages on healthy eating as well as in other settings such as sports clubs, camps, and after-school facilities. The findings from the online survey supported the development of the interview guide for the focus groups and interviews, allowing for a deeper exploration of the reasons behind the opinions expressed in the survey.

Data collection and procedures

Interviews were conducted with teachers and club and camp leaders. Focus groups were held with parents. For the focus groups, participants were also sent a participant information sheet and those willing to participate returned consent to the researcher. Participants were then sent a link to an online focus group, which was held at a convenient time for them.

Similarly, for interviews, the researchers supported participation by organising convenient times for online data collection.

The researcher began with some general questions before asking parents about their experiences with food education and food messaging for children and adolescents. The research team tried to ensure equal participation for all members of the focus groups. All interviews and focus groups were audio recorded for data analysis purposes only. Interviews took 40 to 60 minutes, and focus groups lasted approximately one hour. When data collection was finished, the participants were thanked for their involvement.

Stage 4: Recommendations and dissemination

This stage involved providing recommendations for stakeholders and the reporting and dissemination of the findings ().

Once data analysis was completed, key findings were identified and provided as recommendations. These recommendations were then reviewed with the research team and the Steering Group to gather feedback. Once the final recommendations were agreed upon, they were included in the report. Based on the data, these recommendations provide guidance on how to effectively communicate food messages to children and adolescents. They also provide guidance to stakeholders on the most effective ways to communicate to children and adolescents to enable them to develop food literacy skills.

Personal and Public Involvement (PPI) and the Expert Advisory Steering Group

The research team acknowledges the role and the importance of personal and public (PPI) involvement in this research, and therefore, PPI was included throughout this project, from the design to the dissemination of the findings. This research was also informed by members of the research team's previous research studies, as well as input from key stakeholders. The key stakeholders and the Expert Advisory Steering Group were included in the data collection.

The Steering Group was made up of the project team, a Safefood representative, a youth representative, and 8 expert members, as listed in Table 6 below. This Steering Group met 4 times throughout the project (April 2023, September 2023, May 2024 and September 2024). This Steering Group received updates and contributed to discussions on each stage of the project, offering important guidance to the overall project.

Table 6: Steering Group membership

Member	Role
Dr Anne Moorhead, Ulster University, School of Communications and Media, Institute of Nursing and Health Research, Northern Ireland	Project team, Principal Investigator (Chair)
Dr Fiona Quigley, Ulster University, School of Communications and Media, Institute of Nursing and Health Research, Northern Ireland	Project team, Research Associate
Professor Alison Gallagher, Ulster University, Doctoral College,(Coleraine/Magee), Northern Ireland	Project team
Dr Ruth Price, Ulster University, School of Biomedical Sciences, Northern Ireland	Project team
Dr Lynsey Hollywood, Ulster University, Department of Hospitality Tourism and Events Management, Northern Ireland	Project team
Dr Amanda McGloat, National Centre of Excellence for Home Economics, Atlantic Technological University, St Angela's, Sligo, Ireland	Project team
Dr Elaine Mooney, National Centre of Excellence for Home Economics, Atlantic Technological University, St Angela's, Sligo, Ireland	Project team
Dr Charmaine McGowan, Safefood	Safefood representative
Daniel Price, Northern Ireland	Young person Representative
Alan Murphy, Digital Communication Specialist, Ireland	Expert panel
Lucy Smith, PRO for the Association of Teachers of Home Economics, Home Economics teacher, Ireland	Expert panel
Dr Kirsty Porter, paediatric dietitian, owner of Nutrition4Kids, Northern Ireland https://www.facebook.com/nutrition4kidsni	Expert panel
Jilly Dougan, Author of 'Sow, Grow, Munch, Northern Ireland'	Expert panel
Joris Minne, PR professional, chairperson at JComms, Northern Ireland www.jcomms.co.uk	Expert panel
Laura Kelly, food and nutrition teacher, St Columbanus' College, Bangor, Northern Ireland	Expert panel
Mairead Davidson, Ulster University, lecturer in education (Home Economics), Northern Ireland	Expert panel

Member	Role
Dorothee Wagner, Education Manager, Council for Curriculum, Examinations and Assessments (CCEA) Northern Ireland	Expert panel

Data analysis

Survey data

For quantitative analysis, data were analysed using SPSS version 29 for frequencies, and descriptive and exploratory interferential statistics. Independent sample t-tests and one-way ANOVAs were used to examine trends and differences in the online survey responses, as appropriate. Independent sample t-tests were conducted to determine any significant differences between the 2 regions, NI and Ireland. The level of significance was $P<0.05$. Statistical advice was sought from Dr Paul Stater, Institute for Nursing and Health Research (INHR), Ulster University.

Focus group/survey data

All recorded qualitative data were transcribed using the transcription software MS Teams Transcriptions. The transcriptions were then reviewed for accuracy and read for familiarisation (Braun & Clarke, 2014), which supported the coding of the data. A thematic analysis was conducted using the guidelines by Braun & Clarke (2014), helping researchers to organise patterns and identify key themes and sub-themes in the data.

Ethical considerations

Ethical approval was obtained from the Ulster University Research Ethics Committee for data collection in NI and Atlantic Technological University (ATU) St Angela's, Sligo, for data collection in Ireland. This project adhered to Ulster University's research governance guidance (Ulster University, 2022).

The following key research ethical issues related to the research have been addressed:

- Non-maleficence (do no harm): This research has been carefully planned to avoid harm, including potential distress.
- Beneficence (to do good): This research was beneficial as this project aimed to identify effective food messaging strategies for children and adolescents on the island of Ireland in order to inform stakeholders on how to effectively communicate food messages.

- Informed consent: All participants received an information sheet, and the adolescents, parents, teachers and club and camp leaders provided consent, while the parents provided consent for their children. All participants were free to withdraw consent at any time without giving a reason.
- Honesty and integrity: All information for each research component had a specific information sheet, which clearly outlined the research procedures.
- Confidentiality: Participants completed the online survey anonymously. The participants in the friendship pairs, focus groups and interviews were coded to ensure that their identity was not disclosed. Data analysis took place on a secure and encrypted computer storage in Ulster University. This project adhered to GDPR (2018) and the Data Protection Act (2018). Anonymised data is held in Ulster University and will be stored securely for 10 years (in case source data is required to defend published findings during that time).

3. Results

Stage 1: Scoping and literature review

A literature review was conducted to critique the literature on food messaging and food education for children (2-12 years) and adolescents (13-18 years). The findings from the literature review, combined with internet searches, produced a comprehensive list of existing international food education and food messaging models and approaches that were evaluated in Stage 2. In total, 51 papers were identified. The referencing numbering system reflects the approach used for the journal article, and the numbered references are in Appendix 3.

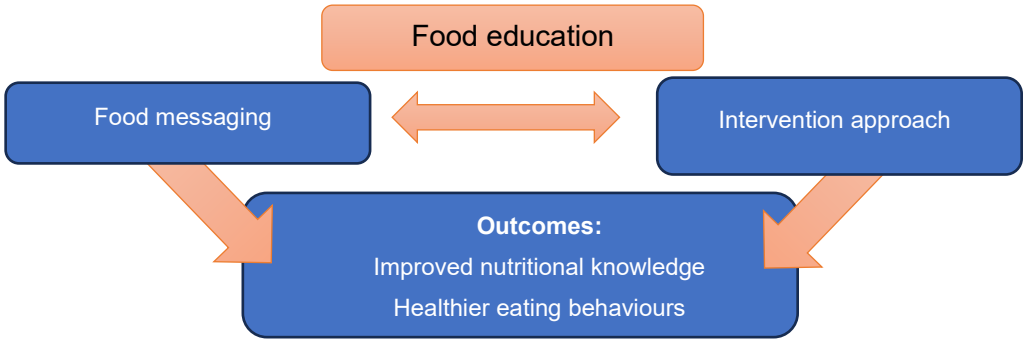
Data synthesis

Given the heterogeneity (array) of review types and outcomes, a narrative synthesis was conducted using qualitative content analysis methods. To aid presentation, summary tables were created. The content analysis focused on 2 pre-identified categories that aligned with the research aims: 1. Food messaging strategies, and 2. Intervention approaches.

A narrative summary was produced under these 2 categories, presenting themes that emerged from the findings and the conclusions that were identified in the evidence regarding food messaging and intervention approaches.

Next, data regarding outcomes focused on improved nutritional knowledge or healthy eating behavioural changes for participants was considered (Figure 3), with the findings from this stage presented in the results.

Figure 3: Categories and themes for narrative synthesis and content analysis



Review characteristics

In total, 51 reviews [27-77] were included, comprising 4 umbrella reviews [30, 41, 42, 57], 4 meta-analyses [35, 46, 48, 55], 36 systematic reviews [((29, 31-33, 36, 37, 39, 43-45, 47, 49, 50, 52-54, 56, 58-70, 72, 73, 75-77))] and 7 other reviews [28, 34, 38, 40, 51, 71, 74]. The number of included studies ranged from 5 [38] to 116 [40] per review. The intervention studies included in the reviews were published in the last 10 years, with the latest review updated in January 2023 [27]. Most reviews included intervention studies in primary school settings (n=35) and/or nursery settings (n=14), followed by post-primary school settings (n=26). Other settings were less frequently used, including after-school, labs, daycare/childcare, healthcare, camps, social media and online spaces (n=11). Family (n=10) and community settings (n=14) were less used than school settings. Most reviews did not report an aggregated sample size (n=43). For those that did, the sample size ranged from n=20 to n=43,375. Some sample sizes were based on the family as a unit, parent-child/adolescent dyads, rather than individuals (n=6).

Review outcomes

This review found a mix of outcomes in the selected review papers. Positive outcomes were identified in review articles when they proposed statistically significant changes (n=20). Mixed outcomes were reported when reviews presented results using terms such as ‘inconsistent’, ‘variable’ or ‘mixed’ (n=18). One review did not report specific outcomes; instead, it reported on the overall success of food literacy. Those review articles that reported small effect sizes tended to report weak positive (n=4) and weak mixed (n=7) findings. No reviews reported large or strong effects overall.

Theoretical models

Most reviews described different ranges of pedagogical theories, behavioural change models, communication theories and nutrition-related theories, although not all. The prominent theoretical frameworks underpinning the design included the social cognitive model (n=25), the theory of planned behaviour (n=14) and the transtheoretical model (n=10).

Food messaging strategies

The review identified nutrition education interventions incorporating food messaging strategies rather than standalone food messaging interventions. Out of 51 review papers, 46 directly detailed messaging strategies (Table 7). These strategies (n=25) varied widely, with the most common approach being the distribution of materials, such as booklets, brochures, recipes,

posters, newsletters, postcards, cookbooks and tip cards. Family and parental or caregiver involvement in messaging was also prominent (n=17), along with text and video messages promoting healthy eating and exercise among family members.

Generally, the reviews indicated that studies employed different combinations of messaging strategies, with only one project specifically contrasting messaging tactics by describing affective versus instrumental text messages (Rose et al. 2017) [63]. Srebly et al. (2019) [54] concluded that tailored messages are more effective when incorporated within a broader healthy eating messaging strategy. Similarly, Hendrie et al. (2017) [62] recommended including nutrition education messages as part of a multicomponent approach for greater impact.

Table 7: Food Messaging strategies used within nutrition education interventions (n=46)

Reviews	Messaging strategy
n=6	School nutritional campaigns [27, 59, 66-67, 74-75]
n=25	Distribution of materials (booklets, brochures, recipes, posters, newsletters, postcards, cookbooks, tip cards) [29, 31, 33, 35, 37, 39-40, 44-45, 48, 53, 55-58, 61-63, 65, 67-69, 74-75]
n=2	Promotional strategies using expert presentations and workshops [29, 44]
n=1	Promotion through social networks [31]
n=4	Key food messaging (food pyramid, 5-2-1) [47-48, 62, 67]
n=1	Linking food safety messages with nutrition messages [74]
n=1	Summarising messaging [37]
n=1	Public service announcements [74]
n=4	Role modelling including parental, peer, public, authority figures or cartoon [27-28, 62, 77]
n=19	Parental and family involvement by sending messages, feedback, materials, phone calls [28-31, 35-36, 42, 44, 48, 50, 59, 61-62, 65, 68, 70, 73, 75, 77]
n=2	Peer messaging [56, 66]
n=10	Text and video messages promoting healthy eating and exercise for family members [29, 31, 36, 43, 60, 63, 65, 72, 75, 77]
n=2	Homework activities [59, 69]

Reviews	Messaging strategy
n=1	Positive food messages [44]
n=9	Message reinforcement as part of a multicomponent programme [28, 46, 52, 53, 55, 61, 67, 68, 77]
n=5	Positive reinforcement/reward (sticker chart/points) [30, 51, 59, 62, 67]
n=3	Targeting specific/single messages [52, 55, 61]
n=4	Use of social media to disseminate healthy eating messages [27, 32, 56, 66]
n=3	Games and websites [49, 56, 62]
n=3	Counselling and coaching [48, 63, 72]
n=3	Motivational messaging [56, 62, 72]
n=4	Tailored feedback or advice [60, 62, 69, 72]
n=3	Tailored messaging, including value-based [51, 56, 62, 68]
n=2	Private messaging/phone line to experts for advice [56, 62]
n=2	Computer-based individualised feedback [52, 63]

Intervention approach

The interventions covered extended beyond food messaging strategies and were categorised into key intervention types: educational programmes; experiential learning; environmental restructuring; digital interventions; family, peer or community involvement; and a multicomponent approach (Table 8).

Table 8: Nutrition education interventions to improve children's (2-18 years) nutrition knowledge and healthy eating behaviours (n=51)

Number of reviews	Intervention grouping
	Educational strategies
n=9	Games including observational role-playing [27, 40, 44, 49-52, 57, 63]
n=6	Skills development (cooking skills, cognitive skills)[37, 49, 54, 63, 68, 72]
	Experiential strategies
n=16	School gardening activities [28, 30, 33, 37-40, 44, 50, 59, 64, 67, 71, 75-77]

Number of reviews	Intervention grouping
n=15	Cooking/food preparation/sampling food [27-28, 30, 33-34, 37-38, 40, 44, 50, 53, 57, 66, 74, 76]
n=1	Participation in nutritional campaigns [27]
	Environmental restructuring
n=10	Changes to canteens, vending machines [27, 35, 49-50, 55, 57, 62, 65, 68, 77]
n=13	Availability/provision of healthy foods (fruit and vegetables) [30-31, 35, 39, 52-53, 57-59, 62, 68, 70, 77]
n=1	Choice architecture/nudging towards healthy dietary behaviour [30]
n=4	General modifying home/school environment [32, 41, 44, 49]
	Digital interventions
n=5	Computer-based individualised feedback [49, 52, 60, 63, 68]
n=9	Online content/social media/websites/apps [32, 36, 43, 50, 56, 60, 63, 68, 72]
n=2	Interaction/messaging with others/professionals online [56, 68]
n=5	Video lessons/computer delivered/podcasts [27, 34, 43, 56, 68]
n=4	Gaming/gamification (27, 30, 60, 63)
	Family, peer and/or community involvement
n=16	Parental/community involvement in intervention [30, 32, 34, 39, 42, 49, 53, 55, 57, 59, 61, 67-68, 70, 72-73]
n=2	Family-based goal setting [42, 44]
n=4	Parental role-modelling [42, 51, 58, 62]
n=7	Text messaging/phone calls to families[31, 42, 58, 62-63, 65, 68]
n=16	Newsletters [36-38, 44-45, 49, 51, 53, 57, 62-63, 68-69, 72, 75, 77]
n=12	Take-home resources, materials and leaflets [34-35, 38, 49, 53, 57-59, 65, 68, 75, 77]
n=4	Peer involvement [45, 52, 56, 66]
n=8	Peer role-modelling [27, 32, 39, 55, 57, 62, 68, 77]
n=3	Peer-led sessions [32, 56, 66]
n=1	Supporting cultural/community practices/ethnic foods [37]

Number of reviews	Intervention grouping
	Structural strategies
n=6	Supportive policy [27, 46, 53, 57, 65, 77]
n=3	Provision of vouchers/economic incentives [42, 44, 62]
	Other
n=13	Multicomponent [32, 35-36, 41, 49, 52-53, 57, 59, 67, 73, 75, 77]

Outcomes: Improved nutritional knowledge and healthy eating behaviours

The second stage in mapping the literature was to identify reported evidenced outcomes in relation to 2 key areas of interest: (1) Improved nutritional knowledge and (2) healthier eating behaviour change. Table 9 maps the reviews to the evaluated outcomes and the intervention focus. The totals and percentages in the table represent the number of reviews per outcome expressed as a percentage of the total number of reviews (n=51) (Table 9).

