

## PERSPECTIVES

# Policies on pets for healthy cities: a conceptual framework

MELANIE J. ROCK<sup>1,2,3\*</sup>, CINDY L. ADAMS<sup>1,3,4</sup>, CHRIS DEGELING<sup>5</sup>,  
ALESSANDRO MASSOLO<sup>2,3</sup> and GAVIN R. McCORMACK<sup>1,3</sup>

<sup>1</sup>Community Health Sciences, Faculty of Medicine, University of Calgary, Alberta, Canada, <sup>2</sup>Ecosystem and Public Health, Faculty of Veterinary Medicine, University of Calgary, Alberta, Canada, <sup>3</sup>Institute for Public Health, University of Calgary, Alberta, Canada, <sup>4</sup>Department of Veterinary Clinical and Diagnostic Sciences, Faculty of Veterinary Medicine, University of Calgary, Calgary, Alberta, Canada and <sup>5</sup>Centre for Values, Ethics and the Law in Medicine, School of Public Health, University of Sydney, Sydney, Australia  
\*Corresponding author. E-mail: mrock@ucalgary.ca

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### SUMMARY

*Drawing on the One Health concept, and integrating a dual focus on public policy and practices of caring from the Ottawa Charter for Health Promotion, we outline a conceptual framework to help guide the development and assessment of local governments' policies on pets. This framework emphasizes well-being in human populations, while recognizing that these outcomes relate to the well-being of non-human animals. Five intersecting spheres of activity, each associated with local governments' jurisdiction over pets, are presented: (i) preventing threats and nuisances from pets, (ii)*

*meeting pets' emotional and physical needs, (iii) procuring pets ethically, (iv) providing pets with veterinary services and (v) licensing and identifying pets. This conceptual framework acknowledges the tenets of previous health promotion frameworks, including overlapping and intersecting influences. At the same time, this framework proposes to advance our understanding of health promotion and, more broadly, population health by underscoring interdependence between people and pets as well as the dynamism of urbanized ecologies.*

*Key words:* health promotion; animal welfare; environmental policy; urban health

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### INTRODUCTION

Within health promotion, the conceptualization of socio-ecological systems would benefit from refinement. The popularity of the socio-ecological model in health promotion is indebted to a visual metaphor of 'a series of concentric or nested circles', such that each circle 'represents a level of influence on [human] behavior' [(McLaren and Hawe, 2005) p. 9]. This metaphor is consistent with conceptualizing health and illness as 'the consequence of reciprocal causation unfolding at multiple individual and environmental levels of influence' [(Richard *et al.*, 2011) p. 309]. We agree with the tenets of overlapping and intersecting influences in socio-ecological systems.

Researchers in health promotion, however, have tended to portray socio-ecological systems as though they were essentially inert and stable, except for people. Notwithstanding theoretical divergences (Dooris and Heritage, 2011; Rydin *et al.*, 2012), the literature on healthy cities is a prime example of this tendency.

Recent developments in veterinary medicine and public health, meanwhile, emphasize dynamic interdependence between and among humans, non-human animals and ecosystems under the banner of 'One Health' (Zinsstag *et al.*, 2006; FAO-OIE-WHO Collaboration, 2010). One Health is a concept that is based on recognition that without due consideration for how humans relate to non-human animals and to shared environments,

locally and globally, opportunities will be missed to reclaim and enhance well-being for sentient inhabitants of the planet. Social scientists and practitioners aligned to health promotion are well positioned to contribute to these developments (Rock *et al.*, 2009; Masuda *et al.*, 2010; Zinsstag *et al.*, 2011; Green, 2012). But first, health promotion itself must be reconceived to acknowledge the fundamental interdependence of humans with non-human animals. As a step in this direction, we introduce a conceptual framework for promoting healthy cities via people's pets.

Our position, following on from Hinchliffe and Whatmore (Hinchliffe and Whatmore, 2006), is that healthy cities comprise multispecies collectivities. A reconceptualization of healthy cities as entailing multispecies collectivities is needed because—increasingly and worldwide—people, domesticated animals and wildlife live in urbanized societies. Increased population densities and living in close quarters with pet animals, whether as pet owners or non-pet owners, create challenges for policy-makers, and these challenges can become especially acute for local governments (Coleman *et al.*, 2010; Walsh, 2011). Policies that allow people to keep pets within cities, subject to some limits, are important for health promotion to an extent that has yet to be investigated thoroughly (Cutt *et al.*, 2007; Toohey and Rock, 2011; Rock, 2013; Rock and Degeling, 2013).

