Abstract

Purpose – This paper aims to present a discursive and evaluative analysis of Energy + Illawarra, an Australian Government Low Income Energy Efficiency Program (LIEEP) funded interdisciplinary social marketing energy efficiency programme. Energy + Illawarra was a community programme working with low-income older people in Australia and involving social marketers, human geographers and engineers. The paper aims to identify how ecological systems theory can inform social marketing, and what practicalities there may be in doing so. The paper also aims to assess whether a social marketing programme that draws on ecological systems theory can have a positive impact on people’s thermal comfort.

Design/methodology/approach – First, the paper uses critical discursive analysis to examine the use of various elements of a social marketing energy efficiency programme in relation to the different levels of ecological systems theory. Second, a longitudinal cohort survey study design is used to evaluate the programme’s influence on people’s perceptions of thermal comfort and satisfaction with thermal comfort in their homes.

Findings – The study found that ecological systems theory could be an effective framework for social marketing programmes. The evaluation study found that the intervention had a positive impact on participant’s perceptions of thermal comfort, satisfaction with thermal comfort and attitudes towards energy efficiency. However, the paper identifies some potential tensions in using ecological systems theory and suggests that issues of power, representation, agenda setting, the need for reflexive practice and consideration of unintended consequences are important considerations in social marketing programmes.

The research is an outcome of a project that involves partnerships between University of Wollongong (UOW), Macquarie University, Regional Development Australia Illawarra (RDAI), Warrigal, IRT Group, Royal Freemasons’ Benevolent Institution (RFBI), Illawarra Forum, WEA Illawarra and the Illawarra Joint Pilot Organisation. This activity received funding from the Australian Government, Department of Industry, Innovation and Science, through the Low Income Energy Efficiency Project. The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information or advice contained herein.
Originality/value – The work presented here suggests that multi-level social marketing programmes that draw on ecological systems theory can make a useful contribution to social change as demonstrated by the evaluation survey finding positive impacts on thermal comfort and attitudes of participants. However, issues of power, representation, agenda setting, the need for reflexive practice and consideration of unintended consequences should be considered in social marketing programmes.

Keywords Thermal comfort, Energy efficiency, Low Income Energy Efficiency Program, Unintended consequences, Ecological systems theory, Older low income people

Paper type Research paper

Introduction
This paper presents a discursive and evaluative analysis of an Australian Government Low Income Energy Efficiency Program (LIEEP) funded social marketing energy efficiency programme named Energy + Illawarra with low-income older people in Australia. Energy + Illawarra was delivered by an interdisciplinary collaborative consortium involving social marketers, human geographers and engineers, and local community partners including a regional development agency, and community support services. The paper has two key areas of focus. First, the paper aims to identify how ecological systems theory can inform social marketing. A critical discursive analysis regarding the use of various elements of a social marketing energy efficiency programme in relation to the different levels of ecological systems theory is presented. Second, the paper aims to assess whether a social marketing programme that draws on ecological systems theory can be effective. This is achieved through a longitudinal cohort survey study that assessed the programme’s influence on people’s perceptions of thermal comfort in their homes, an important factor for supporting well-being. The paper addresses the following research questions:

RQ1. What social marketing intervention mix tools can be identified with the different levels of ecological systems theory?

RQ2. What are some of the tensions in applying ecological systems theory to a social marketing programme?

RQ3. Can a social marketing programme on energy efficiency drawing on ecological systems theory positively influence people’s perceptions of thermal comfort in the home?

The work presented here responds to current debates in the social marketing and energy efficiency literatures. The study responds to discourse that encourages social marketers to be more strategic by using multiple systems level approaches to influence social change (Andreasen, 2002; Hastings and Domegan, 2013; Gordon, 2013). It does so by drawing on ecological systems theory as a framework for designing and implementing social marketing programmes (Bronfenbrenner, 1979). The debates on strategic and multi-level action in social marketing are also linked to calls to move beyond the 4Ps social marketing intervention mix (Peattie and Peattie, 2003). The intervention presented in this paper acknowledges this through the application of a broad range of social marketing mix tools that are aligned with the different levels of ecological systems theory. Furthermore, the discussion in this paper responds to the work of Brace-Govan (2015), who argues for an acknowledgement of power relations in social marketing, by examining some of the tensions relating to ecological systems theory and application in social marketing practice in this context.
The study also contributes to arguments from some social marketers about the need to move beyond a singular focus on behaviour change (Spotswood et al., 2012; Spotswood, 2016). This is facilitated by focusing on the issue of thermal comfort, an embodied knowledge that expresses satisfaction with the thermal environment in the home (American National Standards Institute, 2013). Thermal comfort is identified as an important factor in supporting comfort, health and well-being of people (Chappells and Shove, 2004). Focusing on thermal comfort also contributes to emerging discourses in the energy literature that energy efficiency is about more than cutting back on energy use, but should concern questions of comfort and well-being in the home (Waitt et al., 2016).

The remainder of this paper is structured as follows. The literature on applying socio-ecological models to social marketing, and the theoretical framework of ecological systems theory that informed the present intervention is considered. The literature on thermal comfort as an important factor in comfort, health and well-being, and its relation to energy efficiency is then discussed. The next section presents the social marketing programme and presents a critical analysis about the practice of implementing the programme. The following sections present the method and findings from the evaluation study on the impact of the programme on thermal comfort. The discussion section then considers the theoretical, practical and research implications and limitations of the study, and some conclusions are offered.

