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Barriers and facilitators to supporting families with children most at risk of developing excess weight

A scoping review of qualitative evidence from the UK and Europe

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Published: September 2020
PHE publications
gateway number: GW-1580

PHE supports the UN
Sustainable Development Goals



Contents

About Public Health England	2
Acknowledgements	4
Glossary of terms	4
Executive summary	5
Introduction	8
Background	10
Research question, aim and objectives	13
Methods	14
Results	16
Discussion	23
Appendices	29
References	61

Acknowledgements

Public Health England (PHE) would like to thank Fiona Gillison (University of Bath), Helen Croker (University College London), Maria Maynard (Leeds Beckett University) and Anita Counsell (PHE) for peer reviewing this scoping review by providing their expertise and insight that has shaped its development.

Glossary of terms

Weight management service: An intervention that supported individual behaviour change with the aim of preventing or treating excess weight.

Ethnicity: A fluid social construct referring to shared characteristics including cultural traditions, nationality, geographical and ancestral origins¹.

Ethnic minority: Typically refers to populations of ethnic origin other than White. Considerations of ethnic health differences overlaps with that of socio-economic differences¹.

Executive summary

Background

Children and young people from certain minority ethnic groups, from low socio-economic status (SES) families, or with intellectual and/or physical disabilities are at greater risk of developing excess weight. For the purposes of this review, these 3 groups, including parents/carers, are described from here as 'families most at risk of excess weight'. However, there are no specific recommendations for successful weight management (prevention and treatment) of children from families with the highest risk of developing overweight or obesity. Systematic review evidence demonstrates that recruitment and retention of families most at risk of excess weight into weight management trials is poor, and there is a lack of evidence from interventions reporting on weight management outcomes in these families.

Objectives

To explore the qualitative evidence base that examines the barriers, facilitators and practice implications for the development and delivery of weight management services for families with the highest risk of developing overweight or obesity.

Methods

A scoping review including any qualitative or mixed method study that aimed to explore the prevention or treatment of obesity in children 0-17 years who are from families most at risk of excess weight residing in the UK or Europe. Families at risk of developing excess weight were defined as: families with children with a physical and/or intellectual disability, or from ethnic minority groups, or of low SES. MEDLINE and Embase were searched in December 2019 and literature was limited to: English language only, publications from 2010 onwards, full text papers only, and studies conducted in Europe. The Critical Appraisals Skills Programme (CASP) quality appraisal checklist was used for each study. All data were independently extracted by one reviewer (LE) and checked by a second (TB).

Results of the search

The searches identified over 2,500 records, of which 14 were included: 8 prevention articles from 6 studies and 6 treatment articles from 5 studies. Quality assessment demonstrated overall high quality; in 5 of the articles it was unclear whether the relationship between the researcher and participants was considered sufficiently.

Main findings

Obesity prevention studies in families most at risk of excess weight demonstrated:

- there is a lack of qualitative evidence examining the prevention of excess weight in older children (>12years) from low SES populations or some ethnic minority groups
- to enhance study quality, all studies should ensure they give clear consideration to the impact of the relationship between the researcher and participants
- good programme communication is essential, and can be enhanced by the use of translators and/or the use of graphic illustrations, in order to overcome language and cultural barriers
- programmes should be tailored to the capability and preferences of target families, ensuring content and monitoring is realistically achievable
- the economic impact of making healthy diet and activity choices must be considered in parallel with the impact of wider environmental influences such as neighbourhood safety and availability of fast food
- prevention programmes, assessment tools and health promotion materials should be co-developed with families from groups who are at a high risk of childhood obesity to ensure they are appropriate to different communities (for example, they are culturally sensitive and reinforce positive cultural norms)
- places of worship may enhance the reach of prevention programmes for some people from some ethnic minority populations, although additional resource may be required to facilitate this
- there is a lack of qualitative evidence examining prevention of excess weight in children with disabilities, and an absence of evidence in children with intellectual disabilities
- the benefits of physical exercise as opposed to physical therapy should be communicated to children with physical disabilities
- prevention programmes should ensure they are accessible to wheelchair users and those with other physical disabilities, to provide appropriate equipment and staff training to facilitate inclusive participation

Obesity treatment studies in families most at risk of excess weight demonstrated:

- there was no qualitative evidence that examined obesity treatment in children with physical or intellectual disabilities
- children from low-SES families, from some ethnic minority communities or those with complex needs may benefit from more tailored interventions
- tailoring services to the needs of families most at risk of excess weight could help in improving uptake and compliance. Considerations for tailoring services include
 - supporting families on a low income to make healthier food and activity choices, with consideration given to the cost of healthier food, activity and any child care and transport costs associated with programme attendance

- enhancing communication through the use of translators, and good visual resources to reduce reliance on literacy
- cultural adaption of programme content and delivery, ensuring cultural awareness amongst staff, and provision of non-stigmatising support
- including researcher/programme staff from target communities
- addressing wider environmental contributors to weight gain such as neighbourhood safety and fast food availability
- ensuring relevant services are joined up to provide continuity of care
- socio-economically matched peer support programmes may be worth exploring in future adolescent interventions

Discussion

The review demonstrates that there is an overall lack of qualitative evidence directly relevant to the UK. It indicates that there is only a relatively small body of evidence describing the prevention of excess weight in children over 12 years and the prevention and treatment of excess weight in children from more deprived areas or in children with physical disabilities. There was no evidence identified for the management of excess weight in children with intellectual difficulties.

The findings could relate to research priorities being focussed elsewhere; design of interventions not appealing to or engaging underserved communities; and/or a lack of engagement from such population groups. Given the inequalities associated with excess weight these are factors deserving of further consideration.

Conclusions

Insight into how and why families with the highest risk of developing excess weight, engage [or do not engage] with weight management services remains limited. In the future, there should be clear consideration given to the impact of the relationship between the researcher and participants. The use of researchers and other programme staff from target communities may help with participant engagement and the design of the intervention. In addition, weight management programmes, including assessment tools and health promotion materials, should be co-developed with children and their families to ensure they are designed appropriately and tailored. This will enable approaches that are relevant to the target child/young person and tailored to meet the specific needs of families from certain ethnic minority populations, low SES groups, or with intellectual and/or physical disabilities as appropriate. This review has particular relevance given the new evidence relating to COVID-19 and the disproportionate impact of COVID-19 associated with adults from ethnic minority populations and those from more deprived areas.

Introduction

Scoping review rationale

Prevention and treatment of childhood obesity presents a significant public health challenge. Childhood obesity rates in the UK are now ranked among the worst in Europe². Currently 1 in 5 children in England start primary school (aged 4-5 years) living with overweight or obesity, rising to 1 in 3 children living with overweight or obesity by the time they leave primary school (aged 10-11 years)³. This trend is concerning given obesity in childhood can result in the early onset of cardio-metabolic, respiratory and musculoskeletal conditions, as well as adverse psycho-social outcomes and an increased risk of living with obesity and associated mortality and morbidity later in life⁴. Obesity does not affect all populations equally, with children from the most deprived areas being twice as likely to develop obesity compared with children from more affluent areas, and these widening inequalities are continuing². Children from certain UK minority ethnic groups, particularly Black African origin and Bangladeshi ethnicities are also more likely to develop obesity³. There is also evidence demonstrating a higher prevalence of obesity in children with physical and/or intellectual disabilities^{5,6}. Therefore, addressing inequalities related to obesity is paramount.

In 2018, the government pledged to halve childhood obesity by 2030, and address the inequalities gap⁷, and in 2020, the government published a new obesity strategy⁸, introducing measures to ban unhealthy food adverts, new laws for calorie labelling, and an end to 'buy one, get one free' promotions. This strategy also commits to looking at ways to support people living with a disability to move towards a healthier weight and to consult on front-of-pack nutritional labelling⁸. Promoting healthier diets and a healthier weight and tackling health inequalities are 2 strategic priorities for PHE⁹. It is therefore imperative that weight management interventions, as part of a whole system approach¹⁰, appropriately target, engage and impact upon the populations in greatest need.

Relevant international research is summarised in the background section of this report, and includes systematic review evidence, which has demonstrated significant attrition and low compliance amongst families attending weight management services who are of Black ethnicityⁱ or low income. This research calls for more qualitative research to gain insight into this observation and to understand how services can best meet the needs of communities most at risk of obesity^{11,12}. This is coupled with low participation and engagement rates among families at risk of overweight or obesity who are taking part in trials^{13,14}. This raises serious questions as to the transferability of findings across different socio-demographic populations and the

ⁱ Described in this systematic review as Black, African American, non-Hispanic Black

effectiveness of weight management programmes within the communities most in need^{13,14}. This evidence therefore highlights the importance of ensuring that interventions are culturally and socially sensitive: recognising the barriers and facilitators to weight management for those families most at risk of the socio-demographic inequalities related to childhood obesity.

Given the lack of qualitative research identified in older reviews^{11,12}, this scoping review was designed to provide a current overview of qualitative evidence published in the last decade and examines the barriers and facilitators to prevention and treatment of overweight and obesity, in families with the highest risk of developing excess weight. The review will help to identify knowledge gaps, highlight areas for future research, and identify implications for design of interventions and assist policy makers and delivery. Evidence was sought from European populations only in order to capture data from health care systems and populations that are culturally most similar to the UK. This was important as the purpose of this review is to provide practical recommendations to support the reduction in current obesity related inequalities within the UK.

Background

Summary of the wider relevant international systematic review evidence

Whilst previous systematic reviews have examined critical components of successful child weight management¹⁵, and barriers and facilitators to family weight management in the general population¹², they lack any specific recommendations for families most at risk of excess weight. However, in 2014, a systematic review was published on the effectiveness of individual, community and societal level interventions at reducing socio-economic inequalities in obesity amongst children¹⁶. The review examined the best available international evidence for both prevention and treatment approaches in children aged 0-18 years. Although evidence from this review was limited, 2 randomised control trials (RCTs) suggested that an individual level, mentor-based health promotion, and screen time reduction, may be effective in reducing obesity prevalence in children from low SES families.

A review by Cui et al. 2015¹⁷, examined recruitment and retention in obesity prevention and treatment trials targeting minority or low-income children. Cui et al. observed that retention rates were lower in studies that: targeted solely Hispanics (vs mixed ethnicities), involved children and parents (vs children alone); focused on children with overweight or obesity (vs a mixed weight population); were home or community based (vs school based); and had an anthropometric target (vs obesity related behaviour outcomes). However, age, number of interventions sessions or sample size had no impact on retention¹⁷.

Two systematic reviews have specifically examined interventions to prevent or treat obesity in certain ethnic minority populations^{18,19}. Brown et al. 2015, examined interventions to prevent or treat obesity in South Asian children¹⁸. The review identified 7 studies in children aged 6-16 years, and although one high-quality, culturally sensitive, school-based physical activity intervention, was found to be effective, the meta-analyses of anthropometric outcomes were inconclusive¹⁸.

An earlier US review examined cultural adaption of obesity interventions for preschool children from specific ethnic minority populations¹⁹. This review identified a limited number of studies and observed that the most successful interventions in general were those that 'employed multiple cultural adaptations tailored to the intended population group'. The authors called for more research in this area and national guidelines to help support the future implementation of appropriate cultural adaptations¹⁹.

A 2019 Cochrane systematic review examining the effectiveness of obesity prevention trials reported a scarcity of evidence in children from different socio-demographic and ethnic groups. This review found that whilst prevention interventions didn't worsen

inequalities, there was insufficient evidence to determine which interventions were more effective in these populations¹³. Olstad²⁰ reviewed evidence relating to the impact of targeted policies in reducing obesity and improved obesity related behaviours in socio-economically disadvantaged children. Although evidence from this review was scarce in very young children and older adolescents, the authors reported that successful components of organisational (school-based) policy interventions included nutritional standards, enhancement to physical education, physical activity opportunities, school self-assessments and nutrition and physical activity education. When government policies were reviewed, the authors reported that providing education and fruit and vegetable subsidies also had a positive impact on disadvantaged children²⁰.

