



REVIEW

Pediatric Obesity

Communication strategies and effectiveness of early childhood obesity-related prevention programs for linguistically diverse communities: A rapid review

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Summary

Children from culturally and linguistically diverse backgrounds experience higher rates of obesity and have poorer outcomes in obesity prevention studies. Interventions tailored to specific cultural groups may be limited within linguistically diverse, multicultural communities, and thus, alternative approaches to childhood obesity prevention in these communities are needed. This study aims to describe communication strategies used in interventions targeting prevention of obesity/obesity-related behaviors, among children 0–5 years, from linguistically diverse communities, and assess their effectiveness. A rapid review was conducted by systematically searching Medline, Embase, and CINAHL. The inclusion criteria are as follows: Studies reported an intervention tailored to linguistically diverse communities targeting at least one obesity-related behavior among children 0–5 years. The exclusion criteria are as follows: Interventions used simple language translations, targeted one language group, or treated obesity. A total of 4677 articles were identified with 14 studies meeting inclusion criteria. Key communication strategies included materials in multiple languages, English text written at a set readability level, and multimodal delivery. Six studies reported effectiveness data, of which five had effective primary or secondary outcomes. This is the first rapid review to identify communication strategies used in childhood obesity prevention interventions for linguistically diverse communities, highlighting a need for future research to incorporate and evaluate the communication strategies identified.

KEYWORDS

childhood obesity, health promotion, limited English proficiency, prevention program

Abbreviations: BF, breastfeeding; BIBBs, Born in Bradford's Better Start; BMI, body mass index; CALD, culturally and linguistically diverse; CHALK/HSFS, Choosing Healthy and Active Lifestyles/Healthy Schools, Healthy Families; CHALO!, Child Health Action to Lower Obesity and Oral Health Risk; EL, English literacy; GROW, Growing Right Onto Wellness; GWG, gestational weight gain; MINISTOP, Mobile-based Intervention Intended to Stop Obesity in Preschoolers; MMAT, Mixed Methods Appraisal Tool; PHLAT, Parental Health Literacy Activities Tests; RCT, randomized controlled trial; SMS, short message service.

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1 | INTRODUCTION

Childhood obesity rates are increasing globally and pose a significant global health challenge.¹ Evidence suggests early childhood overweight tracks into later life with almost 90% of children with obesity at 3 years of age experiencing overweight or obesity in adolescence,² posing adverse health consequences through to adulthood.³ Interventions treating childhood obesity have limited efficacy,^{4,5} and thus, prevention of childhood obesity provides a key opportunity to establish healthy behaviors early in life and prevent obesity in adulthood.

The first 2000 days of life is a critical time for physical, cognitive, social, and emotional health⁶ and as such is a unique window to implement preventative health interventions. Infant feeding practices, including breast feeding⁷⁻⁹ and the timing of introducing solids,^{9,10} as well as children's eating habits,¹⁰ sleep patterns,¹¹ and screen time,^{12,13} have been identified as obesity-related risk factors in childhood. A 2019 Cochrane systematic review found multifaceted interventions targeting both diet and physical activity behaviors that reduce the risk of obesity in children aged 0-5 years.¹⁴

Children from culturally and linguistically diverse (CALD) backgrounds in English-speaking countries have higher rates of childhood obesity.¹⁵ The term "CALD" has varied use across the literature but can be used to refer to people born in non-English-speaking countries, and/or who do not speak English at home.¹⁶ Families from CALD backgrounds may face challenges accessing mainstream early childhood interventions and services for various reasons, including language barriers and cultural differences.^{17,18} Further, it is important to consider the health literacy of CALD populations. Health literacy can be defined as the ability of an individual to obtain, process, and understand the health information needed to make informed health decisions.¹⁹ Importantly, the concept of health literacy also addresses the capacity of available healthcare services to meet the needs of the populations they serve. With global migration toward high-income countries expanding²⁰ and evidence to suggest poorer obesity-related outcomes among mothers who spoke a language other than English at home,²¹⁻²⁴ there is a need to ensure programs supporting healthy growth and development in early childhood that are accessible to families from CALD backgrounds.

