Assessing implementation fidelity and adaptation in a community-based childhood obesity prevention intervention

Zoe Richards1, Iordan Kostadinov1, Michelle Jones2, Lucie Richard3 and Margaret Cargo*1

1Spatial Epidemiology and Evaluation Research Group, School of Population Health, University of South Australia, Adelaide 5001, Australia, 2Public Health and Clinical Systems, South Australian Department for Health and Ageing, Adelaide 5001, Australia and 3Faculté des sciences infirmières, Institut de recherche en santé publique (IRSPUM), Université de Montréal, Montréal H3T 1J4, Canada.

*Correspondence to: M. Cargo. E-mail: margaret.cargo@unisa.edu.au

Received on October 16, 2013; accepted on August 6, 2014

Abstract

Little research has assessed the fidelity, adaptation or integrity of activities implemented within community-based obesity prevention initiatives. To address this gap, a mixed-method process evaluation was undertaken in the context of the South Australian Obesity Prevention and Lifestyle (OPAL) initiative. An ecological coding procedure assessed fidelity and adaptation of activity settings, targets and strategies implemented in the second year of four communities. Implementation integrity reflected fidelity and adaptation to local context, whereas efforts resulting in significant deviations from the original plan were deemed to lack fidelity and integrity. Staff implemented 284 strategies in 205 projects. Results show that 68.3 and 2.1% of strategies were implemented with fidelity or adapted, respectively. Overall, 70.4% of all strategies were implemented with integrity. Staff experienced barriers with 29.6% of strategies. Chi-square analyses show statistically significant associations between implementation integrity and strategy type, intervention and behavioural targets. These relationships are weak to modest. The strongest relationship was found between implementation integrity and proximal target. Staff experienced implementation barriers at the coalition, policy, organization, interpersonal and community levels. The greatest range of barriers was encountered working with organizations. To overcome these barriers, staff took greater ownership, invested more time, persisted and allocated more financial resources.

Introduction

Multi-target, multi-setting and multi-strategy community-based prevention interventions are identified as holding the greatest promise for stemming the childhood obesity epidemic in developed nations [1]. Indeed, a growing number of community-based childhood obesity prevention programmes report promising results on the behavioural antecedents of obesity and children’s body weight [2–5]. Intervention success has been attributed to their focus on changing the environmental and individual determinants of obesity. Despite the ecological qualities of these interventions, the nature of the intervention exposure remains somewhat of a mystery. So, too, does the assessment of program implementation.

Capturing the heterogeneity of intervention exposure in childhood obesity prevention programmes has been hampered for a number of reasons. First, there are few tools to assess the multi-target, multi-setting and multi-strategy elements that constitute the ecological basis of community-based
interventions. Holding the greatest promise is Richard’s ecological coding procedure that has been used to capture the ecological basis of a range of health promotion interventions and to characterize the practice of public health practitioners [6]. Second, community-based interventions are not implemented as fixed packages. Instead, strategies comprising the intervention are adapted to the local context based on local needs. Tailoring interventions to the local context is often guided by the use of time-honoured programme planning models such as Precede–Proceed [7]. If anything is ‘standardized’, it is the sequence of steps that prevention staff takes to develop, implement and evaluate local programmes. Third, and relatedly, tailoring strategies to the local context and need for front-line staff to be responsive to local needs raises questions about the applicability of implementation fidelity or the extent to which strategies are implemented as planned in community-based prevention such interventions [8–11].

Existing definitions of fidelity centre on maintaining the fit of developer-designed programme elements during actual implementation in the practice setting [10]. Attention to both fidelity and adaptation are considered essential for successful implementation of evidence-informed efforts [12]. As such, both fidelity and adaptation can be considered aspects of implementation integrity; efforts resulting in changes that no longer fit with original objectives or intentions can be deemed to lack integrity.

The conundrum of assessing fidelity and adaptation stems, in part, from difficulties inherent to conceptualizing and operationalizing intervention exposure in community-based interventions. A review of the seven community-based interventions included in the latest Cochrane review of childhood obesity prevention interventions found that all interventions claimed to be ecological by design; none, however, operationalized the intervention exposure nor reported results on fidelity or adaptation [13]. Added to this is the dearth of information on practitioner experiences in implementing strategies that target change at different levels of the environment. Such information is crucial for providing feedback to strengthen implementation processes.

