Preventive Medicine Reports 3 (2016) 348–352

Contents lists available at ScienceDirect

Preventive Medicine Reports

journal homepage: http://ees.elsevier.com/pmedr

Review Article

The development of a model of community garden benefits to wellbeing

Victoria Egli [a,*], Melody Oliver [b], El-Shadan Tautolo [c]

[a] Faculty of Health and Environmental Sciences, AUT University, Auckland, New Zealand
[b] Human Potential Centre, AUT Millennium Campus, AUT University, New Zealand
[c] Centre for Pacific Health and Development Research, Faculty of Health and Environmental Sciences, AUT University, New Zealand

ARTICLE INFO

Article history:
Received 29 February 2016
Received in revised form 13 April 2016
Accepted 20 April 2016
Available online 21 April 2016

Keywords:
Knowledge translation
Community
Gardens
Wellbeing
Health promotion

ABSTRACT

Community gardens contribute to community wellbeing by influencing the nutritional and social environment. The aim of this research was to develop a model that communicates the many benefits of community garden participation as described in the academic literature, to a diverse audience of laypersons. This model is an example of effective knowledge translation because the information is able to be more than simply understood but also practically applied. From April to August 2015, a model depicting the many benefits of community garden participation was prepared based on a global, critical literature review. The wellbeing benefits from community garden participation have been grouped into factors influencing the nutritional health environment and factors influencing the social environment. The graphic chosen to form the basis of the model is a fractal tree of life. In October 2015, to test the models comprehension and to obtain stakeholder feedback this model was presented to a diverse group of community members, leaders and workers from the Tāmaki region of Auckland, New Zealand. The model we present here effectively and clearly translates knowledge obtained from the academic literature on the benefits to wellbeing from community garden participation into a tool that can be used, adapted and developed by community groups, government agencies and health promoters.

© 2016 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Contents

1. Introduction . . . 348
2. Methods . . . 349
3. Results . . . 349
4. Discussion . . . 351
   4.1. Limitations. . . . 352
   4.2. Future directions . . . 352
   4.3. Let us know how you use it . . . 352
5. Conclusion . . . 352
Conflict of interest . . . 352
Acknowledgements . . . 352
References. . . . 352

1. Introduction

Community gardens are sections of land collectively gardened for the specific purpose of growing fruits, vegetables and/or herbs for self-consumption; and include allotments, school gardens as well as teaching/demonstration gardens. Contemporary community gardens first became widespread across the United Kingdom, Europe and North America during the First and Second World Wars to supplement war-time food shortages (Ginn, 2012). These gardens played an important role in national food security, by supplementing rations and providing essential nutrients that were unable to be otherwise supplied by the food environment of the time (Buckingham, 2005). Community gardens today are often established by volunteers in the hope they will function as alternatives to the current food environment, providing

* Corresponding author.
E-mail addresses: vegli@aut.ac.nz (V. Egli), meoliver@aut.ac.nz (M. Oliver), dtautolo@aut.ac.nz (E.-S. Tautolo).

http://dx.doi.org/10.1016/j.pmedr.2016.04.005
2211-3355/© 2016 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

opportunities for food and income generation and for urban residents to engage in outdoor physical and social activities.

Wellbeing is a multidimensional construct that is becoming an increasingly popular measure for health promoters, government agencies and academics as an indicator of societal contentedness and population progress. Wellbeing is more than the absence of disease; it encompasses optimal physical and mental functioning with resilience, positive emotional experiences and overall life satisfaction (Huppert and So, 2013). Wellbeing is important to consider in the context of community gardens because while wellbeing may not be the intended end goal of community gardens, many of the outcomes of community garden participation positively influence wellbeing.

Community gardens often occupy spaces of contested land use (Schmelzkopf, 1995) and are commonly run by layperson volunteers. Community gardens regularly require advocacy to secure funding needed for garden establishment and expansion, when obtaining or reobtaining permission for land use and in the face of public opposition (Schmelzkopf, 2002; Staeheli et al., 2002). Many articles on the health and social benefits of community garden participation have been published in the academic literature. To date this information has not been summarised in a form that effectively communicates the key messages to a wide audience of laypersons.