Table 9: Reported outcomes of food education interventions (n=51)

Reported outcomes **Intervention focus**	**Improved dietary intake**	**Increased fruit and/or vegetables**	**Improved healthy behaviours (attitudes to eating and preferences)**	**Improved relationship with food**	**Improved nutrition knowledge/ food literacy**	**Healthy attitudes**	**Improved food skills (practical)**	**Improved skills (cognitive; self-efficacy)**	**Increased dairy and calcium consumption**	**Reduced sugar-sweetened beverages (SSB)**
Nutrition intervention programmes in schools (n=19, 37%)	n=6, 12% (27, 32, 50, 62, 64, 76)	n=7, 14% (32, 38, 45, 53, 65, 70, 76)	n=9, 18% (27, 36, 38, 46, 50, 51, 53, 62, 65)		n=9, 18% (27, 36, 38, 40, 46, 48, 50, 53, 71)	n=3, 6% (27, 50, 62)		n=2, 4% (50, 62)		n=3, 6% (26, 27, 40
Targeting single dietary behaviours, food or food groups n=5, 10%)	n=2, 4% (27, 28)		n=2, 4% (57, 65)							n=1, 2% (66)
Multicomponent (n=17, 33%)	n=4, 8% (27, 28, 64, 72)	n=5, 10% (40, 45, 63, 70, 72)	n=7, 14% (27, 28, 31, 36, 37, 49, 53)		n=2, 4% (36, 37)					n=2, 4% (55, 66)
Tailored education (n=1, 2%)					n=1, 2% (29)					
Integration with an existing curriculum (n=3, 6%)		n=1, 2% (37)	.	n=1, 2% (30)	n=1, 2% (29)					

Reported outcomes Intervention focus	Improved dietary intake	Increased fruit and/or vegetables	Improved healthy behaviours (attitudes to eating and preferences)	Improved relationship with food	Improved nutrition knowledge/ food literacy	Healthy attitudes	Improved food skills (practical)	Improved skills (cognitive; self-efficacy)	Increased dairy and calcium consumption	Reduced sugar-sweetened beverages (SSB)
Garden-based interventions (n=12, 24%)	n=3, 6% (37, 48, 67)	n=6, 12% (29, 37, 43, 48, 60, 74)	n=2, 4% (33, 43)		n=5, 10% (29, 43, 48, 71, 74)	n=2, 4% (35, 43)	n=1, 2% (74)		n=1, 2% (37)	
Cooking and food prep, and tasting/sensory (n=10, 20%)	n=3, 6% (35, 75, 76)	n=4, 8% (69, 74, 75, 76)	n=4, 8% (33, 35, 44, 69)	n=1, 2% (30)	n=4, 8% (44, 71, 74, 75)	n=3, 6% (30, 35, 69)	n=3, 6% (44, 74, 75)	n=2, 4% (44, 75)	n=3, 6% (3, 18, 50	n=1, 2% (76)
Availability/ provision of healthy foods (n=10, 20%)	n=4, 8% (29, 50, 58, 64)		n=3, 6% (41, 42, 49)	n=1, 2% (36)						n=2, 4% (55, 66)
Environment modification/ restructuring (school or home) (n=12, 24%)	n=3, 6% (58, 64, 72)	n=4, 8% (6, 37, 46, 48	n=3, 6% (33, 50, 51)	n=1, 2% (41)	n=1, 2% (74)		n=1, 2% (74)			n=2, 4% (55, 66)
Family-based goals/education (n=6, 12%)	n=1, 2% (58)	n=2, 4% (57, 77)	n=3, 6% (33, 50, 56)							

Reported outcomes Intervention focus	Improved dietary intake	Increased fruit and/or vegetables	Improved healthy behaviours (attitudes to eating and preferences)	Improved relationship with food	Improved nutrition knowledge/ food literacy	Healthy attitudes	Improved food skills (practical)	Improved skills (cognitive; self-efficacy)	Increased dairy and calcium consumption	Reduced sugar-sweetened beverages (SSB)
Fruit and vegetable vouchers (n=1, 2%)			n=1, 2% (33)							
Games/ creative arts (n=3, 6%)			n=2, 4% (33, 35)		n=1, 2% (71)	n=1, 2% (35)				
Role-modelling (n=3, 6%)			n=3, 6% (35, 51, 53)			n=1, 2% (35)				
Positive food messages (n=1, 2%)			n=1, 2% (35)		n=1, 2% (35)	n=1, 2% (35)				
Community-based participatory interventions (n=6, 12%)	n=2, 4% (72, 75)	n=4, 8% (58, 72, 74, 75)	n=2, 4% (36, 50)		n=3, 6% (36, 74, 75)		n=2, 4% (74, 75)	n=1, 2% (75)		

Reported outcomes **Intervention focus**	**Improved dietary intake**	**Increased fruit and/or vegetables**	**Improved healthy behaviours (attitudes to eating and preferences)**	**Improved relationship with food**	**Improved nutrition knowledge/ food literacy**	**Healthy attitudes**	**Improved food skills (practical)**	**Improved skills (cognitive; self-efficacy)**	**Increased dairy and calcium consumption**	**Reduced sugar-sweetened beverages (SSB)**
Peer/parental involvement (n=9, 18%)	n=3, 6% (56, 64, 72)	n=4, 8% (56, 58, 63, 72)	n=6, 12% (36, 42, 49, 51, 53, 56)		n=1, 2% (36)					
Digital interventions (n=5, 10%)	n=1, 2% (73)	n=2, 4% (34, 73)	n=3, 6% (42, 57, 68)		n=2, 4% (34, 68)	n=1, 2% (34)		n=2, 4% (34, 68)		
Gaming (n=2, 4%)	n=1, 2% (73)	n=2, 4% (40, 73)			n=1, 2% (73)			n=1, 2%) (73)		
Computer-based delivery (n=6, 12%)	n=2, 4% (72, 76)	n=3, 6% (40, 72, 76)	n=2, 4% (42, 49)		n=1, 2% (73)			n=1, 2% (73)	n=1, 2% (76)	n=1, 2% (76)
Behavioural interventions/ BCT (n=6, 12%)			n=3, 6% (47, 51, 53)							n=3, 6% (52, 55, 61)

Key findings

Reviews that identified interventions with the highest percentage of positive outcomes found that multicomponent interventions were the most effective (n=17, 33%). These interventions primarily improved healthy behaviours, attitudes toward healthy eating and food preferences rather than directly influencing food intake measures (Table 9). Many reviews examined attitudes and behaviours together, which often made it challenging to separate these findings, as distinctions between the 2 were not always clearly outlined. This emphasises the need to understand the relationship between these 2 outcomes, with the following results outlining what is currently known about the variables to date.

Improved nutritional knowledge

The first outcome examined the effectiveness of interventions in enhancing food and nutrition knowledge among children and adolescents. The primary method found to be effective involved nutrition intervention programmes (n=8) and multicomponent approaches (n=2). Experiential methods, such as cooking (n=1) and gardening (n=3), were also linked to increased knowledge. Social interventions, including parental involvement, also showed positive impacts (n=2), as did positive messaging strategies (n=1) and educational approaches, such as tailoring or integrating content into existing curricula (n=2).

Healthy eating behaviour change

The second outcome, related to dietary behaviours, appeared more frequently in reviews than increased knowledge (Table 9). Research on this outcome includes exploring the cause-and-effect relationship between specific interventions and improvements in dietary behaviour. The improvements most cited among these were nutrition intervention programmes in schools, which showed positive effects on behaviours such as fruit and vegetable intake (n=11), eating preferences (n=9), and skill development (n=2). Specifically, targeting single dietary behaviours (n=4) can have effective results, while integrating food education with an existing curriculum can increase fruit and/or vegetable consumption (n=1) and an improved relationship with food (n=1).

Experiential interventions, such as gardening and cooking, were associated with improved dietary intake (n=3), increased fruit and vegetable consumption (n=6), dairy/calcium intake (n=3), healthier eating preferences (n=5), skill enhancement (n=1), and a better relationship with food (n=1). Creative approaches, such as games and arts (n=2), supported healthier eating habits. Using multicomponent approaches was also a common strategy with successful results across many behavioural change outcomes (Table 9).

Although positive food messaging was specifically effective in only one project for enhancing healthy eating and preferences, digital interventions showed promising results, particularly for fruit and vegetable intake (n=2), healthier eating habits (n=7), and skills in goal-setting and self-efficacy (n=1).

Behavioural change techniques (BCTs) were linked to improved eating preferences (n=3) and reduced consumption of sugar-sweetened beverages (SSBs) (n=3). Additionally, SSB reductions were associated with nutrition intervention programmes (n=2), targeted interventions (n=1), healthy alternative availability and environmental restructuring (n=2), which are a part of multicomponent approaches (n=2).

Environmental interventions with demonstrated effectiveness included restructuring or modifying environments to provide or increase the availability of healthy foods (Table 9). Structural interventions showed some improvements in dietary intake (n=4), eating and food preferences (n=6), relationships with food (n=2), and fruit and/or vegetable consumption (n=2). Support, such as voucher provision (n=1), and social interventions, such as role modelling (n=3), community-based participatory approaches (n=2), and parent or peer involvement (n=6), were also effective in enhancing eating preferences.

For dietary intake and fruit or vegetable consumption, peer and parental involvement (n=3) showed positive impacts. One project highlighted the benefits of community-based participatory interventions (n=1). Family-centred interventions focusing on education and goal setting could support healthy behaviours and food preferences (n=3), dietary intake (n=1), and fruit and vegetable intake (n=1).

The need for a multicomponent approach

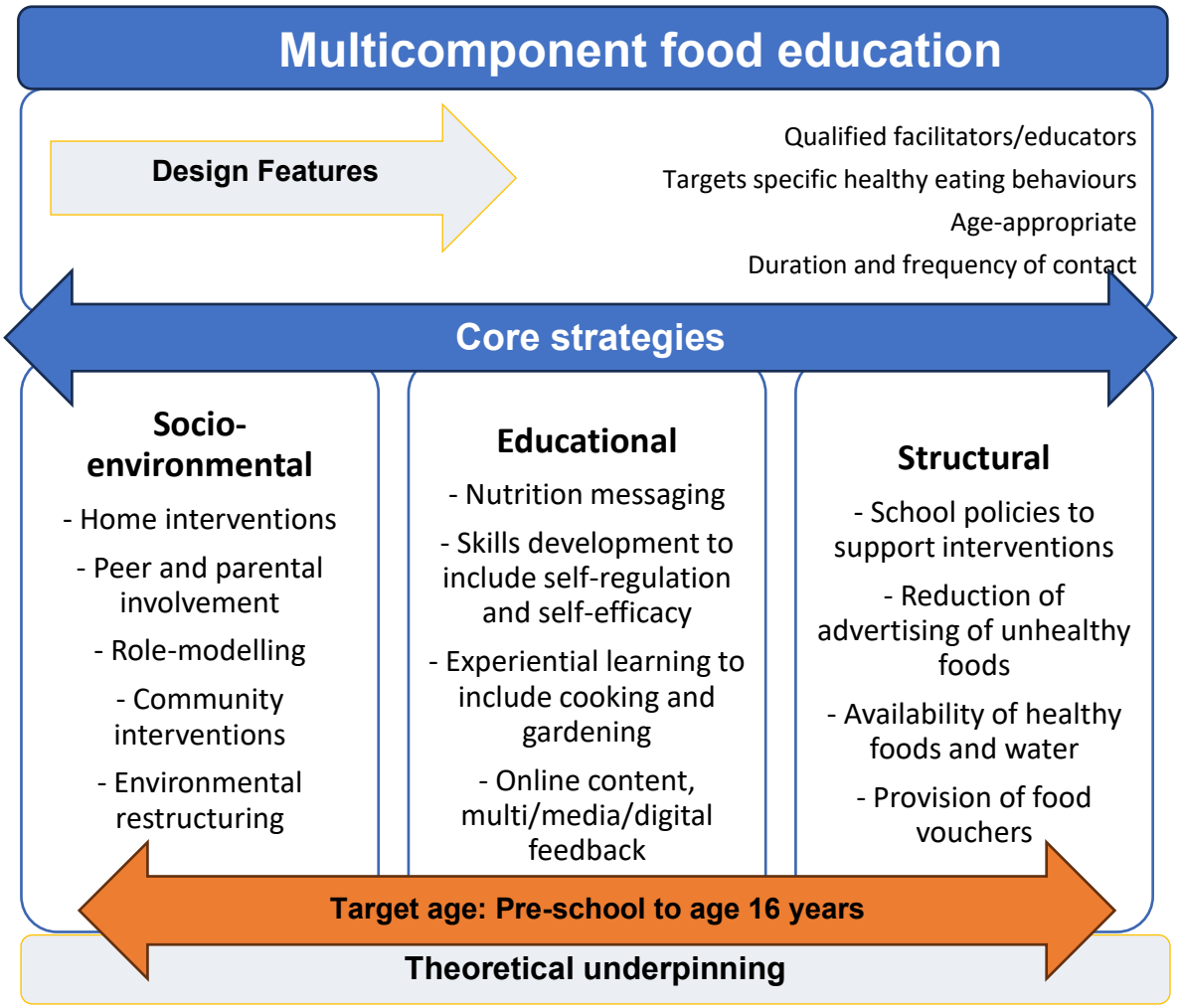
Prowse et al. (2021) [43] reported that interventions targeting single levels, such as knowledge, might not generate large impacts. Lone interventions in nutrition education have also been reported to have short-term impacts [32] because how children choose and access foods depends on multiple factors, including taste, parental control practices, accessibility and advertising [46].

Over the last decade, the evidence base has shifted towards a multi-level understanding of food nutrition education. The most recent reviews suggest that nutrition education should be

delivered as part of a multicomponent approach. Multicomponent approaches using comprehensive, theoretically based strategies can be more successful with children and adolescents [27, 29, 31-33, 38, 52-53, 57, 68, 75, 77]. Specifically, in a systematic review of systematic reviews by Capper et al. (2022) [32], it was reported that the most successful studies combine several key components. These components include nutrition education, environmental restructuring, environmental and educational strategies, increased availability of foods, multimedia and computer-based education feedback, peer and/or parental involvement and the use of behavioural theory as a basis for the intervention.

An extra feature reported by Meiklejohn et al. (2016) [68], Hackman et al. (2014) [75] and Hendrie et al. (2017) [62] relate to the individual/teacher training, qualifications/knowledge level and competency of the person delivering nutrition education [46]. Based on the evidence reported in these reviews, Figure 4 summarises the findings on the features of a successful evidence-based multicomponent approach to food education, incorporating food messaging.

Figure 4: Features for successful evidence-based multicomponent food education



The data collected for analysis came from friendship pairs with children and focus groups with adolescents. Data collected from children and adolescents in NI and Ireland encompassed urban and rural areas to ensure representation across different social classes, ages, regions, and rural and urban locations. Children participated in friendship pairs in primary schools with 12 friendship pairs. Their demographics are presented in Table 10.

Demographics of participants

Friendship pairs

In total, 24 participants across 7 schools were recruited, with all but one school being a co-educational setting. Regarding ethnicity and gender, all participants were white Irish/British, with more girls than boys recruited. Participants were aged between 4 and 12 years, and the average age was 8 (SD 2.4) (Table 10). Note: 'n' is used to show the sample size in the study. For example, friendship pairs with children (12 pairs, (n=24)) means 12 pairs of children with a total of 24 children

Table 10: Participants' characteristics - Friendship pairs (n=24)

Schools	7
Type of school	6 co-educational, one all-girls
Friendship pairs	12 (n=2 per pair)
Mean length of recording	17 minutes
Location: Counties in NI and Ireland	Derry/Londonderry (1 pair), Down (1 pair), Antrim (2 pairs), Donegal (2 pairs), Sligo (2 pairs), Cork (2 pairs, all-girls) and Dublin (2 pairs)
Gender	Male n=10 Female n=14
Ethnicity	White Irish/British (n=24)
Age (years)	4 (n=1) 5 (n=1) 6 (n=4) 7 (n=2) 8 (n=5) 9 (n=3) 10 (n=1) 11 (n=4) 12 (n=3)
Mean age	8 (SD 2.4)

Focus groups

In total, 46 participants across 6 schools were recruited, with all but one school being in a co-educational setting. All participants were white, with the majority being of Irish or British background. Similar to the friendship pairs, more girls than boys were recruited. Participants were aged between 12 and 17 years, and the average age was 15 (SD 1.6) (Table 11).

Table 11: Participant characteristics - Focus groups (n=46)

Schools	6
Type of school	5 co-educational, one all-girls
Focus groups	6 (n=7 or n=8 per group)
Mean length of recording	42 minutes
Location: Counties in NI and Ireland	Antrim, Armagh, Donegal, Sligo, Cork (all-girls) and Dublin
Gender	Male n=16 Female n=30
Ethnicity	White Irish or British (n=44) Other white background (n=2)
Age (years)	12 (n=6) 13 (n=7) 14 (n=6) 15 (n=15) 16 (n=4) 17 (n=8)
Mean age	15 (SD 1.6)

Key themes

Three overarching themes were generated from friendship pairs and focus groups:

1. Food messages that made the most impact
2. Food messaging through surveillance and monitoring
3. Ideas to improve food messaging and nutrition education

Theme 1: Food messaging that made the most impact

In theme one, participants recalled food advertisements and social media content that contained frequent references to food, for what they classified as ‘good’ and ‘bad’ food.