There is little empirical literature on the assessment of fidelity, adaptation and overall integrity of activities implemented in community-based prevention programmes. To address this gap, this study utilized a parallel mixed-method study design to: (1) assess implementation fidelity, adaptation and integrity in a multi-site community-based childhood obesity prevention program; 2) gain insight into the factors influencing staff’s modification or purposeful adaptation of planned projects from planning to implementation, the former due to encountering barriers in the field. More specifically, this study utilized the ecological assessment procedure [6] to systematically assess the extent to which intervention efforts were implemented with fidelity, adapted to the local context and implemented with integrity.

Programme

The South Australian (SA) Department for Health and Ageing launched the Obesity Prevention and Lifestyle programme (OPAL) programme in 2009. OPAL is based on the French community-based obesity prevention programme Ensemble Prévœnons l’Obésité Des Enfants (translated as EPODE ‘together we can prevent childhood obesity’) [14]. OPAL aims to increase the proportion of 0- to 18-year-olds in the healthy weight range by working with children, families, organizations, political actors and the community. It is implemented in four phases across 21 communities; communities receive 5 years of funding from Commonwealth, State and Local governments. A central coordinating unit provides management, social marketing and evaluation support to 21 teams of two interventionists. Staff are centrally funded and based in local government. The senior project officer, hired based on their high level of expertise and strategic thinking capability, is assisted by a support officer.

Three theories inform the programme—community development [15], social marketing [16] and ecological systems theory [17]. Local implementation is guided by a set of principles (e.g. equity, non-stigmatizing, values local community), six goals (home meals, healthy outlets, local food, active travel, active leisure, parks and places) and seven action areas (e.g. policy and planning, awareness,
education and training, infrastructure and environments), which are complemented by annual social marketing themes focusing on a particular behaviour target (e.g. ‘Water. The original cool drink.’). Staff spend the first six months getting to know the local community and engaging with organizations. They also develop a 5-year plan, which is updated annually. Each year, staff attend three 4-day staff training sessions that include council sharing (time for staff to share their learnings from local implementation), externally facilitated staff reflection sessions (opportunity for staff to engage in reflexive practice), road maps of evidence-based interventions and capacity-building activities. Staff draws on programme theories, action areas and principles and synthesize evidence with local knowledge to mount locally responsive evidence-informed projects.

**Methodology**

This process evaluation utilized a parallel mixed-method design [18]. The quantitative component characterized intervention projects implemented for one intervention year and assessed whether they were implemented with fidelity or purposefully adapted. Qualitative interviews provided complementary information on barriers to implementation and circumstances influencing adaptation.

**Sample**

Data were collected from four OPAL communities in the same intervention year. Each community is supported by a senior project officer and support officer. This sub-group was selected on the basis of no staff turnover for the intervention year and access to good quality data.

**Measures**

*Intervention strategies and actions*

Richard *et al.*’s [6, 19, 20] ecological coding procedure was used to operationalize intervention strategies for each intervention project. Projects are coded according to: (i) intervention targets intended for change; (ii) intervention strategies and actions applied to bring about change to the intervention target and (iii) setting of participant recruitment [6].

Five targets are designated for change: (i) individual ultimately targeted by the intervention (IND); (ii) interpersonal environment of the individual (INT); (iii) a social grouping or organization guided by a formal decision-making and governance structure (ORG); (iv) community residents or built environment of the community (COM) and (v) elected officials or policy makers (POL).

Intervention strategies sequence intervention targets designated for change. Each strategy begins with HP (represented by OPAL council staff) and ends with IND or ultimate target, which are children (0–18 years). Table I provides sample intervention strategies.

OPAL staff can influence the obesogenic behaviours of children (IND) either directly or indirectly. With direct intervention strategies (HP→IND), they interface directly with children (e.g. healthy eating session). Indirect strategies aim to change children by acting on a proximal environmental target (HP→‘X’→IND, where X can be INT, ORG, COM or POL). For example, OPAL staff can influence children’s eating habits by offering cooking classes to parents (HP→INT→IND).

Indirect strategies can also involve networking two or more targets. They are depicted through brackets (HP→[X-X]→IND). Targets represent entities engaged in the network. For example, OPAL staff can bring together representatives from two communities to form a coalition to improve healthy eating in sporting clubs (HP→[COM-COM]→IND).

