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Sustaining Obesity Prevention in Communities: a systematic narrative synthesis review.

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Summary

Obesity is a global problem for which sustainable solutions are yet to be realised. Community based interventions have improved obesity-related behaviours and obesity in the short term. Few papers have explored how to make the interventions and their intended outcomes sustainable. The aim of this paper is to identify factors that contribute to the sustainability of community based obesity prevention interventions and their intended outcomes.

A systematic narrative synthesis review was conducted of published community based obesity prevention interventions to identify factors contributing to intervention sustainability. Data extracted were included study authors' perspectives of intervention success and sustainability.

Eighty-one papers met the inclusion criteria and from these we identified ten factors that contribute to sustainability: resourcing, leadership, workforce development, community engagement, partnerships, policy, communications, adaptability, evaluation and governance.

This review of community based obesity prevention interventions gives rise to optimism that sustainable change is possible. We propose a framework to help practitioners build sustainability into their interventions and report on them so that others can also benefit.

Keywords: obesity prevention, sustainability, implementation

167 words (maximum 200 words)

Introduction/Background

The prevalence of overweight and obesity poses an urgent global challenge. World-wide, a majority of adults and one in five children (<18years) are overweight or obese with significant implications for the global burden of disease ¹. The inability of countries to reverse the obesity epidemic shows obesity is one of, if not the most, complex and intractable of public health problems ².

Community based interventions that adopt multiple strategies show promise in preventing unhealthy weight gain for children ^{3,4}. Similarly community wide interventions that included multiple settings (e.g. schools, workplaces and whole of communities) have shown obesity can be addressed with a multiple strategy approach across different life stages ⁴. However, few papers have examined long-term implementation, sustainability or maintenance of promising strategies ³. Reasons for this lack of longer term follow up (post 12 months or 2 years) ^{5,6}, include funding constrained by political cycles ⁷, insufficient intervention duration to achieve a sustainable outcome ⁸, or reductions in intervention dose when researchers leave the intervention ⁹.

Sustainability of interventions has been studied broadly within the field of public health ^{5,10-12}, and focussed largely on continuation of program activities within an intervention ¹³. Previous reviews have either scoped, or systematically or comprehensively examined sustainability across public health, health promotion and health care interventions ^{6,11,12}. This work has revealed some challenges to studying sustainability. Firstly, a consensus definition of sustainability does not exist ^{5,11}. Secondly, what is being sustained is not always clear; some discuss continuation of programs, benefits or outcomes, attention to the issue, organisational and contextual structures and processes ^{14,15,11} or 'institutionalisation' into core business ¹⁶. Despite this lack of agreement on definition and

focus, there is strong agreement that sustainability is necessary to improve population health outcomes and maximise return on investment ⁶.

Achieving sustainability requires considerable forward planning and big picture thinking, for example a US, concept mapping study identified sustainability domains ¹¹ and developed a program sustainability assessment tool ¹⁰. This comprised eight domains: political support, funding stability, partnerships, organisational capacity, program evaluation, program adaption, communications and strategic planning. In Australia, a scoping review identified ten elements of sustainability similar to those of Schell (2013): planning, evidence, organisational support, community and partnership engagement, champions, capacity building, evaluation, policy, evolve and adapt, diverse funding sources. It is only recently, that such planning and thinking have started to inform the design of public health and obesity prevention interventions ¹⁷. As yet the characteristics of sustainability in obesity prevention have not been systematically reviewed and a specific framework for guiding sustainability is missing ¹².

This review sets out to identify factors considered fundamental to the sustainability of obesity prevention interventions and their effects and to overcome, at least in part, some of the abovementioned challenges. These findings are imperative given the complexity of the problem of obesity prevention and the numerous constraints experienced in achieving sustainable solutions and outcomes.

This review aims to determine:

- how the term sustainability is used in obesity prevention interventions; and
- what factors are related to the sustainability of obesity prevention interventions and their intended outcomes

Methods

Design

We conducted a systematic review of obesity prevention interventions published since 1997 using the Preferred Reported Items for Systematic Reviews and Meta-Analyses PRISMA statement ¹⁸.