Literature review

Socio-ecological models in social marketing and ecological systems theory

In the past two decades, some social marketing scholars have advocated a focus beyond individual behaviour change to realise social good (Goldberg, 1995; Andreasen, 2006; Hastings, 2007; Spotswood, 2016). It is argued that social marketing needs to operate at the micro (individuals), meso (e.g. community, workplace, service and social capital) and macro (e.g. policy, structures, power relations and markets) levels to achieve real social change (Andreasen, 1997, 2002; Gordon, 2013; Russell-Bennett et al., 2013; French and Gordon, 2015).

For example, French (2012) identifies that policy formulation, fiscal intervention and programme strategies are key components in the macro environment. He provides examples such as a policy to restrict the sale or promotion of harmful products, or promoting environmental sustainability by sponsoring a national cycle to work programme. French and Gordon (2015) argue that exo and meso strategies such as service delivery (e.g. a mobile breast cancer screening service), activities in the workplace (e.g. an organisational wellbeing programme), or community development efforts (e.g. training and skills programmes to build social capital) should be considered as part of a strategic approach. It is posited that such intervention tools can be combined with the more traditional micro level individual behaviour change tactics such as product delivery, health messages and promotion. However, some scholars note the lack of theoretical explication of systems level approaches in social marketing (Gordon, 2013).

How to conceptualise a social marketing programme that operates at multiple levels? Given the multiple levels of influence social marketing programmes would be so multifaceted and complex, it would be unlikely that one single theory could be used to guide, explain and evaluate such interventions. This suggests the importance of multi-theory frameworks, especially if they are to be designed to help influence the individual, social, cultural and structural environments (Brennan et al., 2014). For example, a social marketing programme may use a form of systems theory to inform their overall structure and strategy, as is the case in the Healthy Together Victoria intervention (Tobin and Proimos, 2014).
However, the same social marketing programme may also draw on a combination from a range of other psychology, social, cultural and critical theories:

- such as the use of social practice theory to offer insights and interpretations of cycling routines (Spotswood et al., 2015); or
- Bourdieu’s cultural theory of Habitus to help understand discourses around physical activity among low-income families (Spotswood and Tapp, 2013)

Indeed, the social marketing programme that forms the focus of this paper drew on a combination of theories: ecological systems theory, social practice theory and value theory.

A specific focus in this paper is on the use of higher-level theory to guide the overall structure of a strategic social marketing programme. A promising theoretical perspective are social ecological models (Lindridge et al., 2013; Brennan et al., 2014). Social ecological models emerged from the work of sociologists in the post-First World War period in response to the narrow individual scope of research conducted by psychologists. Social ecological models draw on systems thinking (Susser and Susser, 1996) by recognising that the social world can be understood as systems that consist of interacting, interrelated or interdependent entities (such as people, things, institutions, structures and social constructs).

One of the most prominent social ecological models is ecological systems theory (Bronfenbrenner, 1979). Ecological systems theory is a framework that acknowledges the multiple entities, interactions and social elements in a system and how they interact with the systems’ environment. Bronfenbrenner (1977, 1979), proposed four types of nested environmental systems of influence:

1. microsystem: immediate environments (e.g. family, school, peer group neighbourhood);
2. mesosystem: a system of connections between immediate environments (e.g. a child’s home or school);
3. exosystem: external environmental settings which only indirectly influence development (e.g. a parent’s workplace); and
4. macrosystem: the wider cultural context (e.g. East vs West, national economy, political culture, sub-culture).

Bronfenbrenner (1977) originally developed ecological systems theory as a way of understanding child psychology. He argued that children’s psychology could be understood through how each system in his theoretical framework contains entities, roles, norms and rules. Since then, ecological systems theory has entered the broader public health (Sallis et al., 2008) and the social marketing arenas (Brennan et al., 2014). The Centers for Disease Control and Prevention (CDC) uses a four-level SEM to help targeted preventative health activities: societal, community, relationship and individual. The nested systems of influence approach has obvious synergies with social marketing, especially given the increasing focus on multi-level action (Alcalay and Bell, 2000). The CDC ecological systems theory model has been used in social marketing interventions on adolescent physical activity (Elder et al., 2007). Social ecology approaches are now so well established in the public health discourse that the World Health Organization recommends its application for health improvement programmes (Blas and Kurup, 2010).

Later work in social marketing continues to build on social ecological models. Lindridge et al. (2013) present a study on how a social ecological model of health behaviour could be applied to “Childsmile” – a successful social marketing oral health programme in Scotland. Their work identified the importance of scoping, formative research, planning and
development of social marketing programmes that acknowledges individual, interpersonal and environmental influences on oral health. The implementation of the Childsmile programmes featured a range of strategies, tools and activities including communications, promotion and services directed at individuals and families, improving access to dental services, health service training and delivery related to oral health for children and families and extensive stakeholder engagement and policy development with health practitioners, key organisations and policymakers.

However, Lindridge et al. (2013) identified some apparent tensions in applying social ecological models to social marketing programmes. For example, the Childsmile website aimed to provide information to low income families about oral health, but it was unclear whether parents and children could or did visit the site (low-income families may not necessarily have reliable internet access for example). It was also unclear if deprived families who did visit the website could comprehend the complex information provided there (Lindridge et al., 2013). Therefore, although the Childsmile website was identified as a tool for influencing the home context of children with regards to oral health at the mesosystem level, it was unclear whether this was effective in doing so. Lindridge et al. (2013) identified that more concerted efforts to engage and reach out to low income families may have been required. Another issue identified by Lindridge et al. (2013) was that Childsmile relied on health visitors to liaise between families and oral health-care professionals, and to deliver campaign messages. In practice, Lindridge et al. (2013) reported that this did not always occur as envisioned and questioned how much increased uptake of oral health services resulted through this liaison.