The arrows in each intervention strategy, as described above, represent actions utilized by OPAL staff to bring about the change in proximal or ultimate targets. Based on the OPAL staff actions, the proximal target then mounts actions to influence the IND. A single project can comprise one or more strategies.

**Intervention setting**

Richard *et al.*’s [6, 19, 20] ecological coding procedure was used to define intervention setting
for each project. The intervention setting is the social system(s) in which children (IND) are reached by OPAL staff. These include; organization (ORG) (i.e. local government), community (COM) (i.e. neighbourhoods) and society (SOC) (i.e. states).

**Implementation fidelity, adaptation and integrity**

Fidelity was assessed in relation to the intervention strategy and actions utilized by OPAL staff to bring about change in the planned intervention targets with the strategy as the unit of analysis. OPAL teams work with local community and partner organizations to develop a 5-year plan, updated annually. These plans form part of the reporting requirements to State Government; the annual listing of planned projects with descriptions and rationales were shared with researchers. We defined fidelity as maintaining the integrity of the intervention strategy (i.e. sequencing of intervention targets) setting and the actions used to bring about change in the intervention target from planning to implementation. If a project comprised one intervention strategy, it was implemented with fidelity if there were no changes in the sequencing of targets or the core actions used to bring about change in the intended target. A project lacked fidelity when the setting, strategy or actions changed due to issues encountered during implementation [21]. Local adaptation of settings, strategies and actions was deemed a good thing as long as staff adhered to the original plan. For this particular study, purposeful adaptation and modified due to barriers are not mutually exclusive. It is possible that barriers could be experienced during the process of adaptation.

We considered implementation integrity to include efforts implemented with fidelity and those purposefully adapted to the local context. Efforts where staff encountered barriers such that the strategy, action or setting no longer fit with the original plan or design were deemed to lack fidelity and thus integrity. In addition, barriers encountered during the process of adaptation would be deemed to lack integrity.

In summary, implementation was classified as a three-level nominal measure based on the presence or type of change in the planned intervention strategy or actions supporting the strategy, target and setting from the implemented intervention strategy or action, target and setting. Each strategy was coded as either:

(i) ‘implemented as originally planned’ (fidelity)—no changes to the intervention strategies or the actions that staff took to bring about the change;

(ii) ‘purposefully adapted’ to local context (adapted)—the strategy or action was purposefully adapted during the process of implementation to improve its fit with the local context [22];

(iii) ‘modified due to barriers’ (lack of fidelity)—strategies or actions changed due to difficulties encountered during implementation [21]; or a dichotomous variable was then computed to reflect strategies implemented with ‘integrity’, that is, strategies implemented with fidelity or adapted to local context versus those which

<table>
<thead>
<tr>
<th>Intervention strategy type</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP→IND</td>
<td>75</td>
</tr>
<tr>
<td>HP→ORG→IND</td>
<td>69</td>
</tr>
<tr>
<td>HP→INT→IND</td>
<td>66</td>
</tr>
<tr>
<td>HP→ORG→INT→IND</td>
<td>25</td>
</tr>
<tr>
<td>HP→ORG→COM→IND</td>
<td>9</td>
</tr>
<tr>
<td>HP→COM→IND</td>
<td>6</td>
</tr>
<tr>
<td>HP→[ORG-ORG]→IND</td>
<td>4</td>
</tr>
<tr>
<td>HP→[ORG-ORG]→ORG→IND</td>
<td>4</td>
</tr>
<tr>
<td>HP→[ORG-ORG]→INT→IND</td>
<td>5</td>
</tr>
<tr>
<td>HP→INT→ORG→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→ORG→ORG→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→POL→ORG→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→POL→COM→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→POL→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→[ORG-INT]→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→[POL-COM-ORG]→ORG→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→[ORG-ORG]→COM→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→[POL-ORG]→IND</td>
<td>2</td>
</tr>
<tr>
<td>HP→[INT-INT]→IND</td>
<td>1</td>
</tr>
<tr>
<td>HP→[COM-ORG]→IND</td>
<td>1</td>
</tr>
<tr>
<td>HP→[ORG-INT]→COM→IND</td>
<td>1</td>
</tr>
<tr>
<td>Total strategies</td>
<td>284</td>
</tr>
</tbody>
</table>
lacked integrity (i.e. were modified due to barriers). For strategies lacking integrity, we determined whether the sequencing of targets (e.g. from HP→INT→IND to HP→IND) or actions supporting the strategy changed.