In 2014, Beauchamp et al²¹ published a review examining the effect of prevention interventions by SES. This review identified only 8 studies in children, with mixed findings. However, it was observed that interventions that supported behaviour change through a stronger reliance upon changes to the social or structural environment did appear to be more effective in low SES families. Furthermore, the majority of the interventions were sustained for up to 2 to 5 years duration. To improve food choice a school successfully introduced policies on water and fruit breaks, canteen menu changes and promotional materials. Physical activity strategies that helped to change behaviours, included after-school activities and walking school buses. To encourage the reduction in sedentary behaviour, a device to limit screen time was shown to be effective in the home environment²¹.

A further scoping review examined prevention interventions for children with physical disabilities²². This review identified 34 quasi- or non-experimental studies; however, none of those that focused on obesity prevention were long term, and most were undertaken in children with cerebral palsy, thus illustrating the lack of robust studies in this area. Of the 18 studies reporting a positive outcome, all involved physical activity, and other common features including motivational strategies and self-direction²².

A very recent (in press) systematic review of treatment interventions for children with excess weight aged 3-10 years, demonstrated a paucity of trial evidence examining the effectiveness of treatment approaches for different socio-demographic groups¹⁴. The authors of this review concluded that there was weak evidence to suggest that treatment effectiveness may be influenced by family-level factors such as attitudes to overweight, knowledge about the causes of weight gain and motivation to make family-level behaviour changes¹⁴.

A further 2018 scoping review of treatment services for children with disabilities²³, identified just 4 studies, all in children with intellectual disabilities and one also included children with physical disabilities, again highlighting the dearth of evidence in this population group. Although all programmes reported a moderate impact on improved weight status, with common components including: use of multidisciplinary teams,

technological delivery such as tablets to allow the use of apps and email and family engagement; there was a lack of long term data, data from Europe and data from different settings.

Key learning from international background literature

- Children and young people from specific ethnic minority groups, from low SES populations or with intellectual and/or physical disabilities are at greater risk of developing excess weight.
- Systematic review evidence demonstrates that:
 - recruitment and retention of families most at risk of excess weight into weight management trials is poor
 - there is a lack of effectiveness data on weight management outcomes in families most at risk of excess weight
 - culturally sensitive interventions may be more effective in supporting families from specific ethnic groups
 - interventions that support behaviour change through social or structural changes to the environment maybe more effective in low SES families
 - there is a paucity of evidence on weight management approaches for children and young people with physical and or intellectual disabilities
- There is a need for more qualitative evidence to improve understanding of how prevention and treatment programmes can be improved to address and reduce obesity-related inequalities in families most at risk of excess weight.

Research question, aim and objectives

Research questions

What qualitative evidence is available from the UK and Europe that explores the barriers and facilitators to the prevention or treatment of overweight or obesity in children living within families most at risk of excess weightⁱⁱ?

What changes are required for UK childhood obesity prevention and treatment policy, practice and research, in order to better serve families with a high risk of developing excess weight?

Aim

To explore the qualitative evidence base that examines the barriers, facilitators and practice implications for the development and delivery of child/family weight management services (prevention and treatment) for families with a high risk of developing overweight or obesity.

Objectives

Research objectives were:

- to improve understanding of how and why families most at risk of excess weight engage [and/or do not engage] with child/family weight management services
- to determine how to improve accessibility and retention of weight management services for families most at risk of excess weight
- to explore the implications for policy and practice in the UK
- to explore current gaps in the current evidence base and provide recommendations for future policy, practice and research

ⁱⁱ Families most at risk of excess weight have a higher risk of having or developing overweight or obesity: defined as families with children with a physical and/or intellectual disability, or from specific ethnic minority groups or from low SES populations. Children are defined as those between 0-17 years, residing in Europe.

Methods

The methodology of the review was guided by the Joanna Briggs Institute (JBI) methodology for scoping reviews set out in the JBI reviewers manual²⁴. The design of the protocol was pragmatic to ensure the output is tailored to policy and practice need. This review also followed the preferred reporting items for systematic reviews guidelines (PRISMA) for scoping reviews. As this was a scoping review of qualitative studies, a risk of bias assessment was not undertaken²⁵.

Inclusion criteria

Searches were conducted from 2010 onwards to identify research articles that met the following criteria:

Table 1: Population (P), Concept (C), Context (C); (PCC)

P	Families most at risk of excess weight: those families at risk of having or developing overweight or obesity: defined as families with children with a physical and/or intellectual disability, or from specific ethnic minority groups or from low SES populations. Children are defined as those between 0-17 years, residing in Europe.
C	Any qualitative or mixed method study that aims to explore the prevention or treatment of overweight and obesity in children 0-17 years who are from families most at risk of excess weight. Treatment studies were defined as interventions that exclusively recruited children with overweight or obesity, prevention studies were defined as interventions that aimed to change individual or family behaviours to prevent excess weight gain.
C	Any free living setting in Europe that specifically examines insights from families most at risk of excess weight.

By focussing on European studies, the methods did exclude any studies from the US and wider international contexts

Search limits

English language only, publications from 2010 onwards, full text papers only (no conference abstracts, dissertations or protocols), studies conducted in Europe.

Search strategy

A broad search was developed from the terms developed using the PCC terms in [Table 1](#). The resulting search was conducted in Medline and EMBASE on the 17 December 2019 (full search strategies are available in [Appendix 1](#)). Reference lists of included studies and relevant reviews were also hand searched.

Screening and data extraction

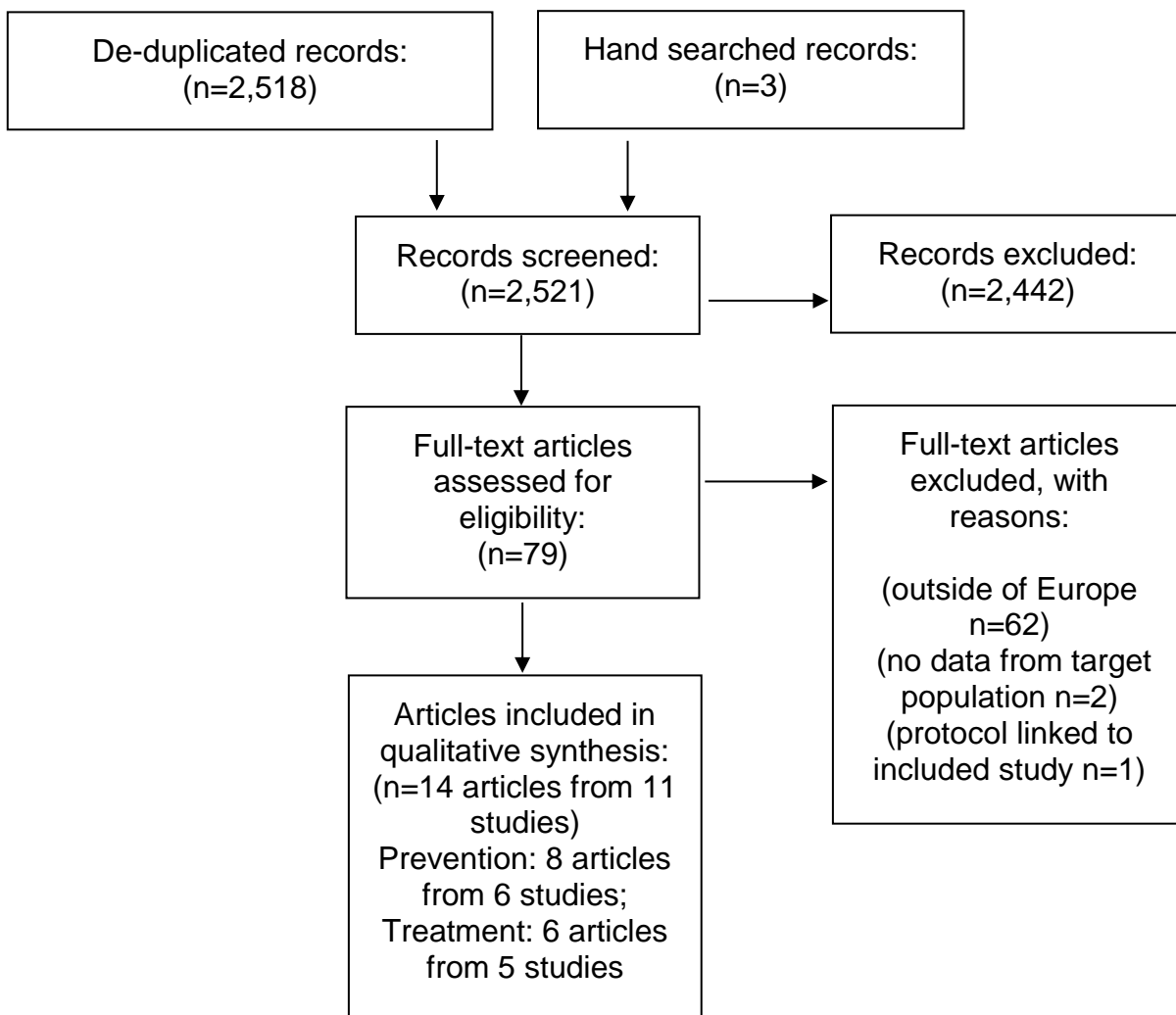
The titles and abstracts were entered into Endnote reference management software and screened by one reviewer (TB or LE). One reviewer (LE) then screened all full-text articles, with a second reviewer (TB) consulted to review any papers marked as unclear. The CASP quality appraisal checklist was used for each study, as it was deemed the most relevant assessment tool for included studies. All data were independently extracted by 1 reviewer (LE) and checked by a second (TB). Data extraction tables were developed to record participant and study characteristics. Ethnicity and migration status were variously defined and operationalised across studies and therefore the terminology reported in the results reflects the terminology in the individual papers. Relevant outcomes (for example, barriers and facilitators to programme implementation within target populations, and supporting qualitative insights) and implications for policy and practice were also extracted. The findings were then synthesised narratively.

Results

Figure 1 shows the study flow. The database searches identified 2,518 articles after deduplication. Seventy-nine full-text articles were obtained and further screened, and hand searching identified a further 3 articles. In total, 14 studies met the inclusion criteria and 65 were excluded, the majority of which (n=62) were excluded as they were not conducted in Europe, with a further 2 studies not providing data for the specified target populations, and another providing a protocol linked to 1 of the included studies. An excluded studies table is provided in Appendix 2 and demonstrates that the vast majority of data is currently derived from the US.

The results are presented separately for the prevention and treatment findings, with each section providing an overview of the study characteristics followed by a more detailed description of the individual study findings, which are summarised at the end.

Figure 1: PRISMA flow diagram



Prevention studies

Eight papers examined obesity prevention in predominantly primary school age children with 2 sets of papers providing findings from different aspects of the same programme^{26,27} and^{28,29}. Only 1 paper³⁰ targeted children over 13 years old. Six papers examined obesity prevention in populations of low SES (defined using a range of different indicators), 5 of which also examined families from specific ethnic minority groups. One study focused on families predominantly from Black Caribbean, Black African, Indian, Pakistani and Bangladeshi origin²⁶, and another paper examined children with disabilities³⁰. All studies were published between 2012 and 2019, with 2 papers (1 study) conducted in Sweden^{28,29} and the remainder conducted in the UK. An overview of the data extracted from each study is shown in [Appendix 3](#) and [Appendix 4](#). CASP quality assessments are shown in [Appendix 5](#), and demonstrate generally high quality publications, with the only predominant flaw being a lack of clarity in the consideration of the relationship between the researcher and participants in 5 of the papers.