Current research into the delivery of obesity-related interventions to CALD communities does not adequately address the needs of these diverse communities. Interventions targeting specific cultural groups have largely focused on Latino populations within the United States, with mixed outcomes.²⁵⁻³² Plain language translations may be useful but fail to encapsulate the nuance of culture and are difficult to scale in multicultural communities. Another method of targeting minority groups in mainstream English-speaking societies is cultural adaptation, the process of modifying an intervention to make it more suitable for a new target population considering culture, language, and context.³³ A recent systematic review by Marshall et al.³⁴ assessed processes and effectiveness of cultural adaptations of pre-existing interventions targeting obesity-related behaviors in children 0-5 years. Although these programs were largely acceptable to the target populations, the availability and cost of skilled, bilingual staff

may limit the scalability of such programs. Although encouraging, these methods are limited by their cultural and/or linguistic specificity, providing logistical challenges in delivering interventions among multi-cultural communities.³⁴⁻³⁶

An alternative method of targeting CALD communities in mainstream English-speaking societies is the implementation of prevention programs that cater to varying English proficiency and/or health literacy levels. Research regarding such interventions provides an opportunity to target a wide variety of minority groups and may be more feasible for widespread use in multicultural communities. Of particular interest are the communication strategies employed in these interventions and their effectiveness in delivering childhood obesity-related health promotion material to linguistically diverse populations.

As such, this rapid review aimed to identify health promotion programs or interventions targeting obesity-related behaviors (including infant feeding, nutrition, sleep, and/or physical activity) among children 0-5 years from linguistically diverse communities and then analyze their intervention approaches, communication strategies, and outcomes. Our specific research questions were as follows: (a) What communication strategies have been used for childhood obesity-related behavioral prevention interventions for linguistically diverse communities, and (b) How effective were these programs in achieving obesity-related health outcomes? By answering these questions, effective communication strategies of childhood obesity prevention programs for linguistically diverse communities can be identified and leveraged.

2 | METHODS

This rapid review was conducted following the recommendations outlined by the "Cochrane Rapid Reviews Methods Group."³⁷ The review protocol was registered with Open Science Framework (DOI [10.17605/OSF.IO/P9C72](https://doi.org/10.17605/OSF.IO/P9C72)). Amendments to the registered protocol include the removal of the inclusion criterion that the study had to be set in a predominantly English-speaking society. This criterion was removed to increase the scope of papers identified and strategies employed.

2.1 | Search strategy

An initial limited search of Scopus was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles and the index terms used to describe the articles were used to develop a full search strategy for MEDLINE (see Data S1). Key search terms included (1) infant OR child OR preschool*, (2) minority group OR limited English proficiency OR health literacy, (3) intervention or prevention, (4) diet OR nutrition OR sleep OR physical activity OR tummy time, (5) obesity OR childhood obesity. Studies published in English since 2012 were included. The databases searched were Medline, Embase, and CINAHL. The search strategy, including all identified keywords and index terms, was adapted for each included database. The reference list of all included sources of evidence was screened for additional studies.

2.2 | Inclusion criteria

We included peer-reviewed studies published since 2012 in English that focused on prevention strategies and programs that (i) had been developed to cater for a linguistically diverse population; (ii) aimed to prevent obesity or obesity-related risk factors; (iii) targeted at least one obesity-related risk behavior, including infant feeding practices, nutrition, sleep, screen time, physical activity, and tummy time; and (iv) targeted children aged 0–5 years not affected by obesity. Where the intervention began antenatally, the study was included if the intervention continued postnatally. We considered experimental and non-experimental study designs including randomized controlled trials, non-randomized controlled trials, quantitative descriptive studies, qualitative studies, and published study protocols.

2.3 | Exclusion criteria

We excluded studies that (i) treated or managed pre-existing obesity, (ii) were whole language translations of existing interventions, (iii) were tailored to one specific linguistic group, and (iv) targeted children aged over 5 years with a specific health condition.

2.4 | Study/source of evidence selection

Following the search, all identified citations were collated and uploaded into EndNote X9.3.3 (Clarivate Analytics, PA, USA), and duplicates were removed. The citations were then exported into Covidence software³⁸ to aid the screening process. Two reviewers (SA and SM, LM, GW, DJ, or ST) dual-screened titles and abstracts with conflict resolution by a third reviewer. Potentially relevant sources were retrieved in full and assessed in the same manner against the inclusion and exclusion criteria. Reasons for exclusion at the full-text level were recorded and reported. Any disagreements that arose between the reviewers at each stage of the selection process were resolved through discussion until consensus was reached.