‘Children’s age group’, categorized according to pre-school (0–5 years), school-based (6–18 years) or all children (0–18 years).

‘Behavioural targets’, categorized according to physical activity, healthy eating or both.

‘Socio-economic status’ (SES), categorized as low, mid-range/high or no specific target.

Data collection
Descriptive information on each project was extracted from a planning document routinely updated by OPAL. The list was the basis for conducting semi-structured interviews with OPAL staff. One interview was conducted in each community with both OPAL staff, for a total of four interviews; interviews lasted 2.5 h and were digitally recorded and transcribed. Staff was given the interview guide with definitions of fidelity and adaptation. Questions probed into the composition of planned and implemented intervention strategies for each project. Questions first sought information on the targets, sequencing of targets and setting (e.g. What were you trying to achieve? Can you describe how you went about planning this project?) Then, questions probed into whether project strategies were implemented as planned or changed (e.g. Did the implemented strategy differ from what was initially planned? If yes, how? Were elements adapted during implementation? What elements, and why? Was this project modified due to a barrier? Describe the barrier?)

Data analysis
Activity descriptions were generated for each project by two researchers independently. Descriptions were summarized on a standardized form.

Quantitative analysis
Quantitative data were analysed using SPSS-PC (Version 21). The intervention strategy was the unit of analysis. Frequencies for all measures were computed.

Two-way tables were generated to examine frequency distributions for implementation integrity according to intervention strategy type, proximal target, setting and descriptive activity characteristics. The $\chi^2$ test of independence [23] explored associations between implementation integrity (dependent measure) and ecological coding components (independent measures). Cramer’s V or $\phi$ coefficients assessed the strength of statistically significant associations. Standardized residual values determined which cells contributed most strongly to the $\chi^2$. Cells having a standardized residual $\geq 2.0$ were identified as major contributors to the significant $\chi^2$ value [23]. The $\kappa$ coefficient was used to determine the level of inter-rater reliability. Statistical significance was set at 0.05.

Qualitative analysis
Chen’s implementation system model [24] was used to understand the factors influencing lack of fidelity and adaptation. Based on quantitative results, strategies were sorted into whether they were adapted to the local context or OPAL staff encountered barriers during implementation. These groupings represented the higher-order deductive categories within which basic themes and organizing themes were inductively identified using cross-case analysis techniques [25]. Each strategy was designated as the case in the analysis. Meaning units of interview text were assigned inductive codes. Codes were compared and contrasted for similarities and differences and grouped into basic and organizing themes under the two high-order deductive themes.

Results

Quantitative results
OPAL staff in the four communities implemented 284 strategies in 205 projects for the given intervention year. The number of projects implemented ranged from 38 to 70 per community, with one to four strategies implemented per project. The
majority of projects included one (66.8%) or two strategies (28.8%).

Table II shows the frequencies and percentages of planned strategies implemented with fidelity or purposefully adapted. Those not implemented with fidelity were considered to ‘lack fidelity due to barriers’. Results show that 68.3% of planned strategies were implemented with fidelity and 2.1% of planned actions were purposefully adapted. OPAL staff encountered barriers during the implementation of 84 strategies (29.6%). Staff modified their actions to change 64 strategies when encountering barriers during implementation. In the remaining 20 strategies, OPAL staff was unable to influence their intended target, and therefore the targets in the overall strategy changed during implementation (e.g. HP→INT→IND changed to HP→IND).

OPAL staff implemented the majority of strategies (70.4%) with integrity. There was a statistically significant association between integrity and strategy type (Table III). Compared with indirect and networking strategies, a greater proportion of direct strategies (HP→IND) were implemented with integrity. As indicated by the Cramer’s $V$ of 0.214, the two variables were weakly correlated. A standardized residual of $-2.6$ (data not shown) indicates that the HP→IND/No integrity cell in the table contributed the most strongly to the $\chi^2$ value; when targeting children directly strategies lacked integrity less than would be expected by chance (10 observed versus 22.2 expected).

There was a statistically significant association between implementation integrity and proximal target (Table IV). The Cramer’s $V$ indicates a weak correlation.

Further analyses revealed no statistically significant associations between implementation integrity and intervention setting, target age group or target socio-economic status.