Finally, Lindridge et al. (2013) identified that while the Childsmile strategic plan proposed a suite of different programme activities, in practice, a much more limited set of activities were implemented due to planning reviews, delays in approvals, a changing economic climate and political influence. Lindridge et al. (2013) argued that in Childsmile issues with planning, delays and the changing economic and political environment resulted in a much-reduced social marketing programme that appeared more top-down than bottom-up, with little focus on forming community alliances for oral health than originally intended. These discourses talk to Brace-Govan's (2015) discussion in social marketing of the issue of power, particularly the use or misuse of organisational power, or the role of power relations between social marketers and “target audiences” in social change efforts. Therefore, while social ecological theory appears to offer some utility for social marketing, critical analysis regarding its application and potential challenges in doing so is somewhat lacking. Indeed, scholars have identified that there is a need to gain further insight regarding the practicalities and potential tensions involved in using social ecological models in social marketing (Lindridge et al., 2013). This paper aims to contribute to this knowledge base by examining the application of ecological systems theory (Bronfenbrenner, 1977, 1979) as a planning tool to inform the design and delivery a social marketing energy efficiency programme and discusses some of the issues and tensions in doing so.

**Thermal comfort**

Social marketing is often identified as having a strong focus on health and well-being (Lee and Kotler, 2015). While behaviour change is often a critical focus in social marketing (Andreasen, 1994), some social marketers have called for a broader focus on factors such as promoting ideas, influencing discourses, shifting attitudes and influencing social norms (Spotswood et al., 2012; French and Gordon, 2015). Such perspectives aim to broaden the scope of social marketing beyond a singular focus on “behaviour change”. The present
study aims to contribute to these debates, through a focus on evaluating the impact of a social marketing energy efficiency programme on thermal comfort.

Thermal comfort is a cognitive expression of a person’s satisfaction with the thermal environment/temperature that they are in – for example their home or their office (American National Standards Institute, 2013). Thermal comfort is central to notions of comfort, health, productivity and well-being (Ormandy and Ezratty, 2012; Parsons, 2014). The World Health Organization identifies a minimum temperature benchmark of 18°C as being comfortable for humans, with increases of 2-3°C recommended for people more vulnerable to the effects of being cold – such as the elderly or the physically disabled (Collins et al., 1985; World Health Organization, 1987).

Thermal comfort is an entry point to energy efficiency. Much of the work on energy efficiency and behaviour/social change is focused on technical solutions to reducing energy use to save on energy costs and to support the environment (Abrahamse et al., 2005). Yet, drawing on ideas from social practice theory (Reckwitz, 2002), there is a need to focus more broadly on the elements of energy use practices such as what does thermal comfort mean to householders, and what materials and competences are needed to call a house a home (see Chappells and Shove, 2004; Shove, 2014; Waitt et al., 2016). However, as Waitt et al. (2016) identify meanings attached to issues of thermal comfort and health and well-being receive less attention in the energy literature (Waitt et al., 2016). There is increasing recognition that among vulnerable populations such as low-income older people, issues of thermal comfort need to be carefully considered when promoting energy efficiency (Waitt et al., 2016).

Researchers have identified that concerns over energy efficiency, rising fuel costs, and fuel poverty can cause low-income older people to use little energy to maintain thermal comfort and can lead to them being too cold in winter and too warm in summer (Hitchings and Day, 2011). This is an important issue of concern, as longer periods of cold exposure among older people in winter is linked with increased winter mortality rates (Smolander, 2002), and heat stress in summer is linked with increased mortality among older people (Strengers and Maller, 2011). This means that energy efficiency social marketing programmes with older people should also focus on the thermal comfort. A householder’s perception of thermal comfort through their embodied knowledge, informs their energy use practices to make a house a home. Therefore, social marketing programmes that conceive of thermal comfort as a home-making practice, help move beyond a singular focus on behaviours, by acknowledging the meanings, material and skills that shape domestic energy consumption. Therefore, this paper also presents an analysis of whether a social marketing energy efficiency programme can increase low-income older people’s perceptions of thermal comfort in their home.

The social marketing programme

The design and implementation of the Energy + Illawarra social marketing programme, followed recognised principles (Hastings and Domegan, 2013; Lee and Kotler, 2015; French and Gordon, 2015). Energy + Illawarra was informed by extensive scoping and desk research, and the programme used a segmentation approach, and priority group engagement with a baseline cohort of 830 low-income older people across four adjacent council areas in regional NSW, Australia who were recruited using a random digit dialling telephone approach (Cooper et al., 2016). Participation in the project was entirely voluntary. The programme was theory based by using ideas from ecological systems theory, social practice theory and value theory. The programme also used a broad social marketing mix, and involved critical thinking and competition analysis, and an iterative and reflexive process of development, testing, refinement, participant orientation and co-design. Another
crucial feature of this project was interdisciplinary collaboration between social marketers, human geographers and engineers. This meant that the community intervention involved teamwork and continued collaboration between project partners throughout, with specific activities led by different groups but featuring crucial input from others as is explained later. While further details about all aspects of the social marketing programme are available here (www.energyplusillawarra.com.au), the following section focuses on the application and practicalities of using a social ecological approach in social marketing.

Ecological systems theory was used as a planning tool to help design the social marketing programme. This approach was informed by the extant energy literature that suggests that influencing domestic energy practices requires a focus not just on the individual, but on the social, cultural and structural context in which domestic energy practices are performed (Shove, 2014; Waitt et al., 2016). Therefore, unlike traditional energy efficiency social marketing programmes that focus on individual behaviour change (Sheau-Ting et al., 2013), our programme aimed to act at multiple levels of influence. To achieve this, ecological systems theory (Bronfenbrenner (1977, 1979) was used as a planning tool for the intervention with the aim of identifying and developing a range of social marketing mix activities acting at different and multiple levels of influence (Figure 1).