Younger participants (age <12 years) recalled school campaigns for vegetables with prizes and rewards and how taking part exposed them to new tastes. However, not all participants felt that these campaigns were effective. Some older participants (age > 12) reported that just tasting vegetables was not enough and that they would have liked to know more about how to use the vegetables in recipes, demonstrating age-related needs.

There were also benefits and challenges expressed about peer influence. Participants explained that if they saw one of their friends who liked or did not like a vegetable, this could then influence their views either way. For example, one participant reported: ‘Sometimes others just didn’t even try the vegetables – like the broccoli. And that could put you off. But same goes if they did like them – you might try it too.’ (Male, 14).

Participants explained that well-known supermarkets had recently started to use vegetable campaigns with prizes and rewards. For example, ‘There used to be something (in the supermarket) that it would be – Like you could collect Smurfs for like, the amount of vegetables you buy. So, if you spent, I think it was like, €10 on veg, you'd get like, a little character and you'd have to like build the collection.’ (Female, 17).

Participants thought that while this encouraged them to think about eating vegetables, sometimes they were more interested in the rewards and prizes than the vegetables. In general, participants did not recall watching food advertisements on TV. However, they did recall posters at bus shelters, on the way to school, in their local community and on social media platforms such as YouTube, Snapchat, Instagram and TikTok. Food advertisements that were highly coloured or included offers such as a certain percentage off seemed to be more memorable. When participants occasionally recalled TV advertisements, they tended to remember memorable music, comedy elements, rewards and prizes, for example, the Haribo advertisement or McDonald’s Happy Meal.

TikTok was the most frequently mentioned social media platform, particularly among older participants (age > 12). Many participants specifically mentioned following ‘influencers’ who had food recipes that they liked and considered healthy. YouTube was noted by older adolescents (age 14+) for its ‘food challenges’. For instance, the concept of ‘mukbangs’ was mentioned as gaining popularity. Mukbangs are live-streamed videos where a host consumes large quantities of food, often while interacting with an audience. Participants also mentioned watching videos where people tried out new local restaurants that sometimes issued the food challenges via social media.

This theme found that the most impactful food messages were those that were framed to engage interest and delivered collaboratively, presented in a non-forceful manner. This suggests moving away from traditional expert teaching approaches to working together with children and adolescents.

Theme 2: Food messaging through surveillance and monitoring

In theme 2, participants recalled hearing frequent food and nutrition messages from teachers in school, family members and from coaches if they were involved in sporting clubs.

National and primary schools tended to have a 'lunch box policy, which included regular efforts by schools to encourage younger participants to reduce the number of 'treats' they had in a week. Participants often defined a treat as 'bad food' and included items such as chocolate, biscuits or crisps. They explained that their schools generally had rules regarding treats, such as no treats, one treat per week or treats only on special occasions.

Most participants in post-primary schools recalled the recent Safefood campaign – START. The campaign was regarded as realistic and helpful. However, older adolescent participants thought it could be improved by providing gradual swaps for treats rather than eliminating them in one go.

All participants, apart from the very youngest (age 4-5 years), were familiar with either the Eatwell Guide (NI) or the Food Pyramid (Ireland). Most participants said they understood portion size but did not think about it often.

The younger the participants, the less likely they were to think about what they had in their lunch box – they relied on parents, mostly mothers, to make their lunch. Older participants thought that cooked school lunches could be healthier, and they would be more likely to eat them if they were. Older adolescent participants also mentioned the challenge of staying hydrated, with mothers being cited as the most likely person to remind them to drink water instead of more 'sugary drinks. Avoiding sugary drinks was cited as one of the more difficult food messages to follow.

While in the family, mothers and fathers seemed to communicate most of the food messaging, while grandparents were mentioned significantly, in both negative and positive ways. One participant reported: 'I learn from my mum. She'd cook stuff and tell me, 'Oh, don't put as much of that in it.' 'Only put a tiny bit of salt in.' 'It says so much salt – you need that.' She'd say like, 'Take it down a wee bit so that it is a wee bit healthier.' (Male, 15)

In a positive sense, younger participants said that many of their grandfathers had vegetable gardens, and they enjoyed learning how to grow different types of fruit and vegetables. Grandmothers also seemed to cook on special occasions, and sometimes, younger female participants especially enjoyed learning to cook with their grandmothers. Grandparents were also seen as a source of 'treats', and the frequency of treats could sometimes cause tension in the family. Participants saw this as a negative, but they also considered it a kind thing to do and 'normal' for grandparents.

Most participants involved in sports or clubs such as scouts or Girl Guides mentioned having at least one nutrition education talk from a coach or someone brought into the club. The topics covered included 'how to eat before a game' and 'keep well hydrated'. Participants were told to eat 'protein' to give them energy, but they were unclear why. In general, few participants, regardless of age, seemed to understand the role of different nutrients in the diet. Also, coaches or other experts did not seem to cover post-game or post-meeting nutrition.

This theme found that food messages are everywhere, both healthy and less healthy. Children and adolescents report being monitored by others, such as families, schools and coaches, but this is expected and accepted.

To effectively cut through the 'noise' of less healthy food messages, the messages and their delivery need to be consistent and accurate from the different sources.

Theme 3 – Ideas to improve food messaging and nutrition education

In theme 3, there was a range of ideas to improve how participants learn about food and nutrition. Younger participants wanted to grow more fruit and vegetables and then learn how to cook them. A few participants suggested selling the fruit and vegetables either in the school tuck shop or having a fun day where they had a fruit and vegetable stall for the local community. For example, a participant reported: 'You could have a growing contest, like if you had a wee bed, you could divide into 5 plots and then they could have a growing contest and then you could eat the vegetables in school.' (Male, 8)

Exposure to a wider variety of food through a 'taste the world day' was frequently mentioned, with some secondary schools already doing this. Participants generally wanted more practical activities, including tasting and cooking new food and some suggested visiting local food producers to see how different foods are made.

While the Eatwell Guide and Food Pyramid guides are well known, many older adolescent participants felt they could be more practical. There was a consensus that while they could read and understand food labels, it would be much more practical to get examples of ‘tasty and healthy’ meals and recipes which were also clearly labelled with all the nutrients.

Some participants believed that ‘healthy food’ is often not that tasty. Some of the participants were worried that the guides gave the impression that certain foods were ‘bad’, and this could cause problems of too much dietary restriction. One participant offered feedback on the Eatwell Guide: ‘I think if people seeing these messages took them really seriously – so for example, on the dairy, on cheese, lower fat options, lower sugar options. Some people might take that too literally at times and maybe take that out of their diet completely and just switch you off food.’ (Female, 14)

This theme found that the food guides are well known, but more practical activities related to children’s and adolescents’ interests are required.

Summary

Younger participants recalled school and supermarket vegetable campaigns that included prizes that sometimes resulted in them focusing more on rewards than on actual vegetable consumption. Older participants expressed a need for practical activities, such as learning recipes, and highlighted the influence of peers and the impact of colourful advertisements and influencers on social media platforms.

Participants received food and nutrition messages from various sources, including teachers, parents, grandparents, and coaches, with schools often enforcing ’lunch box policies’.

Participants wanted more hands-on, practical activities to learn about food, such as growing, tasting, and cooking fruits and vegetables, and suggested holding events or having produce stalls in schools. Older adolescents valued familiar tools like the Eatwell Guide but wanted more practical, tasty meal ideas and recipes labelled with clear nutritional information. They felt some guidance unintentionally labelled or implied certain foods were ‘bad’.

These findings demonstrate that food messaging takes place in various areas, is influenced by key adults, role models and peers, and there is a need for age-appropriate approaches.

Stage 3: Quantitative and qualitative research with stakeholders

This stage consisted of a quantitative online survey, qualitative interviews and focus groups with stakeholders (teachers, parents, and club and camp leaders).

Stage 3a: Survey results

Data were collected from adult participants through an online survey (n=272) about their views on various topics related to food messaging for children and adolescents. The survey covered topics such as the participants' familiarity with and ability to follow dietary guidelines, their perspectives on memorable factors, and the social media tools, information sources, media sources, channels and delivery methods used for food messages for children and adolescents. Participants were also asked about barriers and facilitators to family healthy eating.

Demographics of participants

Most survey respondents were female, making up 85% of the total, while males represented 14%. The remaining 1% of respondents reported 'Prefer not to say'. Parents and guardians made up 57% of roles, followed by teachers at 28% and club or camp leaders at 15%. The largest age group represented was individuals aged 41 to 49, making up 34%. Over half of the participants held a postgraduate degree (52%). Most respondents were employed (74%), and they primarily worked with or cared for post-primary school children (45%), while 34% of respondents had 2 children at home (Table 12).

Table 12: Characteristics of survey respondents (n=272)

Characteristic	**n**	**%**
Region		
Northern Ireland	114	42
Ireland	158	58
Area		
Urban	147	54
Rural	125	46
Role		
Parent/guardian	156	57
Teacher/educator	76	28
Club/camp leader	40	15
Sex		

Characteristic	n	%
Female	231	85
Male	39	14
Prefer not to say	2	1
Age (years)		
18-25	24	9
26-30	16	6
31-40	65	23
41-49	93	34
50-59	64	24
60 or over	10	4
Education		
Prefer not to say	5	2
GCSE, Junior certificate or equivalent	4	2
A-Level, Leaving Certificate or further education	33	12
Undergraduate degree	66	24
Postgraduate degree	142	52
Doctorate	22	8

Characteristic	N	
Employment status*		
Prefer not to say	1	
Unemployed	9	
Unable to work for health reasons	9	
Retired	9	
Full-time or part-time education	20	
Employed	216	
Self-employed	27	

Children you work with or care for*	**N**	
Pre-school/nursery school age	61	
Primary school age	144	
Post-primary school age	170	
Children/adolescents in the home		
0	69	25
1	62	23
2	92	34
3	37	14
4	12	4
Teachers' experience level		
Less than one	4	5
1-3 years	7	9
4-5 years	9	12
6-10 years	9	12
11-20 years	17	22
20+ years	30	39
Club or camp leaders' experience level		
Less than one year	5	13
1-3 years	8	20
4-5 years	7	18
6-10 years	2	`5
11-20 years	10	25
20+ years	8	20

**Participants belonged to more than one category*

Summary of reported survey frequencies

The survey revealed that adults show high familiarity with general dietary messages, such as 'drinking 6-8 glasses of water' (70%) and 'choosing wholegrain options' (64%). However, familiarity drops for more specific or restrictive advice, such as 'eating more beans and pulses' (37%) and 'limiting fruit juice and smoothies' (42%). 'Recommended calorie intake' (35%) and 'recommended portion sizes' (33%) have the lowest levels of familiarity.

This trend may indicate that while general healthy eating concepts are well understood, more detailed dietary recommendations are less familiar. Similar patterns emerge when it comes to adults' perceptions of the ability of children and adolescents to follow these

guidelines. Messages such as ‘drinking 6 to 8 glasses of water’ (24%) and ‘eating the rainbow of fruits and vegetables’ (17%) are perceived as easier for children and adolescents to follow. In contrast, messages such as ‘limiting foods high in fat, sugar, and salt’ (12%) and ‘eating more beans and pulses’ (7%) are rated as more difficult to follow.

To assess different types of messages on the same topic, the survey had 3 messages about fruit and vegetables:

- Eat 5 to 7 portions of fruit and vegetables each day
- Eat the rainbow of fruits and vegetables
- Half of your plate is recommended to be fruit and vegetables

Participants showed higher familiarity with ‘eat the rainbow of fruits and vegetables’ (68%). When evaluating children’s and adolescents' ability to follow these messages, participants also perceived ‘eating the rainbow of fruits and vegetables’ (17%) as easier compared to ‘eat 5 to 7 portions’ (15%) and half of your plate as fruits and vegetables’ (12%). This suggests that participants generally understand the importance of fruit and vegetable intake, but messages with more specific numerical targets may be more challenging to follow.

Repetition (53%) and age-related messaging (43%) were rated highest as factors for making food messages memorable for children and adolescents. Sports-related (41%) and hobby-related messages (40%) were also rated highly. Fear-based messages (11%) and those related to gender and identity (10%) were rated lowest. Encouraging or supporting messages were rated higher (36%) than fear, showing that positive reinforcement may resonate better with children and adolescents.

For social media tools used in food messaging, TikTok (60%) and YouTube (43%) showed strong agreement, indicating a strong preference for engaging and visual content. Snapchat (38%) and Instagram (35%) also showed strong agreement, suggesting that children and adolescents may prefer platforms that are both visual and socially interactive. Pinterest (5%), Twitch (5%) and LinkedIn (3%) were rated among the lowest, suggesting that more niche or professional-focused platforms may not have a wide reach for children and adolescents. Overall, children and adolescents refer social platforms that combine entertainment with social influence.

Peers (46%), friends (45%) and family (42%) were rated as key sources of information for children, while for adolescents, friends (58%) and peers (57%) were rated higher than family.

Social media influencers for adolescents were rated more highly (56%) than children (27%). Government institutions, such as the Food Standards Agency and Public Health Agency (Northern Ireland), were rated much lower by both groups. This indicates a clear preference for peer and social media-driven messaging over formal institutional sources.

TV advertising (43%), streaming services (37%), and online advertising (37%) were rated highest as media sources for children, suggesting a strong impact of visual, easily accessible media. For adolescents, influencers or brand ambassadors (59%) were rated higher, followed by streaming services (53%) and online advertising (51%). Both groups rated traditional media such as books and newspapers much lower, reflecting a shift towards digital media for communication.

The survey highlights that peer role modelling (47%), cooking classes (45%) and healthy school meals (44%) are rated more strongly as methods for delivering food messages. Family cooking events (43%) also play an important role, emphasising the value of hands-on, interactive and family-centred activities. The least-rated delivery methods include public health campaigns (11%) and expert presentations (10%). For food messaging channels, face-to-face conversations (36%) remain important. Video blogs (24%) and animations (24%) are also rated strongly. In contrast, channels such as text messaging (7%) and telephone calls (4%) are rated much lower, likely due to the preference for digital and visual formats.

Affordability of healthy food (33%) and lack of time to prepare healthy meals (18%) were rated as the most significant barriers to healthy eating in the families of the survey participants. The data highlights that practical challenges, such as time and cost, are the main issues, while social factors such as pressure from friends (1%) and access to shops (1%) are perceived as less impactful barriers to healthy eating.

The most important facilitators to healthy eating include lowering the cost of fruits and vegetables (32%) and eating together as a family (31%). Adolescents and children both benefit from family involvement and affordability measures. Other facilitators, such as help with understanding food labels and planning affordable meals, fall into the middle ranks, suggesting these are helpful but not as crucial as cost and family dynamics.

Children versus adolescents

The research showed a consistent pattern across topics such as information sources, media influences, and effective delivery methods: Adolescents are more influenced by peers and social media, whereas children are more influenced by family and visual media.

Both groups prefer digital content, with adolescents leaning heavily towards influencer-driven media compared to children. Adolescents have a stronger connection to social media influencers and streaming content, while children respond to traditional TV advertising and family-oriented activities.

Across both groups, peer influence is significant, and cost-related barriers are consistently highlighted. Positive and interactive methods, such as peer role modelling, cooking classes and family activities, are preferred across all ages, with less preference given to authoritative or fear-based messaging.

Adults' familiarity with food messages from dietary guidelines

Participants rated food messages from not familiar to very familiar (Table 13). Adults are familiar with messages such as drinking 6 to 8 glasses of water (70%), choosing wholegrains (64%), and eating fruits and vegetables (68%). However, messages such as eating more beans and pulses (37%), limiting fruit juice/smoothies (42%), and recommended calorie intake (35%) show lower familiarity. Recommended portion sizes (33%) had the lowest level of familiarity.