First, without a legitimate presence for pets in cities, societal benefits from pets will be limited. Policies on pets confer legitimacy. In other words, policies buttress the positive associations that have reported between human well-being and contact with pets in urbanized societies. These positive associations encompass *direct effects* from human–pet interactions as well as *indirect effects* arising from interactions that pets facilitate among people (Beck and Meyers, 1986; McNicholas *et al.*, 2005; Cutt *et al.*, 2007; Toohey and Rock, 2011; Christian *et al.*, 2013). Both direct and indirect benefits are relevant to public health, due to the ubiquity of pets in urbanized societies. In Western countries, pets tend to be regarded as family members and live in approximately half of all households (McNicholas *et al.*, 2005). Pet ownership has also become popular in some non-Western countries, including Japan and China (Headey *et al.*, 2007; Oka and Shibata, 2009). Most of the existing literature on benefits to human well-being arising from the presence of pets has little to say about policies. Nevertheless,

as dramatically illustrated by China, where pet-keeping was prohibited in cities under Communism until 1992 (Headey *et al.*, 2007), policies allowing people to keep pets should not be taken for granted in health promotion.

Second, policies on pets pertain to health promotion because they can assist in mitigating the potential for pets to harm, intimidate, or annoy others beyond any single pet-human dyad or pet-owning household. Again, due to the widespread presence of pets in cities, these problems concern millions of people. Problems in public health that policies on pets can attenuate include dog bites and exposure to infectious pathogens (Duperrex *et al.*, 2009; Day, 2010). Policies on pets can also reduce the potential for pets to catalyze conflict or exacerbate tensions, to the extent that dog-related threats and nuisances in parks may deter physical activity among dog owners and non-dog owners (McCormack *et al.*, 2010). Such negative influences, furthermore, appear to be concentrated in disadvantaged subpopulations (Toohey and Rock, 2011). In fact, pet-related problems can symbolize powerlessness and mistrust of neighbors as well as of local governments (Derges *et al.*, 2012). Policy measures exist to tackle pet-related problems such as these. To the extent that policies promote health by enabling people to enhance and exert control over their lives (WHO, 1986), policies to diminish nuisances and threats from pets in the settings of daily life are as relevant to health promotion as are policies that enable people to share in benefits from pets.

In keeping with settings-based approaches to health promotion (Dooris, 2009), Christian *née* Cutt (Cutt *et al.*, 2008b) led the development of an elaborate model acknowledging that, in urbanized environments, pet-specific policies may foster well-being and reduce disease and injury. This model embeds the theory of planned behavior (Ajzen, 1991) within a socio-ecological framework, and the focus is on supporting physical activity through dog-walking. For instance, their model identifies on-leash and off-leash areas as environmental features that could encourage dog-walking. In turn, while not stated explicitly, the existence and quality of such areas are policy issues. And whereas this model acknowledges that dog aggression and dog waste may deter physical activity in urbanized environments (Cutt *et al.*, 2008b), within health promotion, interest is nascent in leveraging governmental jurisdiction over pet animals within cities so as to minimize

harms and to maximize benefits (Cutt *et al.*, 2007; Rock, 2013).

Below, we introduce a conceptual framework on pets in urban areas that has been informed by the literatures on socio-ecological systems, healthy cities and anthrozoology (i.e. interactions between humans and non-human animals in diverse settings and contexts). Ultimately, our purpose is to assist with developing, refining, implementing and evaluating policies on pets in urban settings. Our conceptual framework focuses on local governments (also known as municipal governments and local councils) because a higher level of government typically vests local governments with some authority over pets. Consistent with long-standing recognition in health promotion of the importance of local governments for healthy cities (Hancock, 1993), our conceptual framework links local governments' authority to adopt policies on pets with the objectives and orientation of health promotion. In other words, we are interested in how the wording and implementation of local governments' policies on pets could minimize the potential for harm while maximizing the benefits of pets in cities (Rock and Degeling, 2013). As a contribution to public health, our principal focus is on human well-being (WHO, 1948, 1986). Nevertheless, we are also concerned with the well-being of non-human animals, and with how the well-being of non-human animals could reciprocally impact upon people. In line with veterinary applications (Zinsstag *et al.*, 2011) of Nobel Laureate Ostrom's (Ostrom, 2009) conceptualization of socio-ecological systems, we contend that pet-related policies can be worded and implemented to promote health in both animal and human populations.

