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Translating systems thinking into practice for community action on childhood obesity

Steven Allender[1] [iD] | Andrew D. Brown[1] | Kristy A. Bolton[1] [iD] | Penny Fraser[1] |
Janette Lowe[2] | Peter Hovmand[3]

[1] Global Obesity Centre, Institute for Health Transformation, Deakin University, Geelong, Australia

[2] Southern Grampians & Glenelg Primary Care Partnership, Hamilton, Australia

[3] Brown School, Institute for Public health, Washington University in St. Louis, St. Louis, Missouri

Correspondence
Professor Steven Allender, Global Obesity Centre, Institute for Health Transformation, Waterfront Campus, Deakin University, Geelong, VIC, 3221 Australia.
Email: steven.allender@deakin.edu.au

Summary

We report on the first 18 months of two communities' efforts using methods inspired by community-based participatory system dynamics for the development, implementation, and evaluation of whole of community efforts to improve the health of children. We apply Foster-Fishman's theoretical framework for characterizing systems change to describe the initiatives. Bounding the system began with defining leaders more broadly than standard health interventions to be those who had the ability to change environments to improve health, including food retailers, government, and business, and using high-quality childhood monitoring data to define the problem. Widespread access to junk food, barriers to physical activity, and efforts to promote health predominantly through programmatic approaches were identified as potential root causes. System interactions existed in the form of relationships between stakeholder groups and organizations. The approach described built new relationships and strengthened existing relationships. Willingness in taking risks, changing existing practice, and redesigning health promotion work to have a community development focus, were levers for change. This approach has resulted in hundreds of community-led actions focused on changing norms and environments. Insights from this approach may be useful to support other communities in translating systems theory into systems practice. Further empirical research is recommended to explore the observations in this paper.

KEYWORDS

childhood obesity, community intervention, chronic disease, systems thinking

1 | INTRODUCTION

There has been a recent resurgence in calls to apply systems science to public health initiatives as a way to address the complexity that hampers traditional approaches to improving population health. Sniehotta and et al[1] call for a conceptualization of health that recognizes interdependent elements connected at multiple levels that affect health. They further identify that systems be conceptualized

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not just as interdependent elements, but that they are also comprised of actors, each of whom play a role in the conceptualization and implementation of efforts to improve population health.

Writing in The Lancet, Rutter et al[2] call for approaches that engage with the complex systems affecting health at the design, implementation, and evaluation stages of any population health intervention. There are many fields of systems science that attempt to address complexity,[3,4] though it appears that participatory approaches like community-based system dynamics[5] hold significant promise. Foster-Fishman[6] provides a strong theoretical framework for characterizing transformative systems change that sets the efforts in terms of bounding the system, understanding fundamental system parts as potential root causes, assessing system interactions, and identifying levers for change.

Population health and, in particular, community-based efforts to prevent obesity and other chronic diseases have seen a rapid increase in calls to apply systems thinking to efforts to prevent obesity, improve diets, and levels of activity towards reducing the burden of chronic disease. There is far less in the literature about how to take a systems approach or how taking such an approach looks at the interaction of research, practice, and policy and the implications for best practice in implementation, evaluation, and systems science. Authors such as Sterman[7] have conceived of systems changes being needed to address resistance to change (known as policy resistance) because efforts do not consider the ways in that dominant balancing feedback loops can counteract change. Additionally, people frequently disregard time delays, resulting in a short-term and narrow focus distracting from longer term, more fundamental change (eg, policy decisions sitting within election cycles). Sterman[7] also points to the importance of understanding the distinction between accumulations and their corresponding rates of change, demonstrating the importance of the transfer of knowledge, resources, etc, and not the result of a single action or event.

Though difficult, these challenges need to be addressed scientifically; population changes at the scale required are unlikely to be supported without timely and meaningful evaluation of intervention outcomes. Measuring changes in systems and traditional health outcomes is also critical in creating interventions that are able to learn and adapt in real time to maintain momentum and evolve in a way that is best tailored to the specific community context and potential for effective intervention.