Details of the protocol for this systematic review were registered on PROSPERO and can be accessed at www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42017055571.¹⁹ The review included all intervention study designs.

Search Strategy

A search was conducted in nine databases: PubMed and Web of Science; and within the host database: EBSCO HOST to include: Academic Search Complete, Cinahl Complete, ERIC, Health Source – consumer education, Health Source – nursing/academic, PsychInfo, Medline Complete. Search terms used a combination of key words for ‘sustainability’, ‘community based’ and ‘healthy weight’. The starting date of 1997 was chosen to coincide with the publication on ecological approaches to obesity ²⁰. Search terms were chosen based on the pilot work into sustainability concepts in our published scoping review ¹², the review by Stirman et al (2012) ⁵ and discussions with all authors and a research librarian. The search strategy below was adopted and is outlined in detail for each of the databases in Appendix 1.

sustainability or implementation or “long-term implementation” OR dissemination OR “knowledge translation” OR routinization OR routinisation OR discontinuation OR de-adoption OR durability OR institutionalization OR institutionalisation OR maintenance OR “capacity building” OR sustai OR routini* OR institutional* AND “community based” or*

“community wide” or community-based or “whole of community” or school or pre-school or “child care” or “day care” or “early years” or workplace or “work environment” AND obesity or overweight or “healthy weight” or “healthy eating” or “physical activity” or “healthy lifestyle”*

Study selection

Papers published in English were included in the review if they were conducted on humans, published between 1997 and 2015, were implemented in communities, as defined by study authors; studies that included multiple strategies and that were identified as being conducted in either single or multiple settings³. Papers were included if they targeted obesity prevention and used both healthy eating and physical activity strategies³, and interventions were of 12 weeks duration or longer³. Papers were excluded if they related to an issue other than overweight or obesity in humans, if they described clinical interventions (surgical and pharmaceutical interventions), were focussed on the genetic or biochemical determinants of obesity or did not describe the effectiveness of an intervention. References to a poster presentation or protocol paper were also excluded.

Figure 1: Prisma Diagram

Put Figure 1 about here please

Data extraction

The initial 5,241 titles were scanned for inclusion by JW. Where titles were unclear they were left within the data corpus. The remaining 735 abstracts were: firstly, divided between PL, LM, SA and CB; and secondly all 735 were reviewed by JW. A 10% random sample was then reviewed by CB to identify the level of agreement between any two reviewers, this returned a kappa of .68. This level of agreement is considered significant ²¹, however JW and CB then both reviewed all abstracts where there was disagreement between JW and the alternate reviewer. These were discussed between JW and CB until agreement was reached. JW reviewed the full text of the remaining 150 articles and marked 72 for exclusion. These exclusions were discussed with CB until consensus was reached (67 of the 72 were excluded) with 83 articles being included for full review. During full review two further papers were excluded (one of duration less than 12 weeks; one a review) resulting in 81 papers included for analysis. Details of the 81 included studies are available as supplementary online material.

Quality assessment

Two reviewers (JW, LM) conducted quality assessment using the 16-item quality assessment tool designed for use in the review of studies with diverse designs ²². Thirty-three studies were quantitative studies with an average quality assessment score of 78%, 25 were qualitative studies and scored an average of 71%, 23 studies used mixed methods and scored an average of 69%. Quality scores are shown within the table of included studies available, the full quality appraisal table is available as supplementary online material.

Narrative synthesis

Extracted papers (n=81) were imported to NVivo 11.3.2.779 (64-bit)²³ and a narrative synthesis was conducted to identify factors related to sustainability²⁴. Data synthesis was informed by Popay et al (2006) regarding conducting a narrative synthesis²⁴. Papers were coded using the sustainability framework identified from our earlier scoping review¹²: 1. Planning for sustainability early in implementation phase, 2. Using evidence to identify the issue and potential interventions, 3. Commitment and support from host and stakeholder organisations, 4. Engagement with community and strategic partners, 5. Champions, 6. Capacity building – community and organisational capacity, 7. Evaluation, 8. Policy, 9. Evolve and adapt 10. Funding from diverse sources. New codes were created as they emerged from the included papers. JW and CB then reviewed the initial and the new codes and expanded, collapsed or removed several as the data indicated different themes and grouping of ideas from the a priori coding schema²⁵. The 10 themes that most frequently emerged from the literature are described as factors related to sustainability.