Two Swedish papers examined the Healthy School Start programme^{28,29}, which is a parental intervention delivered via school, that promotes healthy diet and activity behaviours in children aged 5-7 years from low SES (defined by parental education and residential area) and from specific ethnic minority communities (parents born outside of Sweden). The findings from this study highlight the importance of good communication (including the use of translations and graphic illustrations to overcome language barriers) and ensuring materials are tailored to the abilities of the target families, acknowledging the impact of different parenting styles. These factors were deemed important in engaging parents in the programme and fulfilling their role in modelling positive behaviour change in the home environment.

Four UK studies examined obesity prevention in children from low SES families. The only study to examine low SES families, with no reference to ethnic origin was the Change4Life (C4L) social marketing evaluation which targeted parents of children aged 6-11 years, to increase awareness of the risks of excess weight and promote healthy behaviour changes³¹. The study demonstrates that the campaign did not adversely impact lower SES families, with more work needed to:

- provide low SES families with more support in positive parental role modelling of healthy behaviours
- consider the economic impact of making healthy choices for low SES families
- work with families to understand what is realistic in terms of intervention content and monitoring

The remaining 3 studies explored obesity prevention in children from specific ethnic minority groups and low SES populations. The first of these studies undertook a mixed

method approach to examine uptake of 'the daily mile' physical activity intervention that requires children to run for 15 minutes every school day³². The study did not undertake any individual level socio-demographic analysis but didn't find that the proportion of low SES or Black and minority ethnic families significantly impacted on uptake at a school level. In addition, feedback from teachers viewed 'the daily mile' as a potential for narrowing the health inequality gap by supporting children from the most deprived populations. The second mixed method study³³ was a feasibility trial of the UK adaptation of the Australian Healthy Dads Healthy Kids programme. From the small number of interviews undertaken in this study, the authors reported that the group sessions and facilitators were appreciated by participants, with a particularly strong theme identified around the appreciation of time spent with their children. However, a key challenge was identified in the delivery over the UK winter. This study demonstrated that this approach was acceptable to low SES groups and families from ethnically diverse populations, although more work is required to improve uptake and retention.

The final papers^{26,27} reported on the DiEt and Active Living (DEAL) study, which was conducted to identify culturally acceptable child and family-based interventions to prevent obesity by reducing diet and activity related risk factors, among specific ethnic minority families with children aged 8-11 years from a range of socio-economic circumstances. In this study less than half of all fathers had a non-manual occupation, and mothers of Black African origin ethnicity were more likely to be in non-manual occupations when compared to their South Asian counterparts. This was the first UK evaluation of such an intervention in places of worship, and the authors noted that although schools may logistically be more straightforward settings for delivery, places of worship provide important opportunities to reach specific ethnic minority children, families and communities. However, additional time and resources are required to facilitate engagement with places of worship. This study highlights the importance of researchers working in co-production with communities and community organisations to co-develop culturally-appropriate interventions, and culturally adapt dietary assessment tools. Policy makers and practitioners must also work with ethnic minority families to ensure health promotion messages are clearly communicated. The authors also note the importance of working with a representative range of ethnic communities, as culture and practices can vary between groups. The study also reported on the importance of prevention interventions addressing barriers to change, including factors within the local environment such as fast food outlets and actual/perceived lack of neighbourhood safety.

Only 1 study conducted in the UK examined obesity prevention in children aged 6-18 years who were active wheelchair users³⁰. This study demonstrated that children and young people who use wheelchairs were motivated to keep fit to improve their function and strength and were less aware of their levels of adiposity or fitness. Barriers to being active for this group were exclusion from physical education (for those in

mainstream schools), cost, accessibility, lack of sport specific wheelchairs, and time and child care requirements when parental involvement was required. The study highlights the need for improved communication of the benefits of physical exercise compared to physical therapy.

Key findings from obesity prevention studies in families most at risk of excess weight

- There is a lack of qualitative evidence examining the prevention of excess weight in older children (>12 years) from low SES populations or some ethnic minority groups.
- To enhance study quality, all studies should ensure they give clear consideration to the impact the relationship between the researcher and participants.
- Good programme communication is essential and can be enhanced by the use of translators and/or the use of graphic illustrations, in order to overcome language and cultural barriers.
- Programmes should be tailored to the capability and preferences of target families, ensuring content and monitoring is realistically achievable.
- The economic impact of making healthy diet and activity choices must be considered in parallel with the impact of wider environmental influences such as neighbourhood safety and availability of fast food.
- Prevention programmes, assessment tools and health promotion materials should be co-developed with families from groups who are at a high risk of childhood obesity to ensure they are culturally appropriate to different communities (for example, they are culturally sensitive and reinforce positive cultural norms).
- Places of worship may enhance the reach of prevention programmes for some people from some ethnic minority populations, although additional resource may be required to facilitate this.
- There is a lack of qualitative evidence examining prevention of excess weight in children with disabilities, and an absence of evidence in children with intellectual disabilities.
- The benefits of physical exercise as opposed to physical therapy should be communicated to children with physical disabilities.
- Prevention programmes should ensure they are accessible to wheelchair users and those with other physical disabilities, to provide appropriate equipment and staff training to facilitate inclusive participation.

Treatment studies

A total of 6 papers examined treatment programmes, providing data from 5 studies. Two papers^{34,35} provided data from the same UK study. However, the primary extraction was taken from the first paper³⁴. The studies were published between 2011 and 2019, and undertaken in Germany³⁶, France³⁷, Sweden³⁸ and the UK^{34,35,39}. An overview of the data extracted from each study is shown in [Appendix 6](#) and [Appendix 7](#), providing data for children aged between 4 and 18 years. CASP quality assessments are shown in [Appendix 8](#), and demonstrate generally high quality publications, with only 2 papers presenting queries regarding some quality domains^{36,37}. All studies examined low SES populations or considered specific ethnic minority groups, however no evidence was available for children with either physical or intellectual disabilities.

UK evidence was presented in 2 studies, the first of which was an evaluation of the cultural adaptation of the First Steps programme, which is a parent focused programme to treat excess weight in children aged 4-11 years³⁹. The study identified several important considerations when delivering treatment programmes for the South Asian families, and these are summarised in [Table 2](#).

Table 2: Evaluation summary of First Steps programme

Consideration	Actions
Setting	<ul style="list-style-type: none"> conducting interventions in venues near to home arranging at times that do not clash with religious commitments
Delivery	<ul style="list-style-type: none"> providing additional non-stigmatising support in recognising child excess weight communicating the important role of parents in weight management employing interpreters during programme recruitment taking a whole family approach that encourages peer support providing practical activity sessions
Tailoring	<ul style="list-style-type: none"> keeping written material to a minimum and using graphics where possible ensuring nutritional content is culturally appropriate using researchers from target communities and addressing barriers around complex family lives

Consideration	Actions
Environment	<ul style="list-style-type: none"> acknowledging neighbourhood safety and the impact of the availability of fast food outlets

The second UK study^{34,35}, examined the characteristics of children taking part in the Mind, Exercise, Nutrition, Do it! (MEND) programme when it was implemented at scale. The programme aimed to treat children living with excess weight, aged 7-13 years, through a family based multi-component behaviour change programme. The evaluation found that the MEND weight management approach was not as successful for specific ethnic minority families and low-SES populations (defined by area of residence and parental employment), compared to the general MEND population. Barriers to success included a lack of adaptation suitable for different ethnic groups and an over reliance on good literacy, unsuitability of the programme for children with complex needs, and the cost of healthy eating, transportation and childcare involved with family attendance.

The first of the European studies was from Germany³⁶, and provided a mixed methods evaluation exploring barriers to Turkish, Serbian, Greek and Vietnamese families participating in a clinical interdisciplinary childhood obesity treatment programme. This study, which involved children and adolescents, identified barriers related to:

- distrust of the treatment plan
- time and financial constraints
- language barriers
- impact of co-morbidities
- distance to sports facilities or dislike of sport
- difficulties managing temptations
- feelings of stigmatisation
- difficulty accepting instruction
- long waiting lists and lack of support from relevant external services

The second European study was undertaken in Sweden and took a mixed methods approach to evaluating a school nursing weight management counselling service in children aged 8-16 years who were predominantly refugees or immigrantsⁱⁱⁱ in Sweden (defined as having a parent born outside of Sweden)³⁸. Observations from this study found that school nurses lacked adequate communication skills when delivering diet and physical activity advice and struggled to counsel families whose first language and

ⁱⁱⁱ In UK research 'migrant' is used to describe 'immigrant' (as referred to in the study³⁸), as an individual who seeks immigration status to live permanently in a foreign country

food cultures differed to the nurses. This study therefore provides further evidence to support the need for improved training and resources to improve communication and cultural adaptation of weight management approaches for ethnic minority families.

The final European study based in France³⁷, also implemented a mixed method approach to evaluate the feasibility of a peer intervention to promote healthy eating and physical activity in adolescents (13-18 years) from low SES populations (defined by a family affluence scale). This study provides evidence to suggest that using facilitator–receiver peer dyads that are matched according to SES provide a feasible mechanism to help promote behaviour change in low SES adolescents living with overweight. Along with being matched for SES, it was also deemed important for dyads to be matched by place of residence.

Key findings from obesity treatment studies in families most at risk of excess weight

- There was no qualitative evidence identified that examined obesity treatment in children with physical or intellectual disabilities.
- Children from low-SES families, from some ethnic minority communities or those with complex needs may benefit from more tailored interventions.
- Tailoring services to the needs of families most at risk of excess weight could help in improving uptake and compliance. Considerations for tailoring services include:
 - supporting families on a low income to make healthier food and activity choices, with consideration given to the cost of healthier food, activity and any child care and transport costs associated with programme attendance
 - enhancing communication through the use of translators, and good visual resources to reduce reliance on literacy
 - cultural adaptation of programme content and delivery, ensuring cultural awareness amongst staff, and provision of non-stigmatising support
 - including researcher/programme staff from target communities
 - addressing wider environmental contributors to weight gain such as neighbourhood safety and fast food availability
 - ensuring relevant services are joined up to provide continuity of care
 - socio-economically matched peer support programmes may be worth exploring in future adolescent interventions

Discussion

Summary of the evidence

The aim of this scoping review was to explore the current qualitative evidence base that examines the barriers, facilitators and practice implications for the development and delivery of child/family weight management services (prevention and treatment) for families most at risk of excess weight. However, the searches resulted in a disappointingly, although perhaps unsurprisingly small evidence base that focused predominantly on studies in low SES populations or specific ethnic minority families, with no evidence identified in children and young people with intellectual disabilities, and only 1 study in young people with physical disabilities (predominantly cerebral palsy). This finding aligns with wider review evidence that also demonstrates a dearth of evidence in Europe⁴⁰, a predominance of evidence from the US¹⁶, and an absence of evidence in children with disabilities²⁴.

Although the 2017 weight management insight report, conducted on behalf of PHE, highlighted the need to consider diversity in child weight management approaches⁴¹, insights into how and why families with the highest risk of having or developing excess weight, engage [or do not engage] with weight management services unfortunately remain limited. However, findings from this review align with the insight report⁴¹, with a lack of poor communication, stigma, cultural sensitivity/adaptation and language barriers, identified as common barriers to programme engagement across the studies undertaken with specific ethnic minority families. These findings align with systematic review evidence from the US⁴², which identified the following barriers to weight management in specific ethnic minority families: mistrust; competing demands; concerns about unintended outcomes; poor communication; health insurance; legal migration status and stigma. Whereas the economic impact of making healthy dietary and activity choices, and costs associated with travel and child care required for attendance were noted as key barriers to programme engagement for low SES families. For children with a physical disability only 1 study provided evidence to suggest that accessibility, lack of sport-specific wheelchairs and appropriate staff training were barriers to engagement.