**Inter-rater reliability**

Inter-rater reliability for the proximal target ($\kappa = 0.938$, $P < 0.001$), distal target (second or third) ($\kappa = 0.928$, $P < 0.001$) and setting ($\kappa = 0.901$, $P < 0.001$) were excellent.

**Qualitative results**

Findings are based on 29.6% of the strategies for which OPAL staff reported barriers ($n = 84$) and the 2.1% of strategies purposefully adapted to the local context ($n = 6$).

**Purposeful adaptation**

Four basic themes related to the purposeful adaptation of strategies. Three themes were grouped under the organizing theme of ‘Meet the needs of the proximal target’.

OPAL staff adapted a nutrition project to meet the needs of a migrant Culture; interpreters were recruited to meet participant’s language needs.

‘The people delivering the actual program [project] speak English only, so it had to have interpreters’.

In another situation, participants were unavailable to attend a healthy eating project during the week. OPAL staff was flexible and changed their Schedule to meet participant needs.

‘But they have English lessons during the week, so Saturday morning it had to be’.

Funding was provided to a family day care group to purchase active play equipment for the children. After several meetings, OPAL decided to involve a professional to aid in the selection based on OPAL’s perceived expertise of the organization’s staff. OPAL wanted to ensure the funding was used appropriately.
We wanted to ensure that a professional was involved in the selection of the items so that they were things that were not only fun, but would promote motor development.’

OPAL staff adapted a healthy eating project targeting children with Special Needs. Unaware that the children had special needs until they arrived, the staff member ‘just had to be flexible’ and changed their presentation style by simplifying the cues used to interact with children. This basic theme was grouped under the organizing theme of ‘Meet the needs of the ultimate target’.

**Table II.** Frequencies and percentages of intervention strategies by fidelity, purposeful adaptation and overall implementation integrity (n = 284)

<table>
<thead>
<tr>
<th>Intervention strategies</th>
<th>Implemented with fidelity n (%)</th>
<th>Purposefully adapted n (%)</th>
<th>Lacked fidelity (strategy) n (%)</th>
<th>Implemented without integrity n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented</td>
<td>194 (68.3)</td>
<td>6 (2.1)</td>
<td>20 (7)</td>
<td>64 (22.6)</td>
</tr>
<tr>
<td>IND</td>
<td>200 (70.4)</td>
<td></td>
<td>84 (29.6)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>284 (100)</td>
<td></td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

**Table III.** Implementation integrity by intervention strategy type (n = 284)

<table>
<thead>
<tr>
<th>Intervention strategy type</th>
<th>Implemented with integrity</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HP→IND</td>
<td>65 (86.7%)</td>
<td>10 (13.3%)</td>
</tr>
<tr>
<td>HP→X→IND</td>
<td>120 (64.9%)</td>
<td>65 (35.1%)</td>
</tr>
<tr>
<td>HP→[X-X]→IND</td>
<td>15 (62.5%)</td>
<td>9 (37.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>200</td>
<td>84</td>
</tr>
<tr>
<td>Chi-square (χ²)</td>
<td>12.968 df=2</td>
<td>0.002</td>
</tr>
<tr>
<td>Cramer’s V</td>
<td>0.214</td>
<td></td>
</tr>
</tbody>
</table>

‘We wanted to ensure that a professional was involved in the selection of the items so that they were things that were not only fun, but would promote motor development’.

OPAL staff adapted a healthy eating project targeting children with Special Needs. Unaware that the children had special needs until they arrived, the staff member ‘just had to be flexible’ and changed their presentation style by simplifying the cues used to interact with children. This basic theme was grouped under the organizing theme of ‘Meet the needs of the ultimate target’.

**Barriers to implementation**

Figure 1 depicts each level of the social system as organizing themes and specific barriers to implementation, within these levels, as basic themes. Some Barriers experienced at multiple levels of the system are represented in overlapping circles in Fig. 1.

**Coalition**

Although competing priorities was the only perceived barrier experienced by OPAL staff during efforts involving coalitions, it was also experienced at policy and organization levels.

Partners would come together to make joint decisions and support planning and implementation. This process, however, did not always go smoothly. For example, OPAL staff worked with an advisory committee to create a healthy fundraising resource for sporting teams to use instead of chocolate kits.
Although the committee agreed to provide input on the resource, they were not able to provide ‘something back in a fortnight’ due to competing priorities. In some instances organizations were unable to support OPAL projects to the extent that OPAL staff would have liked due to competing priorities.