Table 13: Familiarity of food messages reported by adults (n=272)

Food messages	**Not familiar n (%)**	**Slightly familiar n (%)**	**Neutral n (%)**	**Moderately familiar n (%)**	**Very familiar n (%)**
Choose wholegrain or higher fibre versions of starchy carbohydrates	2 (1)	15 (6)	27 (10)	53 (19)	175 (64)
Drink 6 to 8 glasses per day of water, and lower-fat milk or sugar-free drinks	2 (1)	7 (3)	20 (7)	51 (19)	192 (70)
Eat 5 to 7 portions of fruits and vegetables per day	7 (3)	15 (6)	25 (9)	45 (16)	180 (66)
Eat less red and processed meat	2 (1)	25 (9)	33 (12)	66 (24)	146 (54)

Food messages	Not familiar n (%)	Slightly familiar n (%)	Neutral n (%)	Moderately familiar n (%)	Very familiar n (%)
Eat more beans and pulses	22 (8)	32 (12)	52 (19)	64 (24)	102 (37)
Eat the rainbow of fruits and vegetables	9 (3)	16 (6)	18 (7)	43 (16)	186 (68)
If hungry between meals, eat fruit rather than sugary snacks	1 (1)	18 (6)	33 (12)	48 (18)	172 (63)
Limit foods high in fat, sugar and salt to once or twice a week	14 (5)	17 (6)	45 (17)	58 (21)	138 (51)
Limit fruit juice and/or smoothies	17 (6)	30 (11)	56 (21)	54 (20)	115 (42)
Recommended calories	15 (6)	31 (11)	61 (22)	70 (26)	95 (35)
Recommended food portion sizes	10 (4)	32 (12)	65 (24)	74 (27)	91 (33)
Half of your plate recommended to be fruits and vegetables	5 (2)	23 (9)	41 (15)	77 (28)	126 (46)

Ability to follow dietary guidelines: Adults view of children and adolescents

Participants rated food messages for children and adolescents from difficult to easy to follow (Table 14). Limiting high-fat/sugar/salt foods (38%), eating more beans and pulses (32%), and recommended calories (27%) were rated most difficult to follow. Messages easier to follow include drinking water (24%), eating the rainbow of fruits and vegetables (17%) and limiting fruit juice and/or smoothies (14%). Different food messaging on fruits and vegetables were rated slightly differently, with eat the rainbow of fruits and vegetables (17%) rated easier to follow than eat 5 to 7 portions of fruits and vegetables per day (15%) and half of your plate recommended to be fruits and vegetables (12%).

Table 14: Adult views of food messages that children and adolescents follow (n=272)

Food messages	Difficult n (%)	Somewhat difficult n (%)	Neutral n (%)	Somewhat easy n (%)	Easy n (%)
Choose wholegrain or higher fibre versions of starchy carbohydrates	41 (15)	63 (23)	76 (28)	55 (20)	37 (14)

Food messages	Difficult n (%)	Somewhat difficult n (%)	Neutral n (%)	Somewhat easy n (%)	Easy n (%)
Drink 6 to 8 glasses per day of water, lower-fat milk or sugar-free drinks	30 (11)	45 (16)	62 (23)	70 (26)	65 (24)
Eat 5 to 7 portions of fruits and vegetables per day	61 (22)	52 (19)	66 (24)	53 (20)	40 (15)
Eat less red and processed meat	32 (12)	62 (23)	87 (32)	53 (19)	38 (14)
Eat more beans and pulses	87 (32)	77 (28)	55 (20)	33 (12)	20 (7)
Eat the rainbow of fruits and vegetables	51 (19)	61 (22)	65 (24)	48 (18)	47 (17)
If hungry between meals, eat fruit rather than sugary snacks	49 (18)	63 (23)	71 (26)	56 (21)	33 (12)
Limit foods high in fat, sugar and salt to once or twice a week	105 (38)	73 (27)	40 (15)	22 (8)	32 (12)
Limit fruit juice and/or smoothies	37 (14)	75 (27)	65 (24)	57 (21)	38 (14)
Recommended calories	74 (27)	64 (24)	72 (26)	34 (13)	28 (10)
Recommended food portion sizes	58 (21)	61 (23)	77 (28)	42 (15)	34 (13)
Half of your plate recommended to be fruits and vegetables	52 (19)	71 (26)	64 (24)	53 (19)	32 (12)

Memorable food message factors for children and adolescents

Participants rated different factors to make food messages more memorable for children and adolescents (Table 15). The most reported memorable factors for food messages were: repetition (53%), age-related (43%), sports-related (41%) and hobby- or interest-related (40%). While the least reported memorable factors for food messages were: fear-related (38%) and gender-related or identity-related (27%).

Table 15: Most memorable food message factors reported for children and adolescents (n=272)

Memorable food message factors	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Age-related	7 (3)	8 (3)	53 (19)	86 (32)	118 (43)
Encourage or support	8 (3)	18 (7)	47 (17)	100 (37)	99 (36)
Explain the benefits of a healthy diet	7 (3)	32 (12)	64 (23)	87 (32)	82 (30)
Fear	105 (38)	46 (17)	68 (25)	24 (9)	29 (11)
From a celebrity	39 (14)	41 (15)	60 (22)	70 (26)	62 (23)
From an influencer	37 (14)	22 (8)	53 (19)	73 (27)	87 (32)
Gender-related or identity-related	74 (27)	51 (19)	83 (31)	36 (13)	28 (10)
Hobby-related or interest-related	5 (2)	20 (7)	61 (23)	76 (28)	110 (40)
Humour	12 (5)	17 (6)	43 (16)	94 (34)	106 (39)
Lead to a practical action	12 (5)	31 (11)	74 (27)	89 (33)	66 (24)
Novelty	15 (6)	28 (10)	64 (23)	95 (35)	70 (26)
Repetition	9 (3)	6 (2)	30 (11)	83 (31)	144 (53)
Sports-related	8 (3)	21 (8)	61 (22)	70 (26)	112 (41)
Story-based	8 (3)	14 (5)	58 (21)	100 (37)	92 (34)
Use a character	29 (11)	35 (13)	81 (30)	78 (28)	49 (18)
Use a jingle	24 (9)	34 (13)	74 (27)	83 (30)	57 (21)
Use music	23 (8)	32 (12)	74 (27)	81 (30)	62 (23)

Social media tools children and adolescents use for food messaging

Participants rated the social media tools children and adolescents use for food messaging (Table 16). The most reported social tools used for food messaging by children and adolescents were TikTok (60%), YouTube (43%), Snapchat (38%) and Instagram (34.7%). Most disagreement was for LinkedIn (70%) and Pinterest (47%), Twitch (43%) and Discord (43%).

Table 16: Social media tools reported that children and adolescents use for food messaging (n=272)

Social media tools	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Discord	117 (43)	53 (19)	78 (29)	14 (5)	10 (4)
Facebook	106 (39)	70 (26)	58 (21)	24 (9)	14 (5)
Instagram	28 (10)	21 (8)	57 (21)	71 (26)	95 (35)
LinkedIn	193 (71)	36 (13)	32 (12)	2 (1)	9 (3)
Pinterest	129 (47)	55 (20)	53 (20)	21 (8)	14 (5)
Snapchat	35 (13)	26 (10)	46 (17)	60 (22)	105 (38)
Spotify	63 (23)	55 (20)	79 (29)	38 (14)	37 (14)
TikTok	23 (9)	8 (3)	31 (11)	47 (17)	163 (60)
Twitch	118 (43)	48 (18)	75 (28)	17 (6)	14 (5)
X/Twitter	108 (39)	70 (26)	65 (24)	18 (7)	11 (4)
YouTube	19 (7)	20 (7)	50 (18)	67 (25)	116 (43)

Information sources children use for food messages

Participants rated information sources children use for food messaging (Table 17). The stakeholders reported that the information sources children use for food messages were peers (53%), friends (45%), family (42%) and social media influencers/creators (27%). Most disagreement was for the Food Standards Agency (40%), Public Health Agency (39%) and Department of Health (38%).

Table 17: Information sources reported that children use for food messaging (n=272)

Information sources	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Celebrities/famous people	29 (11)	38 (14)	68 (25)	80 (29)	57 (21)
Charities	100 (37)	76 (28)	69 (25)	20 (7)	7 (3)
Department of Health	103 (38)	72 (26)	67 (25)	20 (7)	10 (4)
Dietitian/nutritionist	53 (20)	80 (29)	80 (29)	38 (14)	21 (8)
Family	8 (3)	18 (7)	43 (16)	88 (32)	115 (42)
Farmers/other food producers	69 (25)	81 (30)	92 (34)	20 (7)	10 (4)
Food Standards Agency	110 (40)	74 (27)	57 (21)	21 (8)	10 (4)
Friends	3 (1)	3 (1)	31 (12)	112 (41)	123 (45)
GP/nurse/other healthcare	38 (14)	70 (26)	85 (31)	48 (18)	31 (11)
Local role models/leaders	19 (7)	42 (15)	78 (29)	79 (29)	54 (20)
Non-governmental bodies	102 (37)	79 (29)	67 (25)	14 (5)	10 (4)
Peers	3 (1)	4 (2)	34 (12)	104 (38)	127 (47)
Public Health Agency	107 (39)	68 (25)	63 (23)	26 (10)	8 (3)
Social media influencers/creators	30 (11)	33 (12)	54 (20)	80 (29)	75 (28)
Teachers/youth leaders	9 (4)	30 (11)	85 (31)	93 (34)	55 (20)
Safefood	99 (36)	75 (28)	60 (22)	27 (10)	11 (4)

Information sources adolescents use for food messages

Participants rated information sources adolescents use for food messaging (Table 18). The stakeholders reported that the information sources adolescents use for food messages were friends (58%), peers (57%) and social media influencers/creators (56%). Most disagreement was for charities (39%), non-governmental bodies (39%), the Public Health Agency (38%) and the Food Standards Agency (37%).

Table 18: Information sources reported that adolescents use for food messages (n=272)

Information sources	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Celebrities/famous people	7 (2)	15 (6)	38 (14)	82 (30)	130 (48)
Charities	107 (39)	65 (24)	80 (29)	14 (5)	6 (3)
Department of Health	99 (36)	64 (23)	79 (29)	23 (9)	7 (3)
Dietitian/nutritionist	54 (20)	64 (23)	93 (34)	43 (16)	18 (7)
Family	18 (7)	22 (8)	85 (31)	87 (32)	60 (22)
Farmers/other food producers	73 (27)	67 (25)	103 (37)	22 (8)	7 (3)
Food Standards Agency	101 (37)	65 (24)	72 (26)	27 (10)	7 (3)
Friends	4 (2)	5 (2)	24 (9)	79 (29)	160 (58)
GP/nurse/other healthcare	57 (21)	56 (21)	102 (37)	41 (15)	16 (6)
Local role models/leaders	15 (6)	21 (8)	77 (28)	86 (31)	73 (27)
Non-governmental bodies	107 (39)	66 (24)	80 (29)	12 (5)	7 (3)
Peers	4 (2)	5 (2)	27 (10)	80 (29)	156 (57)
Public Health Agency	103 (38)	64 (24)	72 (26)	24 (9)	9 (3)
Social media influencers/creators	10 (4)	10 (4)	26 (10)	72 (26)	154 (56)
Teachers/youth leaders	15 (6)	42 (15)	111 (41)	76 (28)	28 (10)
Safefood	96 (35)	61 (23)	79 (29)	28 (10)	8 (3)

Media sources children use for food messages

Participants rated media sources children use for food messaging (Table 19). Most agreement was for TV advertising (43%), streaming services (37%), online advertising (37%) and influencers/brand ambassadors (35%). Most disagreement was for online courses (45%), leaflets/magazines/newspapers (37%), news media (36%) and books (32%).

Table 19: Media sources reported that children use for food messages (n=272)

Media sources	Strongly disagree n (n%)	Disagree n (n%)	Neutral n (n%)	Agree n (n%)	Strongly agree n (n%)
Books	87 (32)	61 (22)	71 (26)	38 (14)	15 (6)
Influencers/brand ambassadors	22 (8)	31 (11)	62 (23)	62 (23)	95 (35)
Leaflets/magazines/newspapers	102 (37)	74 (27)	59 (22)	26 (10)	11 (4)
News media	99 (36)	68 (25)	69 (26)	28 (10)	8 (3)
Online advertising	19 (7)	24 (9)	55 (20)	74 (27)	100 (37)
Online courses	123 (45)	68 (25)	65 (24)	9 (3)	7 (3)
Outside advertising/billboards	47 (17)	75 (27)	81 (30)	54 (20)	15 (6)
Streaming services	15 (6)	15 (6)	60 (22)	81 (29)	101 (37)
TV advertising	21 (8)	25 (9)	32 (12)	77 (28)	117 (43)

Media sources adolescents use for food messages

Participants rated media sources adolescents use for food messaging (Table 20). The most reported media sources for food messaging for adolescents were: Influencers/brand ambassadors (59%), streaming services (53%) and online advertising (52%). Most disagreements were for online courses (31%), books (26%), and leaflets/magazines/newspapers (25%).

Table 20: Media sources reported that adolescents use for food messages (n=272)

Media sources	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Books	72 (26)	75 (27)	89 (33)	26 (10)	10 (4)
Influencers/brand ambassadors	7 (3)	7 (3)	29 (10)	68 (25)	161 (59)
Leaflets/magazines/newspapers	69 (25)	65 (24)	83 (31)	38 (14)	17 (6)
News media	52 (19)	54 (20)	93 (34)	45 (17)	28 (10)
Online advertising	8 (3)	10 (4)	37 (14)	77 (28)	140 (51)
Online courses	86 (32)	61 (22)	90 (33)	21 (8)	14 (5)
Outside advertising/billboards	45 (17)	50 (18)	99 (36)	58 (21)	20 (8)
Streaming services	8 (3)	8 (3)	33 (12)	79 (29)	144 (53)
TV advertising	22 (8)	27 (10)	55 (20)	82 (30)	86 (32)

Methods of delivering food messaging most suitable for children and adolescents

Participants rated methods of delivering food messages most suitable for children and adolescents (Table 21). The most reported methods of delivering food messages for children and adolescents were: peer role modelling (47%), cooking classes (45%), healthy school meals (44%) and family cooking days/nights (43%). The least reported methods were: public health campaigns (11%), TV/advertising campaigns (10%) and expert presentations (10%).

Table 21: Delivery methods reported for children and adolescent food messages (n=272)

Methods of delivering food messages	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Cafeteria initiative (Healthy school meals)	8 (3)	16 (6)	44 (16)	83 (31)	121 (44)
Cooking classes	13 (5)	14 (5)	41 (15)	81 (30)	123 (45)
Educational videos	22 (8)	38 (14)	96 (35)	69 (25)	47 (18)
Educational games and resources	9 (4)	14 (5)	55 (20)	99 (36)	95 (35)
Expert presentations	27 (10)	34 (12)	89 (33)	68 (25)	54 (20)
Family cooking days/nights	10 (3)	18 (7)	40 (15)	87 (32)	117 (43)
Farm-to-fork gardening programmes	26 (10)	43 (16)	59 (22)	67 (25)	77 (28)
Food and nutrition school policy	18 (7)	26 (10)	49 (18)	73 (26)	106 (39)
Mobile apps	16 (6)	25 (9)	51 (19)	85 (31)	95 (35)
Nutrition board games	21 (8)	35 (13)	87 (32)	69 (25)	60 (22)
Nutrition education curriculum	11 (4)	15 (6)	57 (21)	84 (31)	105 (38)
Parent workshops	14 (5)	23 (9)	63 (23)	81 (30)	91 (33)
Peer role-modelling	6 (2)	12 (5)	42 (15)	82 (30)	130 (48)
Public health campaigns	31 (11)	58 (21)	89 (33)	59 (22)	35 (13)
Social media campaigns	17 (6)	14 (5)	47 (18)	93 (34)	101 (37)
Storybooks and colouring books	22 (8)	27 (10)	91 (33)	72 (27)	60 (22)
TV/advertising campaigns	28 (10)	41 (15)	79 (29)	63 (23)	61 (23)
Take-home materials	20 (7)	37 (14)	79 (29)	69 (25)	67 (25)
Taste-testing sessions	15 (6)	9 (3)	36 (13)	97 (36)	115 (42)
Wellness ambassadors	19 (7)	44 (16)	82 (30)	71 (26)	56 (21)

Channels children and adolescents pay attention to for food messaging

Participants rated the channels that children and adolescents pay attention to for food messaging (Table 22). Most agreement was for face-to-face conversations (36%), video blogs (24%) and animations (24%). Most disagreement was for telephone/mobile calls (32%), graphs and charts (28%) and text messages (25%).