Difficulties in recruiting families most at risk of excess weight were reported in a number of studies included in this scoping review. Common themes across the studies were identified in terms of methods that may improve retention and accessibility of weight management services for families most at risk of excess weight. These included: using translators and good visual materials to overcome language barriers and reliance on literacy skills during programme recruitment and delivery; ensuring programmes are tailored to the needs of target populations (for example, ensuring content and delivery is

culturally adapted, such as including traditional foods and cooking practices), tailoring content to the abilities of target families (for example, ensuring content is achievable and meets expectations), ensuring programme logistics fit around family commitments such as religious events or child care; using researcher/programme staff from target communities; addressing constraints such as family budget, and wider environmental influences such as the role of fast food outlets and neighbourhood safety. Similar facilitators were also identified in the PHE local action on inequalities report⁴³, and in the US⁴² where cultural congruence (for example, research staff from target communities and their ability to speak the participant's first language); benefits to participation; altruism; convenience, and low risk of participation, were all identified as positive contributors. Furthermore, Strugnell et al. 2020⁴⁴ recognised the need to implement culturally appropriate interventions to help reduce widening inequalities for ethnic groups most at risk.

The findings from this scoping review support the outcome of an older 2011 systematic review⁴⁵ that examined attrition in paediatric weight management. This review reported high attrition in families from ethnic minority or disadvantaged communities, in addition to those children with higher BMI and severe co-morbidities or disabilities. The authors of the 2011 review, reported some consistency in terms of reasons for attrition, which included timing issues, programmes not meeting needs or expectations, and put forward questions which remain pertinent to future research and programme development. These are:

- Do families drop out of treatment because of dissatisfaction, stressors in the family, or both?
- How can treatment better fit into the everyday lives of busy families?
- How can we tailor programmes so they can cater for the diversity of families who require them (for example, single parents, blended families, dual-working parents)?
- How can programmes meet the needs of families from ethnically and culturally diverse families, who are most in need of services but more likely to disengage from them?

These questions could be further examined through co-development methodologies such as using community researchers⁴⁶, appreciative inquiry⁴⁷ and community based participatory research⁴⁸, which are showing promise in health inequalities research.

Implications for policy and practice

Despite the limited size of the evidence base, the findings from this scoping review highlight some promising learning applicable to the development of prevention and treatment programmes. This provides useful considerations for future research and UK policy makers and practitioners, which are summarised below:

Implementation considerations for policy and practice

- Work with communities to understand target population needs:
 - work with target populations and associated community organisations to co-develop weight management programme content and more successful recruitment and retention strategies
 - ensure all co-development work takes place with a representative range of communities, as culture and practices can vary between groups
 - be mindful that general public health promotion messages may not resonate with some ethnic minority communities. It is therefore important to understand current knowledge and perceptions of health messaging within target populations
- Be innovative and put co-design at the heart of service development: work with target families to understand what delivery approaches fit best into everyday life, for example consider the use of technology. Evaluate new approaches to ensure they remain fit for purpose
- Ensure clear communication:
 - consider using clear simple graphics to replace text where possible, to reduce reliance on literacy
 - use translators during programme recruitment and delivery, to enhance engagement and retention of specific ethnic minority communities, by overcoming language barriers. However, be mindful that direct translation of English versions may not make sense or be culturally sensitive
 - it may be helpful to communicate the important role parents' play in child weight management, and how they can help by role modelling positive behaviour changes
- Staff training:
 - consider training community members in programme recruitment and delivery. This could help build relationships with communities at the highest risk of obesity and help to overcome barriers to recruitment and retention
 - ensure staff are equipped with the required skills, training and resources to effectively deliver person-centred care within the target populations
- Tailor programme recruitment, content and delivery to target population needs:
 - cultural adaptation is critical for some ethnic minority families, as evidence suggests programmes with the most adaptation can be more successful. Adaptation should be considered in terms of programme recruitment, content, delivery and assessment. For example:
 - adapt recruitment strategies by seeking opportunities to maximise reach through community venues, such as places of worship

- adapt content and delivery by ensuring cultural food and activity practices are retained, and that religious commitments and different family structures are accommodated
- adapt assessment tools to ensure they are culturally acceptable and appropriate (for example, using culturally adapted nutrition composition data for dietary assessment)
- ensure programme content is realistic and tailored to participant ability, for example, ensure tasks are achievable and meet the expectations of target families and activities are creatively adapted to deliver key behaviour change techniques⁴⁹
- economic adaptations are critical for low SES families, for these families it is important to consider the cost implications of healthier food and activity options, and any travel or child care required to participate in the programme. It would also be helpful to consider the availability of cooking equipment and skills in target families, and how to join up with relevant support services, for example, healthier food bank provisions
- In the absence of any evidence identified for children and young people with intellectual disabilities, it is critical that local areas work closely with these families and relevant support services, to understand their weight management programme requirements. Consideration must be given to potential barriers and facilitators to engagement and retention, and required programme adaptations⁵⁰. Given the lack of published evidence it would be helpful for local areas to share learning in this important field to accelerate learning and appropriate action.
- For children and young people with physical disabilities, it is important to ensure that activities are tailored to the needs, and appropriate equipment is available (for example, suitable body composition measurement and specialised sport/activity equipment), and that staff are appropriately trained to support the needs and expectations of these families.
- For all families most at risk of excess weight, programme logistics must accommodate busy family life (for example, located near to home, and conducted at convenient times), and differences in family structure, stressors and parenting style.
- All intervention approaches must not be stigmatising and must acknowledge cultural differences in healthy weight perceptions.
- All interventions should be developed using a whole systems approach, to ensure wider environmental influences such as neighbourhood safety and fast food availability are appropriately addressed.

- Family based approaches and peer support appears to be well received by specific ethnic minority groups and low SES families and could help support programme delivery and engagement.
- When commissioners and practitioners are considering the needs of the community and what services to offer, health inequalities assessments should be used.

Research considerations

- High quality UK-based mixed methods applied research is required to further understand what approaches work and what do not, for whom and why; and how best to tailor weight management prevention and treatment programmes for families with the highest risk of having or developing excess weight.
- There is a need to comprehensively evaluate and share learning from new service approaches, that follows the standard evaluation framework for weight management interventions⁵¹ and reporting template⁵².
- There is a particular need for more research examining how best to provide effective weight management support for children and young people with physical and or intellectual disabilities.
- Ethnicity is a complex concept which changes over time and varies by context. Researchers need to be clear on the definition and intended meaning of the categories used, and to be sensitive to inclusivity and the potential for bias, avoiding outdated and inappropriate terminology.
- Future research should exploit the use of co-production approaches such as community-based research, appreciative inquiry, and using researchers from target communities.
- qualitative researchers should follow the consolidated criteria for reporting qualitative research and clearly consider and report the relationship between the researcher and participants.

Limitations

A scoping review methodology was selected to identify knowledge gaps, highlight areas for future research, and identify implications for decision-making. However, it is important to acknowledge the limitations of the approach used. Firstly, the focus is to provide breadth rather than depth of information, as such, the conduct of a meta-synthesis of the qualitative data was not undertaken. The selection of studies was also limited to those conducted in Europe and published in English during the last 10 years, to provide evidence that was most relevant to current UK policy and practice. Due to

time constraints, the initial screening was only undertaken by 1 reviewer, which may have introduced selection bias.

Conclusion

Evidence suggests that general childhood weight management programmes (preventative or treatment) may not be as suitable for, or effective in, the families most at risk of having or developing excess weight. This scoping review provides evidence-based considerations that may help UK policy makers and practitioners to tailor programmes to better meet the needs of these important, and often least heard populations, and address current obesity related inequalities. This is now, ever so more important given the association between COVID-19 infection, adults and obesity, ethnicity and deprivation^{53,54}. It indicates that further effort is needed to use existing tools to assess the needs of, and proactively work with, underserved communities to design user journeys that better reflect life before, during and after services. It also highlights the need for more co-produced qualitative research to continue to develop this somewhat under researched field. This work will contribute towards consideration of how such approaches align with the government ambition to halve childhood obesity and associated inequalities⁷, and fulfil the expectations set out in the prevention green paper: facilitating people to be the co-creators of their own health by providing them with tailored support and personalised behavioural advice⁵⁵.

Appendices

Appendix 1: Search strategies

Database: Ovid MEDLINE(R) ALL 1946 to December 16, 2019
Ran 17/12/19

1. obesity.ti,ab.
2. overweight.ti,ab.
3. pediatric obesity/
4. or/1-3
5. disability.ti,ab.
6. learning disorder/
7. intellectual disability/
8. disabled children/
9. ethnic.ti,ab.
10. ethnic groups/
11. minority groups/
12. socioeconomic.ti,ab.
13. free school meals.ti,ab.
14. low-income.ti,ab.
15. or/5-14
16. management.ti,ab.
17. prevention.ti,ab.
18. treatment.ti,ab.
19. intervention.ti,ab.
20. service.ti,ab.
21. qualitative.ti,ab.
22. program evaluation/
23. qualitative research/
24. or/16-23
25. 4 and 15
26. 24 and 25
27. children.ti,ab.
28. adolescents.ti,ab.
29. 27 or 28
30. 26 and 29
31. limit 30 to yr="2010 -Current" n=1653

Database: **Embase** 1996 to 2020 Week 01
Ran 07/01/20

1. obesity.ti,ab.
2. overweight.ti,ab.
3. childhood obesity/

4. or/1-3
5. disability.ti,ab.
6. learning disorder/
7. intellectual disability/
8. handicapped child/
9. ethnic.ti,ab.
10. ethnic groups/
11. minority groups/
12. socioeconomic.ti,ab.
13. free school meals.ti,ab.
14. low-income.ti,ab.
15. or/5-14
16. management.ti,ab.
17. prevention.ti,ab.
18. treatment.ti,ab.
19. intervention\$.ti,ab.
20. service.ti,ab.
21. qualitative.ti,ab.
22. program evaluation/
23. qualitative research/
24. or/16-23
25. 4 and 15
26. 24 and 25
27. children.ti,ab.
28. adolescents.ti,ab.
29. 27 or 28
30. 26 and 29
31. limit 30 to yr="2010 -Current" n=2265

Appendix 2: Excluded studies table

Excluded reference:	Reason for exclusion:
<i>Excluded prevention studies</i>	
O'Brien, T. D., et al. (2015). "Well-being, health and fitness of children who use wheelchairs: feasibility study protocol to develop child-centred 'keep-fit' exercise interventions." <i>Journal of Advanced Nursing</i> 71(2): 430-440. UK	protocol linked to Noyes (2017) UK
Vollmer, R. L. and A. R. Mobley (2013). "A pilot study to explore how low-income mothers of different ethnic/racial backgrounds perceive and implement recommended childhood obesity prevention messages." <i>Childhood Obesity</i> 9(3): 261-268	US
Bhawra, J. and M. Cooke (2013). "The impact of food insecurity on diet quality and obesity status among off-reserve first nations and metis children." <i>Canadian Journal of Diabetes</i> 2): S233.-	Canada
Bender, M. S., et al. (2014). "Community engagement approach: developing a culturally appropriate intervention for Hispanic mother-child dyads." <i>Journal of Transcultural Nursing</i> 25(4): 373-382	US
Christiansen, K. M., et al. (2013). "Environmental factors that impact the eating behaviors of low-income African American adolescents in Baltimore City." <i>Journal of Nutrition Education & Behavior</i> 45(6): 652-660.	US
Kaye, L. B., et al. (2011). "Low-income children's reported motivators of and barriers to healthy eating behaviors: a focus group study." <i>Journal of the National Medical Association</i> 103(9-10): 941-951.	US
Campbell, K., et al. (2012). "Engaging families most at risk for child obesity: Lessons from the Melbourne Infant Feeding Activity and Nutrition (InFANT) Program." <i>Obesity Research and Clinical Practice</i> 1): 7-8	Australia
Hopkins, L. C., et al. (2018). "Feasibility and acceptability of technology-based caregiver engagement strategies delivered in a summertime childhood obesity prevention intervention: results from an internal pilot of the Camp NERF (Nutrition, Education, Recreation, and Fitness) study." <i>Pilot & Feasibility Studies</i> 4: 153.	US
Hull, P., et al. (2017). "A Smartphone App for Families With Preschool-Aged Children in a Public Nutrition Program: Prototype Development and Beta-Testing." <i>JMIR MHealth and UHealth</i> 5(8): e102.	US
Knapp, M. B., et al. (2019). "Perceptions of School-Based Kitchen Garden Programs in Low-Income, African American Communities." <i>Health Promotion Practice</i> 20(5): 667-674	US
Brown, C. W., et al. (2017). "A Qualitative Approach: Evaluating the Childhood Health and Obesity Initiative Communities Empowered for Success (CHOICES) Pilot Study." <i>Journal of Racial & Ethnic Health Disparities</i> 4(4): 549-557.	US
Cape, J. and J. Nyhof-Young (2017). "Evaluating the efficacy of Varsity Docs: Innovative after-school, medical student-run sports program for children in vulnerable urban neighbourhoods." <i>Canadian Family Physician</i> 63 (2 Supplement 1): S62	Canada
Cason-Wilkerson, R., et al. (2015). "Factors influencing healthy lifestyle changes: a qualitative look at low-income families engaged in treatment for overweight children." <i>Childhood Obesity</i> 11(2): 170-176	US