### CONCEPTUAL FRAMEWORK: LOCAL POLICIES ON PETS FOR HEALTHY CITIES

According to the *Ottawa Charter for Health Promotion*, health is 'a resource for living, not the objective of living', 'lived by people within the settings of their everyday life' and 'created by caring for oneself and others' (WHO, 1986). Within health promotion, the 'others' in question have been interpreted to mean human beings, exclusively. Yet for millions of people, pets are deeply implicated on a daily basis in caring for the self and others. In fact, pets themselves

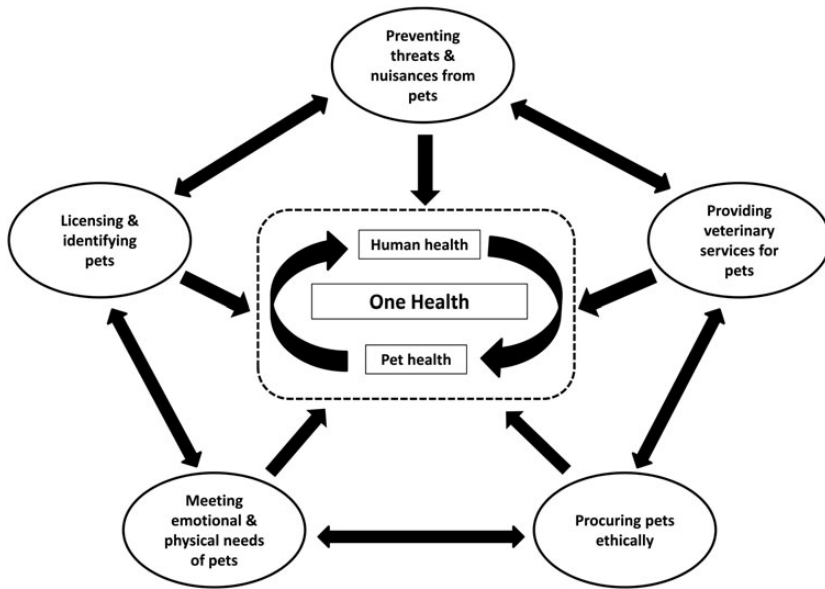
are often regarded as 'significant others'. Furthermore, keeping pets in urban areas generates 'ripple effects' (Wood *et al.*, 2007). Such 'ripple effects' can impact positively or negatively on neighbors, acquaintances and utter strangers (Toohey and Rock, 2011; Derges *et al.*, 2012).

Caring for a pet in an urban environment thus entails consideration for other people and other animals. Insofar as caring for pets may overlap with caring for oneself, other people and other animals in complex socio-ecological systems, the concept of One Health takes on renewed importance for promoting health in human and animal populations in urban areas. This concept evolved from the concept of 'One Medicine', which stressed commonalities between medical science for people and veterinary science with animals, but One Health is broader in scope (Zinsstag *et al.*, 2011). Whereas research and practice in One Health have emphasized zoonotic infections (e.g. SARS, H1N1, brucellosis, rabies), food safety, water safety and environmental toxins, 'One Health' is highly relevant to non-communicable diseases and to non-clinical influences on population health, too (Rock *et al.*, 2009; Green, 2012). Furthermore, to the extent that non-communicable diseases and non-clinical influences on human health increasingly implicate pet animals (Degeling *et al.*, 2013), the concept of One Health and the tenets of health promotion apply to pets as well as to people.

Our conceptual framework builds on the premise, embedded in the *Ottawa Charter*, that health is 'created by caring for oneself and others' (WHO, 1986). We also follow the *Ottawa Charter* in positing that the realm of public policy is crucially important. We explicitly acknowledge, however, that health can be promoted via caring relationships with non-humans and via policies on pets. Specifically, we point to five overlapping spheres of activity, all of which can be mandated, reinforced or both via local governments' policies on pets. These spheres of activity are (i) preventing threats and nuisances from pets, (ii) meeting pets' emotional and physical needs, (iii) procuring pets ethically, (iv) providing pets with veterinary services and (v) licensing and identifying pets (see Figure 1). Below, we consider each of these spheres of activity in turn.