2.5 | Data extraction

Data were extracted by SA and then checked by SM using a template developed for this review (see Data S2). Data were extracted from the primary paper where multiple papers relating to the same intervention existed. Data extracted included details of the population (age of children targeted, ethnicity and language spoken at home, description of the target group, sample size), the study (design, country, duration, and stated aims), the method of the intervention (name, brief description, setting and mode of delivery, theory underpinning study design, communication strategies, and target behaviors), a summary of reported outcomes (obesity-related behaviors and obesity measures), and key author conclusions. Communication studies were identified as any reported modification or consideration to the delivery of

intervention for the linguistically diverse target populations. For study designs that assessed effectiveness, data on the health measures and outcomes assessed were also extracted.

2.6 | Critical appraisal

Critical appraisal of individual sources of evidence was performed using the Mixed Methods Appraisal Tool (MMAT).³⁹ The MMAT was used in this review to perform critical appraisal of included studies. The MMAT is a critical appraisal tool designed specifically for mixed study reviews, allowing for the assessment of methodological quality and risk of bias to be performed using a single tool for multiple study designs. All papers selected for inclusion in this rapid review underwent appraisal by two independent critical appraisers (SA and SM). Discrepancies were resolved through discussion. The results of the appraisal informed the synthesis and interpretation of the results of the studies.

2.7 | Data analysis and presentation

The inclusion of multiple study designs in this review generated data from performed or proposed interventions and data with recommendations for future research. These data were analyzed separately, and key findings were summarized narratively. Data extraction of characteristics of the included studies was summarized (see Data S3). Key communication strategies were identified based on frequency of reporting, and additional strategies were described narratively. Intervention effectiveness was assessed using quantitative data. Qualitative data contextualized the communication strategies reported.

3 | RESULTS

3.1 | Study selection

The final search strategy was run with a total output of 7191 articles; 4677 articles remained following duplicate removal. After review of titles and abstracts by two independent reviewers, 63 studies were eligible for full-text screening. Following full-text screening, 19 papers representing 14 studies were identified, with one additional article identified after hand-searching reference lists, resulting in 20 articles representing 14 studies (11 interventions, three qualitative studies) (Figure 1).

3.2 | Description of studies

Table 1 shows the papers detailing interventions included in the final review ($n = 11$). Most were from the United States of America ($n = 8$), with others from Australia ($n = 3$), the United Kingdom ($n = 1$), Sweden ($n = 1$), and Switzerland ($n = 1$). Of the included studies, randomized controlled trials (RCTs) ($n = 4$) and qualitative studies ($n = 4$) predominated, followed by study quantitative descriptive

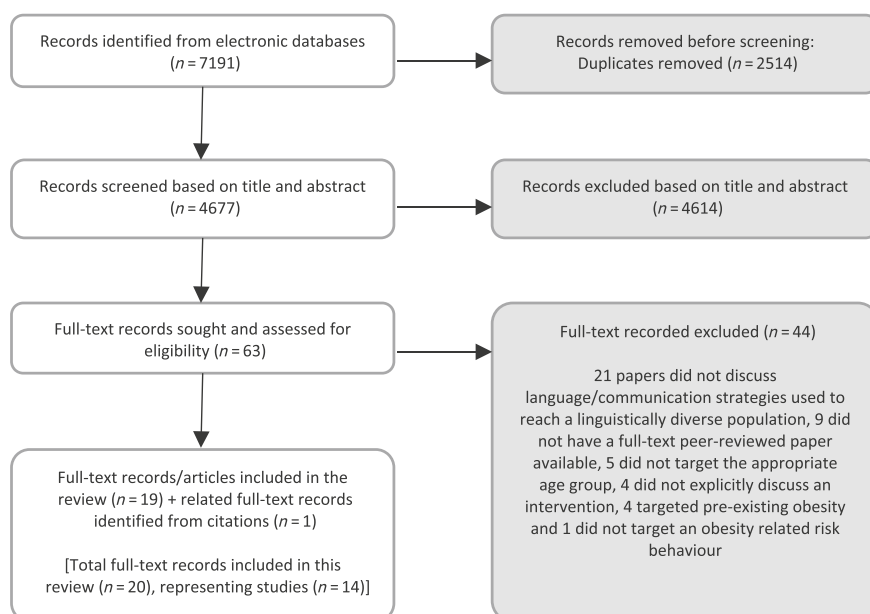


FIGURE 1 Diagram reporting rapid review search findings and study selection.