Cyrl, S., et al. (2017). "Barriers and facilitators to childhood obesity prevention among culturally and linguistically diverse (CALD) communities in Victoria, Australia." <i>Australian & New Zealand Journal of Public Health</i> 41(3): 287-293	Australia
DeFrank, G., et al. (2019). "Key recruitment and retention strategies for a pilot web-based intervention to decrease obesity risk among minority youth." <i>Pilot & Feasibility Studies</i> 5: 109	US
Dickin, K. L. and G. Seim (2015). "Adapting the Trials of Improved Practices (TIPs) approach to explore the acceptability and feasibility of nutrition and parenting recommendations: what works for low-income families?" <i>Maternal & Child Nutrition</i> 11(4): 897-914.	US
Ganter, C., et al. (2017). "Lessons Learned by Community Stakeholders in the Massachusetts Childhood Obesity Research Demonstration (MA-CORD) Project, 2013-2014." <i>Preventing Chronic Disease</i> 14: E08	US
Ganter, C., et al. (2015). "Community stakeholders' perceptions of barriers to childhood obesity prevention in low-income families, Massachusetts 2012-2013." <i>Preventing Chronic Disease</i> 12: E42	US
Gibby, C. L. K., et al. (2019). "Acceptability of a text message-based intervention for obesity prevention in infants from Hawai'i and Puerto Rico WIC." <i>BMC Pregnancy & Childbirth</i> 19(1): 291	US
McPherson, A. C., et al. (2017). "Communicating about obesity and weight-related topics with children with a physical disability and their families: spina bifida as an example." <i>Disability & Rehabilitation</i> 39(8): 791-797.	Canada
Payan, D. D., et al. (2019). "Intrapersonal and Environmental Barriers to Physical Activity Among Blacks and Latinos." <i>Journal of Nutrition Education & Behavior</i> 51(4): 478-485	US
Penilla, C., et al. (2017). "Obstacles to preventing obesity in children aged 2 to 5 years: Latino mothers' and fathers' experiences and perceptions of their urban environments." <i>International Journal of Behavioral Nutrition & Physical Activity</i> 14(1): 148.	US
Sagatov, R. D. F., et al. (2018). "Recruitment outcomes, challenges and lessons learned: the Healthy Communities Study." <i>Pediatric Obesity</i> 13 Suppl 1: 27-35	US
Shahsanai, A., et al. (2019). "Perceived barriers to healthy lifestyle from the parental perspective of overweight and obese students." <i>Journal of Education & Health Promotion</i> 8: 79	Iran
van den Berg, A., et al. (2019). "Design and evaluation of a coalition-led obesity initiative to promote healthy eating and physical activity in low-income, ethnically diverse communities: the Go! Austin/Vamos! Austin initiative." <i>Archives of Public Health</i> 77: 25	US
Whiteside-Mansell, L., et al. (2019). "Together, We Inspire Smart Eating (WISE): An Examination of Implementation of a WISE Curriculum for Obesity Prevention in Children 3 to 7 Years." <i>Lobal Pediatric Health</i> 6: 2333794X19869811.	US
Wright, C. M., et al. (2019). "The FLEX study school-based physical activity programs - measurement and evaluation of implementation." <i>BMC Public Health</i> 19(1): 73.	US
Black, M. M., et al. (2012). "College mentors: a view from the inside of an intervention to promote health behaviors and prevent obesity among low-income, urban, African American adolescents." <i>Health Promotion Practice</i> 13(2): 238-244.	US
Dammann, K. and C. Smith (2010). "Food-related attitudes and behaviors at home, school, and restaurants: perspectives from racially diverse, urban, low-income 9- to 13-year-old children in Minnesota." <i>Journal of Nutrition</i>	US

Education & Behavior 42(6): 389-397.	
St George, S. M. and D. K. Wilson (2012). "A qualitative study for understanding family and peer influences on obesity-related health behaviors in low-income African-American adolescents." <i>Childhood Obesity</i> 8(5): 466-476	US
Cowgill, B. O., et al. (2014). "Parents' views on engaging families of middle school students in obesity prevention and control in a multiethnic population." <i>Preventing Chronic Disease</i> 11: E54.	US
Davis, A. M., et al. (2013). "The nutrition needs of low-income families regarding living healthier lifestyles: Findings from a qualitative study." <i>Journal of Child Health Care</i> 17(1): 53-61	US
Davison, K. K., et al. (2013). "Reframing family-centred obesity prevention using the Family Ecological Model." <i>Public Health Nutrition</i> 16(10): 1861-1869	US
Hearst, M. O., et al. (2013). "Early childhood development and obesity risk-factors in a multi-ethnic, low-income community: Feasibility of the 'Five Hundred under Five' social determinants of health pilot study." <i>Health Education Journal</i> 72(2): 203-215.	US
Heidelberger, L. A. and C. Smith (2014). "A Child's Viewpoint: Determinants of Food Choice and Definition of Health in Low-Income 8- to 13-Year-Old Children in Urban Minnesota Communities." <i>Journal of Hunger and Environmental Nutrition</i> 9(3): 388-408	US
Jones, V. F., et al. (2014). "Stakeholder perspectives on barriers for healthy living for low-income african american families." <i>Frontiers in Pediatrics</i> 2: 137	US
Lindsay, A., et al. (2013). "Socio-cultural, organizational, and community level influences on physical activity levels of latino preschool-aged children: A qualitative study." <i>Annals of Nutrition and Metabolism</i> 1): 432	US
Malhotra, K., et al. (2013). "Perceived benefits and challenges for low-income mothers of having family meals with preschool-aged children: Childhood memories matter." <i>Journal of the Academy of Nutrition and Dietetics</i> 113(11): 1484-1493	US
Pescud, M. and S. Pettigrew (2014). "'I know it's wrong, but...': a qualitative investigation of low-income parents' feelings of guilt about their child-feeding practices." <i>Maternal & Child Nutrition</i> 10(3): 422-435	Australia
Pescud, M. and S. Pettigrew (2014). "Treats: low socioeconomic status Australian parents' provision of extra foods for their overweight or obese children." <i>Health Promotion Journal of Australia</i> 25(2): 104-109	Australia
Pescud, M., et al. (2014). "Nutrition beliefs of disadvantaged parents of overweight children." <i>Health Education Journal</i> 73(2): 201-208	Australia
Pettigrew, S. and M. Pescud (2013). "The salience of food labeling among low-income families with overweight children." <i>Journal of Nutrition Education & Behavior</i> 45(4): 332-339.	Australia
Piziak, V. (2014). "The development of a bilingual interactive video to improve physical activity and healthful eating in a head start population." <i>International Journal of Environmental Research & Public Health</i> [Electronic Resource] 11(12): 13065-13073.	US
<i>Excluded treatment studies</i>	
Lim, C. S. and D. M. Janicke (2013). "Barriers related to delivering pediatric weight management interventions to children and families from rural communities." <i>Children's Health Care</i> 42(3): 214-230.	US
Hinckson, E. A., et al. (2013). "Physical activity, dietary habits and overall health in overweight and obese children and youth with intellectual disability or autism." <i>Research in Developmental Disabilities</i> 34(4): 1170-1178.	New Zealand
Jones, V. F., et al. (2013). "Developing culturally appropriate interventions	US

addressing childhood obesity among low income African American families." <i>Journal of Investigative Medicine</i> 61 (2): 511.	
Morinder, G., et al. (2011). "Adolescents' perceptions of obesity treatment--an interview study." <i>Disability & Rehabilitation</i> 33(12): 999-1009. Sweden	No data in target population
Kelleher E, Harrington JM, Shiely F, <i>et al</i> Barriers and facilitators to the implementation of a community-based, multidisciplinary, family-focused childhood weight management programme in Ireland: a qualitative study <i>BMJ Open</i> 2017;7:e016459. doi: 10.1136/bmjopen-2017-016459 – hand searched	No data in target population
Grow, H. M., et al. (2013). "Understanding family motivations and barriers to participation in community-based programs for overweight youth: one program model does not fit all." <i>Journal of Public Health Management & Practice</i> 19(4): E1-E10	US
Tester, J. M., et al. (2016). "Disordered eating behaviours and food insecurity: A qualitative study about children with obesity in low-income households." <i>Obesity Research & Clinical Practice</i> 10(5): 544-552	US
Flores, G., et al. (2012). "Making tortillas without lard: Latino parents' perspectives on healthy eating, physical activity, and weight-management strategies for overweight Latino children." <i>Journal of the Academy of Nutrition & Dietetics</i> 112(1): 81-89	US
Silver, M. P. and S. M. Cronin (2019). "Health Care Providers' Perspectives on Family Compliance and Behavior Change in a Childhood Obesity Program." <i>Health Education & Behavior</i> 46(4): 582-591	Canada
Teevale, T., et al. (2015). "Acceptability and non-compliance in a family-led weight-management programme for obese Pacific children." <i>Public Health Nutrition</i> 18(14): 2625-2633	Pacific Island
Ptomey, L. T., et al. (2016). "Parents' perspective on weight management interventions for adolescents with intellectual and developmental disabilities." <i>Disability & Health Journal</i> 9(1): 162-166.	US
Rice, K. G., et al. (2017). "Role of Health Coaches in Pediatric Weight Management: Patient and Parent Perspectives." <i>Clinical Pediatrics</i> 56(2): 162-170.-	US
McPherson, A. C., et al. (2019). ""Don't sweat it buddy, it's OK": an exploration of the needs of adolescents with disabilities when designing a mobile application for weight management and healthy lifestyles." <i>Disability & Rehabilitation</i> : 1-9.?	Canada
Cui, Z., et al. (2019). "Recruitment strategies for predominantly low-income, multi-racial/ethnic children and parents to 3-year community-based intervention trials: Childhood Obesity Prevention and Treatment Research (COPTR) Consortium." <i>Trials [Electronic Resource]</i> 20(1): 296	US
Gallo, S., et al. (2019). "Feasibility of a Multidisciplinary and Culturally Adapted Pediatric Weight Management Program for Latino Families: Results From the Vidas Activas y Familias Saludables Pilot Study." <i>Journal of Nutrition Education & Behavior</i> 07: 07	US
Knierim, S. D., et al. (2018). "Home Visitations for Delivering an Early Childhood Obesity Intervention in Denver: Parent and Patient Navigator Perspectives." <i>Maternal & Child Health Journal</i> 22(11): 1589-1597.	US
Buscemi, J., et al. (2015). "Retaining traditionally hard to reach participants: Lessons learned from 3 childhood obesity studies." <i>Contemporary Clinical Trials</i> 42: 98-104	US
Blaine, R. E., et al. (2016). "Implementing a childhood obesity intervention in low-income school districts: A mixed methods analysis from the Massachusetts childhood obesity research demonstration (MA-CORD) project." <i>Obesity Reviews</i> 2): 152	US