This research involved the development of a model that succinctly summarises the key findings from the literature. This model is an example of effective knowledge translation, where large quantities of academic research have been synthesised into an attractive format applicable for use and adaptation by community groups, health promoters and government agencies.

2. Methods

A literature review was conducted using the following databases: MEDLINE, PubMed, Scopus and PsycINFO with the keywords 'community garden*'; 'allotment*'; 'school garden*' and 'teaching garden*'. In order to prevent publication bias, manual searches of references lists were also carried out. Only articles that had undergone peer-review were selected. Articles were excluded if they related to soil contamination and/or plant health, or were not published in English. Conference abstracts, dissertations, letters, and books were excluded, however reference lists of these information sources were checked for additional relevant publications. Searches were not restricted by date of publication.

Articles were read by the corresponding author and themes identified. Themes were grouped initially into two tiers: (Ginn, 2012) major themes (i.e. these themes included concepts that were multidimensional e.g. food security, healthy body weights, and physical activity) and (Buckingham, 2005) minor themes (i.e. these themes included specific concepts that, while complex, contributed to a major theme e.g. the economic benefits (minor theme) of community garden participation, receiving fruits and/or vegetables at little to no financial cost, can contribute to better food security (major theme) for the individual, their family and the community overall). What emerged from the grouping of themes were two distinct sets of major and minor themes. To encapsulate both sets of themes and to place them within an environmental context the following descriptive terms were chosen, the nutritional health environment and the social environment. Decisions on wording and grouping of themes occurred with advice and guidance from the additional authors.

For graphical representation, searches were conducted for nature or garden related images that could be modified into a diagram depicting the benefits to wellbeing from participation in community gardens. A range of sources was examined including: art and graphic design print media available in the Auckland City Library and AUT University Library collection, as well as photographs, infographics, and flow-charts publically available on social media and through Internet search engines. The criteria for choosing the final graphic were: nature or garden themed, eye-catching, and able to be understood by a wide lay audience without the need for accompanying text.

To test comprehension and to obtain stakeholder feedback a black and white version of the model was presented to a diverse group of community members in the East Auckland Region of Tāmaki New Zealand in October 2015. 24 stakeholders comprising community, religious, and cultural leaders, members of local community garden organisations, local council representatives and community health workers. Tāmaki was chosen as an appropriate location to test the model's comprehension, as it is young and culturally diverse with a high level of engagement and participation in existing community projects. Two of the three authors[a,c] have ties to the community.

3. Results

Articles meeting the inclusion criteria were read by the lead author and grouped inductively into themes. The themes were not predetermined but arose from the literature. A table of themes including how the major and minor themes are grouped can be seen in Table 1. The main themes included: healthy body weights, physical activity, food security, ownership and pride, urban beautification and community cohesion. The minor themes, where there was a contribution to each of the major themes was grouped as follows: fruit and vegetable consumption (Alaimo et al., 2008; Hanbazaza et al., 2015; Litt et al., 2011) and the influence of social networks (Zick et al., 2013) into healthy body weights; nature contact (Maller et al., 2006) and regular movement (Park et al., 2014) into physical activity; economic benefits (Litt et al., 2011; Wang et al., 2014) and shortened supply chains (Wang et al., 2014) into food security; crime reduction and decreased stress (Art McCabe, 2014) into ownership and pride; civic engagement (Saldivar-Tanaka and Krasny, 2004) and political activism (Litt et al., 2011) into urban beautification; and cultural identity (Graham and Connell, 2006; Li et al., 2010) and shared goals and experiences (Buckingham, 2005) into community cohesion.