‘Finding the time in the curriculum to let kids out of school time to do bike education classes is a big ask from schools’.

**Policy**

The presence of a champion influenced OPAL’s capacity to deliver projects. In one instance, the absence of a champion among elected council members made it more difficult for OPAL to mount their healthy catering policy.

‘The barrier really was trying to find a route to make this happen. Like I could see that I was getting nowhere’.

At times OPAL staff needed a champion to work with organizations. In one situation they met with limited success in working with a steering group to incorporate a healthy lifestyle agenda across subdivisions of an organization:

‘They have lots of stuff on and they don’t necessarily see the value of OPAL’.

In addition to ensuring a project champion was involved during implementation, occupational health and safety regulations posed an additional barrier. When OPAL staff organized a skateboard and BMX workshop ‘it rained and it was cancelled’ because the wet skate ramp was deemed unsafe for children.

Political issues involving multiple stakeholders led to slight deviations of some projects from their original plan. The community launch of OPAL’s Active Travel theme required a road closure for the day. A few organizations and residents responded unfavourably to the closure.
“Businesses didn’t like the idea that we were closing the main street because cars can’t park right out the front to come and spend money”.

Through the leadership and commitment from the Mayor and additional action of OPAL staff, the event was implemented regardless of the limited organizational support.

At times, OPAL staff encountered difficulties gaining approval from organizations which either caused time delays of varying degrees or impeded projects from achieving their planned goals. For example, OPAL approached council to install a traffic signal on a busy road near a local school in a socially disadvantaged neighbourhood. However, following an assessment and based on road and safety regulations, ‘it didn’t warrant a traffic signal, it only warrants a traffic island’. This was not an optimal outcome. OPAL staff aimed to install a traffic crossing to ensure parents’ and children’s safety walking to school.

**Organization**

OPAL staff experienced the greatest range of barrier types when they engaged with organizations (e.g. local businesses). In addition to organizational barriers presented in the previous section, unique barriers included human resources, financial resources, ownership and facility upgrades.

OPAL worked with a number of schools to establish gardens to provide students opportunities to learn about growing fruit and vegetables. Although some schools had funding to support part-time staff, others struggled to find volunteers or ‘human resources’ to maintain the gardens.

When it came to integrating projects into school curriculums, schools with a limited financial resources found it difficult to sustain projects after OPAL’s input.

‘There is not a good framework out there to allow schools to run these things on their own without somebody paid to coordinate’.

Organizations with limited financial resources placed a greater emphasis on support from volunteers to maintain projects.

At times organizational staff was not in a position to take ownership of OPAL projects. To illustrate, OPAL ran healthy eating sessions at a parents’ organization to build their capacity to run the project. Unfortunately, the organization could not take this responsibility.

‘We would have liked them to be presenting more of the sessions than what they did, but they wanted guest speakers, because guest speakers are fun’.

Organizations undergoing facility upgrades slowed down OPAL’s efforts to get projects off the ground. On one occasion, OPAL developed physical activity equipment kits for families to rent, however ‘they didn’t want to launch it until the new library was up and running’.

OPAL staff was confronted with resistance to change social norms from a range of organizational providers. Staff worked with a local school canteen to provide healthier lunch options, but ‘the ladies that owned the deli were you know “this is hard”’.

Resistance to change social norms was also present at the interpersonal level with parents. Staff encountered resistance from parents when working with schools to change the canteen menu:

‘There was resistance from parents initially, “why can’t my kid have crap food?”’ [Paraphrased by OPAL staff member]

**Interpersonal**

In addition to encountering the aforementioned barriers related to resistance to changing parents’ perceived social norms, OPAL staff encountered an additional barrier related to over enthusiasm.

In one instance healthy food for a parent activity was put out in a low socio-economic suburb, and ‘people got in the line first and piled their plates not like anything you would have seen in your life’. The over-enthusiasm of some parents left others without food at the event.
Community

OPAL staff encountered barriers with community members. To promote active travel, OPAL organized a physical activity project encouraging parents to park a short distance away from their child’s school and walk. From the lack of residential support staff was encouraged to look elsewhere for parking.