The specific programme activities discussed here included home energy efficiency engineering installations, newsletter-factsheets, small energy efficiency products, a website, social media activity, videos, training events, media advocacy and policy/stakeholder advocacy. The intention was that implementing an energy efficiency social marketing programmes that used ecological systems theory as a planning tool, and used social marketing mix tools acting at multiple levels of influence would be potentially be more effective than interventions focused only at the individual level. This ecological approach would also acknowledge the discourse in the extant literature that identifies that influencing energy practices requires action at the individual, social, cultural and structural level (Shove, 2014; Waitt et al., 2016).

**Home energy efficiency engineering installations**

A key feature of Energy + Illawarra was the random selection of 200 participants to receive home energy efficiency installations. An interest in providing home energy efficiency installations was driven by research evidence that suggests that making changes to the technical and built environment in the home can make a positive impact on people’s energy practices and their energy efficiency (Amann, 2006). This project component was not only led by the group of engineers but also involved input by the social marketers and human geographers to embed formative research insights about energy use practices, and a commitment to consultation and co-design and co-delivery of installations with participants. The range of installation options included insulation, new lighting, draught exclusions, pipe lagging, solar panels, reverse cycle air conditioning, window shading, awnings, fans, heat pumps, hot water systems and energy-efficient fridge-freezers. While these installations could influence the individual and other members of the household (micro system level), they could also involve changes to the built environment and Australian housing stock that could be considered as meso/exo system level influence. Extensive dialogue and consultation with participants was undertaken to co-design and deliver energy-efficiency installations that were technically not only recommended but also gained agreement from project participants.

Relevant training and technical support, for example on how to use energy monitors, was provided to participants. This represented a major change to the traditional delivery of energy-efficiency home installations towards a more participant-centred approach, giving
participants more power over the process. A major challenge was the extremely resource intensive qualities of this process. For example, multiple home visits and technical assessments were necessary, and the burden on participants in terms of time spent in their home and invasion of their daily routines was considerable. This did lead to unintended consequences with a few participants withdrawing from the retrofit component due to the imposition, and/or issues with ill health. Furthermore, during the consultation process the conversations at times lead to inconsistencies between the technical recommendations made that may have brought greater energy efficiency benefits, and the installations that participants desired. In these cases, the wishes of participants were honoured. An unintended consequence was that some recipients of retrofits reported that engagement in the project encouraged them to reflect and plan further retrofits to their home to further promote energy efficiency in their household (Cooper et al., 2016). Another tension was that only 200 out of a baseline project sample of 830 participants received home installations due to budget limitations. Random selection aimed to make this process as fair as possible, but as others have argued (Lefebvre, 2013) deciding which priority groups to work with in social
change programmes is a moral and ethical dilemma as other people who may benefit are excluded.

Newsletter-factsheets and home energy books
A key activity in the energy-efficiency programme at the microsystem level was newsletter-factsheets about energy efficiency delivered to the homes of all 830 intervention project participants. Three newsletter-factsheets containing facts, tips and advice on energy use practices such as understanding star ratings and energy consumption of household appliances, heating the home and keeping cool in summer were delivered to project participants. The factsheet-newsletters were a collaborative effort involving the social marketers, human geographers and engineers to meld quantitative and interpretive research insights, creative content and scientific and technical expertise. Qualitative evaluation suggested that these newsletter-factsheets were well received and helpful to address myths and provide facts about energy use and how to be energy efficient (Cooper et al., 2016). However, the research team found during the evaluation survey work that some project participants could not recall receiving or reading them.

This has similarities to the issue raised by Lindridge et al. (2013) about the Childsmile website and whether low income families accessed and read the materials. This may suggest that providing written materials alone is not enough to influence the microsystem level, and that home visits and face-to-face conversations about energy efficiency are important for engaging people, particularly older people. Later in the project, a home energy book that was delivered to all intervention participants containing information provided in the newsletter-factsheets along with supplementary material regarding energy efficiency emerging from the project, links to further external sources of information, and some headline insights from the research phase. Qualitative feedback suggested that the home energy books were popular and provided a more tangible resource for older low income people in the Energy + Illawarra project (Cooper et al., 2016).

Small energy-efficiency products
Another component of the programme delivery was the distribution of small products what were related to and supported energy efficiency in the home to all 830 intervention participants. The products were distributed to project participants’ homes, suggesting that this could be regarded as an individual/micro system level intervention tool. Branded fridge magnet thermometers showing recommended temperature settings for refrigerators and freezers, as well as hot water systems and room temperature during winter and summer months, along with a simple explanation and instruction guide were sent out to the project participants at the same time as the first newsletter-factsheets. Remote control power sockets that enable people to switch off multiple appliances by remote control instead of leaving them on standby power were issued at the same time as the second newsletter-factsheet.

Qualitative process evaluation found that although the idea of the fridge magnet was appreciated by some participants, they sometimes would not stick to appliances and the aesthetics were not pleasing. However, one participant described how receiving the magnet inspired him to purchase digital thermometers for the home. Therefore, although the fridge thermometers were intended for use by participants, an unintended consequence was that they caused people to reflect on their practices and purchase their own equipment. The remote-control sockets were well received by some project participants and were found useful in switching off power points in hard to reach places, e.g. behind the television or microwave. However, some participants reported them as being too difficult to install.
Other participants identified that they wanted more of the sockets. This included some people who wished to share sockets with other family members, friends and colleagues, identifying that products are also relevant at the meso/exo systems levels. However, a finite project budget limited the number of remote control sockets that could be distributed. This identifies that limited project resources can restrict the socio-ecological reach of social marketing activities.