Table 22: Channels reported for children and adolescent food messages (n=272)

Channels for food messaging	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)
Animations	14 (5)	22 (8)	54 (20)	117 (43)	65 (24)
Artificial intelligence (AI) tools	50 (18)	54 (20)	92 (34)	49 (18)	27 (10)
Blogs/vlogs	23 (8)	39 (14)	54 (20)	90 (33	66 (24)
Collaboration tools	37 (14)	48 (18)	105 (38)	54 (20)	28 (10)
Face-to-face conversations	11 (4)	18 (7)	56 (20)	89 (33)	98 (36)
Graphs and charts	76 (28)	67 (25)	91 (33)	26 (10)	12 (4)
Infographics	53 (19)	41 (15)	100 (37)	58 (21)	20 (8)
Instant messages	52 (19)	37 (14)	78 (29)	60 (22)	45 (16)
Music	20 (8)	28 (10)	84 (31)	90 (33)	50 (18)
Podcasts	38 (14)	45 (16)	81 (30)	67 (25)	41 (15)
Recorded audio messages	52 (19)	64 (24)	94 (34)	52 (19)	10 (4)
Telephone/mobile calls	87 (32)	62 (23)	81 (30)	30 (11)	12 (4)
Text messages (SMS)	69 (25)	50 (18)	80 (29)	53 (20)	20 (8)
Videos	11 (4)	19 (7)	65 (24)	124 (45)	53 (20)

Barriers to healthy eating

The top barrier to healthy eating (Figure 5) is the affordability of healthy food options, ranked first by 33% of participants, followed by lack of time to prepare healthy meals, ranked first by 18%. Barriers such as a lack of knowledge of healthy nutrition (16%) and a lack of ideas for tasty and healthy meals (11%) were also frequently ranked highly. In contrast, access/distance to local shops (1%) and pressure from friends and family (1%) were ranked closer to the bottom.

Figure 5: Barriers to healthy eating in rank order (n=272)

Facilitators to healthy eating

Figure 6 shows that lower-cost fruits and vegetables were ranked the most important facilitator for healthy eating, frequently ranked first (33%). Eating together as a family also ranked highly, often in first place (31%). Understanding food labels and planning affordable meals featured more prominently in the middle ranks. In contrast, better food policies that address sustainability and local produce and role models were more commonly ranked last (9th and 10th). Overall, affordability and family involvement are ranked as key facilitators for healthy eating in the family.

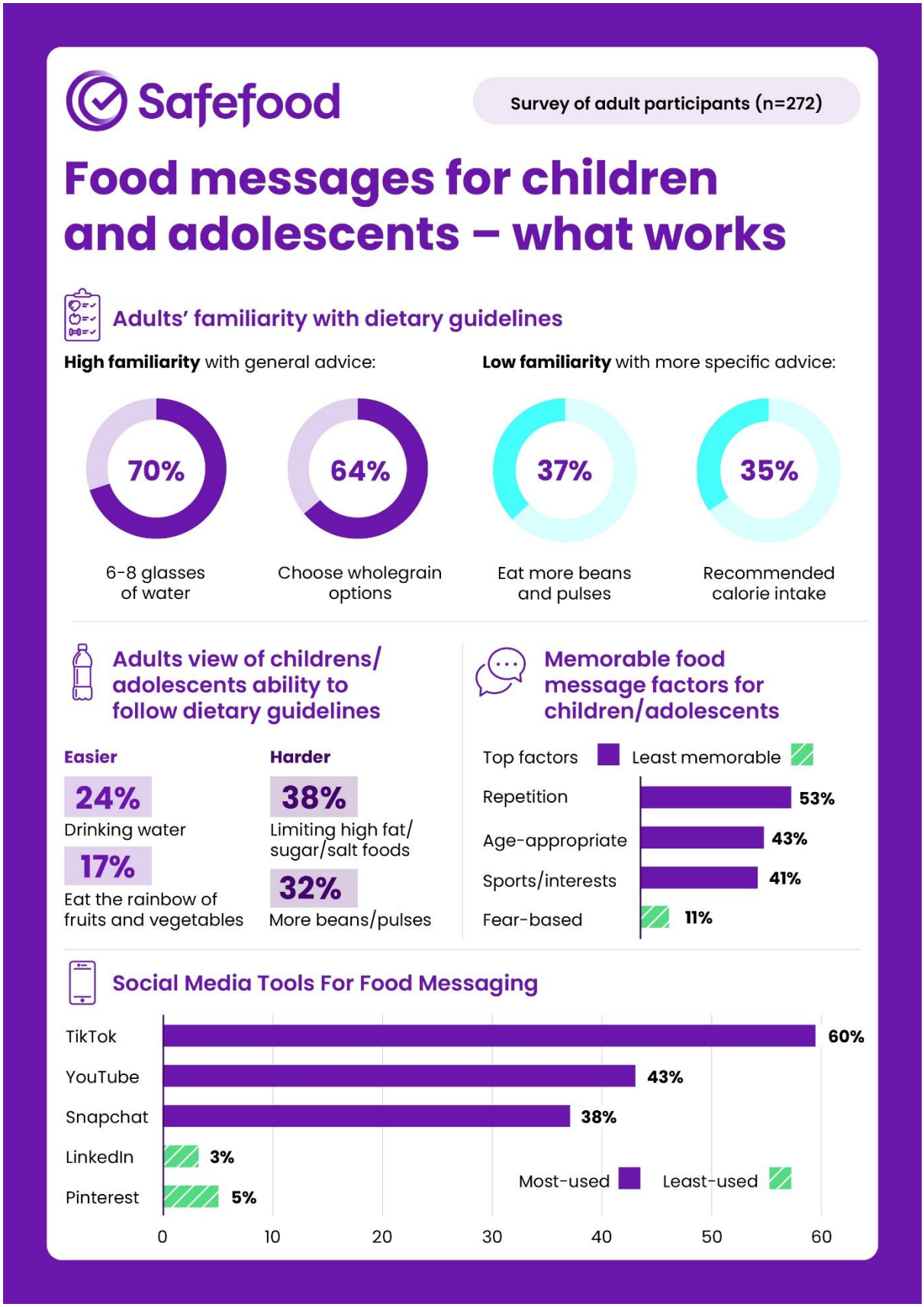
Figure 6: Facilitators to healthy eating in rank order (n=272)

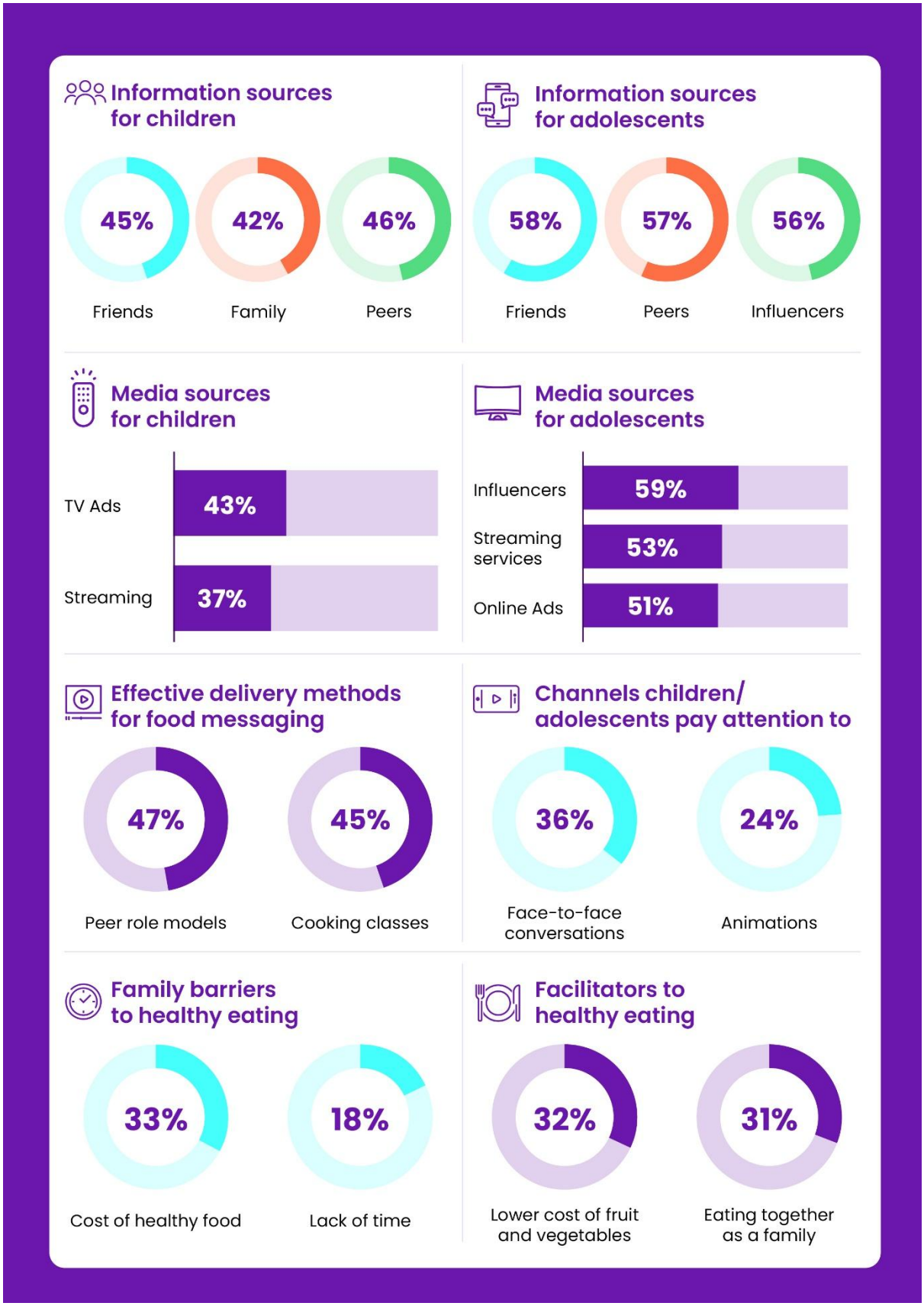
Role differences

Club and camp leaders reported more familiarity with dietary guidelines than teachers, with parents and guardians reporting the least familiarity. Teachers and club and camp leaders have more confidence in children's and adolescents' ability to follow dietary guidelines than parents and guardians, with club and camp leaders rating the highest confidence. Teachers rate teachers' (their own) influence higher than parents and guardians rate teachers' influence. Teachers rate family more influential than parents and guardians rate family influence. Parents and guardians rate social media tools less influential than teachers and club and camp leaders. Teachers and club and camp leaders rate fear as a memorable message strategy higher than parents and guardians.

Overall, the survey found that information and media sources, delivery channels and delivery methods for food messaging reflect the context of each role and their available resources, so specific food messaging campaigns need to take that into account. The key survey results are summarised in Figure 7. For an accessible version of this infographic, please visit the Safefood website.

Figure 7: Infographic of survey results




Information sources for children
45%
Friends
42%
Family
46%
Peers
Information sources for adolescents
58%
Friends
57%
Peers
56%
Influencers
Media sources for children
TV Ads
43%
Streaming
37%
Media sources for adolescents
Influencers
59%
Streaming services
53%
Online Ads
51%
Effective delivery methods for food messaging
47%
Peer role models
45%
Cooking classes
Channels children/ adolescents pay attention to
36%
Face-to-face conversations
24%
Animations
Family barriers to healthy eating
33%
Cost of healthy food
18%
Lack of time
Facilitators to healthy eating
32%
Lower cost of fruit and vegetables
31%
Eating together as a family

Stage 3b: Stakeholders: Qualitative

This section presents the findings from the qualitative data collected from parents, teachers, and club and camp leaders.

Demographics of participants

Parent focus groups (n=31)

Six parent focus groups, each consisting of 4 to 6 parents (n=31), were conducted with parents from NI and Ireland. They represented both rural and urban areas and had children and adolescents in nursery, primary or post-primary schools across the island of Ireland (Table 23). All but 3 parents were female. Parents had children aged from 3 to 10 years in nursery schools and primary schools and from 11 to 17 years in post-primary schools.

Table 23: Participant characteristics for parent focus groups (6, n=31)

Focus group	**Region**	**Primary/secondary/ nursery school**	**Rural/ urban**	**Number of parents**	**Sex** (female=f, male=m)	**Age range of children**
1	Northern Ireland	Post-primary school	Rural	5	4 f, 1 m	11-16
2	Northern Ireland	Primary school	Urban	6	6 f	7-11
3	Ireland	Primary/nursery	Rural	6	6 f	3-8
4	Ireland	Primary/nursery	Urban	5	4 f, 1 m	3-10
5	Ireland	Post-primary school	Rural	4	3 f, 1 m	13-17
5	Ireland	Post-primary school	Urban	5	5 f	11-17

Teacher interviews (n=6)

Six teachers completed the interviews and were from rural and urban schools in NI and Ireland (Table 24). The teachers were female and in mid- to late-career. The teachers covered a range of subjects from home economics; business studies; Social, Personal and Health Education (SPHE); Special Education Needs and Disability (SEND); to religion and Physical Education (PE). According to the Northern Ireland Multiple Deprivation Measure (2017), and the Pobal HP Deprivation Index (2022) in Ireland, 2 schools were in more deprived areas, with the rest in areas with average to above-average affluence.

Table 24: Participant characteristics for teacher interviews (n=6)

Region	Northern Ireland	Northern Ireland	Ireland	Ireland	Ireland	Ireland
Area	Rural	Urban	Rural	Urban	Rural	Urban
School	Primary	Post-primary	Primary	Primary	Post-primary	Post-primary
Socio-economic level	Mid to most deprived measures	Mid to least deprived measures	Marginally above average affluence	Marginally above average affluence	Marginally below average affluence	Marginally above average affluence
Sex	Female	Female	Female	Female	Female	Female
Experience (years)	20+	20+	20+	10-20	10-20	10-20
Subject(s)	Vice Principal (VP), SEND	Food Nutrition/ Nutritional Science, Home Economics key stage 3	All levels Current - 4th class and PE representative	4th class, SPHE - Social Personal and Health Education	Home Economics, SPHE, Religion	Home Economics and Business Studies

Club or camp leader interviews (n=6)

Six club or camp leaders participated in interviews, representing both rural and urban areas in NI and Ireland (Table 25). Most club or camp leaders were female, with one male participant, and they were mostly at mid-career. Six clubs or camps were represented: GAA, rugby, Girl Guides, scouts, athletics and a youth service leader.

Table 25: Participant characteristics for club or camp leaders interviews (n=6)

Region	Rural/ urban	Experience (years)	Sex	Age range of children/ adolescents (years)
Northern Ireland	Urban	3+	Female	5-12
Northern Ireland	Rural	10-20	Female	16+
Ireland	Urban	20+	Male	12+
Ireland	Rural	10-20	Female	7-10
Ireland	Urban	20+	Female	12+
Ireland	Rural	10-20	Female	12+

Key themes

The findings are organised around 3 overarching themes.

1. Effective strategies employed in food messaging and nutrition education
2. Challenges to effective food messaging and how they are overcome
3. Harnessing external influences to enhance food

Theme 1: Effective strategies employed in food messaging and nutrition education

Across all groups, there was a shared emphasis on practical, engaging and consistent strategies to promote healthy eating among children and adolescents. Parents, teachers, and club and camp leaders employed methods that involve direct participation, positive reinforcement and role modelling tailored to developmental stages.

For parents of younger children, involvement in meal planning and preparation was reported as key. They fostered positive attitudes towards nutritious foods by making healthy eating a collaborative and enjoyable experience. One parent from an urban post-primary school in Ireland noted, ‘We cook everything from scratch, but I let them have treats on the weekend to avoid a complete ban. It's about finding a balance.’ Creative substitutions play a role, as a parent from a Northern Ireland primary school explained: ‘…last night they feel like they got ice cream. It was Greek yoghurt. If I do my best to try and pull things that look similar to what they are wanting.’

With adolescents gaining independence, parents shift strategies toward fostering autonomy and equipping them with life skills. Teaching cooking skills and encouraging critical thinking about food choices become more prominent. A parent from a rural post-primary school in Ireland shared, ‘I'd be mindful, the son, going off to college, teaching them how to make the

spaghetti bolognese and the little things like that.' The goal was to prepare adolescents for independent living while maintaining healthier eating habits.

Teachers integrate food education into various subjects and act as role models for healthy eating behaviours. For younger children, they employ interactive and sensory experiences, making learning about nutrition engaging and accessible. A primary school teacher from rural Ireland said, 'We did procedural writing today, and I was like, you know, you can choose something yourself – how could you tell someone how to make a healthy snack?' Programmes such as 'Food Dudes' were reported as particularly effective with this age group. Another teacher noted, 'I saw my own daughter at home trying to get broccoli out of the fridge... because of the Food Dudes programme.'

In teaching adolescents, the focus shifts to developing critical thinking and self-efficacy. Teachers incorporate nutrition education into subjects such as science and home economics, emphasising the analysis of nutritional content and the impact of diet on health. A post-primary teacher from urban Ireland explained, 'We teach them to measure out the sugar in different energy drinks and physically see how much sugar is in the different foods.' Encouraging adolescents to question food marketing and understand long-term health consequences was reported as empowering them to make informed choices.

Club and camp leaders employ strategies that are age-appropriate and context-specific. For younger children, simple, memorable messages and engaging activities were reported as effective. One club leader stated, 'Short slogans like "eat the rainbow" work well with the younger age groups. Hands-on activities such as cooking workshops make healthy eating tangible and fun. With adolescents, leaders said they focus on autonomy and peer influence, involving them in meal planning and connecting healthy eating to personal goals such as athletic performance. A club leader observed, 'Meal planning nights in teams engage them; they think about what to buy and cook.'