In this paper, we report on insights gained during the development, implementation, and evaluation of the first 2 years in a systems-based childhood obesity prevention initiative. This initiative deliberately applied approaches inspired by community-based system dynamics to the development, implementation, and evaluation of whole of community efforts to improve the health of children. The paper shows one example of how systems thinking is being applied to childhood obesity prevention.

2 | METHODS

The Whole of Systems Trial of Prevention Strategies for Childhood Obesity (WHOSTOPS) is a cluster-randomized trial of a systems approach to mobilizing community action for childhood obesity prevention in 10 communities from the Great South Coast region of Victoria, Australia. The design[8] is reported in detail elsewhere but includes a pilot community Sustainable Eating Activity Change Portland (SEA Change Portland), five communities in the initial 2-year period, and the remaining five joining after the second year. The intervention approach was to build and support capacity within intervention communities to apply methods inspired by community-based system dynamics in the design, implementation, evaluation, and constant improvement of efforts to prevent childhood obesity. The design is adaptive and cocreated with communities.

In this paper, we apply Foster-Fishman's framework's four principle steps for transformative change[6] to describe the WHOSTOPS intervention from a systems lens and make some sense of the initial effort in two of the intervention communities. Both communities are rural population hubs in Western Victoria, Australia sitting in two council areas with a combined population of over 30 000 inhabitants covering 10 000km[2]. The council's economies are supported by a range of agriculture, fishing, education, maritime export, health, and service industries. Building on seminal works in systems science, Foster-Fishman's framework[6] provides a practical framework and a set of questions grounded in the systems science literature to make systems thinking clear and applicable for practitioners. Data for this paper are based on lived experience of several community leaders of the initiatives in the WHOSTOPS communities.

3 | RESULTS

3.1 | Bound the system

Establishing boundaries to the system is a fundamental starting point to efforts to change systems. Foster-Fishman[6] conceptualizes this as (a) clarifying the problem statement for assessment and intervention and (b) understanding who is contained within the system related to the targeted problem.

3.1.1 | What is the problem that should be targeted for intervention?

Several of the WHOSTOPS communities had identified, and in some cases, had been working in, efforts to prevent childhood obesity. The community understood that child health, generally, and obesity specifically were serious problems on a national level and groups external to the community (like state departments of health and universities) identified that prevention of disease in children would prove a powerful place to invest preventive health efforts. The lack of granular data was a limitation to engagement for the communities, while there were some data available at state and national level, but nothing specific enough to inform local communities.

Some community leaders recognized childhood obesity as a problem but were having trouble engaging the community more broadly and were frustrated with existing prevention efforts that achieved apparently limited results. For this study, a pilot community

conducted group model building[9] to build a causal loop diagram (CLD) of their understanding of the causes and effects of childhood obesity in their community. This process engaged a broader range of perspectives to define the problem of childhood obesity in a way that appeared to be accessible to a broader audience. One of the key issues arising from this initial work was the lack of local data, with the consequence that engaging leaders outside of health was difficult as people assumed that national-level data did not imply there was a problem at the local level. A monitoring system[10] was constructed using local capacity for data collection and data were collected via electronic tablets to shorten the time delay from collection to analysis and presentation of data form 18 months to 6 weeks. In subsequent communities, the combination of high-quality local data and group model building (GMB) seemed to allow for broader engagement around child health and a high-quality behavioural and anthropometric data provided the basis for understanding the broader social context as it led to observed patterns in childhood obesity. A second element of the engagement was to describe the current thinking on intervention design and the steps taken towards a whole of systems approach. A further conceptualization was that "business as usual" was not working for the prevention of childhood obesity.

The behavioural data coupled with community consultation to build CLDs appeared to engage the whole community around positive messages of health, specifically adopting the message "engaging the whole community to make the healthy choice the easy choice (especially for kids)." The framing of the problem extended beyond absolute measures of childhood obesity acknowledging that a focus on healthy eating and physical activity had benefits ranging far beyond just obesity rates.

3.1.2 | Who and what is contained within the system given the targeted problem?