**Videos**

A total of ten videos containing narratives about a range of different energy use practices were another key element of the social marketing programme, and this aimed to influence not only individuals and families (micro systems level) but also peer groups, and the broader community (meso and exo systems level) to reflect upon and discuss energy efficiency. The videos featured real stories that project participants provided during formative research focus groups about energy use and energy efficiency. Furthermore, the videos featured real project participants in their own homes and acting out their everyday energy use practices. The strong participant orientation and inclusion of real participants and their narratives in the videos aimed to address issues of power, representation and “who writes the discourse” in the social change arena (Brace-Govan, 2015). The videos then presented myth busting, facts, and advice on being energy efficient at home while maintaining comfort and wellbeing. These facts were based on scientific and technical research and expertise provided by the engineers on the project. The videos are available on the project website (see www.energyplusillawarra.com.au/?page_id=84) and were also featured on LCD brochures that were distributed to community and health centres and other community organisations engaged with older people in the project region.

The videos aimed to address misunderstandings about energy use, including misconceptions about energy star ratings on appliances and how to heat and cool the home efficiently (to name a few), and encourage people to hold conversations and pass on knowledge and insight about energy efficiency. One challenge the project team faced was that energy use is not usually a topic that people discuss with other people outside their immediate family (Cooper et al., 2016). This suggests that even though some social marketing tools may hold potential to influence different socio-ecological levels, achieving this in practice can be a challenge. To help address this lack of discourse about energy efficiency, the project team engaged in extensive media advocacy (as discussed later), held energy efficiency road shows and delivered community advertising of the videos, in attempt to promote conversations about energy efficiency.

**Training and education community events**

The project partners collaborated to deliver a series of community training events and workshops about energy efficiency with the aim of influencing micro/meso and exo system levels of change. These activities involved the sharing of insights, stories and provision of technical advice and support for people to use energy efficiently – e.g. the best and most efficient ways to heat the home in winter. These events were held in local community venues and details were posted on the project website and Facebook page and promoted through community centres and organisations. A major issue with the training events when first rolled out was a lack of interest and poor attendance. This was overcome by refocusing events as providing IT training with a context focus on energy efficiency. This strategy resulted in better attendance at later training events. Road show events were well attended and community members reported that they appreciated having interactive displays, and energy engineers on site to explain technical aspects of energy efficiency.
Website and social media
The project website (www.energyplusillawarra.com.au) was designed with the aim of promoting energy efficiency in the broader community (meso and exo system levels), and to other interested stakeholders such as researchers, practitioners and policymakers who were sent the website link (meso and exo system levels). The project website contains facts on energy use practices, news items, copies of the newsletter-factsheets, videos, information on road shows, training and community events, media coverage on the project, links to existing services such as recycling and energy rebates, and details on the project research findings. Social media platforms were also used including a Facebook page, Facebook Advertising and Twitter. To address concerns about the reach of social media activities, existing community, research and practice networks were used to broaden the promotion of social media activity for the project. This included local community centres promoting visits to the website (and viewing of the video brochures) and researchers showing the website and videos on an iPad during home visits. These activities were successful in encouraging community engagement and debate about energy efficiency. To monitor the issue that Lindridge et al. (2013) identified about not knowing if people visited and used materials on the website, Google analytics were used to record number of unique website visits, and average amount of time spent on the website. The Google analytics revealed that those who visited the website spent an average of three and a half minutes browsing. However, evaluative research indicated that some participants had little access to the internet to access the website or preferred the newsletters or books (Cooper et al., 2016).

Media relations and media advocacy
A media relations and media advocacy strategy to influence community, media and social discourses about energy efficiency at the exo and macro systems levels of influence was an important component of the project. Several phases of media advocacy were undertaken with stories appearing in local and national newspapers, radio and television presenting research findings, interviews, editorials and information about energy use and energy efficiency. An important tension when using media advocacy in social marketing is that project stakeholders have limited control over the discourses that media disseminate, and this can lead to misrepresentation or interpretations of the issues that diverge from themes identified by community participants during formative research and on-going partnerships in programmes. As an example, an early media story from Energy + Illawarra sensationalised project findings with stories that people could suffer ill health or risks to their lives unless they change their practices. The project team worked to establish trust and rapport with select journalists to enable a better representation of the issues.

Stakeholder and policy advocacy
Stakeholder advocacy, lobbying and influencing the policy agenda was a crucial part of the project to influence micro/meso/exo and macro systems levels of influence on energy efficiency. Energy retailers were lobbied and engaged to support the distribution of project materials, and fund additional research activities. Regular meetings and continued dialogue with government policymakers enabled the project team to contribute to policy discourses and influence the energy policy agenda. This involved a commitment from government to provide funding for project participants to share learning, and scope energy policy and programmes for the future. However, such stakeholder dialogue relies on reflexive practice to acknowledge the different agendas, priorities and biases for different actors. This was one of the biggest challenges and created some tensions as working across multiple actors, with
different objectives and different understandings of energy efficiency and what should be done made it difficult to always achieve consensus and work towards common objectives.

Lack of time and resources, and limited opportunities for open dialogue and reflection provided real challenges. Furthermore, some actors such as local government indicated interest in the project but did not actively engage. As Gordon and Gurrieri (2014) suggest, social marketers and other actors need to engage with stakeholder reflexivity and be open minded, think critically and participate in extensive dialogue with a range of relevant stakeholders to build successful social change coalitions. As Brace-Govan (2015) identifies, while examples such as tobacco control offer hope here, other social issues including energy efficiency are extremely contested and issues of agenda setting, and power relations make consensus building difficult. From the experience of this project, more time, space and freedom for honest and open dialogue at the start and throughout the process could possibly have helped.