Results

The 81 included papers used differing study designs and methodologies to explain the process or assess the impact of community based obesity prevention interventions.

Defining sustainability

The terms sustainability and maintenance were used widely in the reviewed papers. Of the 81 included papers, 64 used the term 'sustain' or derivatives when reporting on obesity prevention. Thirty-six, referred to the sustainability of the program, project or intervention; 15 referred to sustainable changes to the food and/or physical activity environments, or policy environment; 12

referred to sustainability of behaviour changes post the intervention; 11 described sustainability as observable changes in outcome measures; seven referred to sustained engagement, six referred to the intervention continuing, either through the project continuing or another organisation incorporating the project into their usual business, in full or in part. *(This does not add up to 64 because some authors mentioned sustainability in more than one context.)*

The term 'maintain' was sometimes used instead of or synonymously with 'sustain', most commonly regarding continuation of a program or intervention^{14, 26-29}. Nineteen papers used the term 'maintenance' in relation to specific components of an intervention, such as a website³⁰, participation³¹, collaborations³², vegetable garden or water policy³³, prevention messages³⁴, engagement²⁸, and 10 papers used the term to refer to particular outcomes, such as screen time³¹ or BMI/BMIz^{28, 29}.

Definitions of sustainability were provided in three papers^{14, 35, 36}. Dreisenger et al (2012) defined sustainability as 'the existence of structures and processes that allow a program to leverage resources to effectively implement evidence-based policies and activities.'^{14 p.298}. The remaining two,^{35, 36} cited definitions from other researchers including Scheirer (2005) who identified four concepts of sustainability, to maintain: (a) the project, (b) the benefits, (c) the capacity or (d) the attention to the issue³⁷. In addition, Shediach-Rizkallah & Bone (1998) used the term 'institutionalisation', where the project becomes integrated into core business, for example internal catering policies, and therefore becomes sustainable¹⁶.

Factors related to sustainability

Table 1 provides an overview of factors that emerged from the narrative synthesis with references coded to each. Many references mentioned multiple themes and are therefore coded to multiple factors.

Table 1 about here please

Table 1: Factors related to sustainability with corresponding references.

Figure 2 provides a visual depiction of how frequently particular themes were discussed. For example, leadership was mentioned by 28 more papers than governance.

Figure 2 about here please

Figure 2: Coding of references by number of references that mentioned each theme.

Figure 3 illustrates how the initial codes from the scoping review¹² evolved into the final sustainability factors. Planning for sustainability and gathering evidence were identified in the scoping review but did not persist; seeking commitment and support devolved into resources, leadership and governance; engagement and partnership separated into two themes; program champions became a subset of leadership; building capacity was expanded into resources, leadership and workforce development; embed into core policy was slightly broadened to a policy theme; evaluation remained; evolve and adapt was renamed adaptation; and funding was included within resources.

Figure 3 about here please

1. Resourcing – financial, human resources and other

The most frequently mentioned links to sustainability of interventions or intended outcomes were human^{9, 26, 29, 30, 38, 39} and financial resources^{9, 28, 33, 39-43}. Where interventions were able to mobilise existing resources, authors reported enhanced community ownership and sustainability^{35, 44-48}.

Most commonly human resources were related to sustainability through employment of the local workforce^{26, 49} or the creation of new positions for local people^{9, 14, 26, 38, 40, 41, 43, 44, 50-53} because such employment built local capacity. Other papers pointed out that intervention tasks should be given to people who already had jobs in the community wherever possible^{44-47, 54}, but it was important not to overload the existing workforce^{54, 55}. Some suggested that where local staff does not exist the intervention is unsustainable^{8, 39, 55}.

Thirty-five papers specifically identified the importance of finances for enabling 'sustainability' or 'maintenance' of the intervention or desired health outcomes. Some papers reported the benefits of actively seeking out grant funding³⁰, or independently generating funding to achieve a sustainable outcome⁵⁶. The importance of the intervention being replicated at reasonable costs was also highlighted¹⁴. Activities counter to the purpose of the intervention, for example unhealthy fundraising options, were noted as an ongoing struggle that undermined intervention efforts and sustainability⁵⁷.