Intervention characteristics		n	Reference numbers
Aim	Obesity prevention	6	40–43,45,49
	Improving obesity-related risk factors	5	44,47,48,50,51
Behaviors targeted	Feeding	3	47–49
	Activity	0	
	Sleep	1	50
	Multiple behaviors	7	40–46
Target child age	Antenatal	1	48
	0–2	4	43,45,47,49
	2–5	5	40–42,44,50
	Other	1	51
Intervention target	Child	0	
	Parent	5	40,43,45,48,49
	Parent and child	6	41,42,44,46,47,50
Setting	Home	2	40,47
	Community center	3	41,46,50
	Early education and care setting	2	42,44
	Community health center	1	49
	Healthcare clinic or hospital	2	45,48
	Multiple	1	43
Delivery method	SMS	1	49
	Written materials only	1	48
	Multimodal	8	40–47,50
Theory of intervention	Described	8	41,42,45–50
	Not described	3	40,43,44

TABLE 1 Main characteristics of included interventions (n = 11).

Abbreviation: SMS, short message service.

designs (n = 2). Study designs/protocols (n = 5) were also included. The majority of studies targeted multiple obesity-related risk behaviors^{40–46} compared with focusing on a single obesity-related risk

behavior.^{47–50} Two studies included were not strictly within the 0- to 5-year age range but were included given overlapping age ranges.^{46,48} Interventions were targeted at either parents and children, or parents

alone, with none of the included studies targeting children alone. The setting of the interventions varied across the home, childcare/early education center, healthcare clinic, community center, or healthcare/hospital clinic. The majority of studies used multiple methods to deliver the intervention, whereas one used SMS only.^{46,49} Social Cognitive Theory, Social Ecological Framework, and/or health literacy principles underpinned the theoretical design of a large majority of the studies included in this review.^{41,42,45-50}

3.3 | Communication strategies

Table 2 outlines the key communication strategies detailed in the included studies ($n = 11$). Key communication strategies identified include provision of materials in multiple languages, text written at a low readability level (how easy a piece of English text is to understand), inclusion of visual images, audio/visual delivery, use of tangible tools to reinforce messages, and employment of bilingual staff. All interventions employed multiple communication strategies simultaneously. All studies, except for one,⁴⁸ offered intervention materials in more than one language. Languages included in intervention materials are Somali,⁴⁰ Arabic,⁴⁰ Swedish,⁴⁰ Spanish,^{44,45,49-52} French,⁴² German,⁴² Urdu,^{43,47} Punjabi,⁴³ Slovakian,⁴³ Polish,⁴³ Sylheti,⁴³ Bengali,⁴⁷ Hindi,⁴⁷ Haitian-Creole,⁵¹ and Portuguese.⁵¹ Six studies targeted written materials to a specified literacy or health literacy readability level,^{41,43-45,49,50} generally targeting around a fifth-grade reading level. Intervention content was delivered orally, either in person or via audio recording, in four studies,^{40,43,45,47} whereas videos were identified as a communication tool in three studies.^{40,47,50} A tangible tool to reinforce key health messages, such as portion-size bowls, or a pedometer, was included in three studies.^{41,45,50} Cultural appropriateness of study materials was actively considered in five studies.^{44,45,47,50,51} Provider training in health communication was a key part of the intervention in three interventions.^{42,45,50} Communication strategies unique to individual interventions included communication between nurses and parents via a mobile application in the MINISTOP⁴⁰ study, the use of a color-coded “traffic light” motif to reinforce key messages in the Greenlight⁴⁵ study, and English language courses to improve caregiver English proficiency (and thus ability to engage in health-related information in a predominately English-speaking society) in the BiBBs⁴³ experimental birth cohort.

Three qualitative studies were identified, all from a research group in Melbourne, Australia.⁵³⁻⁵⁵ These studies used qualitative methods to discuss barriers and facilitators to, and preferences for, childhood obesity prevention interventions with providers and parents in diverse migrant populations. These papers complement each other, as well as support the findings of the interventions outlined. The main findings of these studies indicated the use of bicultural workers across various fields (incl. nurses, early years education, and community centers) as facilitators of participation in obesity prevention interventions in various migrant populations. Cyril et al.^{53,54} highlight the need to adequately address low health literacy among CALD populations, suggesting building the capacity of the bicultural

workforce to facilitate community-led childhood obesity prevention initiatives and targeting health promotion materials at health literacy levels appropriate to CALD community literacy levels. The suggestion of integrating obesity prevention messages within existing programs was also raised as a potential communication strategy.⁵³ Renzaho et al.⁵⁵ highlight the importance of integrating cultural appropriateness in the development and delivery of obesity prevention programs.