Defining the boundary of the system began with a local catalyst organization defining an appropriate geographical boundary. Leaders from within each area were then identified using the key question "Who in the community has authority to change the places where children make decisions or have decisions made for them about physical activity and nutrition?" This identified those who might normally be considered in a childhood health initiative (such as health services and school principals), but extended beyond these usual actors to include local government councillors, retail leaders, business leaders, and key community figures.

Following two initial sessions, community leaders were asked to reflect on the CLD as a representation of the system and answer the question "If we were to tackle this problem then who else from the community needs to be in the room to design and implement a response?" An invitation was issued to a broader group of community members beyond professionals within organizations to contribute to the developing understanding of childhood obesity. It appeared that including community members in the system boundary allowed for a deeper understanding of the problem along with greater capacity to intervene. Data were used to support this process and localized monitoring provided the means to understand prevalence and differences in behaviours.

Local practitioners indicated that a broader leadership was engaged in terms of place in community and seniority and ability to make decisions. It has been outside health where some of the greatest traction for change has been achieved. Critical to this was both an open invitation to all community members supported by a series of strategic invitations with a clear target of recruiting change makers from across the community.

Following two initial sessions with leaders, the catalyst organization worked with the leadership group to create an open community invitation to join and contribute to the initiative. The initial leaders were recruited as intervention ambassadors and subsequently recruited other community leaders, including those from schools and community sporting clubs.

3.2 | Understanding fundamental system parts as potential root causes

Foster-Fishman[6] proposes six elements to describe the system parts and root causes: systems norms, financial resources, human resources, social resources, regulations, and operations.

3.2.1 | Systems norms

Our stakeholders described that, prior to WHOSTOPS, normal prevention for health issues like childhood obesity involved programmatic, single-setting, single-strategy, and single-agency responses. These efforts were reliant on external funding and did not seek nor attain high levels of broad community engagement or ownership. It appeared there was some effort towards partnership on one sub-driver of obesity (eg, social marketing to increase water consumption). Programmatic efforts were trapped in a short-term cycle of planning (of 1 year or less), scoping for 1 year and reporting in a final year. This resulted in action within strictly defined roles and competition for external funding and resources between different groups within the same community. Collaboration was limited to the project officer level without the engagement of organizational senior leadership. The competitive nature of the siloed work meant projects and their leaders competed for visibility for their work, and attribution of positive change to one program and one agency was hotly contested.

An unintended consequence of the programmatic approach was difficulty in engagement with, and compliance to, the expected implementation of predetermined programs School leaders, for example, felt overburdened with research and short-term projects externally funded to improve activity levels, mental health, reduce bullying, increase literacy, and so on. Schools had become disengaged and unwilling to commit to another program.

The cocreation of change between researchers and community leaders seems to have transformed the role and focus of those traditionally involved in community health planning. Instead of planning programs in detail, planning became focused on engaging community and maintaining momentum. Rather than being bound by usual constraints of grant conditions and rigidity of 3-year plans, the ability to adapt and evolve meant short-term actions were enacted

quickly within the context of a longer-term strategic vision. One example of how this changed normal practice was in the type of internal reporting. While the norm formerly was the provision and operation of a large triennial plan, which was approved and then rarely referenced, the current approach is characterized by multiple one-page action summaries that are reviewed fortnightly by the backbone team in the context of operational discussion around implementation of change.

A third system norm that has been disrupted is the use of population segmentation (eg, low socio-economic status [SES] and remote communities) to identify specific target groups for specific programmatic intervention. This process seems to have led to the communities taking a universal approach with a specific emphasis on the inclusion of underserved subgroups of population in the design and implementation of systems actions.

3.2.2 | System resources (human resources)

Health promotion roles have been rethought; in one community for example, the advertising of employment within community health efforts no longer emphasizes health-promotion skills but instead seek community development skills with emphasis on relationship building and support of grassroots change agents rather than program delivery. The health leader drives and facilitates the process of community engagement and adaptation as the community constantly moves forward in the range of efforts implemented. In particular, this has seen a deliberate shift away from planning specific programs and towards planning specific processes that engage a broader range of community members in the idea of evolving new actions to address problems as they arise.