Of the graphics that met the aforementioned inclusion criteria images based on trees and spirals were selected. Trees form an appropriate skeleton for this model as they are both nature and garden themed and easily recognisable globally. Spirals effectively symbolise infinite recursion and commonly occur in nature (e.g., pinecones, snails, sunflowers). The graphic chosen to base the model on was the fractal Tree of Life, essentially combining both trees and spirals.

The term community gardens were placed on the trunk of the tree to form the foundation of the branches of benefit to wellbeing. The two descriptive terms, the nutritional health environment and the social

Table 1
Grouping of major and minor themes that arose from the literature.

Major theme	Minor theme	Reference
Nutritional Health Environment		
Healthy body weights	Fruit and vegetable consumption	Alaimo et al., 2008; Hanbazaza et al., 2015; Litt et al., 2011
	The influence of social networks	Zick et al., 2013
Physical activity	Nature contact	Maller et al., 2006
	Regular movement	Park et al., 2014
Food security	Economic benefits	Litt et al., 2011; Wang et al., 2014
	Shortened supply chains	Wang et al., 2014
Social Health Environment		
Ownership and pride	Crime reduction	Art McCabe, 2014
	Decreased stress	Art McCabe, 2014
Urban beautification	Civic engagement	Saldivar-Tanaka and Krasny, 2004
	Political activism	Litt et al., 2011
Community cohesion	Cultural identity	Graham and Connell, 2006; Li et al., 2010
	Shared goals and experiences	Buckingham, 2005

Table 2
A selection of comments received at the community meeting.

Comment	Made by
"Thank you for including us in the process of developing this valuable community resource."	Community Member
"I can see us using this model in *all* our future (funding) applications."	Community Garden Member
"I like that you have included these images (points to traditional New Zealand vegetables, stars from the New Zealand flag and the icon of the New Zealand Silver Fern), it makes us feel like this model is ours."	Community Leader
"Looking at this (the model) makes me feel like all the hard work I do in the garden is really doing good for the whole community, not just putting food on my plate."	Community Garden Member
"I never knew there were so many benefits to come out of community gardens."	Local Council Representative
"Can I have a copy of this (the model) to take with me today? I'd like to show (other community members) who weren't able to come today."	Community Worker

environment, divide the left and right sides of the tree and its associated branches. The major themes are situated on the innermost branches of the tree and the minor themes on the outermost branches. Small images were inserted in-between the branches to visually depict the ideas associated with the nearby text, thereby increasing the eye-catching appeal and overall comprehension of the image by layperson audiences. The term wellbeing was placed in the centre at the top of the tree, in the position where the sweetest fruit is often harvested.

The feedback received from the meeting was overwhelmingly positive. Community members noted that the model was easily understood and visually appealing but having an option to use a colour version would be ideal. Members from the various community garden organisations expressed delight at having a graphic they could use in applications for funding and the members of the local council noted that the many and varied benefits to wellbeing form community garden participation was clearly conveyed. A selection of comments that captured the key themes and sentiments expressed by attendees at the community meeting can be seen in Table 2.

The model can be easily reproduced in both colour and black and white and adapted to best suit the cultural context of the intended audience. The text is easily translated into other languages, and the font size can be adjusted to fit neatly within the branches. Every effort was taken to ensure the small images within the tree were suitable for use in a variety of diverse contexts. However to increase feelings of ownership of the model and to aid comprehension in different cultural contexts these images can be changed to better appeal to the intended audience e.g. varieties of fruits and vegetables can be replaced with the most