‘You get the residents that live on the street a bit angry. They say things like, “I didn’t buy a house in front of a school, because I don’t want this”’.

Some projects were scheduled on the same date as community events and resulted in a lack of participants due to competing events.

‘There was a town show on the same day and a sporting carnival, so that was a barrier to kids participating’.

Implementer

Staff also experienced individual level barriers. Despite the experience and competence of OPAL staff, on occasion they underestimated the time required to implement their action plan. For example, staff underestimated the time to get a healthy eating grant project off the ground, in part owing to gaining approval.

‘We underestimated the time it takes to administer it. Running a grants program [project] is a lot of work I think and I underestimated that’.

In one instance OPAL planned a project for a local migrant group and cultural sensitivity emerged as an issue. A healthy eating project was planned for Indian mothers to encourage them to make healthy snacks for their children. However, no one attended the first session because the wives required their husband’s permission to attend. A volunteer from the same culture identified that OPAL needed to follow appropriate cultural protocols to engage migrant groups.

‘Of course no one will come, you need to invite the men along and they need to give their permission’.

Overcoming barriers to implementation

Implementation emerged as a dynamic process rather than a static event (Fig. 2). During implementation, strategies were either implemented as planned \((n = 194)\) or purposefully adapted \((n = 6)\) to the local context. OPAL staff encountered the aforementioned barriers as they moved from the planning to the implementation stage for 20 strategies and for 64 actions that supported strategies. To overcome the barriers, OPAL staff employed a range of strategies (Fig. 3). When OPAL staff were unable to find champions within organizations or experienced competing priorities, in some instances it was necessary for them to take greater ownership of projects. In one example, OPAL worked with an organization to establish an Active Travel to work project. Despite OPAL’s efforts to empower organization staff to take ownership of the project, this did not happen.

‘It took quite a while to get off the ground and my support officer ended up taking a lead role in that, but it is now humming along beautifully’.

OPAL staff, however, did not take ownership of all projects. Some projects required constant attention and persistence.

‘It was one of those ones and you know OPAL sometimes requires you to be a terrier and you get hold of something and you don’t let go of the pants’.

Taking ownership and persisting to change their targets came with the cost of investing more time into getting projects off the ground than initially planned.

‘I did a lot of the work and a lot of chasing people up, it just meant that I had a massive work load’.

Finally, to overcome barriers related to gaining approval and resistance to social norms, OPAL staff
had to allocate additional financial resources for projects to be implemented.

‘I made the decision to put more resources into that school because they had particular challenges’.

Taking greater ownership, investing more time, being persistent and allocating more resources into projects contributed to staff energy burnout and impacted on their capacity to implement additional projects because they ‘ran out of energy’.

Of the 84 strategies in which staff encountered barriers during implementation (i.e. lacked fidelity), two coders determined that 69 strategies resulted in partial implementation failure and 15 strategies, complete implementation failure. The former resulted in changes to planned strategies, actions were implemented with time delays or planned strategies and actions did not engage the target as originally planned.

**Discussion**

This study is the first to report on the fidelity, purposeful adaptation and implementation integrity of intervention projects implemented in a community-based obesity prevention programme using a systematic assessment procedure. The majority of planned strategies (70.4%) were implemented with integrity. Of the 84 planned strategies in which OPAL staff encountered difficulties during implementation, in only 20 strategies did their actions result in a change in target (e.g. HP→ORG→IND to HP→IND). More often (64 strategies) OPAL staff had to change their actions to engage the
target. It is important for fidelity to be maintained in practice settings because projects were designed to be locally responsive and based on combining the best available evidence with OPAL principles and theories. Difficulty maintaining fidelity during implementation may indicate a Type III error, that is, the programme was not effective because efforts could not be implemented as planned. This would be the case if the majority of strategies with POL or COM targets, for example, were reluctant to engage with OPAL staff or efforts to influence infrastructure changes in COM or ORG targets consistently resulted in education or awareness raising actions instead. As this is the first study to assess fidelity and adaptation using the ecological coding grid developed by Richard et al. [6], we are unable to compare our findings with other studies.