3.4 | Effectiveness

Of the 11 included interventions, $n = 6$ reported primary and/or secondary outcome data,^{41,42,44,45,48,49} with only four of these being RCTs.^{41,42,45,49} Reported outcomes are summarized in Table 3. Overall, there was no long-term effect in interventions that measured BMI as an outcome.^{41,42,45} The Greenlight study⁴⁵ reported improvement in BMI z-score at 15 months; however, these changes were not sustained through the 24-month intervention period. There was, however, a significant difference in growth trajectory in the intervention sites compared with control. The GROW Healthier study⁴¹ reported lower caloric intake and increased use of community centers compared with control. The Ballabeina trial⁴² saw a significant reduction in the percentage body fat and waist circumference and a significant improvement in agility in migrant children exposed to the intervention. In a quantitative descriptive study, the CHALK/HSHF trial⁴⁴ achieved a significant reduction in reported unhealthy behaviors following intervention. Readiness to change to a more physically active lifestyle increased after 1 year but not after 2 years. Physical activity behavior improved after both year 1 and year 2 although not significantly.

3.5 | Critical appraisal

MMAT scoring consistency between reviewers was 84%, with discrepancies resolved through reviewer discussion (full scoring available as Data S4). All included studies met the MMAT initial screening questions indicating clear research questions or aims and appropriate data collection methods to answer the research questions. Four interventions met all five MMAT criteria for their given study design,^{40,53-55} indicating high methodological quality with low risk of bias. Four met all but one of the criteria for their given study design. Two studies did not meet two or more criteria, often because of insufficient clarity of methods, making it difficult to confidently assess methodological quality. Of note, three papers were protocol papers and as such were not evaluated using the MMAT.

4 | DISCUSSION

This rapid review aimed to identify the communication strategies and, where available, assess effectiveness of health promotion interventions targeting prevention of obesity and obesity-related behaviors

TABLE 2 Key communication strategies of included interventions.

Intervention name (or primary author) + Description	Communication strategies used						
	Written text at a set readability level	Multiple languages	Images	Multimodal delivery	Bilingual staff	Tangible tool	Simple formatting
MINISTOP 2.0 ⁴⁰ <i>n</i> = 3 Qualitative interviews with parents and nurses to assess how an app promoting healthy diet and exercise can be adapted for multi-ethnic communities to prevent obesity		x	x	x			
Palacios ⁴⁹ <i>n</i> = 3 A multisite randomized clinical trial where caregivers of healthy term infants enrolled in a national supplemental nutrition program were randomized to receive SMS messages designed to improve feeding practices	x	x					x
GROW Healthier ⁴¹ <i>n</i> = 6 A multicomponent behavioral intervention targeting children at risk of obesity from underserved communities with a family-based, community-centered program of weekly skills-building sessions with long term follow-up	x	x	x		x	x	x
Bonuck ⁵⁰ <i>n</i> = 5 Study protocol for a stepped-wedge, cluster randomized control trial of the adaptation of sleep education materials in a federal program of early childhood and education for low-income families	x	x		x		x	x
Ballabeina ⁴² <i>n</i> = 3 A multicenter cluster randomized controlled trial of a multidisciplinary, multidimensional lifestyle intervention in preschool children		x	x				x
BiBBs ⁴³ <i>n</i> = 3 Study protocol for an experimental birth cohort evaluating the impact of multiple early life interventions in an ethnically diverse city	x	x		x			
CHALO! ⁴⁷ <i>n</i> = 3 Study protocol for a multilevel randomized control trial and knowledge translation campaign targeting common risk factors associated with childhood dental caries and obesity in South Asian families		x		x	x		
Mackert ⁴⁸ <i>n</i> = 2 A brochure that combined gestational weight gain and breastfeeding information was designed and delivered to assess whether a combined health promotion message would achieve greater impact			x				x

TABLE 2 (Continued)

Intervention name (or primary author) + Description	Communication strategies used						
	Written text at a set readability level	Multiple languages	Images	Multimodal delivery	Bilingual staff	Tangible tool	Simple formatting
Live Well ⁵¹ <i>n</i> = 3 A study protocol focusing on the development and recruitment for a community-based randomized controlled obesity prevention intervention targeting new immigrant mothers and children		x	x	x			
CHALK/HSHF ⁴⁴ <i>n</i> = 2 A multilevel coordinated school health program delivered in a minority community aiming to alter parental knowledge, attitudes and behaviors regarding nutrition and physical activity	x	x					
Greenlight ⁴⁵ <i>n</i> = 6 A cluster randomized control trial based in a primary care setting consisting of a low-literacy parent toolkit and provider training in health communication to provide low literacy guidance on obesity prevention	x	x	x	x		x	x

Note: *n* = number of communication strategies used.