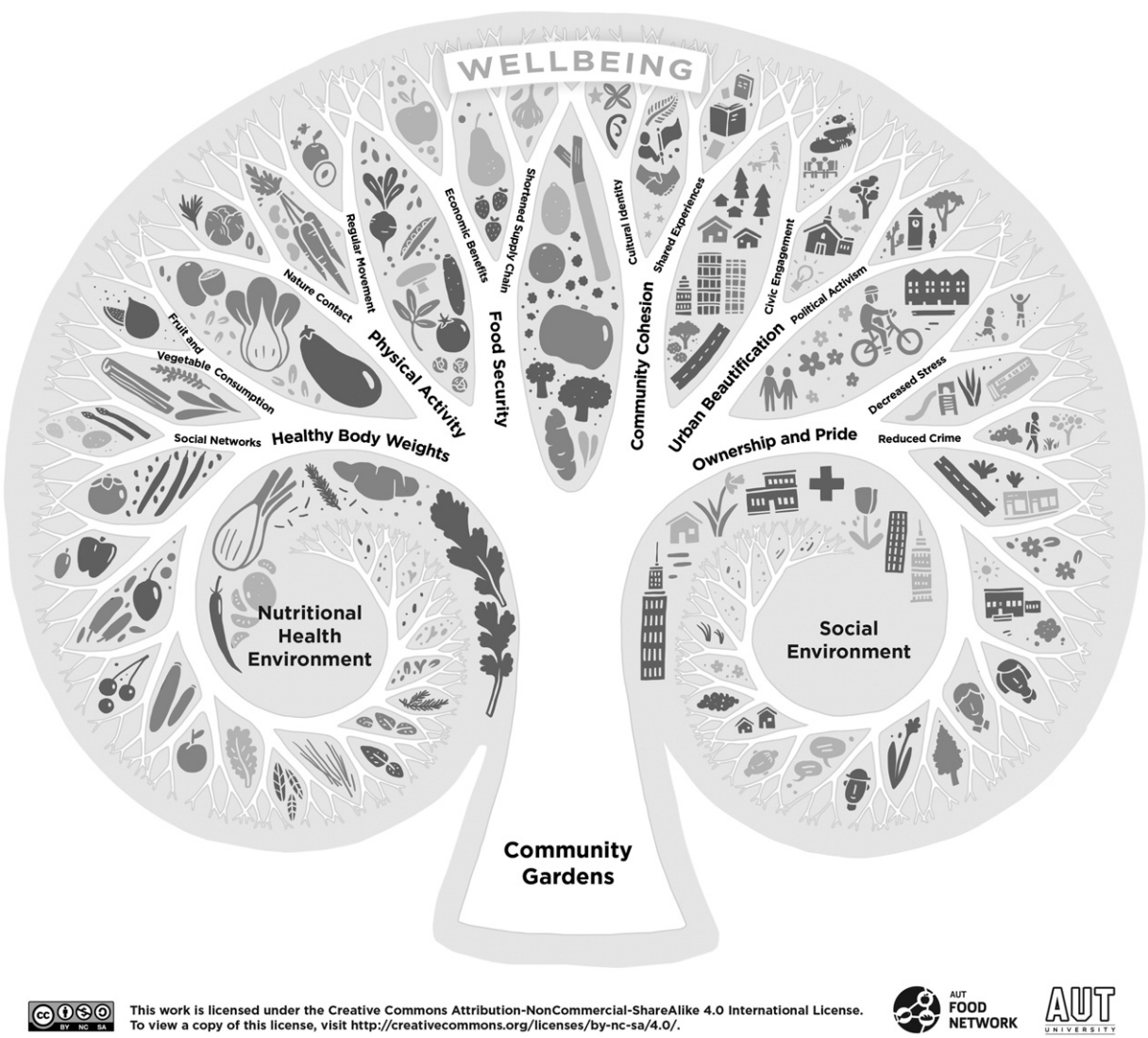

Fig. 1. Model of community gardens and wellbeing, black and white.

Fig. 2. Model of community gardens and wellbeing, colour.

Table 3
Suggestions for how to use the model.