2. Leadership

Leadership was mentioned by 31 papers and was most commonly associated with adoption, implementation and dissemination, rather than sustainability. None of the papers reviewed defined leadership, but drawing on the work of Rogers (2003)⁵⁸ one paper defined champions as ‘key individuals who are willing to throw their support behind an innovation and endeavour to overcome organisational indifference or resistance to a new idea’.^{59 p.13.}

Champions was included as a starting code and broadened as other forms of leadership were identified. Within this review, we included champions as a subset of leaders and note champions may emerge throughout the life of an intervention³⁸. Fifteen papers identified the importance of a champion within an intervention to drive community participation and ownership. Champions were referred to as program champions^{30, 40, 52, 60}, school champions^{50, 61} and community champions¹⁴. Others talked of the need for champions for change⁶², or a powerful person⁵⁹. In terms of their function, champions were: employed within the intervention⁵⁰, part of management⁶³, responsible for identifying ongoing training needs⁶⁰, a key partner¹⁴, or a role model (such as a mayor or civic leader)³⁸. Peer helpers, for example workplace buddies, could be perceived as champions where they became effective role models for health promoting behaviours and may assist diffusion of innovations through communities thereby assisting with the sustainability of change⁴⁸. Role models were cited as important in implementation^{33, 54, 64-66} and maintenance⁴⁸ and central to the intervention⁶⁷. Staff turnover, when it involves champions, can be problematic for sustainability⁵².

Leaders were identified as: municipal or government leadership^{38, 59, 62}, opinion leaders⁴⁸, organisational leadership^{14, 27}, key leaders^{38, 56}, natural leaders⁶⁸, project leaders¹⁴, formal (high-level policy and decision makers)⁴² and informal leaders^{42, 68}, peer leaders^{9, 69}, community leaders^{35, 38, 41, 62, 70}, religious leaders^{39, 70}, civic and cultural leaders³⁸.

Leaders, whether formal or informal were linked to sustainability of an intervention ⁶⁸, as role models ⁴¹, or influencers of project ownership ^{61 38}. Studies reporting on interventions with limited impact reflected that effective leadership was a determinant needed for future success ⁵⁴.

3. Workforce Development

Workforce included paid employees, volunteers and community members ^{39, 45}. Fifteen papers associated skill development with sustainability, related to content knowledge, for example healthy eating ^{47, 61, 64}, and intervention delivery ^{4, 9, 13, 27, 30, 31, 56, 60, 71, 72}. Staff turnover was highlighted by several papers as driving the need for ongoing workforce development to replace trained staff.

One paper questioned the sustainability of externally funded ongoing training due to associated costs ³², and preferred upskilling of local health professionals to deliver ongoing training ³². Providing support via electronic platforms ⁶⁴, or other low cost or more accessible training models ⁶⁰ was also discussed as a potential to enhance workforce development.

4. Community Engagement

Differing forms of community engagement were discussed within 32 of the 81 reviewed papers and included the mobilisation and participation of community members and community groups. The term 'community' meant different things depending on the context or setting of the intervention. Over half of interventions reviewed were conducted in schools (n=19, or pre-schools n=1), where community engagement included consultative decision making involving students, parents and school caterers ^{4, 26, 29, 38, 56, 70, 73}. Other papers noted the importance of broad community consultation and collaboration ^{26, 40} and an understanding of 'public sentiment' in community wide interventions ⁵⁹, with 'buy in' from everyone ⁵⁶.

Mobilisation of community wide efforts was directly linked to sustainability of interventions and their outcomes in several papers^{4, 35, 40, 41, 47, 54, 74-79}; and when policy interventions were supported by an engaged community, interventions were strengthened^{80, 81}. Six of these papers discussed the importance of community being involved in the intervention design through a participatory approach and attributed this contributory design and implementation methodology to sustainable outcomes.^{4, 26, 35, 38, 74}.