Theme 2: Challenges to effective food messaging and how they are overcome

Despite their commitment, parents, teachers, and club and camp leaders reported facing challenges that vary between children and adolescents. Common obstacles include time constraints, financial limitations, and conflicting messages from external sources.

Parents of younger children reported a lack of support with 'fussy' eating and external temptations from advertising and peers. A parent from a rural primary school in NI expressed

frustration: ‘She is what I would call a fussy eater... despite me trying hard.’ Managing family schedules and time constraints adds to the difficulty of consistently promoting healthy eating.

For adolescents, parents reported finding it more challenging to influence food choices directly due to their increased independence and exposure to social media. A parent from a rural post-primary school in Ireland remarked, ‘They come home wanting the latest snack they saw on TikTok... It makes it tough to keep them on track with healthy eating.’ Parents explained that they addressed these challenges by maintaining open communication, setting boundaries, encouraging trying new tastes and reinforcing the healthy habits established earlier.

Teachers of younger children reported that they often confront socio-economic disparities that impact access to healthy foods. A primary school teacher from rural Northern Ireland noted, ‘Fruit is awful in price... if you have 4 children at school every day, there's a lot of money that you're trying to find for a wee snack during the day.’ To overcome this, teachers said that they advocated for supportive school policies, such as providing breakfast.

With adolescents, teachers reported facing challenges related to misinformation from social media and their students' resulting scepticism. Teachers explained that incorporating media literacy into the curriculum helps students to critically evaluate the information they encounter. A post-primary teacher from urban Ireland reported, ‘We discuss how influencers promote certain foods and what the reality behind those messages is.’ Teachers discussed that engaging adolescents requires making lessons relevant to their interests and respecting their growing autonomy.

Club and camp leaders working with younger children noted that children’s choices are strongly influenced by parents and the immediate environment, so simple messages and engaging activities are needed. For adolescents, challenges include countering fast-food marketing and aligning healthier eating with their values and interests. One club/camp leader noted, ‘Kids are bombarded by influencers promoting trendy diets... it's difficult to counter that.’ Leaders address this by connecting healthy eating to goals important to adolescents, such as improved sports performance. Club and camp leaders also expressed concerns about ‘gym culture’, where they observed that adolescents are going to gyms for strength and conditioning training at younger ages and are being exposed to ‘supplement talk’ (how adolescents discuss nutrition supplements to help their sports performance). They felt more information and regulation was needed. Some parents and teachers also expressed this view.

Some club and camp leaders, especially those connected with sport, expressed concerns about the potential impact of commercial sponsorship obligations on the food environment and activities connected to the club. One club/camp in rural Ireland commented, '…because of our sponsorship obligation, we stop in to our local shop or fast food outlet every time we're going to a match or coming from a match to get a picture outside'. Other non-sporting club and camp leaders spoke of using commercial organisations to provide educational programmes.

Theme 3: Harnessing external influences to enhance food messaging

All groups recognise that external influences significantly affect children's and adolescents' eating habits, but also see opportunities to leverage these influences positively. Understanding how these influences differ between age groups may support the development of more effective strategies.

Parents of younger children reported using media and popular trends to introduce healthy foods in a fun and appealing way. A parent from urban Ireland reported, 'I try to make food fun by arranging it into shapes or characters they like' Parents said adolescents try to engage in open discussions about social media content, encouraging critical evaluation of the messages they receive. 'We talk about why certain foods are marketed to them and make healthier options available,' explained a parent from a post-primary school in Ireland. Another parent noted the importance of using technology to connect with adolescents on their terms: 'I send my teen articles or videos about nutrition that I find online, especially if they're shared by someone influential they respect. It opens up a conversation without feeling like I'm lecturing.'

Teachers incorporate popular media into lessons to engage students and make learning relevant. With younger children, this might involve using stories and cartoons. A teacher from rural NI noted, 'We use stories and cartoons where the characters make healthy choices.' Teachers use social media platforms and trends for adolescents to stimulate critical discussions about nutrition and health. 'Using apps and online resources, we make lessons interactive and relevant to what they see online,' said a teacher from an urban post-primary school in Ireland.

Club and camp leaders reported leveraging peer influence within their settings to promote healthier eating. For younger children, they encouraged older peers to model healthier behaviours, understanding that younger members look up to them. 'Younger kids copy

senior players' habits, like drinking water,' observed a leader. With adolescents, consistent with previous strategies, leaders connected healthier eating to personal interests such as sports performance and involved them in leadership roles that promote healthier habits to younger members. This peer-led approach resonated with adolescents' desire for autonomy and influence.

By adapting to the developmental stages of children and adolescents, these groups harness external influences to enhance food messaging. For children, integrating familiar and enjoyable elements into messaging makes healthy eating more appealing. For adolescents, engaging critically with social media and aligning healthy eating with personal goals increases the relevance and effectiveness of the messaging.

Summary

Across all stakeholder groups, there is a focus on practical, engaging and age-appropriate strategies to encourage healthier eating, with parents, teachers, and club leaders acting as role models and using methods that encourage active participation.

Parents of younger children discussed the importance of meal preparation and balance with treats, while parents of adolescents focused on cooking skills for independence. Teachers tailoring nutrition education to developmental levels was considered effective, especially with younger students learning through sensory activities and adolescents developing critical thinking about food choices.

Parents, teachers, and club and camp leaders faced numerous challenges in promoting healthy eating, including time constraints, financial barriers, and competing messages from less healthy food advertising and social media. Topics such as managing 'fussy' eating in younger children, the influence of social media on adolescents' choices, socio-economic disparities, misinformation, and pressures from gym culture are important to consider.

All stakeholder groups recognised that external influences strongly impact children's and adolescents' eating habits but also present opportunities to promote positive choices. Parents, guardians, teachers, and club and camp leaders tailor their approaches based on the developmental stages of children and adolescents. They use media and peer influence to engage children and adolescents, aiming to make healthier eating appealing, practical and relevant to their interests and social environments.

4. Recommendations and dissemination

Recommendations

This 4th stage outlines the recommendations, which were developed based on the findings from this project. These include:

- How to communicate food messages to children and adolescents
- Clear guidance to stakeholders on the most effective ways to communicate to children and adolescents to enable them to develop food literacy skills
- Scientific advice to inform future approaches to the co-creation and design of interventions for children and adolescents

Recommendations on how to communicate food messages to children and adolescents

The proposed recommendations for communicating food messages to children and adolescents are shown in Table 26.

Table 26: Age specific considerations when communicating food messages to children and adolescents

Age group (years)	Recommended food messaging	Channels/ sources
2-3	Simple, positive messages about trying new foods, focusing on playful elements. For example, 'Carrots help you see like a superhero!'.	Family, friends, peers, TV advertising, streaming
4-6	Messages that use stories and characters focusing on adventure and exploration. For example, 'Broccoli gives you the strength of a brave explorer!'	Family, friends, peers, TV advertising, streaming
7-9	Link food choices to various activities they enjoy. For example, 'Milk helps you build strong bones for your favourite activities'.	Family, friends, peers, TV advertising, streaming
10-12	Emphasise the benefits on mood, energy and performance in various activities. For example, 'Eating a variety of foods helps you feel good when playing sports, studying, or hanging out with friends'.	Family, friends, peers, TV advertising, streaming
13-15	Focus on independence, confidence, and personal health goals. For example, 'Fuel your body with nutritious food to feel confident and strong,' or 'Healthy eating supports your goals, whether in sports, arts, or other interests.'	Friends, peers, social media (TikTok, YouTube), influencers, streaming, online advertising
16-18	Provide facts and encourage critical thinking and debate, appealing to varied interests. For example, 'Understand how different food supports your energy, strength and creativity.'	Friends, peers, social media (TikTok, YouTube), influencers, streaming, online advertising

Design considerations

- Collaborate on food messaging campaigns that include a diverse representation of the target audience and relevant stakeholders, particularly children and adolescents who can experience marginalisation, those from all socio-economic backgrounds, and those of higher weight. It would be valuable to establish a Youth Panel to ensure that the views of the children and adolescents are included.
- Multicomponent campaigns work better than one-off, fragmented campaigns, including supporting structures such as policy change, environmental change and support across communities, families, schools and clubs.

- Include reinforcing experiential learning components such as tasting, cooking and/or gardening.
- It is better to target a specific dietary goal as part of a broader campaign, for example, how to achieve '5-a-day' as part of a broader healthier eating campaign.
- Ensure anyone delivering the campaign has adequate time, training and support.

Effective food messaging strategies

- Consider messages that are clear, memorable and achievable.
- Consider 'gain-framed' approaches – that is, positive and supportive messages focusing on health benefits.
- Use messages tailored to the target audience that are interesting, relevant and important to them.
- Use consistent repetition across multiple sources/channels, for example, school, posters in schools and community centres, or TV/online sources. The messages should be reinforced by parents, guardians and club and camp leaders.
- Use clear examples and demonstrations on how to achieve the desired behaviour, for example, recipes or what to include in meals.
- Employ consistent role modelling of the desired behaviour by a variety of stakeholders, such as teachers, parents and club and camp leaders.
- Consider the impact and role of peer modelling and peer-led messaging, ensuring the messaging is disseminated accurately.

Implementation

- **Food environment and social media influence**
  Consider how the food environment might help reinforce the food message, such as how the food surroundings can help convey healthy eating messages and how children and families can be supported to enjoy visually appealing and attractive food.
- **Overcoming taste barriers**
  Consider the food used in the food message. Could there be taste barriers for children and adolescents? If so, what strategies can be employed to make certain vegetables more appealing?
- **Selective eaters**
  Achieving behaviour change through food messaging can be more difficult for some people than others. Selective eating, or food 'fussiness', can be a normative

childhood behaviour, so it is important to consider how to provide support for families with selective eaters.

- **Cost and resources**
  Consider the types of financial or resource barriers families may face that could affect the success of the overall message.

What works less well

- Fear-based or authoritative food messaging that puts pressure on children or adolescents
- One-off, fragmented food messaging that is not supported by the environment or key relationships

Guidance to stakeholders on the most effective ways to communicate to children and adolescents to enable them to develop food literacy skills

The evidence-based guidance for stakeholders – schools (teachers), parents, and club and camp leaders – on the most effective ways to communicate to children and adolescents to enable them to develop food literacy skills is listed below:

Schools (teachers)

Consider the school environment in reinforcing healthier food messages by:

1. Implementing school policies that encourage healthy eating in school
2. Ensuring healthy food options are available and easy to access
3. Maintaining consistent food messaging throughout the curriculum
4. Supporting the school community to act as models for healthier food messages and fostering a positive culture around healthier eating

Parents and guardians

- Consider more strategies to improve families' engagement with schools in food messaging and nutrition education, such as developing a multi-generational cookbook or involving parents and grandparents in the community.
- Consider strategies for reinforcing positive and healthier eating food messaging, such as:
  1. Support younger children in discovering eating patterns that work for them and gradually help them become familiar with nourishing foods.
  2. Regularly introduce new tastes and foods to children and adolescents.

3. Guide children's relationship with food through positive education rather than overly focusing on restrictions.
4. Involve children and adolescents in planning, meal preparation and cooking where resources and time allow.
5. Maintain at least some structured mealtimes a few days a week.

Clubs and camps leaders

- To reinforce and consolidate the healthy food messages children and adolescents already receive:
    1. Ensure any staff or external experts have adequate training to speak to specific age groups about nutrition
    2. Review the current level of 'supplement talk' to determine if evidence-based information is available to members under 18 years, especially regarding protein, magnesium and creatine.

Scientific advice to inform future approaches to co-creation and design of interventions for children and adolescents

This section has been derived based on guidance from multiple sources, including the European Commission (2021); Council Recommendation establishing a European Child Guarantee, UNICEF (2021); the Child Guarantee: Supporting children in Europe to break cycles of disadvantage, UNICEF (2022); Child and Adolescent Participation in the Child Guarantee: Guidance and Practices for Pilot Countries in Phase III, WHO (2018); Guidelines on health education and promotion for school-aged children; and UN Convention on the Rights of the Child (1989).

A rights-based approach for children and adolescents

A rights-based approach for children and adolescents ensures that their fundamental rights are at the core of policy development and implementation. This approach recognises children as rights-holders who are entitled to have their needs and views respected and addressed in decisions that affect them.

For healthy eating and nutrition education policy, a rights-based approach ensures that children:

- Are actively involved in shaping the policies that impact their health
- Have access to adequate nutrition
- Receive appropriate education on healthier lifestyles

The rights-based approach is informed by international treaties such as the United Nations Convention on the Rights of the Child (CRC) and the European Child Guarantee.
The CRC is an international human rights treaty that grants all children a comprehensive set of rights, including the right to survival, development, protection, and participation. Adopted by the UN General Assembly in 1989, the CRC has been ratified by 196 countries, making it one of the most widely endorsed human rights treaties globally.

The European Child Guarantee builds on these rights, ensuring that children, particularly those at risk of poverty and social exclusion, have access to adequate nutrition and are actively involved in shaping services and policies that impact their health and well-being. The rights of children in relation to food and nutrition policy are rooted in ensuring their well-being and addressing their vulnerabilities. These rights include:

1. Right to adequate nutrition: All children have the right to adequate and nutritious food. This means governments and institutions must ensure children have access to healthy food at school and home, which is a central aim of the European Child Guarantee.
2. Right to participate in decision-making: Children have the right to be heard in decisions that affect them, including food and nutrition policies. Their views should be considered when designing meal plans, food education programmes, and health campaigns.
3. Right to education: This includes education on nutrition, food choices, and healthy lifestyles. Nutrition education should be part of school curricula, with opportunities for children to help shape the content to make it more engaging and relevant.
4. Right to safe and inclusive participation: Children's participation must be facilitated in a way that is inclusive and accessible to all, ensuring that even the most vulnerable have a voice in shaping food policy.

Opportunities in Northern Ireland and Ireland

Ireland created an action plan in response to the European Child Guarantee, which aims to address the needs of children at risk of poverty or social exclusion. The action plan was developed to tackle challenges such as limited access to healthcare, education, and nutrition services, particularly for children in vulnerable situations. The goal is to ensure that all children have access to essential services, including healthcare, education, early childhood care, nutrition and housing.

Ireland's European Child Guarantee National Action Plan aims to ensure that children at risk of poverty or social exclusion have access to these services. Published in 2022, the plan sets out specific commitments to improve the well-being of vulnerable children by providing these basic needs. The action plan also emphasises the involvement of children and adolescents in shaping the services they receive, with efforts made to gather input from adolescents through consultations and focus groups.

To date, children and adolescents have been involved in discussions about school meal programmes and educational campaigns to ensure the services provided are suited to their needs. This involvement aligns with the broader goal of empowering adolescents to influence decisions that directly impact their health and well-being.

Northern Ireland currently does not have an equivalent to the Child Guarantee Action Plan. However, the NI Commissioner for Children and Young People (NICCY) has reviewed the CRC to help set priorities to ensure the inclusion of children and adolescents in policy decisions.

The Children and Young People's Strategy (2020-2030) in NI aims to improve outcomes for adolescents, and there have been participation initiatives that seek to involve children in decisions affecting them. For example, NI has used youth forums and school councils to gather adolescents' views on education and social care services.

There is an opportunity in NI and Ireland to increase child participation in multiple settings, using frameworks and models that have been proven to be effective. For example, a model developed in NI called the Lundy Model of Child Participation is described in 4 parts: 1. Space, 2. Voice, 3. Audience, and 4. Influence – how to understand and support children's participation. This model is used internationally to ensure children are involved in important decisions (available at https://eu-for-children.europa.eu/about/lundy-model).

Rights of children and adolescents regarding healthy eating and nutrition

Children and adolescents also have the right to access nutritious food and information that supports healthy eating habits. This includes participation in: the design of educational programmes around nutrition, setting guidelines for school meal programmes, and contributing their perspectives on food messaging campaigns. Participation, in this context, ensures that the experiences and preferences of adolescents are considered when policies related to nutrition and healthy eating are developed, implemented and evaluated.

Framework for involving children and adolescents in policy development

When involving children and adolescents in policy development, a useful resource is the Child Guarantee (European Commission, 2021). This framework supports child and adolescent participation from research to evaluation. It promotes age-appropriate engagement for different developmental stages, supporting children and adolescents to provide meaningful input during the different phases of policy development. The following sections outline 5 steps for children and adolescent participation.

Step 1: Inform and educate

This step aims to prepare children and adolescents to take part in policy development by equipping them with specific skills**.** Firstly, in childhood**,** age-appropriate activities can be successful with more detailed information and workshops being used by middle childhood. In adolescence**,** more in**-**depth information, as well as social documents, can be introduced. Table 27 provides an overview of this step.