For a local dietitian, normal practice had been to present structured nutrition talk to classrooms, typically resulting in gaining little traction and low nutrition education in schools. This approach also meant that it was very hard for dietitians and others in health to get access to schools and further created uncertainty about reach and impact. As a result of the engagement work, the dietitian changed focus from individual dietetics to food systems in their community, including helping school canteen menu reform and actively and deliberately identifying and engaging key influencers on school food policy. Schools and other agencies now actively seek the dietitian's help. These requests sometimes include traditional health promotion education workshops, but typically focus on working with the principal to think about environmental change to improve health.

The community worked with the local university partner, which provided some academic credibility. The strong relationships between community and academic leaders appeared to be critical to the success of this program because robust conversations could be had in cocreating and adapting process to best suit community needs and structure. The commitment of researchers to remain in the community and ensure data collected was in the service of the community rather than the academics interests appeared to be a further key element. The open approach to shared problem solving has also created new and stronger relationships between the local primary care partnership, council, and health services along with new and stronger relationships across key community members and agencies.

3.2.3 | System resources (social resources)

It was important for the leaders in the community to recognize that relationships amongst stakeholders already existed, and that these relationships were typically very strong around other community issues. Actively recruiting community leaders to bring more community leaders into the room was far more effective than a single, central call, the local teams suggests that understanding and activating existing relationships were an important starting point and prerequisite to the success of the systems change initiative. The engagement of leaders in the general idea of broad systemic change and the mapping of the system with the leaders helped to identify broader areas of local community systems where action would be valuable, and so leaders engaged in the activity were able to use their relationships to broaden the leadership contribution to the effort. For example, the mapping of water quality as a factor influencing water consumption and the relationship with sugar-sweetened beverage consumption led the building of new relationships (via existing networks) with new stakeholders.

3.2.4 | System resources (economic resources)

One example of usual practice is exemplified in the award of a large health promotion grant of $700 000 to prevent obesity, which requested the community choose from a select range of pre-approved programs. The result was a short-term effort constrained by the structure of the specific health programme and leading to frustration for the project officer who once more felt they were working in isolation delivering a single project and increasingly aware that this was another "3-year funding cycle" project unlikely to be sustained, rather reproducing the existing failures.

The community has worked to change norms related to funding and resources in two fundamental ways. First, they shifted the emphasis to funding sources available locally within the community rather than relying on external funding. When the community applies for external funding, they attempt to emphasize funding that will build embedded, sustainable change. Second, the community has tried to focus on reorienting existing resources rather than consistently applying for new, additional funding (eg, changing what is offered at a school canteen to be healthier rather than running a grant-funded healthy eating program at schools).

3.2.5 | System operations

The local teams expressed a determination to expand beyond programmatic approaches and the backbone team adopted a mantra for their work that consisted of the challenge: "are we just doing business as usual?"

3.2.6 | System regulations in policy

The provision of the tools and training to the broader leadership appears to have had several knock-on effects, not least that there

has been a shift towards using systems thinking in council plans around obesity and broader social problems (drug and alcohol use, intimate partner violence, etc) in local communities. The health service chief executive officer (CEO) saw that sugar-sweetened beverage cost, access, provision, placement, and normal place in daily diet were major drivers of broader chronic disease outcomes. The further realization occurred that health services, despite having a remit to reduce the burden of chronic disease, were actively providing and profiting from a major cause in the form of sugar sweetened beverages. Understanding the complexity of causes led to the health service CEO banning sugar-sweetened beverages throughout the health service, change menus to ensure healthy food provision, and creating an organizational key performance indicator (KPI) to halt the year on year rise in obesity within the community within 5 years. The proposal was passed unanimously in the same week by the board and ratified by a broader governance group of 13 health services boards in the region within 2 months.

4 | DISCUSSION

In this paper, we applied Foster-Fishman's systems framework[6] to describe the activities in a whole of community approach to using methods inspired by community-based systems dynamics for obesity prevention. The WHOSTOPS process is using these along with other community engagement and development techniques to prevent childhood obesity. The approach appears to have created significant engagement and momentum across the intervention communities and has led to multiple changes across multiple levels.