Abbreviations: BF, Breastfeeding; BiBBs, Born in Bradford's Better Start; BMI, body mass index; CHALK/HSFS, Choosing Healthy and Active Lifestyles/Healthy Schools, Healthy Families; CHALO!, Child Health Action to Lower Obesity and Oral Health Risk; EL, English literacy; GROW, Growing Right Onto Wellness; GWG, gestational weight gain; MINISTOP, Mobile-based Intervention Intended to Stop Obesity in Preschoolers.

among children 0–5 years from linguistically diverse communities. This review identified 20 articles, representing 14 distinct studies, 11 of which detailed interventions. Three papers were qualitative^{53–55} and did not reference a specific intervention, rather suggesting recommendations for future interventions. Communication strategies identified were varied, and many interventions employed multiple strategies at once. Of the studies, only four were completed randomized controlled trials.^{41,42,45,49} This highlights the limited evidence of effectiveness of health promotion interventions targeting childhood obesity prevention in linguistically diverse communities and the communication strategies they employ.

Designing written materials using low literacy principles was a commonly employed technique in identified studies. The BiBBs study⁴³ used the Flesch–Kincaid reading score to set written materials at a readability level appropriate for 12 years and older, whereas Palacios et al.⁴⁹ used the modified Flesch–Kincaid formula for English text⁵⁶ and the Fernández–Huerta formula for Spanish text.⁵⁷ Although readability instruments are commonly used, a systematic review reports that these tools are limited in their capacity to consider other elements that can aid readability and comprehension such as structure and context.⁵⁸ Two studies^{41,50} reported using the Suitability Assessment of Materials tool⁵⁹ to rate materials on content, literacy demand, graphics, layout and typography, learning stimulation and motivation, and cultural appropriateness. The SAM addresses the

shortcomings of instruments focusing on readability alone with good validity between users; however, many studies have highlighted the subjective nature of some scoring aspects.^{60–62} A publication relating to the GROW Healthier⁴¹ intervention reported that materials assessed with the SAM tool were acceptable and feasible for behavior change following cognitive interviews with target population members, with minor adjustments made based on their feedback.⁶⁰ Thus, low literacy principles are a worthwhile strategy to aid communication of health information in this context, although it is recommended that the tool is used by those with experience and ideally by multiple scorers to improve internal validity.

Health literacy was used extensively in the included studies as a guiding design theory,^{45,48,50} in the development of study materials^{41,44,45,48,50} and as a key modifiable factor.^{43,53–55} Evidence-based recommendations for addressing health literacy communication are outlined in the Institute of Medicine health literacy guidelines,⁶³ which were used as guiding principles in the GROW Healthier⁴¹ study. Research shows that addressing parental health literacy may be helpful in reducing barriers to care and promoting positive healthcare relationships between providers and caregivers.⁶⁴ More specifically, low parent health literacy has been associated with certain “obesogenic” infant care behaviors,⁶⁵ many of which are modifiable behaviors such as those included in this review. Assessing the health literacy levels of the target population in order to provide appropriate health-related

TABLE 3 Effectiveness of interventions $n = 6$ (where reported).

Intervention	Measures	Outcomes
Palacios ⁴⁹	Primary outcome	Weight status Weight gain Infant feeding practices
	Secondary outcome	N/A
	Primary outcome	No significant ^b improvement No significant improvement No significant improvement
GROW Healthier ⁴¹	Secondary outcome	N/A
	Primary outcome	No significant difference
	Secondary outcome	Significant reduction in caloric intake Significant increase in usage
Ballabeina ⁴²	Primary outcome	BMI trajectory (1) Child mean daily energy intake (kcal); mean percentage of energy intake from (2) fat, (3) carbohydrates, and (4) protein; mean daily minutes spent in (5) rest and sedentary behavior and (6) moderate and vigorous physical activity (MVPA); and (7) community center use with child (never or at least once)
	Primary outcome	BMI and aerobic fitness
	Secondary outcome	%Body fat, waist circumference, motor agility
Mackert ^{48a}	Primary outcome	Migrant children—No significant changes in BMI in either group and no significant difference between the two groups. The effects on aerobic fitness were only significant in non-migrant children with effect sizes being larger in non-migrant compared with migrant children. Children of low EL parents—No significant changes in BMI in either group and no significant difference between the two groups. Low EL benefited less from the intervention compared to middle/high EL counterparts, although not significantly
	Secondary outcome	Migrant children—%body fat and waist circumference were significant in both groups and not significantly different from each other. The effects on agility were only significant in migrant children. Children of low EL parents—waist circumference difference was significant
	Primary outcome	BF brochure significantly changed participant views on the topics that “breastfeeding saves money.” Combined GWG and BF brochure significantly changed participant views on the item “breastfeeding reduces babies’ risk of allergic reactions.”
Secondary outcome	N/A	