Table 27: Inform and educate guidance for children and adolescents

1.	Early childhood (5-8 years) • Introduce concepts of healthy eating through simple storytelling, play-based learning and activities. • Information on nutrition can be provided through visuals, games and discussions that help children learn about different foods in an accessible manner.
2.	Middle childhood (9-12 years) • Provide more detailed information on nutrition and health by organising workshops or classes on the importance of healthy eating. • At this stage, children can be engaged in activities like building their food pyramid or cooking demonstrations that focus on healthy meals.
3.	Adolescents (13-18 years) • Provide more in-depth workshops and seminars on nutrition policy, linking it to social determinants of health and food systems.

	• Adolescents can engage in more complex discussions about the impact of food policies on their community and can be introduced to government mechanisms that influence policy.

Step 2: Establish participation channels

This step aims to create structures and opportunities for children to be able to express their views.

In early childhood, this can look like simple questionnaires or group discussions. In middle childhood, children are better able to engage with school councils or through platforms in the school or community. By adolescence, more formal mechanisms can be employed. Table 28 provides an overview of this step.

Table 28: Participation channels for children and adolescents

1.	Early childhood (5-8 years) • Conduct consultations through simple questionnaires with visual aids or engage in guided group discussions that are facilitated by teachers or social workers. • Young children might also provide input through drawings or storytelling.
2.	Middle childhood (9-12 years) • Facilitate participation through school councils, classroom activities, or by encouraging children to develop posters or videos expressing their views on healthy eating. • Providing platforms for sharing these within the school or community can be empowering.
3.	Adolescents (13-8 years) • Establish youth councils, focus groups and online platforms where adolescents can express their opinions on food policies. • Adolescents can also be involved in school and community-level discussions, providing recommendations directly to policymakers or school administrators regarding school meal programmes.

Step 3: Ensure safe and inclusive participation

The purpose of this step is to create safe and inclusive environments that support children and adolescents to express their views. The first feature of these environments is about safety and respect, which includes voluntary participation and expression without fear of reprisal or discrimination. Extra steps may be needed when working with children and adolescents from marginalised communities. The second feature – support for vulnerable groups **–** focuses on supporting children with disabilities and those who experience marginalisation. This can include providing accessible formats, sign language interpreters, or multilingual materials.

Step 4: Engage in decision-making and policy design

The fourth step involves supporting children and adolescents in decision-making by ensuring their feedback is incorporated into policy design. There are 2 main ways to achieve this:

- The first is through interactive workshops, which are suitable for middle childhood. These workshops provide an opportunity for adolescents to connect with policymakers and support them to take on leadership roles.
- The second approach focuses on involving adolescents in designing nutrition programmes. Adolescents can directly contribute to the design of nutrition programmes, provide suggestions for curriculum, and be involved in meal planning design and healthy eating campaigns.

Step 5: Monitor and evaluate

The final step focuses on involving children and adolescents during the monitoring and implementation stages of policies. This involves two primary activities:

- The first activity involves monitoring. Children and adolescents can provide input through surveys, testimonials or involvement on evaluation panels. They can also assist in the implementation of surveys or interviews to gather feedback on the successes or challenges of the policies that were implemented**.**
- The second activity focuses on establishing feedback mechanisms. This can be achieved by establishing systems where adolescents can provide continuous feedback on all activities.

Summary

Including children and adolescents in the development of healthy eating and nutrition policy, whether for school-based interventions or at a wider government level, is a necessary and beneficial approach that aligns with important international frameworks on children's rights, such as the UNCRC and the European Child Guarantee.

By following a step-by-step approach to education, consultation and safe participation, governments and institutions can ensure that young voices are heard and acted upon, leading to more effective, inclusive and sustainable nutrition policies.

Ensuring children's meaningful participation in food policy is not merely about fulfilling obligations – it is about creating a healthier future where children and adolescents feel empowered and engaged in shaping the systems that serve them.

5. Discussion and key findings

This mixed-methods project on effective food messaging strategies for children and adolescents on the island of Ireland:

- Reviewed the relevant literature
- Collated qualitative data from:
  - Friendship pairs with children
  - Focus groups with adolescents
- Conducted:
  - A quantitative online survey
  - Qualitative interviews or focus groups with stakeholders – teachers, parents and club and camp leaders.

The diverse range of participants and the depth of research produced key findings that identified what food messaging strategies work for children and adolescents (aged 2-18 years) on the island of Ireland.

The review of reviews successfully examined the depth and breadth of the evidence on the potential of food messaging and nutrition education interventions to improve nutrition knowledge and healthier eating behaviours for children and adolescents aged 2 to 18. Food messaging strategies were found to be integrated into nutrition education programmes and were deemed effective when implemented alongside other strategies.

The evidence regarding food messaging and nutrition education interventions showed mixed results. However, there are positive outcomes related to improving nutrition knowledge and healthier eating behaviours for children and adolescents aged 2 to 18. Food messaging strategies included in nutrition education programmes were more effective when part of a multicomponent approach with socio-environmental, educational and structural strategies.

This project found that children and adolescents had mixed experiences, perceptions and attitudes to food and nutrition education and food messaging. Although children and adolescents were aware of the healthy eating guidelines, there appears to be a disconnect in translating them into practical everyday use.

There were advantages and disadvantages of using social media to supplement nutrition education. Adolescents, in particular, often used and trusted social media messages without considering whether the information was accurate.

Food and nutrition education and food messaging for children and adolescents need to be communicated through simple and clear messages. It is important to use consistent repetition and practical and fun methods in partnership with schools and families, taking into account the potential harm and benefits of using social media.

The online survey with the stakeholders found that children and adolescents have different ways of sourcing and being influenced by food messages. The context in which food messages are delivered (such as in schools, families, or clubs and camps) highlights the variety of sources and tools used for conveying food messages. This indicates that the place where the food messages occur significantly impacts their effectiveness.

The design of future food message campaigns should consider the age group of the children and adolescents, as well as the context and setting. These results were supported by the qualitative stakeholder findings, which found that teachers, parents and club and camp leaders used role modelling for food messaging. However, they faced challenges with the availability, affordability and visibility of healthier food.

Some parents and teachers provided contradictory statements in relation to food messages versus the food environment. For example, some parents reported schools using treat foods as rewards, while some schools reported concerns about families not adhering to their food policies. These key challenges arise for several reasons, including socio-economic pressures and challenges in making food choices in the current food environment.

Club and camp leaders were concerned about how commercial sponsorship and social media influencers impacted club activities and food and beverage choices.

It was concluded that teachers, parents and club and camp leaders play a vital role in helping children and adolescents navigate our complex food environment. Addressing the challenges of affordability, access to healthier food and combating external influences is key. Our findings show that role modelling is a vital strategy for promoting repeated and consistent food messages tailored to the needs and interests of children and adolescents while maintaining a balanced and pragmatic approach.

Overall, this project highlighted that what works in food messages is using a multicomponent approach in campaigns and education strategies (a multi-context and multi-place approach). Appropriate stakeholders should support this approach.

It is important that the food messages, including their content and related activities, are age-appropriate. To achieve this, the food messages should be presented in multiple contexts, ensuring they are repetitive and consistent to foster a supportive food environment. Key stakeholders – teachers, parents and club and camp leaders – play an important role in reinforcing learning and creating a supportive food environment. This alignment between consistent and repeated messages and stakeholders, facilitated by the environment, is essential to reinforce effective food messages.

However, there are potential barriers to communicating food messages. Firstly, it is important to acknowledge marginalised groups, such as ethnic minorities, families with lower socio-economic status, and children and adolescents of higher weight, as there is limited research about these groups on food messaging (Arlinghaus et al. 2021; Willmott et al. 2022).

Secondly, it is important to consider the journey from designing a food message to potentially impacting dietary behaviour. For example, when it comes to improving water consumption, evidence from reviews that considered sugar-sweetened beverages (SSB) emphasised that classroom interventions targeting the reduction of SSB need multicomponent approaches to sustain change (Vézina-Im et al. 2017) and that repetition and reinforcement of messaging across multiple environments is also needed (Vercammen et al. 2018).

In addition, many reviews noted the importance of teachers, families and peers in promoting water over SSB (Rahman et al. 2018; Avery et al. 2015).

When considering strategies for increasing water consumption, focusing on simple messaging that is repeated and involves support from key adults in the wider environmental and structural interventions can be effective (Avery et al. 2015; Rahman et al. 2018; Vézina-Im et al. 2017). Our project findings support this previous research that a multicomponent approach to food messaging is needed, and it likely accounts for ‘improving water consumption’ being the most reported familiar message in the survey.

Similarly, messaging to promote fruit and vegetable consumption was also reported as very familiar in the survey. Research considering system dynamics has noted that messaging to improve fruit and vegetable consumption is more difficult (Gerritsen et al. 2019) when compared to, for example, promoting water consumption. There are multiple reasons for this, such as cost, availability and system issues, such as ubiquitous placement of fast-food outlets, food in the retail environment, school provision of food, and unhealthy food marketing (Gerritsen et al. 2019; Meshkovska et al. 2022; Varela et al. 2023).

When exploring strategies on a school or community level, interventions need to consider how best to support early food experiences as these are important for shaping children's long-term preferences, and thus there are opportunities to embed this strategy and promote healthy eating patterns which can increase vegetable consumption as they grow (Beckerman et al. 2017; Varela et al. 2023).

While school-based nutrition interventions incorporating food messaging for improving the consumption of fruit and vegetables are common, consumption of fruit and vegetables in children and adolescents in the UK and Ireland remains well below what is recommended (Public Health England 2020; Flynn et al. 2021). This further highlights the need to better understand the barriers to food messaging.

In addition, when addressing food messaging barriers, the role of important facilitators, such as design and packaging, needs to be considered, as well as the suitability of the food education intervention to those delivering and receiving (Meshkovska et al. 2022). Strategies that promote positive sensory experiences related to taste, texture and less familiar foods can improve food literacy, foster agency in children and adolescents and support their decision-making skills (Varela et al. 2023).

Similar findings have been described in this current project and support the conclusions by Varela et al. (2023) on the importance of viewing children and adolescents as active participants within food systems and the need to empower them. Therefore, barriers to specific food messages need to be identified and explored before designing nutrition education programmes or food-related health promotion campaigns.

In summary, this project found that 'what works' in food messaging is a nuanced approach that combines age-specific strategies and interests. It emphasises the importance of collaboration with consistent and repetitive efforts among key stakeholders. Additionally, proactive measures to address challenges are essential. Positive experiences with food, role

modelling and fostering autonomy are key elements. Repeating consistent and engaging messages across a range of environments, including home, school and the community (for example, in clubs and camps), creates a supportive ecosystem that nurtures healthier eating habits in both children and adolescents.

Conclusion

This project identified effective food messaging strategies for children and adolescents on the island of Ireland to inform stakeholders on how to communicate food messages effectively.

What works for food messaging in children and adolescents?

Food messaging that is:

- Multicomponent in design
- Age appropriate
- Context-specific (multi-contexts)
- Place-specific (multi-place)
- Aligned between stakeholders and the messages
- Supported by consistent repetition for reinforcement
- Achievable through experiential learning
- Facilitated by a supportive food environment

This project found that ‘what works’ in food messages is the use of a multicomponent approach in campaigns and education strategies, supported by appropriate stakeholders, along with the recognition of the impact of social media. Components should include age-appropriate content and context-specific activities, focusing on food messaging across multiple contexts and places.

This conclusion indicates that a whole systems approach to food messaging is required and should include consistent repetition across various environments and by key adults who can reinforce learning. A supportive food environment can facilitate this approach. Figure 8 presents the project’s key messages.

Figure 8: Overview of the key messages from the Food News project

Effective food messaging

Age-appropriate, context-specific and place focused

- ☑ Multicomponent
- ☑ Consistent
- ☑ Repeated

Stakeholder alignment: parents and guardians, teachers, club and camp leaders

References

Arlinghaus, K.R. & Stang, J. (2021) Population-Engaged Approaches to Improving Adolescent Nutrition. *The Journal of Nutrition*, 151(6), pp.1371–1372.

Avery, A., Bostock, L. & McCullough, F. (2015) A systematic review investigating interventions that can help reduce consumption of sugar-sweetened beverages in children leading to changes in body fatness. *Journal of Human Nutrition and Dietetics*, 28(Suppl. 1), pp.52–64. https://doi.org/10.1111/jhn.12267.

Beckerman, J.P., Alike, Q., Lovin, E., Tamez, M. & Mattei, J. (2017) The development and public health implications of food preferences in children. *Frontiers in Nutrition*, 4, p.66.

Beverley, B., David, C., Kerry, S.J., Polly, P., Caireen, R., Toni, S. & Gillian, S. (2020) *National Diet and Nutrition Survey Rolling Programme Years 9 to 11 (2016/2017 to 2018/2019)*. A survey carried out on behalf of Public Health England and the Food Standards Agency.

Braun, V., & Clarke, V. (2014) What can "thematic analysis" offer health and wellbeing researchers? *International journal of qualitative studies on health and well-being*, *9*(1), 26152.

CASP, C. (2018). CASP qualitative checklist. *Critical Appraisal Skills Programme*.

Clark, T., Foster, L., Bryman, A., & Sloan, L. (2021) *Bryman's social research methods*. Oxford University Press.

Creswell, J. W., & Creswell, J. D. (2018) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Sage.

European Commission (2021) Council Recommendation establishing a European Child Guarantee. *Official Journal of the European Union*, C 204/01, 14 June. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H1004 [Accessed 14 Nov. 2024].

Flynn, A., McNulty, B. & Kearney, J. (2021) *National Children's Food Consumption Survey II Final Report*. Dublin: Department of Agriculture, Food and Marine, Ireland.

Gerritsen, S., Renker-Darby, A., Harré, S., Rees, D., Raroa, D.A., Eickstaedt, M., Sushil, Z., Allan, K., Bartos, A.E., Waterlander, W.E. & Swinburn, B. (2019) Improving low fruit and vegetable intake in children: Findings from a system dynamics, community group model building study. *PLOS One*, 14(8), p.e0221107.

Lavelle, F., Benson, T., Hollywood, L., Surgenor, D., McCloat, A., Mooney, E., Caraher, M. & Dean, M. (2019) Modern transference of domestic cooking skills. *Nutrients*, 11, p.870.

Lavelle, F., McGowan, L., Spence, M., Caraher, M., Raats, M., Hollywood, L., McDowell, D., Mc Cloat, A., Mooney, E. & Dean, M. (2016) Learning cooking skills at different ages: a cross-sectional study. *International Journal of Behavioural Nutrition and Physical Activity*, 13, p.119.

McCloat, A. & Caraher, M. (2019) An international review of second-level food education curriculum policy. *Cambridge Journal of Education*, 50(3), pp.303-324. https://doi.org/10.1080/0305764X.2019.1694641.

McCloat, A. & Caraher, M. (2020) Home economics education in secondary school settings: lessons from education policy on the island of Ireland. In: M. Rutland & A. Turner, eds. *Food Education and Food Technology in School Curriculum*. Switzerland: Springer.

Meshkovska, B., Forberger, S., Wendt, J., Scheller, D.A., Castellari, E., Tiboldo, G., Luszczynska, A., Lien, N. & PEN Consortium (2024) Barriers and facilitators to implementation of the EU school fruit and vegetables scheme: Cross-country study. *Global Implementation Research and Applications*, 4(1), pp.52–65.

Moher, D., Stewart, L., & Shekelle, P. (2016) Implementing PRISMA-P: recommendations for prospective authors. *Systematic reviews*, *5*, 1–2.

NCBI Bookshelf (2016) Session 1: Food Literacy and the Role of Communications Relating to Food Safety, Nutrition, and Other Health Matters. Available at: https://www.ncbi.nlm.nih.gov/books/NBK367600/ [Accessed 14 Nov. 2024].

Rahman, A.A., Jomaa, L., Kahale, L.A., Adair, P. & Pine, C. (2018) Effectiveness of behavioral interventions to reduce the intake of sugar-sweetened beverages in children and adolescents: A systematic review and meta-analysis. *Nutrition Reviews*, 76(2), pp.88–107. https://doi.org/10.1093/nutrit/nux061.

Shea, B. J., Reeves, B. C., Wells, G., Thuku, M., Hamel, C., Moran, J., ... & Henry, D. A. (2017) AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ*, *358*.

United Nations General Assembly (1989) Convention on the Rights of the Child. *Treaty Series*, 1577, p.3. Available at: https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child [Accessed 14 Nov. 2024].

UNICEF (2022) *Child and Adolescent Participation in the Child Guarantee: Guidance and Practices for Pilot Countries in Phase III*. UNICEF Europe and Central Asia Regional Office.

Varela, P., De Rosso, S. & Ferreira Moura, A., et al. (2024) Bringing down barriers to children's healthy eating: a critical review of opportunities, within a complex food system. *Nutrition Research Reviews*, 37(2), pp.331-351. https://doi.org/10.1017/S0954422423000203.