This discussion of the application of ecological systems theory to a social marketing energy efficiency programme presented here identifies not only strong potential but also some important tensions and limitations. Issues of power, representation, agenda setting, the need for reflexive practice and consideration of unintended consequences from using tools to influence micro/meso/exo and macro systems level of change are important considerations. While the discussion presented here does not claim to address each of these issues in depth, it does aim to shed some light on these issues and, in the discussion section of this paper, consider some conceptual and practical implications.

Assessing the effectiveness of the intervention

Method

To assess the impact of the social marketing programme on perceptions of thermal comfort among participants, a longitudinal cohort survey control study was carried out with the same baseline cohort of 830 intervention participants who were involved in the energy efficiency social marketing programme. Within the overall intervention baseline cohort of 830 intervention participants, funding was available as part of the programme to provide home energy-efficiency engineering installations (also known as retrofits) to 200 households. Therefore, a random number generator was used to select 200 of the 830 baseline cohort participants to receive a retrofit. This meant that of the total 830 baseline intervention participants there were two sub-groups:

(1) 630 participants who received social marketing with no home energy-efficiency engineering installations (or retrofits); and

(2) 200 participants who received social marketing including energy-efficiency engineering installations (or retrofits).

The overall social marketing programme received by all 830 baseline participants was based on ecological systems theory and used a range of social marketing mix tools operating at multiple levels of influence. However, it could be posited that the 200 participants who also received a retrofit were influenced at the micro, meso, exo and macro systems level due to the installations as these may influence people’s domestic energy practices, their living environment and the structural integrity of the home.

Participants were surveyed at baseline and then at a subsequent follow-up time point during the implementation of the programme. This was approximately one year after the baseline survey. Control group participants (n = 614) who were not exposed to the social marketing programme and living in another region of New South Wales (NSW) but similar
in climate, were also surveyed at baseline and the same follow-up time points to act as a comparison.

The baseline survey involved a total of 1,444 low-income older residents (aged ≥ 60 years) in NSW. Of that 1,444 survey participants 830 were in the intervention cohort (630 receiving social marketing and 200 receiving social marketing including retrofits), and 614 were in the control group. A total of 955 individuals participated in the Wave 2 follow-up survey. Of these 955 participants, the breakdown among the three intervention groups was as follows: social marketing (n = 459; 48.11 per cent); social marketing + retrofit (n = 180; 18.8 per cent); and control (N = 316; 33.1 per cent). At follow-up survey, participants ages ranged from 60 to 95 years (mean = 70.97; SD = 7.19), and there were more females (n = 578; 60.5 per cent) than males (n = 377; 39.5 per cent). Most participants were retired (n = 825; 86.4 per cent), living in a house (n = 708; 74.1 per cent) and married/partnered (n = 598; 62.6 per cent). Education levels varied among the following categories: < high school (n = 117; 12.3 per cent), high school (n = 367; 38.4 per cent), diploma/trade/certificate (n = 299; 30.8 per cent) and university degree (n = 117; 18.5 per cent).

Sample recruitment was carried out by telephone random digit dialling, with a short telephone questionnaire used to screen for eligibility based on age, and income level, using the Australian Bureau of Statistics income bracket definition of low income (Australian Bureau of Statistics, 2011). An interview administered questionnaire survey was then undertaken in participant’s homes during 2014 by trained researchers using iPads, with responses recorded on the Qualtrics survey software platform. The follow-up survey was then conducted with the same cohort of intervention and control group participants one year later following the roll out of the social marketing programme.

All participants were provided with an information sheet about the study and gave written informed consent. Ethical approval for the study was obtained from the appropriate university ethics committee. Participants were presented with a $30 voucher as recompense for their time at each of the two survey time points. The survey questionnaire design involved an extensive review of the extant literatures on energy efficiency and thermal comfort, use of existing rigorous and well tested survey scale items and a process of cognitive pre-testing (n = 24). The survey used established scales to measure participant’s knowledge (DeWaters, 2009), attitudes (DeWaters, 2009) towards energy efficiency and perceptions of thermal comfort (Healy and Clinch, 2002; Huizenga et al., 2006). Several demographic measures including age, sex, employment status, housing status and education were also recorded. The focus of this paper is on perceived thermal comfort; evaluation of the intervention on behavioural outcomes is reported elsewhere (Cooper et al., 2016).

The survey data that were collected was then transferred to SPSS for initial cleaning and descriptive analysis, prior to further analysis. The key focus in the evaluation analysis was to assess for any changes in perceived thermal comfort between survey time point one and survey time point two, while controlling for demographics and the category of survey participant (i.e. whether they received the social marketing intervention only, social marketing plus retrofit or were in the no intervention control group).

General linear modelling was conducted on the entire data set (including social marketing, social marketing + retrofit, and control group samples) to examine whether the three groups of survey participants, (social marketing; social marketing + retrofit; and control) were associated with participant satisfaction with thermal comfort in their home overall, in the living room, bedroom and participant satisfaction with their thermal comfort at home during summer and during winter. All models controlled for baseline scores of the
respective variable, along with age, sex, education, employment status and housing status. Post hoc analyses were performed for significant trends, using estimated marginal means.

Results

Mean scores (standard error) and the percentage of change between baseline and follow-up surveys on the included variables for each of the three participant groups:

(1) social marketing with no home energy-efficiency engineering installations;
(2) social marketing including energy-efficiency engineering installations; and
(3) control group as shown in Table I.

These findings indicated that the social marketing with no energy-efficiency installations and the social marketing including energy-efficiency installation groups had significantly higher levels of perceived thermal comfort during winter, and greater perceived thermal comfort in their overall home and bedroom compared to the control group.