Kulik, N. L., et al. (2017). "Access to primary care child weight management programs: Urban parent barriers and facilitators to participation." <i>Journal of Child Health Care</i> 21(4): 509-521	US
Kwitowski, M., et al. (2017). "An exploration of factors influencing attrition from a pediatric weight management intervention." <i>Obesity Research & Clinical Practice</i> 11(2): 233-240.	US
Lee, R. L. T., et al. (2019). "Family carers' experiences of participating in a weight management programme for overweight children and adolescents with intellectual disabilities: An exploratory study." <i>Journal of Advanced Nursing</i> 75(2): 388-399	Hong Kong
Amiri, P., et al. (2010). "Personal barriers to life style modification in overweight/obese adolescents: A qualitative study. [Arabic]." <i>Iranian Journal of Endocrinology and Metabolism</i> 11(5): 521-529+601	Arabic

Appendix 3: Overview of data extracted for prevention studies (study design, study aim, country, target population intervention, details and target age group)

Author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
Norman (2016) ²⁹ Healthy School Start	[Q]: teacher interviews and parent focus groups. No information was provided on whether the researchers were from the target community. Focus groups carried out by moderator and assistant, no further information provided.	To describe barriers and facilitators influencing implementation of the Healthy School Start intervention in disadvantaged areas in Stockholm, Sweden, from the perspective of parents and teachers. [S]	Sweden, Stockholm (school, but target behaviour in the home environment).	[LS and EM] determined by area SES and parental education. 10 teachers, 14 parents, from disadvantaged areas of Stockholm (8 of low education and 8 born outside of Sweden). The country of origin of the parents included: Iraq, Korea, Lebanon, India, Turkey, Afghanistan, Somalia.	Healthy School Start: Parental intervention to promote healthy diet and activity based on social cognitive theory and targeting children 5-7 yrs. Intervention is conducted for 6 months, involves providing parents with information and motivational interviewing (MI) and teachers with classroom resources, accompanied by a home workbook.
Norman (2018) ²⁸ Healthy School Start	[Q]: A phenomenographic design and analysis of MI sessions with parents. No information reported on whether researchers or MI counsellors were from target community.	To explore the variation in how parents from low SES populations influence their child's dietary behaviours.[S]	Sweden, Stockholm (school, but target behaviour in the home environment).	[LS classified by low parental education and EM] all parents had a low level of education and most (n=23) participants born outside of the Nordic region. The countries of origin of the participants included: Eastern Africa, Ethiopia, Eritrea, Somalia, Northern Africa, Morocco, Western Asia, Iraq, Azerbaijan, Armenia, Turkey, Southern Asia, Afghanistan, Iran, Bangladesh, Eastern	Healthy School Start: Parental intervention to promote healthy diet and activity based on social cognitive theory and targeting children 5-7 years. Intervention is conducted for 6 months and involves providing parents with information and MI and teachers with classroom resources,

Author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
				Europe, Poland, Northern Europe, Estonia. 57 MI sessions from 29 parents were included.	accompanied by a home workbook.
Croker (2012) ³¹	MM cluster RCT plus qualitative interview with parent subset. No information provided on whether researcher was from target community.	To examine the impact of personalised feedback and print material from the C4L campaign on parents' attitudes and behaviours about their children's eating and activity in a community-based cluster-randomised controlled trial. [P]	UK, national (home).	[LS determined by parental education] 12 parents of children aged 6-11 years (said to be nationally representative, although supporting quotes were designated by SES, the number of low SES participants was not provided). There was no indication as to the ethnicity of the interview participants. One table refers to 'social class' but no reference to social class anywhere else in paper.	C4L social marketing campaign that aimed to increase awareness of the health risk associated with excess body fat, reduce calories and improve dietary habits, do regular physical activity and reduce sedentary time. Target age range: 6-11 years.
Hanckel (2019) ³²	MM rapid ethnographic assessment involving interviews, focus groups, observations and secondary data analysis. Participants from the 5 schools did not know the researcher prior to the commencement of the study.	To identify how 'The Daily Mile' is being implemented in a naturalistic setting, and what implications this has for its potential impact on population health. [P]	UK, Lewisham, South London (school).	[LS (free school meals) and EM]. Interviews [n=11], focus groups [n=41] with key stakeholders (public health, teachers and pupils, and parents/carers) and 49 daily miles observations conducted in 12 classes of children aged 5-11 years across 5 schools. 20 children and 1 parent identified from ethnic minority groups.	'The Daily Mile' requires school teachers to take school children out of their classroom at any time for 15 min/day to run (this equates to a distance of ~1 mile) to improve physical, mental, emotional and social health and wellbeing. The intervention is free and involves no equipment or staff training and

Author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
					should support children with mobility difficulties. Target age range 5-11 years.
Griffin (2019) ³³	MM RCT with MM process evaluation using session observations, participant and facilitator survey and qualitative interviews. One of the study authors conducted the interviews and there was some information from researchers on process, but researchers were not from the target community.	To assess the feasibility of delivering a culturally adapted weight management programme, Healthy Dads, Healthy Kids UK (HDHK-UK), for fathers with overweight or obesity and their primary school-aged children, and examine the feasibility of conducting a definitive RCT. [S]	UK, West Midlands (community).	[LS and EM] for the whole study population (n=43 fathers and 62 children). 60.5% were from EM communities and 74.4% lived in the 2 most deprived quintiles of deprivation (using IMD). 16 session observations, participant and 12 participant and 7 facilitators interviews.	HDHK-UK is a weight management programme for fathers of children aged 4-11 years, that also addresses obesity prevention (healthy eating and activity behaviours in their children). Developed and successful in Australia, the programme was adapted to a UK population. Weekly 90 min sessions were delivered over 9 consecutive weeks, which involved separate father child education and a joint activity. Children were taught about healthy diet and activity behaviours and how to support their father through role modelling these behaviours.

Author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
Maynard (2017) ²⁶ – part of the DEAL study	MM session observations, focus groups and open text and scores from a self- completed questionnaire. Study authors report that commonly cited barriers to participation is lack of researchers from within the target community but no information about whether the researchers for this study were from target community.	To conduct developmental research among children from ethnic minority groups, in schools and places of worship. [S]	UK, London (schools and places of worship).	[EM] 65 children (7-13 years old) predominantly from Black Caribbean, Black African, Indian, Pakistani, Bangladeshi and 10.8% from White minority groups.	Taster intervention sessions were provided in school or places of worship and involved activities that could be included in a subsequent trial. Sessions focused on healthy diet and activity habit formation. Measures that were evaluated included 3-day food diaries, 24-hour dietary recalls, the Youth Physical Activity Questionnaire, accelerometry, and diet and physical activity self-efficacy questionnaires. Target age range 7-13 years.
Rawlins (2013) ²⁷ - part of the DEAL study	[Q] 5 parental interviews, 8 parental focus groups and 13 child focus groups. Does not report on whether the researchers were from target community but does discuss potential biases	To elicit perceptions, intentions and beliefs relating to barriers to and facilitators of eating a healthy diet and participating in physical activity. [S]	UK, London (schools and places of worship).	[EM and LS] 70 children aged 8-11 years, the majority from EM communities which included Black Caribbean, Black African, Indian, Pakistani, Bangladeshi, other EM (White participants represented 7%) and their parents (n=43). Findings were assessed by SES.	The DiEt and Active Living (DEAL) study was conducted to identify culturally acceptable child and family-based interventions that aimed to prevent obesity by reducing diet and

Barriers and facilitators to supporting families with children most at risk of developing excess weight

Author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
	and ethnicity of researchers.				activity related risk factors among EM families with children aged 8-11 years.
Noyes (2017) ³⁰	[Q] structured interviews either face to face or over the phone followed up 6 months later by a structured group discussion. None of the researchers had any prior relationship with the children and their families and disengaged at the end of the study.	To gain a better understanding of how children aged 6–18 years who use wheelchairs and their families conceptualized physical exercise and keeping fit. [S]	UK.	[D] 24 children with a range of conditions, primarily White including 23 parents.	An exploration of keeping fit and exercising using a wheelchair, in children 6-18 years and their families.

Appendix 4: Overview of data extracted for prevention studies (outcomes relating to barriers and facilitators regarding engagement, access and retention; key learning for implementation, and comments, competing interests, funding)

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
<p>Norman (2016)²⁹ Healthy School Start</p>	<p>Overarching theme: tailoring the intervention to increase participant engagement. For teachers, engagement was enhanced by being asked rather than told to implement the programme, and being provided with classroom materials that were informative, clear, ready to use, and were pitched at the right ability level or easily adapted (providing it was provided ahead of their lesson planning). Teachers also felt that parents' ability to understand the assignments, support their child and encourage them to bring their workbook were important for success, and felt that whilst children were engaged often parents were not. For parents: engagement was enhanced: if they perceived the intervention to be relevant to their family's everyday life and needs; if they felt the information was pitched at the right level for them; if they had a positive MI experience; if (where applicable) both parents were on board. Cooperation between home and school, and parents' ability to act as good role models were also key to programme adherence at</p>	<p>When maximising engagement with families from low SES and families from ethnic minority groups it is important to:</p> <ol style="list-style-type: none"> 1. Tailor the intervention to the abilities of the target group to maintain engagement. 2. Gain parental engagement and using parents as role models to initiate change in the home environment. 3. Get involvement from both parents (if applicable/possible). 4. Ensure good communication (including translations and graphic illustrations to overcome language barriers) and clear roles. 	<p>Well conducted study, although results limited to those most engaged [8/9], no competing interests declared. Funded by Sven Jerring Foundation, Marin Rind Foundation and the Stockholm county Council Public Health fund.</p>

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	<p>home. Other useful insights from parent interviews were that some parents felt that translation or less text and more pictures may help with literacy problems, and some found telephone counselling difficult.</p>		
<p>Norman (2018)²⁸ Healthy School Start</p>	<p>The analysis revealed 5 categories that described parental influences on children’s dietary behaviour through different forms of guidance. These categories:</p> <ul style="list-style-type: none"> -silent guidance: <i>“I guide my child to healthy dietary behaviours without the child noticing”</i>, -open guidance: <i>“I guide my child to healthy dietary behaviours so that the child notices”</i> -conscious lack of guidance: <i>“I am aware that my child lacks guidance to healthy dietary behaviours”</i>, -subconscious lack of guidance <i>“I want to influence my child's dietary behaviours, but it does not seem to work”</i> -enforcement: – where parents know what healthy eating is and have tried to impose their view on the child using forcing strategies. <p>Thus, ranging from positive impact, high trust low guidance to negative impact low trust, high distress guidance.</p>	<p>This study demonstrates that parents from a low SES EM setting in Sweden use different types of parental guidance which will influence the parent-child interplay around food, which includes: the parental perceptions of responsibility for the child's healthy dietary behaviour, level of trust in their child's ability to self-regulate food intake, and level of own emotional distress. Thus, emphasising the need to examine parenting techniques in target populations so that the type of supportive intervention can be tailored depending on parenting guidance used.</p> <p>Parents from SES populations not a homogenous group in terms of parenting style.</p>	<p>Well conducted study [8/9]. Although findings are limited to the population studied. No competing interests declared. Funded by Sven Jerring Foundation, Marin Rind Foundation and the Stockholm county Council Public Health fund.</p>