Adapt it	Example
Change the colour scheme.	If a community group has a logo or set of colours normally associated with it, change the colour of the model to match.
Change the images.	Change the vegetables to those most commonly grown in the community garden; or add photos from the community garden and wider community in place of some/all of the smaller images.
Change the language of the text.	If English is not the primary language spoken in a community, use a translator to help modify the text.
Include it	**Reason**
Add the model to funding applications and official letters.	Show providers and authorities, clearly and simply, the benefits that have been shown to come from community gardens.
Show the model at community meetings.	Help garner support for local community gardens, encourage participation and acceptance by highlighting the benefits that come from community gardens.

common fruits and vegetables consumed by the target audience and/or those grown in local community gardens. The final version of the model can be seen in Figs. 1 and 2 (black and white and colour versions, respectively). Table 3 depicts a sample of suggestions on using the model in a variety of settings.

4. Discussion

Clearly conveying complex messages are a challenge for public health and graphical models can be useful tools for accomplishing this. This is the first time that the benefits to wellbeing from community garden participation has been presented in a model suitable for use by community groups, health promoters and government agencies alike. For knowledge translation to be effective in the field of public health, it must move beyond simple synthesis and dissemination and incorporate elements of actual use of that knowledge (Straus et al., 2009). This model accomplishes this by being a tool for both bottom-up advocacy actions and in aiding the top-down decision-making process.

Key priority areas for many health agencies at present are physical activity, healthy body weights and food security (Mendis et al., 2014). This research clearly portrays how these are affected by participation in community gardens and how they, combined with social benefits of

community cohesion, urban beautification and ownership and pride, contribute to overall wellbeing.

4.1. Limitations

There are limitations to the final design chosen and the final wording of the themes. The connections between specific concepts, those on the outer branches, are not clearly communicated, for example nature contact and decreased stress are two themes which have been shown to influence each other (Kaplan, 1995). However, due to space allocation and connection to other major themes, they appear on the model as unrelated entities located on opposite sides of the tree.

4.2. Future directions

The steps described in the development of this model can be repeated for other topics relevant to community health and wellbeing, where community involvement and effective knowledge translation would be beneficial.

Globally, school garden programmes are becoming increasingly popular (Berezowitz et al., 2015). While many of the benefits from school gardens mirror those of community gardens further research is needed to create a model specific to school gardens and their influence on child wellbeing. Children are excellent co-producers of knowledge and the incorporation of child-participatory research methodologies in the development and design of such a model would yield novel insights for governments, schools, teachers, parents, health promoters and child health researchers interested in the health, development and overall wellbeing of children.

To accommodate the limitations of displaying connections between specific concepts, further consideration could be given to modifying the graphic. However, it is presently unknown in what manner it would be appropriate to do this without losing other important meanings currently displayed in the model.

To give a complete picture of community gardens, future research on factors influencing the successful operation and functioning of community gardens could be added to the model and potentially displayed as roots of the tree.

4.3. Let us know how you use it

Community groups, government agencies, health promoters and others are invited to use this model, adapt it and document the process. The authors invite readers to share with them how they used this model. Was it adapted? What purpose did it serve? What was the outcome? Please share your experiences with the corresponding author, using the contact details provided. The documentation and sharing of the processes and outcomes will ensure that the model of benefits to wellbeing from community gardens is able to evolve and remain a dynamic, useful and purposeful resource for communities globally.

5. Conclusion

There are many benefits to wellbeing from community garden participation and the model presented here summarises these benefits as described in the academic literature and displays them in a model that was presented and well received by a diverse, layperson audience. The benefits to wellbeing can be grouped into factors influencing the nutritional health environment and factors influencing the social environment. This model is an example of effective knowledge translation and it can be used, adapted and developed by community groups, health promoters, government agencies and health departments internationally.

Conflict of interest

The authors declare there are no conflicts of interest.

Acknowledgements

We wish to thank to the community of Tāmaki for their honest and thoughtful feedback on the model. Thanks to Candace Weir, Tara Moala, Nerissa Henry and Karen Clifford for their assistance and support of Tāmaki community garden research. We thank Ezra Whittiker-Powley for the graphic design of the model and the AUT Food Network for providing the funds for his time. Thanks to Richard Main from Gardens 4 Health, Diabetes Project Trust for his thoughtful insight on the future directions and day-to-day applicability of this model as a useful tool for advocacy by other community groups.