The social marketing with no energy-efficiency installations group also had significantly higher perceived thermal comfort in their main living room compared with the control group. Satisfaction with thermal comfort was higher in the social marketing with no energy-efficiency installations group compared with the other two groups (social marketing including energy-efficiency installations; and control). Given that the follow-up survey occurred very soon after the intervention, this finding may be because potential positive effects of the retrofit programme had not yet transpired and the inconvenience experienced by participants was still fresh in their minds. The two intervention groups also had more positive attitudes compared with the control group.

This analysis from the initial follow-up survey suggests that even at an early stage of implementation the intervention had a significant and positive effect on perceived thermal comfort, and satisfaction with thermal comfort. This is particularly relevant as perceived thermal comfort is an important indicator of comfort and well-being in the home (Chappells and Shove, 2004; Ormandy and Ezratty, 2012), and perceived thermal discomfort is often associated with health harms (World Health Organization, 1987; Parsons, 2014). Furthermore, the results suggest that the social marketing intervention was effective in changing attitudes towards energy efficiency. This is important as existing research argues that attitudes may be a predictor of future behaviour (Ajzen and Fishbein, 1977; Kraus, 1995).

Discussion

The present study identifies some important conceptual and practical implications. Conceptually, this paper has made a further contribution to the growing recognition of social ecological models, and specifically ecological systems theory in social marketing. Ecological systems theory appears to offer a useful conceptual framework for social marketers to scope, develop and implement strategic programmes, as it encourages consideration of different intervention tools that influence micro, meso, exo and macro-systems. As identified in this paper, this requires use of a broad range of the social marketing mix including individual and micro-system level tools such as messaging, communications and products, meso and exo-system level tools such as training and services, and exo and macro-system level tools such as media advocacy, stakeholder engagement, lobbying and policy change. As Lindridge et al. (2013) identify, for the full potential of social-ecological approaches to social marketing to be realised, such activities need to be incorporated into strategy and action. Furthermore, this process can often be an art more than a science, as
Table 1. Differences in perceived thermal comfort, and attitudes between the three groups between baseline and follow-up and Look before you LIEEP

| Outcome variable               | Social marketing  
|                               | $n = 459$ | Social marketing including retrofit  
|                               | $n = 180$ | Control group  
|                               | $n = 316$ | Significance  
| Mean (SD) (%) change          | Mean (SD) (%) change | Mean (SD) (%) change | Significance ($p$ value) |
| Attitudes                     | 29.85 (2.82)$^a$ 114.2% (67.81) | 29.98 (2.87)$^b$ 108.8% (67.33) | 28.73 (2.99)$^{a,b}$ 93.6% (68.24) | $< 0.001$ |
| Perceived thermal comfort     |                      |                      |                      |                        |
| Overall home                  | 3.29 (0.04)$^a$ 2.5% | 3.24 (0.05)$^b$ 2.4% | 3.10 (0.04)$^{a,b}$ 3.1% | $< 0.001$ |
| Main living room              | 3.22 (0.04)$^a$ 3.0% | 3.16 (0.05) 0.9% | 3.07 (0.04)$^a$ 1.4% | 0.005 |
| Bedroom                       | 3.48 (0.05)$^a$ 5.2% | 3.36 (0.06)$^b$ 1.1% | 3.17 (0.05)$^{a,b}$ 2.0% | $< 0.001$ |
| Satisfaction with thermal comfort |                      |                      |                      |                        |
| Summer                        | 11.45 (0.13)$^a$ 3.9% | 10.99 (0.17)$^a$ 0.3% | 10.88 (0.14)$^a$ 2.0% | $< 0.001$ |
| Winter                        | 10.14 (0.16)$^a$ 0.2% | 9.78 (0.20)$^b$ 2.9% | 10.52 (0.16)$^{a,b}$ 4.3% | 0.008 |

Note: $p$-values are derived from general linear models. All models controlled for age, sex, employment status, housing status, education. Groups with the same superscripts ($^a$, $^b$) differed significantly at $p < 0.05$
different activities may not necessarily impact the expected systems level of influence, or they may lead to unintended consequences. Ensuring that programmes use multiple activities, which are based on extensive insight and stakeholder engagement, and operate at micro, meso, exo and macro-systems levels of influence is important.

This paper also identifies some potential tensions in applying ecological systems theory to social marketing application. Socio-ecological approaches to social marketing often involve complexity, engagement with numerous stakeholders and acknowledgement of issues relating to power, representation, agenda setting, the need for reflexive practice and consideration of unintended consequences from using tools to influence micro/meso/exo and macro systems level of change. While ecological systems theory forms a useful broad conceptual framework for social change programmes, social marketers should be aware of and debate issues of social power; ethics; acknowledge and seek to influence agendas; be more reflexive; and acknowledge unintended consequences.

As discussed in this paper with respect to the Energy + Illawarra social marketing programme, the use of intervention tools acting across multiple levels of systems influence can be difficult to manage – for example the media may not always transmit an accurate story by sensationalising research insights, running community events may not generate the interest from members that is desired, or policymakers may delay or defer acting upon lobbying and briefing based on insights when delivering programmes. As illustrated in this article, ecological systems social marketing programmes are complex and multi-faceted and involve multiple stakeholders. This makes them more challenging to manage and potentially more unpredictable than simpler individual focused interventions. Furthermore, operating at the stakeholder and policy level is political, and building consensus and gaining agreement regarding change may be difficult.

Many of these debates are only just starting to enter the social marketing literature (Gurrieri et al., 2013; Gordon and Gurrieri, 2014; Brace-Govan, 2015). Conceptual development and practical advice on how social marketers can navigate some of these tensions would make a welcome addition to the social marketing literature. Some key reflections from Energy + Illawarra are that making time to work on stakeholder engagement, dialogue and consensus building and mapping who is doing what and when and why at the start of any programme and before any action in the field is essential. Furthermore, regular communication and ongoing planning, conceptualising and analysis meetings are crucial to help manage the complexity of such programmes.