Given the emphasis in the literature on the adaptation of community-based interventions [8, 9, 26], we were surprised to find that few strategies were purposefully adapted during implementation. Following EPODE methodology [14], the OPAL programme is based on community development principles in which staff undertakes a comprehensive needs assessment prior to implementation. Staff spend the first 6 months of their position engaging with local stakeholders to gauge priority areas, levels of resourcing, interest, leadership and capacity. Through this process, and in line with community development principles [27], staff gains insight into how to respond to local community needs and capacity issues [28]. The needs assessment, a core OPAL principle, may explain the low level of purposeful adaptation during implementation, because projects are already planned around local priority areas and needs. The high level of staff expertise also may have contributed to the limited adaptation. Senior council managers are hired at the level of senior project manager based on their ability to think and plan strategically. The notion that qualified implementers are better equipped to undertake purposeful adaptation without compromising programme effectiveness fits with previous findings [21].

Our results show statistically significant associations between implementation integrity with
overall strategy type and proximal target. For strategy type, a greater proportion of direct strategies (HP→IND) were implemented with integrity, when compared with indirect strategies (HP→X→IND). Our quantitative and qualitative findings converge to reveal that OPAL staff experienced barriers most often when organizations were the proximal target. It is well-established that building capacity and working to bring about changes in the built environment within formal institutions and organizations can be a rewarding, but challenging process [29]. A systematic review demonstrated barriers were more common when programme staff collaborated with organizations during implementation [30]. In addition, there were several similarities in the types of barriers found in our study with this particular review. At the organizational level, these included; political issues, resistance to change social norms, ownership and presence of a champion. These barriers as well as facility upgrades, were also identified as barriers to implementation at the organizational level in additional process evaluations of community-based obesity and diabetes prevention programmes [31–33].

Our findings suggest that strategies targeting the more distal layers of the social system (organizational, community and policy) were less likely to be implemented with integrity. There may have been some reluctance from key stakeholders across these particular sectors to take ownership of OPAL projects. This reluctance may have been due to resistance to social norms, competing priorities, a lack of a champion, having to gain approval or limited financial or human resources. This punctuates the importance of OPAL staff building relationships with key stakeholders; relationship building contributes to understanding the culture and context of the community that is necessary for implementing appropriate projects and preparing for any resistance to social change [34].

Strengths and limitations

Study strengths include the mixed method design with qualitative findings providing interpretive insight to the quantitative analysis and utilizing an ecological coding procedure [3, 6] with established face and content validity to assess fidelity and adaptation. The participatory nature of the study contributed to interviews being conducted in a context of rapport and trust. Credibility of the qualitative component was strengthened by two data analysts, peer debriefing and member checking.

Upon completion, results were presented to OPAL staff during a quarterly training session. The presentation enabled them to reflect on their work with stakeholders and how it could be enhanced. Aforementioned, our qualitative analysis revealed that staff encountered barriers most frequently when working with organizations. This research recognized and documented that to overcome these barriers, staff contributed additional time and effort to implement strategies. Staff reported that it increased their consciousness about their daily work, and they found it helpful that these difficulties were confirmed and acknowledged.

The study was limited in that saturation was not reached at the basic and organizing levels of coding. In addition, OPAL staff had less control over implementing strategies with targets located at the distal layers of the social system. It is possible that further adaptations were made to strategies implemented by key stakeholders targeted for change by OPAL staff, and staff was unaware of these changes. It is additionally possible that adaptions during implementation were masked by barriers and not reported during the interviews. These may have contributed to an under-estimation of adaptation and over-estimation of fidelity.

**Conclusion**

This study found that the majority of planned intervention projects were implemented with integrity in a community-based obesity prevention programme and few strategies were adapted. Staff was more likely to experience difficulties working with organizations compared with other targets. When encountering difficulties, staff responded by allocating additional resource, investing more time, being
persistent and taking greater ownership of the projects. The needs assessment and high level of frontline staff strategic planning skill may have contributed to the high level of implementation integrity.

Acknowledgements

The authors would like to thank OPAL State Coordination Unit and the participating OPAL communities for supporting this project. We also thank the Chief Public Health Officer for his comments on the manuscript.

Funding

Mr. Kostadinov is supported by a South Australian Department of Health and Ageing Obesity Prevention and Lifestyle (OPAL) PhD Scholarship. OPAL by EPODE is a joint Australian, State and Local Government Program. The views expressed are solely those of the authors and do not necessarily reflect those of the South Australian Government, or any other Australian, state or local government.

Conflict of interest

None declared.

References