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
Croker (2012) ³¹	<p>Parents from higher SES populations in the intervention group rated the importance of physical activity lower and reported less dietary monitoring and TV watching than in the control group, while there were no significant group differences for parents from lower SES populations. When differences between SES families were examined adverse effects of the intervention were only being seen for the higher SES families, with virtually no differences between the control and intervention group in the lower SES families. Significant interactions with SES for dietary monitoring and TV hours showed the same pattern, with the intervention group doing worse than the control group in the higher SES participants, whilst no differences were observed in the lower SES participants. The qualitative interviews reported that there was some acknowledgement amongst lower SES parents that their own eating and activity habits weren't good, but they felt their children were healthy. Some lower SES parents also thought that monitoring their child's eating or activity was unrealistic and suggested that the cost of healthier eating was a barrier (although 1 parent had found that 'scratch cooking' was more economical). Most parents were positive about the materials themselves,</p>	<p>Campaigns such as C4L seemed to appeal to families from lower SES populations and didn't appear to adversely impact these families.</p> <p>Future interventions need to:</p> <ol style="list-style-type: none"> 1. Support the parents to be good role models to assist with behaviour change. 2. Consider the economic consequences of the intervention to participants. 3. Work with families to understand what is realistic in terms of intervention content and monitoring. 	<p>Qualitative component of study was only small so quality assessment was limited by availability of data [7/9]. Examining inequalities was not the sole focus of the study. No declared competing interests. Funded by Department of Health. Only motivated parents (those that returned a completed questionnaire) received personalised feedback and print materials (5.2% of the intervention group). Protocol amended in response to low participation. Low engagement was an issue.</p>

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	especially those aimed at children, although some higher SES parents considered them patronising.		
Hanckel (2019) ³²	Uptake of The Daily Mile was higher in schools with a higher mean proportion of pupils receiving free school meals [indicator of low SES] (although not statistically significant). There was no difference in uptake in schools with differing proportions of children from Black and minority ethnic communities. No individual level socio-demographic analysis was published.	More research is required to examine the impact of interventions like the daily mile on individual socio-demographics.	Well conducted study, missing individual level socio-demographic data which limited data available to extract and implementation learning. [8/9] Two of the study authors were public health professionals in Lewisham. Funded by Medical Research Council.
Griffin (2019) ³³	Participants lost to follow up at 6 months were more likely to be White. The intervention was acceptable to a majority of fathers and families from ethnic minority groups and families from SES populations and the programme was rated highly by the participants and delivery teams (with fathers particularly enjoying spending time with their children). However, recruiting participants was difficult and attendance rates were low (only 52% attended at least 5 of the 9 planned sessions). General barriers to participation were around the timing of the sessions clashing with other commitments, poor weather conditions in the winter and the youngest 4-year-old child had difficulty	A father child approach appears to be acceptable to families from low SES populations and ethnic minority groups, however more research is required to improve the uptake and retention rates and reduce stigma. It may be advantageous to work with target families to help develop more successful recruitment and retention strategies. Stigma may be reduced by moving away from weight status and instead explore other entry points such as health or wellbeing. Feasibility study that demonstrated an RCT was not feasible due to difficulties with recruitment and retention of dads.	Well conducted study but as qualitative component was small, quality assessment was limited by a lack of available data [7/9]. Two of the authors designed the programme in Australia. Funded by the NIHR Public Health Research programme.

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	<p>engaging with the written materials. Recruitment was hampered by the stigma associated with weight management and difficulties in recruiting fathers. However, whilst this study focused on low SES populations and ethnic minority groups, the qualitative component was not analysed by socio-demographic, and the socio-demographics of those participating in the qualitative work was not reported.</p>		
<p>Maynard (2017)²⁶ – part of the DEAL study</p>	<p>There was no ethnic patterning in completion rates for both diet and physical activity measures. However, the proportion of 24 hour recalls with high coding confidence was similar among White, Black African, Black Caribbean Bangladeshi and other minority ethnic groups (82–85%), but lower for Indian and Pakistani groups (67% and 75% respectively; p=0.02). Ethnic specific dishes and drinks (as described in the study) were reported by ethnic minority groups and were 3 times more likely to be recalled in the place of worship setting compared to schools. There was no ethnic patterning of BMI z-scores or BMI categories. Delivery of interventions was more straightforward in schools, but evaluation coverage was more consistent in places of worship. Although significant time and</p>	<p>Schools may logistically be more straightforward settings for delivery of interventions but, places of worship provide important opportunities to reach ethnic minority communities. However additional time and resources should be allocated to facilitate engagement with places of worship. Researchers, must work in co-production with communities and community organisations to co-develop culturally-appropriate interventions, and culturally adapted dietary assessment tools. Training target community members as researchers may help overcome the logistical complexities of working places of workshop. Methods and tools (for example, food composition tables) which can accommodate diverse cultural frameworks are required.</p>	<p>Good quality study [8/9]. No competing interests declared. Funded by the Public Health Research Consortium, Department of Health Policy Research Programme.</p>

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	<p>resources were required to recruit a small number of places of worship, they provide an important opportunity to reach ethnic minority communities</p> <p>Twenty-four-hour recalls provided the best dietary data, however dietary assessment technologies and associated food composition data (adapted with ethnic-specific foods and recipes could improve the consistency of dietary data in place of worship settings).</p> <p>Completion of the young person's physical activity questionnaire was straightforward, and valid at a group level.</p>	<p>This is the first evaluation study in UK of places of worship as a setting and showed good reach.</p>	
<p>Rawlins (2013)²⁷ – part of the DEAL study</p>	<p>Influences common to all ethnic minority groups included: children had their own interpretation of what healthy foods were, with views on what a balanced diet consists of, conflicting with formal recommendations. Despite having their own interpretation of what healthy foods were, there was a general awareness of key dietary messages such as eating more fruit and veg and cutting down on foods high sugar and fat. Dislike of school meals was also a significant barrier to healthy eating. Parents also had their own views about food (believing some health promotion messages are poorly communicated) but conveyed that variety and not</p>	<p>Policy and practitioners must work with families from ethnic minorities to ensure health promotion messages are clearly communicated.</p> <p>Prevention interventions should be co-produced with ethnic minority communities to ensure that components support the retention of traditional practices, differences in the notion of family and the important of retaining cultural food practices. It is also important to work with a representative range of ethnic minority communities, as culture and practices can vary between groups.</p>	<p>Very good study [9/9]. No competing interests declared. Funded by the Public Health Research Consortium, Department of Health Policy Research Programme.</p>

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	<p>overindulging were important. SES influenced shopping practices, with budgetary concerns and constraints experienced by families from low SES populations. Gender specific roles relating to shopping and cooking were also a potential barrier to male participation in food preparation, and changes to this could help facilitate healthy eating. Physical activity classes were not enjoyed by girls, who reported barriers around lack of competence and mix gender games. Both parents and children also saw cost as a barrier to activity, with a variety of activities required, although parents had limited awareness of current physical activity recommendations for children. Issues relating to families' wider neighbourhoods (for example, fast food outlets; lack of safety) were also raised as a barrier to activity and healthy eating. Although promotion of activity was variable in different places of worship, parents felt places of worship could support the promotion of dietary health messages. Influences that were specific to some people from some ethnic minority groups were place of worship (as a key point for social support). The importance and implications of traditional food practices</p>	<p>Interventions should also address constraints within the local environment such as fast food, neighbourhood safety.</p>	

Author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	and family roles and responsibilities were also discussed.		
Noyes (2017) ³⁰	Despite engaging in high levels of physical exercise, children were assessed as fit but had elevated body fat. However, neither children or parents realised how fit they were or that they were living with overweight and reported a lack of assessment to feed this back. Children enjoyed the social benefits of exercise, however unlike their parents, children confused the purpose and outcomes of physical exercise with therapy (for example, physiotherapy) and incorrectly understood the effects of physical exercise on body function and strength, preventing stiffness, increasing stamina and reducing fatigue. Children's key motivation to take part in activity was not to keep fit, healthy or reduce adiposity, but to improve function and strength. Exclusion from physical exercise (for those in mainstream schools), cost, accessibility, locality and lack of child care, sport-specific wheelchairs and parental time were all reported as potential barriers to activity.	Professionals need to improve communication clarity to improve children's understanding of therapy compared with physical exercise outcomes. Policy makers and practitioners must ensure that children who use wheelchairs are included in health education policy; routine health screening; physical education classes. Body composition measurement is also recommended, which will require specialist equipment and training. Interventions should ensure activities for children who use wheelchairs are accessible with appropriate equipment, and staff training. Consideration should also be given to parental time and child care, where parental involvement is required. Children in this study were mainly physically active and most had cerebral palsy.	A well conducted study [9/9] the only limitation being already active children self-selected to participate. Therefore, more research involving unfit and inactive children using wheelchairs is required. No competing interests declared. Funded by the National Institute for Social Care and Health Research Wales.

Appendix 5: Prevention papers: CASP quality assurance scores. Response key: Yes: Y; Can't tell: CT; No: N)

Study	Was there a clear statement of the research aims?	Was a qualitative methodology appropriate?	Was the research design appropriate to aims?	Was the recruitment strategy appropriate to the study aims?	Was the data collected in a way that addressed the research issue?	Had the relationship between the research and participants been adequately considered?	Had ethical issues been considered?	Was the data analysis sufficiently rigorous?	Was there a clear statement of finding?
Norman (2016) ²⁹	Y	Y	Y	Y	Y	CT	Y	Y	Y
Norman (2018) ²⁸	Y	Y	Y	Y	Y	CT	Y	Y	Y
Croker (2012) ³¹	Y	Y	Y	CT	Y	Y	Y	CT	Y
Hanckel (2019) ³²	Y	Y	Y	Y	Y	CT	Y	Y	Y
Griffin (2019) ³³	Y	Y	Y	Y	Y	CT	Y	CT	Y
Maynard (2017) ²⁶	Y	Y	Y	Y	Y	CT	Y	Y	Y
Rawlins (2013) ²⁷	Y	Y	Y	Y	Y	Y	Y	Y	Y
Noyes (2017) ³⁰	Y	Y	Y	Y	Y	Y	Y	Y	Y

Appendix 6: Overview of data extracted for treatment studies (first author, study design, study aim, country, target population, intervention details and target age group)

First author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
Pallan (2019) ³⁹	[Q] Direct session observations, interviews with parents who did not complete or attend the programme and focus groups with parents who completed the programme. Interviews conducted by community researchers from target communities and conducted interviews in preferred language.	To culturally adapt an existing children's weight management programme (First Steps) for children aged 4–11 years so that the programme was more able to meet the needs of families from South Asian communities. [S]	UK, Birmingham (community).	[EM] 42 South Asian (Pakistani and Bangladeshi) parents who had taken part or enrolled and then disengaged from the First Steps programme. 12 took part in focus groups, 31 took part in interviews.	First step is a parent focused programme for children aged 4-11 years with excess weight. It involves delivering 1-hour weekly sessions over 5-7 weeks in community venues, covering nutrition education, physical activity promotion and promotion of positive lifestyle behaviour changes. The programme has access to interpreters, a high pictorial content and refers to culturally appropriate foods.
Lucas (2014) ³⁴ Supplemented by Law (2014) ³⁵ ADDIN EN.CITE	[Q & MM] Secondary data analysis of service data and qualitative interviews to explore salience and acceptability. Law: Interviews were	To describe the characteristics of children who take part in MEND, when implemented at scale and under service conditions; assess	UK, London, the North East and the South West). (community)	[LS and EM] Children living with overweight 7-13 years old. n=18,289 children in secondary data analysis and interview with 23 families	MEND is a multi-component family-based weight management intervention that aims to support families to adopt and sustain

First author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
Two papers both reporting the same study results.	<p>conducted and analysed by a team of 4 experienced qualitative researchers.</p> <p>No information on whether researchers were from the target community.</p>	<p>how the outcomes associated with participation in MEND vary with the socio-demographic characteristics of children, MEND centres and areas where children live, evaluate the salience and acceptability of MEND; and investigate cost [P]</p>		<p>representing a range of ethnic minority groups, SES groups and level of programme participation.</p>	<p>healthy lifestyles, in children who live with overweight and aged 7–13 years. The programme “combines knowledge from nutritional and sports science and psychology to address individual-level behaviour change (education, skills training and motivational enhancement), while also recognising the need to engage multiple, interacting systems of influence within the family context.”</p>
Ciupitu (2011) ³⁶	<p>[MM] Two-week participant observation followed by a cultural competence survey among staff. No information reported on whether the researchers were from the target community.</p>	<p>To describe barriers to the therapy of childhood obesity, as identified through a mixed-method research design in the context of an interdisciplinary obesity clinic providing</p>	<p>Germany, Berlin (clinic).</p>	<p>[EM] 36 patient observations and 16 staff survey completions. Observed participants ethnicity: German (n=15), Turkish (n=14) Serbian (n=5), Greek (n=1) and Vietnamese (n=1).</p>	<p>The selected interdisciplinary obesity treatment clinic is located in a neighbourhood with a large migrant population and was purposively chosen for its potential to illustrate diversity-related</p>