TABLE 3 (Continued)

Intervention	Measures	Outcomes
CHALK/HSHF ^{44a}	Primary outcome	No significant increase in knowledge of healthy nutrition or physical activity, increase in parent's readiness to change to a more physically active lifestyle after 1 year but not after 2 years. Unhealthy behaviors were significantly lower at both year 1 and year 2.
	Secondary outcome	Physical activity behavior improved after both year 1 and year 2 although not significantly.
Greenlight ⁴⁵	Secondary outcome	N/A
	Primary outcome	No significant difference
	Secondary outcome	Lower BMI z-score in the intervention group at 15 months, marginally lower at 18 months, and no effect at 24 months
	Secondary outcome	Significant difference in overall growth trajectories

Abbreviations: BF, breastfeeding; BMI, body mass index; CHALK/HSF, Choosing Healthy and Active Lifestyles/Healthy Schools, Healthy Families; EL, English literacy; GWG, gestational weight gain.

^aIndicates study is a quantitative descriptive design rather than an RCT.

^bStatistical significance of $p < 0.05$ as reported by authors.

information was suggested by Cyril et al.⁵³ The Parental Health Literacy Activities Tests (PHLAT)⁶⁶ is an example of a health literacy assessment tool that reports good reliability and validity in identifying parents in need of support with health-related communication. Future interventions should consider what the health literacy of their target population is and provide appropriate materials as such, as well as consider possible means of improving community health literacy.

The use of voice recordings or videos was another commonly used communication strategy identified. Alexandrou et al.⁴⁰ held focus groups with Swedish, Somali, and Arabic parents and found Somali parents specifically requested native language audio/video formats to be available for the MINISTOP app, because of limited reading and writing skills. Dickerson et al.⁴³ also discuss the inclusion of audio-recorded resources for languages without a written form or for those who are unable to read the language. A review by Coulter et al.⁶⁷ reported that audio-visual materials and infographics improved health knowledge, understanding and recall, comprehension, and adherence in the context of patient-focused interventions. Focus groups about the delivery of web-based obesity-related health information with culturally diverse parents deemed to be “low health literate” found audio-visual content to be a useful tool for delivery of information but were considered “slow” and “simple” for those with higher literacy levels.⁶⁸ The authors suggested content be delivered in several layers, with basic content provided by audio/video and more in-depth content available as written text to cater to diverse literacy levels, as seen in many CALD communities. Thus, audio recordings and videos are an accessible and practical method of delivering elements of intervention materials to a linguistically diverse group.

This review identified one intervention that was delivered electronically via a mobile phone application⁴⁰; however, three others either have or intend to have selected materials available online.^{45,47,50} Online resources can be accessed on multiple electronic devices, whereas mobile phone app-based programs are designed to be accessible and convenient for use. A systematic review and meta-analysis performed by Flores Mateo et al.⁶⁹ reported that mobile phone app-based interventions may be useful tools for weight loss in children and adults. Evidence for mobile phone-based interventions show that they are feasible and acceptable tools in the prevention and treatment of pediatric obesity; however, more high-quality studies are needed.^{70,71} Online obesity prevention interventions for racial/minority adults show modest, short-term weight loss according to a meta-analysis by Bennett et al.⁷²; however, there was no efficacy evidence for mobile phone-based interventions. As suggested by this meta-analysis,⁷² long-term trials of online and mobile phone-based interventions would aid in assessing the effectiveness of these promising mediums in obesity prevention in CALD communities.