Vézina-Im, L.-A., Beaulieu, D., Bélanger-Gravel, A., Boucher, D., SiRols, C., Dugas, M. & Provencher, V. (2017) Efficacy of school-based interventions aimed at decreasing sugar-sweetened beverage consumption among adolescents: A systematic review. *Public Health Nutrition*, 20(13), pp.2416–2431. https://doi.org/10.1017/S1368980017000076.

Willmott, T.J., Mathew, A., Luck, E., et al. (2022) Participatory design application in obesity prevention targeting young adults and adolescents: a mixed-methods systematic scoping review protocol. *Systematic Reviews*, 11, p.51. https://doi.org/10.1186/s13643-022-01900-z.

World Health Organization (2018) *Guidelines on Health Education and Promotion for School-aged Children*. Available at: https://www.who.int [Accessed 14 Nov. 2024].

World Health Organization. (2021) Nutrition action in schools: a review of evidence related to the Nutrition-Friendly Schools Initiative.

Glossary of abbreviations

BCTs – Behaviour change techniques

NI – Northern Ireland

SSB – Sugar-sweetened beverages

Appendix

1. Food models: The Eatwell Guide and Food Pyramid
2. Stage 1: Scoping: Journal references
3. Stage 3: Topic-level survey table

Appendix 1

Food models

The Eatwell Guide: www.food.gov.uk/business-guidance/the-eatwell-guide-and-resources

The Food Pyramid guide: www.hse.ie/eng/about/who/healthwellbeing/our-priority-programmes/heal/heal-docs/food-pyramid-leaflet.pdf

Appendix 2

Stage 1: Scoping – Journal references

27. Collado-Soler, R., Alférez-Pastor, M., Torres, F. L., Trigueros, R., Aguilar-Parra, J. M., & Navarro, N. (2023). A systematic review of healthy nutrition intervention programs in kindergarten and primary education. Nutrients, 15(3), 541. https://doi.org/10.3390/nu15030541

28. Holloway, T. P., Dalton, L., Hughes, R., Jayasinghe, S., Patterson, K. A. E., Murray, S., et al. (2023). School gardening and health and well-being of school-aged children: A realist synthesis. Nutrients, 15(5), 1190. https://doi.org/10.3390/nu15051190

29. Shinde, S., Wang, D., Moulton, G. E., & Fawzi, W. W. (2023). School-based health and nutrition interventions addressing double burden of malnutrition and educational outcomes of adolescents in low- and middle-income countries: A systematic review. Maternal & Child Nutrition, 18(5), e13437. https://doi.org/10.1111/mcn.13437

30. Verdonschot, A., Follong, B. M., Collins, C. E., de Vet, E., Haveman-Nies, A., & Bucher, T. (2023). Effectiveness of school-based nutrition intervention components on fruit and vegetable intake and nutrition knowledge in children aged 4–12 years old: An umbrella review. Nutrition Reviews, 81(3), 304–321. https://doi.org/10.1093/nutrit/nuac057

31. Andueza, N., Navas-Carretero, S., & Cuervo, M. (2022). Effectiveness of nutritional strategies on improving the quality of diet of children from 6 to 12 years old: A systematic review. Nutrients, 14(2), 372. https://doi.org/10.3390/nu14020372

32. Capper, T. E., Brennan, S. F., Woodside, J. V., & McKinley, M. C. (2022). What makes interventions aimed at improving dietary behaviours successful in the

secondary school environment? A systematic review of systematic reviews. Public Health Nutrition, 25(9), 2448–2464. https://doi.org/10.1017/S1368980022000829

33. Chan, C. L., Tan, P. Y., & Gong, Y. Y. (2022). Evaluating the impacts of school garden-based programmes on diet and nutrition-related knowledge, attitudes and practices among the school children: A systematic review. BMC Public Health, 22, 1251. https://doi.org/10.1186/s12889-022-13587-x

34. Lavelle, F. (2022). A critical review of children's culinary nutrition interventions, the methodologies used and their impact on dietary, psychosocial and wellbeing outcomes. Nutrition Bulletin, 48(1), 6–27. https://doi.org/10.1111/nbu.12596

35. Medeiros, G. C. B. S. d., Azevedo, K. P. M. d., Garcia, D., et al. (2022). Effect of school-based food and nutrition education interventions on the food consumption of adolescents: A systematic review and meta-analysis. International Journal of Environmental Research and Public Health, 19(17), 10522. https://doi.org/10.3390/ijerph191710522

36. Nonguierma, E., Lesco, E., Olak, R., et al. (2022). Improving obesogenic dietary behaviors among adolescents: A systematic review of randomized controlled trials. Nutrients, 14(21), 4592. https://doi.org/10.3390/nu14214592

37. Omidvar, N., Doustmohammadian, A., Shakibazadeh, E., Clark, C. C. T., Kasaii, M. S., & Hajigholam-Saryazdi, M. (2022). Effects of school-based interventions on food and nutrition literacy (FNLIT) in primary-school-age children: A systematic review. British Journal of Nutrition, 129, 2102–2121. https://doi.org/10.1017/S0007114522002811

38. Bennett, A. E., Mockler, D., Cunningham, C., Glennon-Slattery, C., & Johnston Molloy, C. (2021). A review of experiential school-based culinary interventions for 5–12-year-old children. Children, 8, 1080. https://doi.org/10.3390/children8121080

39. Chaudhary, A., Sudzina, F., & Mikkelsen, B. E. (2021). Promoting healthy eating among young people—A review of the evidence of the impact of school-based interventions. Nutrients, 12(9), 2894. https://doi.org/10.3390/nu12092894

40. Kelly, R. K., & Nash, R. (2021). Food literacy interventions in elementary schools: A systematic scoping review. Journal of School Health, 91(8), 660–669. https://doi.org/10.1111/josh.13053

41. O'Brien, K. M., Barnes, C., Yoong, S., et al. (2021). School-based nutrition interventions in children aged 6 to 18 years: An umbrella review of systematic reviews. Nutrients, 13(11), 4113. https://doi.org/10.3390/nu13114113

42. Perdew, M., Liu, S., & Naylor, P. J. (2021). Family-based nutrition interventions for obesity prevention among school-aged children: A systematic review. Translational Behavioral Medicine, 11(3), 709–723. https://doi.org/10.1093/tbm/ibaa082

43. Prowse, R., & Carsley, S. (2021). Digital interventions to promote healthy eating in children: Umbrella review. JMIR Pediatrics and Parenting, 4(4), e30160. https://doi.org/10.2196/30160

44. Varman, S. D., Cliff, D. P., Jones, R. A., Hammersley, M. L., Zhang, Z., Charlton, K., & Kelly, B. (2021). Experiential learning interventions and healthy eating outcomes in children: A systematic literature review. International Journal of Environmental Research and Public Health, 18, 10824. https://doi.org/10.3390/ijerph182010824

45. Andreo, C. L., & Andrade, J. M. (2020). Determining effective nutrition intervention strategies and the subsequent impact on nutrition knowledge, dietary adherence, and health outcomes among American Indian/Alaska Native youth: A systematic review. Journal of Racial and Ethnic Health Disparities, 7, 1202–1213. https://doi.org/10.1007/s40615-020-00745-3

46. Cotton, W., Dudley, D., Peralta, L., & Werkhoven, T. (2020). The effect of teacher-delivered nutrition education programs on elementary-aged students: An updated systematic review and meta-analysis. Preventive Medicine Reports, 20, 101178. https://doi.org/10.1016/j.pmedr.2020.101178

47. Kyere, P., Veerman, J. L., Lee, P., & Stewart, D. E. (2020). Effectiveness of school-based nutrition interventions in sub-Saharan Africa: A systematic review. Public Health Nutrition, 23(14), 2626–2636. https://doi.org/10.1017/S1368980020000506

48. Pastor, R., & Tur, J. A. (2020). Effectiveness of interventions to promote healthy eating habits in children and adolescents at risk of poverty: Systematic review and meta-analysis. Nutrients, 12(6), 1891. https://doi.org/10.3390/nu12061891

49. Roseman, M. G., Riddell, M. C., & McGee, J. J. (2020). Kindergarten to 12th grade school-based nutrition interventions: Putting past recommendations into practice. Journal of Nutrition Education and Behavior, 52(8), 808–820. https://doi.org/10.1016/j.jneb.2020.02.007

50. Bailey, C. J., Drummond, M. J., & Ward, P. R. (2019). Food literacy programmes in secondary schools: A systematic literature review and narrative synthesis of quantitative and qualitative evidence. Public Health Nutrition, 22(15), 2891–2913. https://doi.org/10.1017/S1368980019001666

51. Baranowski, T., Ryan, C., Hoyos-Cespedes, A., & Lu, A. S. (2019). Nutrition education and dietary behavior change games: A scoping review. Games for Health Journal, 8(3), 153–176. https://doi.org/10.1089/g4h.2018.0070

52. Calvert, S., Dempsey, R. C., & Povey, R. (2019). Delivering in-school interventions to improve dietary behaviours amongst 11–16-year-olds: A systematic review. Obesity Reviews, 20(4), 543–553. https://doi.org/10.1111/obr.12797

53. Colley, P., Myer, B., Seabrook, J., & Gilliland, J. (2019). The impact of Canadian school food programs on children's nutrition and health: A systematic review. Canadian Journal of Dietetic Practice and Research, 80(2), 79–86. https://doi.org/10.3148/cjdpr-2018-037

54. Srbely, V., Janjua, I., Buchholz, A. C., & Newton, G. (2019). Interventions aimed at increasing dairy and/or calcium consumption of preschool-aged children: A systematic literature review. Nutrients, 11(4), 714. https://doi.org/10.3390/nu11040714

55. Rahman, A. A., Jomaa, L., Kahale, L. A., Adair, P., & Pine, C. (2018). Effectiveness of behavioral interventions to reduce the intake of sugar-sweetened beverages in children and adolescents: A systematic review and meta-analysis. Nutrition Reviews, 76(2), 88–107. https://doi.org/10.1093/nutrit/nux061

56. Chau, M. M., Burgermaster, M., & Mamykina, L. (2018). The use of social media in nutrition interventions for adolescents and young adults: A systematic review. International Journal of Medical Informatics, 120, 77–91. https://doi.org/10.1016/j.ijmedinf.2018.10.001

57. Matwiejczyk, L., Mehta, K., Scott, J., Tonkin, E., & Coveney, J. (2018). Characteristics of effective interventions promoting healthy eating for pre-schoolers in childcare settings: An umbrella review. Nutrients, 10(3), 293. https://doi.org/10.3390/nu10030293

58. Vercammen, K. A., Frelier, J. M., Lowery, C. M., McGlone, M. E., Ebbeling, C. B., & Bleich, S. N. (2018). A systematic review of strategies to reduce sugar-sweetened beverage consumption among 0-year to 5-year olds. Obesity Reviews, 19(11), 1504–1524. https://doi.org/10.1111/obr.12741

59. Black, A. P., D'Onise, K., McDermott, R., Vally, H., & O'Dea, K. (2017). How effective are family-based and institutional nutrition interventions in improving children's diet and health? A systematic review. BMC Public Health, 17, 818. https://doi.org/10.1186/s12889-017-4795-5

60. Do Amaral e Melo, G. R., Silva Vargas, F. C., Santos Chagas, C. M., & Toral, N. (2017). Nutritional interventions for adolescents using information and communication technologies (ICTs): A systematic review. PLOS ONE, 12(9), e0184509. https://doi.org/10.1371/journal.pone.0184509

61. Gavaravarapu, S. M., Konapur, A., & Saha, S. (2017). Role of education and communication interventions in promoting micronutrient status in India – What research in the last 2 decades informs. Journal of Communication in Healthcare, 10(4), 238–249. https://doi.org/10.1080/17538068.2017.1338407

62. Hendrie, G. A., Lease, H. J., Bowen, J., Baird, D. L., & Cox, D. N. (2017). Strategies to increase children's vegetable intake in home and community settings: A systematic review of literature. Maternal & Child Nutrition, 13(4), e12276. https://doi.org/10.1111/mcn.12276

63. Rose, T., Barker, M., Jacob, C., Morrison, L., Lawrence, W., Strömmer, S., et al. (2017). A systematic review of digital interventions for improving the diet and physical

activity behaviours of adolescents. Journal of Adolescent Health, 61(6), 669-677. https://doi.org/10.1016/j.jadohealth.2017.05.024

64. Savoie-Roskos, M. R., Wengreen, H., & Durward, C. (2017). Increasing fruit and vegetable intake among children and youth through gardening-based interventions: A systematic review. Journal of the Academy of Nutrition and Dietetics, 117(2), 240-250. https://doi.org/10.1016/j.jand.2016.10.014

65. Vézina-Im, L.-A., Beaulieu, D., Bélanger-Gravel, A., Boucher, D., SiRois, C., Dugas, M., & Provencher, V. (2017). Efficacy of school-based interventions aimed at decreasing sugar-sweetened beverage consumption among adolescents: A systematic review. Public Health Nutrition, 20(13), 2416-2431. https://doi.org/10.1017/S1368980017000076

66. Yip, C., Gates, M., Gates, A., & Hanning, R. M. (2017). Peer-led nutrition education programs for school-aged youth: A systematic review of the literature. Health Education Research, 31(1), 82–97. https://doi.org/10.1093/her/cyv063

67. Aloia, C. R., Shockey, T. A., Nahar, V. K., & Knight, K. B. (2016). Pertinence of the recent school-based nutrition interventions targeting fruit and vegetable consumption in the United States: A systematic review. Health Promotion Perspectives, 6(1), 1–9. https://pmc.ncbi.nlm.nih.gov/articles/PMC4847108/

68. Meiklejohn, S., Ryan, L., & Palermo, C. (2016). A systematic review of the impact of multi-strategy nutrition education programs on health and nutrition of adolescents. Journal of Nutrition Education and Behavior, 48(9), 631–646. https://doi.org/10.1016/j.jneb.2016.07.015 .

69. Racey, M., O'Brien, C., Douglas, S., Marquez, O., Hendrie, G., & Newton, G. (2016). Systematic review of school-based interventions to modify dietary behavior: Does intervention intensity impact effectiveness? Journal of School Health, 86(6), 452–463. https://doi.org/10.1111/josh.12393

70. Avery, A., Bostock, L., & McCullough, F. (2015). A systematic review investigating interventions that can help reduce consumption of sugar-sweetened beverages in children leading to changes in body fatness. Journal of Human Nutrition and Dietetics, 28(Suppl. 1), 52–64. https://doi.org/10.1111/jhn.12267

71. Berezowitz, C. K., Bontrager Yoder, A. B., & Schoeller, D. A. (2015). School gardens enhance academic performance and dietary outcomes in children. Journal of School Health, 85(8), 508-518. https://doi.org/10.1111/josh.12267

72. Ajie, W. N., & Chapman-Novakofski, K. M. (2014). Impact of computer-mediated, obesity-related nutrition education interventions for adolescents: A systematic review. Journal of Adolescent Health, 54(6), 631–645. https://doi.org/10.1016/j.jadohealth.2013.12.019

73. Bourke, M., Whittaker, P. J., & Verma, A. (2014). Are dietary interventions effective at increasing fruit and vegetable consumption among overweight children? A systematic review. Journal of Epidemiology and Community Health, 68(6), 485–490. https://doi.org/10.1136/jech-2013-203238

74. Brooks, N., & Begley, A. (2014). Adolescent food literacy programmes: A review of the literature. Nutrition & Dietetics, 71(3), 158-171. https://doi.org/10.1111/1747-0080.12096

75. Hackman, C. L., & Knowlden, A. P. (2014). Theory of reasoned action and theory of planned behavior-based dietary interventions in adolescents and young adults: A systematic review. Adolescent Health, Medicine and Therapeutics, 5, 101–114. https://doi.org/10.2147/AHMT.S56207

76. Hersch, D., Perdue, L., Ambroz, T., & Boucher, J. L. (2014). The impact of cooking classes on food-related preferences, attitudes, and behaviors of school-aged children: A systematic review of the evidence, 2003–2014. Preventing Chronic Disease, 11, E193. https://doi.org/10.5888/pcd11.140267

77. Mikkelsen, M. V., Husby, S., Skov, L. R., & Perez-Cueto, F. J. A. (2014). A systematic review of types of healthy eating interventions in preschools. Nutrition Journal, 13, 56. https://doi.org/10.1186/1475-2891-13-56

Appendix 3

Stage 3: Topic-level survey table

Topic	Description
1	Adults' familiarity with food messages from dietary guidelines
2	Ability to follow dietary guidelines: adults' view of children and adolescents
3	Memorable food message factors for children and adolescents
4	Social media tools children and adolescents use for food messaging
5	Information sources children use for food messages
6	Information sources adolescents use for food messages
7	Media sources children use for food messages
8	Media sources adolescents use for food messages
9	Methods of delivering food messaging most suitable for children and adolescents
10	Channels children and adolescents pay attention to for food messaging
11	Family barriers to healthy eating
12	Family facilitators to healthy eating