5. Partnerships

The time and effort required to establish effective partnerships was acknowledged⁷⁰, and when effective, partnerships were deemed to achieve lasting outcomes⁸². Some interventions found it beneficial to firstly partner with those eager to participate which garnered broader lasting support⁵⁰. Many papers acknowledged that multi-disciplinary teams were required^{56, 61, 72}; some included both government and non-government partners^{54, 61}. These partnerships included where relevant, school principals and food service managers²⁶, canteen staff⁵⁶ and food vendors⁵⁹. Several papers mentioned that it was important to partner with teachers^{50, 56}, parents and children¹³ along with broader community organisations and groups^{35, 38, 41, 56, 83}. Partnering with existing programs within communities was also important⁴¹, along with industry and local businesses^{26, 42, 43}.

Where partnerships were linked to sustainability, they were considered to enhance it by adding tangible resources to the intervention^{51, 74} and considered to be more effective where there was continued interaction and dialogue between partners⁵⁹ and links to existing community resources and organisations^{42, 51, 56}. Fagen (2014) consider that strong partnerships were able to generate buy-in⁴² and Economos and Curtatone (2010) contend that they garner community support for

intervention sustainability³⁸. Ongoing capacity building of these partners is required to sustain the success of partnerships¹³.

6. Communication with target population

Effective communication comprised multiple messaging strategies⁵⁷, including websites and other electronic communications⁵⁶, newsletters⁷² and 'talking to them (not just email)'^{72 p.283}. Several emphasised the importance of social marketing^{33, 43, 64, 70}, and one demonstrated that social marketing increased program awareness across all socio-demographic groups within the target population³⁴. Media was reported to be more successful in engaging and sustaining activity when it was developed in conjunction with representatives from the target audience^{54, 84}. Factors that hampered successful communication were lack of collaboration¹⁴, unclear communication strategies³², and limited reach¹⁴.

Where communication was linked to sustainability, an emphasis was placed on how, what and with whom to share information early in the intervention¹⁴, ongoing communication⁵⁹ and repeated messaging^{28, 59, 82}. These were linked to increased awareness of project branding and healthy messaging^{34, 38}. Aspects of communication that contributed to sustainability of programs or health outcomes acknowledged the need for a formalised communications plan to enhance consistent messaging^{42, 50, 52, 82}. One study found a significant association between awareness of campaign and behaviour change in study participants⁸⁴ and another reported that 'Social marketing is fundamental to project success but is potentially time-consuming and expensive.'^{33 p.10}.

7. Policy

Of the 29 papers that discussed policy, 20 of these related to educational settings and the remainder had a broader community focus (incorporating changes to the environment).

A substantial number of papers reported developing policy as an intervention strategy with the stated purpose of sustaining a program or health outcome. Many directly linked policy to improved health behaviours within an intervention or setting beyond the initial intervention phase^{4, 31, 60, 64, 82, 83, 85, 86}.

Within the education environment, policies to improve the health of food provided by parents were more sustainable when introduced in early years settings^{64, 85} and additional benefits flowed to future cohorts of children⁸². Four interventions in schools acknowledged that policy assisted with sustainable changes to healthier food environments within schools^{54, 83}, post nine years⁸⁷ for one intervention, and post five years for another⁶⁰. In Fiji and Tonga, individual school policies were unsuccessful, researchers considered the schools may have responded better to a broader 'top-down' approach^{33, 61}. Other multi component and multi setting interventions considered policy development a vital component to sustaining change^{4, 38, 63, 88}.

Multiple papers reported policy implementation to be challenging^{33, 59, 75}, enforcement difficult⁸⁵, and noted a voluntary approach to policy was related to poor uptake⁵⁹.

8. Adaptation

Fidelity of implementation, intervention flexibility and adaptability to local context were discussed in 24 papers. Implementation fidelity often required frequent staff training and ongoing support through cultural adaptation^{33, 78} and flexibility of content and delivery^{50, 89} to facilitate real time problem solving³², whilst still respecting the underlying evidence base from which the intervention

was designed²⁸. While the need for flexibility made evaluation more challenging⁵² this adaptation was considered necessary for sustainability.

9. Evaluation

Although 39 references specifically mentioned 'process evaluation' to measure the implementation and effectiveness of intervention strategies, only a few papers were able to link evaluation to sustainability of programs or health outcomes^{28, 30, 72}.