In addition, an ecological systems theory based programmes can be very resource intensive in terms of time and money. This can mean working long hours and stretching the budget or doing in-kind work. It also can be very involving for programme participants – for example in the Energy + Illawarra project, the retrofit component required multiple home visits and often major disruption and changes to the home and daily routine. Project staff also dealt with some participants who had health issues or a partner who was ill. This meant some participants wished to and were able to withdraw from the retrofit programme and/or the social marketing programme as they wished. Therefore, careful consideration should be given to the intensiveness and disruption that can be caused to participants in multi-level social marketing programmes. Risk management is important and time should be taken to anticipate and mitigate for things going wrong or going in another direction as exampled by the initial issues with media reporting encountered in this project. Finally, longevity is a key focus in programmes such as the one described here. For example, acting at exo and macro levels and trying to shift cultural discourses or influence policy takes time and perseverance. Therefore, social marketers interested in using a social ecological approach should be aware of these issues and plan and act accordingly.
This paper also makes a small contribution to the energy efficiency and thermal comfort debate. Formative research that informed the Energy + Illawarra programme (Butler et al., 2016; Waitt et al., 2016, Cooper et al., 2016) identified that alongside buildings and technologies, perceived thermal comfort is important to understanding social practices of energy use. This translated into aspects of the multi-level social marketing programme such as the tailored retrofits, narrative videos and seeking to influence perceptions of thermal comfort. Using an ecological systems analysis, it could be argued that energy efficiency is a social system of interrelated actors, materials, competencies and meanings that comprise different places. This means that a systems approach to promote energy efficiency is required. Yet, much of the existing work on energy efficiency focuses on buildings and technologies (Shove, 2014), without paying much attention to social practices, social norms and the meanings people attach to energy consumption in situ (Castree and Waitt, 2017).

Furthermore, by focusing on influencing perceptions of thermal comfort, and by using narratives to encourage participants to reflect upon their domestic energy use practices, the Energy + Illawarra goes beyond a singular focus on behaviour change that dominates the social marketing literature (Andreasen, 2002). As Spotswood et al. (2012) and others argue, social marketing would benefit from a broader focus on influencing attitudes, influencing discourses and shifting social norms. The survey evaluation findings presented in this paper suggest that a social marketing energy efficiency programme drawing on ecological systems theory can positively influence people’s perceptions of thermal comfort in the home. This has important practical implications for energy efficiency programmes. While such programmes should continue to focus on reducing energy use where appropriate, it is also important to acknowledge meanings like thermal comfort, particularly among vulnerable groups such as low-income older people. This may require a shift in how energy efficiency is defined to not only still encompass being efficient but also include maintaining thermal comfort and wellbeing.

With respect to future research, and as Lindridge et al. (2013) identifies, the use of socio-ecological models in social marketing has not been fully explored. A limitation of this study is that it does not present evaluation findings that relate to different systems levels of influence such as community support, social norms and policy support for energy efficiency. Therefore, future research that not only uses social ecology as a planning approach but also includes evaluation research with measures across different systems levels of influence would help advance the knowledge base in social marketing. Another limitation of this study is that it only concerns the use of social ecology to tackle one social issue (energy efficiency), within a specific geographic context (regional NSW) and among a specific participant group (older, low income people). This means our findings and observations may not be generalizable to all social marketing work using a social ecological approach. Therefore, future research and applications of social ecology in social marketing in different contexts and to different social issues beyond energy efficiency can help advance knowledge.

Furthermore, given the various tensions and limitations of ecological systems theory in social marketing that are identified here, work that provides deep analysis and unpicks the politics and power relations of social marketing, debates issues of representation, and advances reflexive practice in the field would be important. In the context of energy saving, studies that consider the relationships between perceived thermal comfort, health and wellbeing can help redefine what is meant by energy efficiency.

**Conclusion**

This paper aimed to identify how social ecological model perspectives can inform social marketing by considering the various elements of a social marketing energy-efficiency
programme working with low-income older people in relation to the different levels of ecological systems theory. It is argued that while social ecological models have strong relevance to social marketing, there can be limitations and important tensions and issues to consider such as power relations, representation and unintended consequences. The paper also identified how an interdisciplinary energy-efficiency social marketing programme involving social marketers, human geographers and engineers can positively influence perceived thermal comfort. The work presented here suggests that multi-level social marketing programmes can make a useful contribution to social change, and specifically to the relationships between energy efficiency, perceived thermal comfort and well-being. Social marketers should be encouraged to further explore this potential in the future.

References


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Prof Paul Cooper is the Director of the Sustainable Buildings Research Centre at the University of Wollongong. Over the past 30 years, he has focussed teaching and research efforts on the improvement of the efficiency with which we use energy and other resources, particularly in the built environment and in industrial processes. Paul has been involved in research on a wide variety of topics in energy systems, energy efficiency and fluid mechanics. Paul is passionate about contributing to a rapid transition to a society that has a dramatically lower impact on our environment than at present.

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Christopher Magee is an Associate Professor and is currently the Academic Director of South Western and Southern Sydney Campuses at the University of Wollongong. Dr Magee is a health psychology researcher, with specific interests in the following two related areas: understanding the influence of poor sleep quality on health and well-being; and investigating how factors such as sleep, work-life balance, and workplace bullying affect employee outcomes (e.g. absenteeism, work engagement). He is also interested in the determinants and consequences of health behaviours more broadly (e.g. condom use, alcohol), and the well-being of vulnerable populations. He holds several grants and consultancies and has a keen interest in the translation of research findings into policy and practice.