4.1 | Strengths and weaknesses

The use of methods inspired by community-based system dynamics appears to be a strength of this approach. The creation of visual representations of complexity in the form of CLDs provides the ability for community members to share mental models of community systems and collaborate in those places where they feel action is possible. A second major strength was the provision of high-quality local-level anthropometric and behavioural data. These data provide the means to engage and report changes in behaviour and child obesity rates for the use of community leaders to assess progress and determine next steps.

A further apparent strength of this approach is the emphasis on rigorous process and application of best evidence in obesity prevention with the fundamental aim of community ownership. This process represents the current cutting edge of implementation and evaluation in community-based intervention by providing a process to apply best evidence alongside a cluster randomized controlled trial and opt out consent outcomes measurement.[8] Writing in the New England Journal of Medicine, Bleich[11] argues the next step in prevention of chronic disease is a deliberate focus on population-level approaches that make the healthy choice the easy choice rather than relying on individuals to purposefully change their own behaviour.[11] This approach appears to provide roadmaps to respond to that call having created stronger partnerships amongst policymakers, managers, service providers, and researchers, and the

explicit solution-oriented focus has led to specific multi-sectorial, multi-level actions to make the healthy choice the easy choice and address childhood obesity.

The Foster-Fishman[6] framework provides a long list of guiding questions to begin to understand system characteristics. In completing these, we have focused on system norms, operations, and regulation and less on system interdependencies. This is in part because the understanding of interdependencies (depth, relations, and leverage between deeper systems structures) are still emerging concepts for the communities under study in this paper. Developing a full picture of independencies is the subject of a paper in its own right and a logical next step in the research process.

4.2 | Future research

While we present initial indicators of a new way of approaching obesity prevention in community-based intervention, there remain many unanswered questions. We have offered several observations across different parts of the community that appear to have contributed to the measured positive change in children's behaviours and weight status. Further in-depth empirical studies, such as key informant interviews, document analysis, and environmental audits would deepen the understanding of the key elements of success in whole of community efforts to prevent childhood obesity. Preliminary success raises questions about how sustainable these efforts will be and Whelan's systematic review[12] of sustainability in community efforts to prevent obesity gives cause for optimism that sustainability is possible though rarely studied thoroughly nor adequately considered in intervention design. Similarly, the full evaluation of systems thinking in community-based intervention is in its infancy,[13] and real effort is required to establish the tools and resources to undertake thorough evaluation that serves both the community committed to acting and the broader need for other communities to learn what works and what does not. What has proved challenging and exciting in the communities described above is the availability of outcome data in close to real time. How best to use the data to redouble efforts, reorient resources, and broaden community engagement are new questions not previously considered by community interventions because of the speed of data availability.

4.3 | Implications for practice

In the first 2 years, the WHOSTOPS trial appears to have supported communities to reorient practice towards a community-empowered and -led approach that uses innovative approaches inspired by community-based system dynamics in design and implementation and worlds best practice in outcome measurement. The early success of this approach suggests there is high value in strong process and recognition and utilization of existing structures[14] underpinned by strong collaborative relationships between practice and academia. Our initial lessons from this work are not that programmatic single actions are unnecessary, but rather that they are not enough. For these communities, programmatic short-term approaches created silos

between potential actors and created conditions where it was normal to identify others as the responsible party.

This approach has had implications beyond the initial intention to prevent childhood and one legitimate concern was the focus on obesity diverting resources from other important areas of need. Rather than limiting efforts in other areas of community concern, the capacity building approach taken has led to other communities' priorities adapting the same methods. Communities are now applying the approach to identify alignment between prevention efforts in alcohol misuse, methamphetamine use, homelessness, suicide prevention, educational attainment, and local government planning.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

ORCID

Steven Allender https://orcid.org/0000-0002-4842-3294
Kristy A. Bolton https://orcid.org/0000-0001-6721-4503

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