Elinder (2012) noted that involvement of the stakeholders in the design, implementation and evaluation was crucial to successfully sustaining the intervention²⁶. Others reported that the success of a program did not mean that it would necessarily be developed into a sustainable organisational strategy and thereby considered the evaluation of sustainability should be included as a separate measurable outcome in any evaluation^{5, 30}.

10. Governance

Twelve papers discussed the importance of governance but did not clearly define it. Most commonly, interventions reported the use of a steering committee^{26, 38, 54, 61}. Two interventions mentioned the need for a Memorandum of Understanding or other documentation between collaborators^{32, 38}. Other interventions noted project management committees^{13, 36}, or inclusion of community in governance structures^{33, 54}. Unclear governance structures hindered effective program delivery and ongoing sustainability³². Two papers linked strong governance to ownership and institutionalisation of the intervention^{36, 38}.

Discussion

Sustainability did not feature as prominently as we expected in the obesity prevention intervention literature. The literature reviewed supported 10 factors that obesity interventionists associate with sustainability which we have used to develop a framework we propose assists with sustainability (Table 2). We were also able to bring further clarity to what sustainability means in the context of obesity prevention.

A definition of sustainability based on outcomes

To progress the stifled definitional debate^{6, 16}, we propose based on the methods and findings of this review, that sustainability of obesity prevention be defined as changes in behavioural determinants and/or BMI at least 12 months post the initial impact has been demonstrated. This definition is centred on the health outcomes rather than the intervention. We agree with Scheirer (2011) that 12 months is a useful timeframe beyond an initial project phase to assess sustainability⁶, although there is no guidance on what 'initial phase' means and how it is measured, perhaps funding or researcher timeframes. Our definition implies measuring sustainability from the commencement of an intervention effect rather than from when project funding stops. Considered alongside the causal pathway for obesity, the definition offers short term (12+ months post intervention effect) changes in multiple health-related behaviours, such as fruit and vegetable, discretionary food consumption, changes in food supply, policy changes, increases in physical activity as indicative of potential future BMI change and long term (3-5+ years) changes in BMI in the desired direction would be considered the 'gold standard' indicator of sustained obesity prevention.

How can obesity prevention be sustained?

Adequate human and financial^{5,6,11 4,6} resources contributed to sustainability, particularly when directed by effective leaders^{5,6}, where the workforce was not already overloaded^{54 55} and were provided with ongoing professional development relevant to intervention implementation^{5,11}.

Other than recognising the importance of champions within interventions, there was little practical guidance on what effective leadership comprises for obesity prevention with exceptions in the grey literature where the ability to mobilise capacity, including champions and role models and embrace innovation was discussed⁹⁰.

Partnerships between organisations^{5,6} and between the intervention and community members contributed to sustainability by fostering a shared understanding of the issue and often mobilised additional human resources which enhanced engagement and implementation^{30,56,59}. The importance of community engagement before introducing any community-wide change is well established⁹¹. Such engagement contributes to sustainability by working with, rather than intervening in the community and this enhances collaborative efforts^{92,11,12}. Few of the reviewed papers quantified community engagement. We see value in identifying a threshold of community buy-in below which an intervention would not be viable and/or community engagement would need to be strengthened prior to further intervention implementation.

Policy implementation usually brings legislation and accountability, therefore we were not surprised that, as per earlier reviews, policy contributes to sustainability^{5,6,11}. However, tensions between commercial interests, personal rights and public health⁵⁹ sometimes limit the effectiveness of policies. We found that policies can be toothless and literature and practice would benefit from insights to ensure policy flows through to implementation, adherence and sustainability.

Evaluation is considered an obesity prevention best practice principle⁹¹, and has been linked with public health sustainability¹¹, however it was less prominent than expected in our review. This may be because over 60% of the included papers were evaluations, therefore publication implicitly reflects the importance of evaluation. Evaluation contributes to sustainability in a number of ways: firstly, intended outcomes need to be measured to determine intervention effectiveness; secondly, process evaluation informs intervention delivery allowing it to adapt to the context; thirdly, although there is no guarantee that a successful intervention will be continued, intuitively lobbying for further funding or embedding into core practices is more likely if successful outcomes are supported by evidence.