First author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
		services to an ethnic minority population. [S]			barriers to obesity therapy. No target age range was specified but observed participants ranged from <8 to >12
Magnusson (2012) ³⁸	[MM] Using an exploratory design. the authors' broad competence and experience: a registered dietician and nurse with experience of counselling children living with overweight and of collaborating with school nurses in this context, a nutritionist with experience of combining quantitative and qualitative methods when evaluating health and nutrition and a nurse who has conducted research on communication and education in different health care settings.	To analyse school nurses' counselling of children living with excess weight in settings with mainly migrants, focusing on content concerning food and physical activity and how this was communicated. [S]	Sweden, Gothenburg (school).	[EM] 22 counselling sessions conducted with 20 children with excess weight (n=7) or obesity (n=13) aged 8-16 years. Individual participant ethnicity was not reported, but 13 pupils had at least 1 parent born outside of Sweden.	School nurse counselling sessions for school aged children.
Saez (2018) ³⁷	[MM] Secondary data analysis, interviews and	To evaluate the feasibility of an	France, Vosges department : North	[LS measured below 5 on the family	The peer intervention was embedded in a

First author (year) [REF]	Study design: qualitative [Q] mixed method [MM] & details	Study aim. Inequalities part [P] or sole [S] focus of study	Country (setting)	Target population: low SES [LS], ethnic minority [EM], disability [D] and sample size	Intervention details and target age group
	analysis of telephone notes and SMS. Does not report on whether the researcher was from the targeted community but the study purposefully selected peer facilitators according to socio-economic status.	innovative peer intervention promoting healthy eating and physical activity, which purposefully selected peer facilitators according to SES to target less-advantaged receivers living with overweight. [P]	Eastern region (school/community).	affluence scale]. For the facilitators, this included 6 training sessions, 11 mid-programme interviews, 4 end-of-programme sessions, telephone notes and text message exchanges. All 6 potential receivers in 1 school were also interviewed. Socio-demographic and health characteristics were also analysed.	larger trial: PRALIMAP-INÈS (Promotion de l'ALIMENTation et l'Activité Physique-INEgalité de Santé). Facilitators were selected and trained to organise weight-control activities with specific peer receivers participating in the programme. Target age: 13-18 years.

Appendix 7: Overview of data extracted for treatment studies (outcomes; key learning and comments, competing interests, funding)

First author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
Pallan (2019) ³⁹	<p>Important logistical barriers were raised by all participants, these included: sessions needed to be close to home, in a familiar setting and at a convenient time. After-schools sessions were considered impractical due to a clash with religious classes (which were also identified as a barrier to finding time to be active). Language barrier to participation existed for some parents whose first language wasn't English (a barrier particularly identified by non-attenders at the initial recruitment stage, although less of a problem during sessions if interpreters were present). The focus on weight and obesity rather than health was another barrier to engagement as some parents didn't feel their child's weight was a problem, or felt there was nothing they could do to address their child's weight. And others reported that children were sensitive about the 'weigh-ins'. Another group of important themes were identified around target audience, content and delivery, which included: parents feeling a programme that involved the children would be more useful, feeling</p>	<p>It is important that interventions targeting South Asian families:</p> <ul style="list-style-type: none"> - are conducted in familiar venues near to home, and at convenient times that do not clash with religious commitments. - provide additional help in recognising when a child is living with excess weight and supported in understanding the positive role parents can play in weight management. - employ interpreters during the programme recruitment and conduct, so the programme content and format can be clearly articulated. - are not stigmatising, with a strong focus on health rather than weight, and accommodate sensitivities around weight measurement. - should involve parents and children (and accommodate siblings to avoid child care issues), and involve group interaction and encourage peer support, but avoid classroom style. - should keep written material to a minimum, and replace where possible with engaging graphics, 	<p>Very well conducted and informative study [9/9]. The findings have informed the adaptation of the First Steps programme – so an evaluation of this adapted approach will be vital. They also provide a theoretical adaption that others could also follow. One author was the manager of the First Steps programme and another is a member of the NIHR funding board. Funded by NIHR HTA programme.</p>

First author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	<p>their children might listen more to messages not given by their parents; Interactivity was deemed important, and completers enjoyed and valued the group interactivity (although some were concerned about it being classroom style); participants also disliked the volume of written materials and expressed an interest for much more physical activity sessions for the children; daily barriers to physical activity could have been addressed in the sessions; nutritional content should be more relevant to culturally 'traditional diets', but acknowledge the impact of western foods (particularly that of fast food takeaways); some participants were keen to learn new healthier cooking styles while others felt they would not change their cooking methods. No other themes emerged that specifically related to Pakistani or Bangladeshi culture, with the remainder of themes focusing around the impact of managing busy family lives, demands of siblings, perceived safety in local communities.</p>	<ul style="list-style-type: none"> - provide practical physical activity sessions for children and advice about overcoming barriers to daily activity. - should ensure nutritional content is tailored to culturally 'traditional diets' but acknowledge the impact of Western foods on their child's diet (particularly the impact of fast food, with help required on how to tackle this). - healthier cooking skills should be provided, although it should be acknowledged that some participants may not wish to change their cooking practices. - acknowledge the impact of general family difficulties such as busy family life, sibling demands and perceived local safety. - only study to use researchers from target community and provides data from parents who initially accepted then declined participation. 	
<p>Lucas (2014)³⁴ Supplemented by Law (2014)³⁵</p>	<p>Compared with the MEND-eligible population, proportionally more completers were girls, Asian or from families with a lone parent, and lived in</p>	<p>- General childhood obesity treatment interventions may not be suitable for ethnic minority populations or children with complex health needs.</p>	<p>Authors were not able to recruit non-attenders which may have influenced the finding. Quality assessment was based on the qualitative paper³⁴ [9/9]</p>

First author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
<p>ADDIN EN.CITE Two papers both reporting the same study results</p>	<p>social or private rented rather than owner-occupied accommodation, in families where the primary earner was unemployed, and in urban and deprived areas. Proportionally less starters and completers were White or from 'Other Asian' groups. Having started the programme, boys and participants who were psychologically distressed, lived in socio-economically deprived circumstances or attended large groups or groups whose managers had delivered several programmes were less likely to complete the programme. Multi-level models showed that whilst BMI reduced on average in all groups, the reduction was greater for boys, as well as children who were of higher baseline BMI, younger, white or living in less socio-economically deprived circumstances, and for those who attended more sessions and participated in smaller programmes. Reductions in BMI were significantly smaller for Asian and Black groups, children who lived in less favourable socio-economic circumstances (those with unemployed parents and living in more deprived neighbourhoods), and for those who completed <75% of sessions. Although qualitative</p>	<ul style="list-style-type: none"> - General obesity treatment programme may be less successful in children from ethnic minority communities and of low SES populations. - Children from low SES populations, ethnic minority communities and those with complex needs may benefit from more tailored interventions. - Support must be provided to enable families on low income to make healthy food choices, and consideration must be given to child care and transport costs associated with attendance. 	<p>but was part of a much larger study³⁵. Two authors have roles within NIHR and MEND were on the project advisory group. Funded by NIHR public health research programme.</p>

First author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	<p>interview data was not analysed by socio-demographic, a number of issues around inequalities arose from the interviews and these included: difficulties recruiting families from the most deprived areas; potential cost of healthy eating for some families, as well as transport and childcare costs associated with attendance; unsuitability of MEND for children with complex needs; and MEND materials being insufficiently ethnically sensitive and reliant on good literacy.</p>		
Ciupitu (2011) ³⁶	<p>Care giver related barriers related to disengagement or distrust in the therapeutic plan, or inability to provide support due to time constraints or limited finances, and language barriers. Barriers identified by patients also included disengagement with the therapeutic plan because of co-morbidity, distance to sports facility, dislike of sport, difficulties managing temptations, the stigma associated with weight or difficulty acknowledging or accepting authority both in the clinic and home setting. Provider identified that long waiting times, lack of translators as barriers to engagement. External barriers to engagement included a lack of support from other services. Survey results highlighted</p>	<p>This study highlights the importance of good communication, using translators and cultural awareness amongst staff working in treatment services. Tailoring the service to individual need may also help improve compliance, and services should be joined up to provide continuity of care. The study is limited to observations within the clinic and does not inform us about the home environment or issues such as compliance.</p>	<p>Study lacks details regarding some ethical considerations. For example, consent [5/9] No competing interest or funding statement provided.</p>

First author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	difficulties in providing care to some ethnic minority groups due to language barriers, and poor mutual understanding.		
Magnusson (2012) ³⁸	Observations identified that: school nurses lacked adequate skills in communicating general advice to children and their parents and also provided inadequate explanations about food and physical activity. There was also a lack of school nurses tailoring advice to individuals. The study reported that counselling families whose first language and traditional food cultures differed to the nurses, created additional difficulties.	This study highlights the importance of health care professionals having the right training to provide optimal person-centred weight management counselling, and the need for appropriate communication support and resources to help families whose first language differs to the health care professional, and choice of foods are not familiar to the health care professional.	Ethnicity of participants was not reported. [9/9] no competing interests declared. Funded by the Swedish Society of Nursing and from the Region Vastra Gotaland, Sweden.
Saez (2018) ³⁷	“Agreeing to participate was more likely when asked by a peer compared with a professional. Twelve activities, mostly based on physical activity and implemented during weekends or holidays, were carried out. The mean age of active receivers was 16 and their BMI was higher than other participants. For both facilitators and active receivers, there were more participating girls. Qualitative analysis reveals key implementation challenges for facilitators. Interviews with the receivers highlight social difficulties, with most feeling bad about their appearance and wanting to lose	This study suggests that using facilitator–receiver peer dyads matched according to SES to promote behaviour change in overweight adolescents is feasible provided organisational difficulties are addressed, good practice recommendations are formulated, longer training sessions are provided, alongside joint meeting with the facilitators and receivers. It is also important that dyads are matched by place of residence.	Study doesn’t address inequalities directly but evaluates a peer support programme whereby participants from low SES populations are linked to SES matched facilitators. [8/9] No competing interests declared. Funded by the French National Cancer Institute.

Barriers and facilitators to supporting families with children most at risk of developing excess weight

First author (year) [REF]	Outcomes relating to barriers and facilitators regarding engagement, access, and retention.	Key learning for implementation	Comments, competing interests, funding [CASP SCORE]
	weight. Those who participated in peer activities were very positive about the experience especially social support.”	Socio-economically matched peer support programmes may be worth exploring in future interventions.	

Appendix 8: Treatment papers: CASP quality assurance scores. Response key: Yes: Y; Can't tell: CT; No: N)

Study	Was there a clear statement of the research aims?	Was a qualitative methodology appropriate?	Was the research design appropriate to aims?	Was the recruitment strategy appropriate to the study aims?	Was the data collected in a way that addressed the research issue?	Had the relationship between the research and participants been adequately considered?	Had ethical issues been considered?	Was the data analysis sufficiently rigorous?	Was there a clear statement of finding?
Pallan (2019) ³⁹	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lucas (2014) ³⁴	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ciupitu (2011) ³⁶	Y	Y	Y	CT	Y	CT	CT	CT	Y
Magnusson (2012) ³⁸	Y	Y	Y	Y	Y	Y	Y	Y	Y
Saez (2018) ³⁷	Y	Y	Y	Y	Y	N	Y	Y	Y

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