References

Alaimo, K., Packnett, E., Miles, R.A., Kruger, D.J., 2008. Fruit and vegetable intake among urban community gardeners. J. Nutr. Educ. Behav. 40 (2), 94–101.
Art McCabe, J.D., 2014. Community gardens to fight urban youth crime and stabilize neighborhoods. Int. J. Child Health Hum. Dev. 7 (3), 223.
Berezowitz, C.K., Bontrager Yoder, A.B., Schoeller, D.A., 2015. School gardens enhance academic performance and dietary outcomes in children. J. Sch. Health 85 (8), 508–518.
Buckingham, S., 2005. Women (re) construct the plot: the regen (d) eration of urban food growing. Area 37 (2), 171–179.
Ginn, F., 2012. Dig for victory! New histories of wartime gardening in Britain. J. Hist. Geogr. 38 (3), 294–305.
Graham, S., Connell, J., 2006. Nurturing relationships: the gardens of Greek and Vietnamese migrants in Marrickville, Sydney. Aust. Geogr. 37 (3), 375–393.
Hanbazaza, M.A., Triador, L., Ball, G.D., et al., 2015. The impact of school gardening on Cree children's knowledge and attitudes toward vegetables and fruit. Can. J. Diet. Pract. Res. 76 (3), 1–7.
Huppert, F.A., So, T.T., 2013. Flourishing across Europe: application of a new conceptual framework for defining well-being. Soc. Indic. Res. 110 (3), 837–861.
Kaplan, S., 1995. The restorative benefits of nature: toward an integrative framework. J. Environ. Psychol. 15 (3), 169–182.
Li, W.W., Hodgetts, D., Ho, E., 2010. Gardens, transitions and identity reconstruction among older Chinese immigrants to New Zealand. J. Health Psychol. 15 (5), 786–796.
Litt, J.S., Soobader, M.-J., Turbin, M.S., Hale, J.W., Buchenau, M., Marshall, J.A., 2011. The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption. Am. J. Public Health 101 (8), 1466–1473.
Maller, C., Townsend, M., Pryor, A., Brown, P., St Leger, L., 2006. Healthy nature healthy people:'contact with nature' as an upstream health promotion intervention for populations. Health Promot. Int. 21 (1), 45–54.
Mendis, S., Armstrong, T., Bettcher, D., et al., 2014. Global Status Report on Noncommunicable Diseases 2014. World Health Organization.
Park, S.A., Lee, A.Y., Lee, K.S., Son, K.C., 2014. Gardening tasks performed by adults are moderate-to high-intensity physical activities. Hortic. Technol. 24 (1), 58–63.
Saldivar-Tanaka, L., Krasny, M.E., 2004. Culturing community development, neighborhood open space, and civic agriculture: the case of Latino community gardens in New York City. Agric. Hum. Values 21 (4), 399–412.
Schmelzkopf, K., 1995. Urban community gardens as contested space. Geographical Review 364–381.
Schmelzkopf, K., 2002. Incommensurability, land use, and the right to space: community gardens in New York City. Urban Geogr. 23 (4), 323–343.
Staeheli, L.A., Mitchell, D., Gibson, K., 2002. Conflicting rights to the city in New York's community gardens. GeoJournal 58 (2–3), 197–205.
Straus, S.E., Tetroe, J., Graham, I., 2009. Defining knowledge translation. Can. Med. Assoc. J. 181 (3–4), 165–168.
Wang, H., Qiu, F., Swallow, B., 2014. Can community gardens and farmers' markets relieve food desert problems? A study of Edmonton, Canada. Appl. Geogr. 55, 127–137.
Zick, C.D., Smith, K.R., Kowaleski-Jones, L., Uno, C., Merrill, B.J., 2013. Harvesting more than vegetables: the potential weight control benefits of community gardening. Am. J. Public Health 103 (6), 1110–1115.