Some elements from the scoping review used to create the initial codes did not persist through the more rigorous systematic review process, for example, planning for sustainability and the use of evidence. This may be because most of the included papers were written by researchers and both are implicit. It is important to note that one prior review emphasised the need for sustainable strategies to be supported by evidence⁶ and our further research will continue to explore where evidence best fits in the implementation of sustainable interventions.

Our proposed sustainability framework includes ten factors that peer-reviewed literature suggest are associated with sustainability of obesity prevention. It appears that sustainability is intrinsically linked to good implementation and as such, it should grow in importance within the field of implementation science. However, these reviewed studies did not provide advice on how to measure or demonstrate the effectiveness of these individual or collective factors and this requires further research. Table 2 provides a sustainability framework for use in planning, implementation and evaluation of interventions. This framework overviews these ten factors, provides a brief

description of their meaning and suggestions for implementation to enhance the sustainability of obesity prevention interventions.

Table 2: Sustainability Framework - Factors, Descriptions, Proposed Applications

Table 2 here please

Strengths

The strengths of this review lie in the systematic approach and specific attention paid to obesity prevention given it is a leading cause of chronic disease internationally. The inclusion of quantitative, qualitative and mixed methods papers gave us more insight into authors thoughts on sustainability than quantitative papers alone would have revealed because papers describing quantitative studies are often limited by word counts and structures that preclude such reflection. Similarly, the inclusion of process along with outcomes papers yielded broader insights into sustainability. Finally, we built this review on a practice-based scoping review which enhances the relevance and robustness of the findings.

Weaknesses

Few of the studies reviewed set out to identify factors contributing to sustainability and therefore, we can only claim association. Further, we were not able to tease out the individual contribution of these factors to sustainability because the multi-component nature of interventions made attribution difficult⁷⁰. Finally, the factors are influenced by the interpretation of the original authors and our own.

Implications for practice

The proposed sustainability framework includes 10 factors that peer-reviewed literature suggest are associated with sustainability of obesity prevention. Overlap between sustainability factors is evident, particularly between community engagement, leadership, policy and partnerships^{56, 80, 87}. As such, they are presented as a framework for practitioners and researchers to consider when planning, implementing and reporting obesity prevention interventions and not a ranked order of importance. Planning using the framework should help communities maintain healthy weights and evaluation of community based interventions against the framework will allow comparison and testing of the factors.

Questions for future research

The literature did not provide advice on how to measure or demonstrate the effectiveness of these individual or collective factors and this requires further research. Studies are needed that evaluate the impact of interventions over 3 or more years and, if available, secondary analysis of national or regional data is a pragmatic way of gathering information over such a long period⁹³. Where such studies already exist, the retrospective application of our sustainability framework may be helpful in identifying the relative importance of various factors. Also, quantitative analysis of the individual and collective impact of the framework components is required to verify and quantify their contribution to sustainability. Finally, research is required to ensure sustainable community-based obesity prevention interventions are also equitable.

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APPENDIX 1

Search Strategy

sustainability or implementation or “long-term implementation” OR dissemination OR “knowledge translation” OR routinization OR routinisation OR discontinuation OR de-adoption OR durability OR institutionalization OR institutionalisation OR maintenance OR “capacity building” OR sustai* OR routini* OR institutional* OR institutional*

AND

“community based” or “community wide” or community-based or “whole of community” or school* or pre-school or “child care” or “day care” or “early years” or workplace or “work environment”

AND

obesity or overweight or “healthy weight” or “healthy eating” or “physical activity” or “healthy lifestyle”

IN

ABSTRACT: EbscoHost 7808, 5248 were exported to endnote after the automatic removal of exact duplicates : : Academic Search Complete, Cinahl Complete, ERIC, Health Source – consumer education, Health Source – nursing/academic, PsychInfo, Medline Complete

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TITLE/ABSTRACT: PubMed 3476

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Web of Science: Topic: 1906

Figure 1: Prisma Diagram

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Figure 1: Coding of References by number of references that mentioned each theme.

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Figure 1: Sustainability Framework: Scoping Review to Systematic Review

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