The use of bilingual or bicultural staff was employed in the GROW Healthier⁴¹ study, whereas Cyril et al.^{53,54} and Renzaho et al.⁵⁵ displayed the benefit of bilingual staff in a number of different sectors, including playgroup leaders. It has been found that CALD groups prefer explanations of health messages delivered by bicultural workers as they are delivered within the context of their own

culture.⁷³ Training community and religious leaders to deliver healthy lifestyle messages is one method of bridging cultural and linguistic barriers,⁷⁴ whereas families, particularly elders, are well-respected within the community and can facilitate the adoption of healthy behaviors by CALD families.^{75,76} Sosa et al.⁷⁷ and Adams et al.⁷⁸ provide two valuable examples of capitalizing on the unique benefits of delivery by community members, training parent educators and elders respectively. Of course, delivery by non-skilled staff raises concerns regarding fidelity and reproducibility, and as such, further research is needed to assess the validity of this model.

4.1 | Strengths and limitations

This is the first review to address childhood obesity prevention interventions in linguistically diverse populations. By identifying effective communication strategies that can be used to reach linguistically diverse communities, feasible and scalable interventions can be developed to benefit the multicultural societies we live in. The Rapid Review protocol closely followed the recommendations from the Cochrane Rapid Reviews Methods Group³⁷ ensuring high methodological quality of the review.

The review was limited to peer-reviewed literature in English, which may have limited findings, and introduced a level of bias in reported studies. This review excluded unpublished literature and papers published more than 10 years ago, and it is possible that valuable communication strategies used in earlier studies were not reported.

The concept of linguistic diversity, which was integral to both the search strategy and the inclusion of studies in the screening process, is incredibly nuanced and varied in its reporting and description. Inclusion/exclusion criteria pertaining to the concept of linguistic diversity resulted in high rates of conflict resolution in the screening process, and it is possible that appropriate papers may have been missed in the search process.

As the present study aimed to identify communication strategies that could be implemented to reach a linguistically diverse community in a practical and feasible way, it did not consider culture specifically. Cultural norms, beliefs, and practices play a significant role in the health behaviors of CALD families, and as such, it may be fair to assume that the most effective intervention strategy for any given community would target both cultural and linguistic elements. However, the scalability of targeted interventions in highly diverse, multicultural communities is limited with such tailored, specific interventions.

4.2 | Implications for practice and policy

Development and implementation of childhood obesity prevention interventions in CALD communities should remain a key focus area for future public health measures given the limited evidence of effective preventive measures. Although the value of effective obesity

prevention interventions reaching linguistically diverse populations should not be undermined, policy should continue to focus on addressing the social and environmental risk factors that lead to increased obesity rates in CALD communities. CALD communities are disproportionately exposed to risk factors that increase their likelihood of developing obesity, and as such, the most effective preventive measures should aim to increase the social and systemic support for CALD communities to minimize these exposures. The existing literature shows that developing intersectoral collaborations with the involvement of stakeholders from outside the health sector and adopting a multilevel coordinated approach to addressing childhood obesity will remove obesity-related disparities.⁷⁹

4.3 | Implications for research

This review has highlighted several strategies that can be employed in future obesity prevention interventions for linguistically diverse communities. Research into which communication strategies are most effective at delivering these interventions is paramount; however, the use of multiple communication strategies within an intervention is recommended. As highlighted in this review, addressing literacy, health literacy, use of multimedia, online or mobile-based programs, and delivery of programs by persons of a shared cultural background are all communication strategies that can be incorporated together to maximize intervention effect. Long-term randomized controlled trials of childhood obesity prevention interventions targeting linguistically diverse populations are needed to accurately assess effectiveness. Easily accessible, multidimensional interventions, particularly those addressing family literacy and health literacy, are likely to have the most effect on long-term community health behaviors. Qualitative studies such as those performed by Cyril et al.^{53,54} and Renzaho et al.⁵⁵ may be of use to identify the needs of the local population to inform future program content and implementation.

5 | CONCLUSION

This is the first rapid review to identify communication strategies and, where available, assess effectiveness of health promotion interventions targeting prevention of obesity and obesity-related behaviors among children 0–5 years from linguistically diverse communities. Identified papers reported varied communication strategies used. Few papers reported effectiveness, and those that did showed limited effect. These findings highlight the need for effective communication strategies in childhood obesity prevention interventions for linguistically diverse populations. Effective delivery of key obesity-related messages to CALD populations will help minimize disparities in child health and reduce childhood obesity prevalence.

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CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest in this project.

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SUPPORTING INFORMATION

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

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