#### Preventing threats and nuisances from pets

Even in settings where dogs tend to be leashed and closely supervised, dog bites remain a leading



**Fig. 1:** Policies on pets in urban areas and ‘One Health’.

cause of injury among children, and educational programming alone may be insufficient to curb incidence (Duperrex *et al.*, 2009). Fears of being bitten or chased by dogs, furthermore, are health concerns in their own right; and such fears can negatively impact on levels of physical activity by deterring people from entering parks where dogs may be present (Cutt *et al.*, 2007; McCormack *et al.*, 2010; Toohey *et al.*, 2013). The potential also exists for dog-walkers to avoid parks and other public spaces based on concern that canine companions could be harassed, bitten or exposed to infectious diseases (Cutt *et al.*, 2007; Westgarth *et al.*, 2008; Wang *et al.*, 2012; Degeling and Rock, 2013). Also, the negative symbolism of dog feces is beginning to be recognized as relevant to health promotion (e.g. Derges *et al.*, 2012), yet little is known about how to intervene effectively with policies or programming (Atenstaedta and Jones, 2011). Meanwhile, the potential for cat-related threats and nuisances to fuel social conflict remains unaddressed in health promotion. The overall impact of policies on threats and nuisances associated with dogs and pets of other species ultimately hinges on systems for implementation, but such systems have yet to be investigated in-depth (Borthwick, 2009; Rock, 2013).

Future research projects could include in-depth and spatial analyses of dog aggression along with socio-demographic characteristics of

owners, complainants, and victims. Many jurisdictions have adopted policies intended to prevent dog aggression by banning certain breeds, but such policies have not been shown to reduce the incidence of dog bites and, given similar care, dogs of commonly banned breeds appear no more likely than dogs of a similar size to exhibit aggression (MacNeil-Allcock *et al.*, 2011). Further research is warranted on policies to reduce the negative impact of ill-controlled dogs and of dog feces (McCormack *et al.*, 2010; Atenstaedta and Jones, 2011; Toohey and Rock, 2011). Research is also warranted on the investigation and settlement of complaints about pet-related threats and nuisances that are recognized in policies, including qualitative analyses of the kinds of evidence and claims that appear to be persuasive. In doing so, the potential for inequity to be perpetuated through local governments’ investigations and quasi-judicial processes should be investigated, as previous research has uncovered insidious forms of prejudice in the implementation of such policies (Valverde, 2012).

### Meeting pets’ emotional and physical needs

Animal welfare tends to be regarded as ancillary to health promotion, even though animal welfare appears to be linked systematically to physical, mental and social well-being in human

populations (Rock *et al.*, 2009). In fact, promising programs to promote health via physical activity seek to emphasize animal welfare concerns and to build on people's caring relationships with dogs (e.g. Johnson and Meadows, 2010; Rhodes *et al.*, 2012). These examples of evaluation research build upon a growing body of cross-sectional studies and some longitudinal research indicating positive associations between dog ownership and physical activity (Knight and Edwards, 2008; Peel *et al.*, 2010; Lail *et al.*, 2011; Temple *et al.*, 2011; Christian *et al.*, 2013; Degeling and Rock, 2013; Higgins *et al.*, 2013; Richards *et al.*, 2013; Toohey *et al.*, 2013). Such positive findings hinge on human–animal bonds, and thus on people's commitment to meet the physical and emotional needs of dogs. Environmental supports for the health benefits of dog-walking include policies legitimizing the presence of dogs on sidewalks and in parks, along with policies guiding the design of built environments more generally (Cutt *et al.*, 2007; Coleman *et al.*, 2008; Cutt *et al.*, 2008a; McCormack *et al.*, 2011; Christian *et al.*, 2013; Degeling and Rock, 2013; Richards *et al.*, 2013). Furthermore, dog-walking can benefit people's emotional health via positive impacts on canine well-being, positive interactions with fellow dog-walkers and a positive sense of belonging to a community, and these emotional benefits can help to sustain participation (Wood *et al.*, 2007; Knight and Edwards, 2008; Johnson and Meadows, 2010; Rhodes *et al.*, 2012; Toohey *et al.*, 2013). In addition, people do not have to own dogs personally to participate in dog-walking or to derive benefits (Johnson and Meadows 2010; Peel *et al.*, 2010; Toohey and Rock, 2011; Degeling and Rock, 2013).

In legal terms, welfare for pet animals is complicated, and multiple levels of government along with non-governmental organizations can become involved (Fox, 2010; Nowicki, 2011; Rock and Degeling, 2013). Local policies on the leashing of dogs in public space illustrate the relevance of local policies on pets to both animal welfare and human well-being. Whereas policies forbidding unattended dogs in urban areas date back to the 1800s in Western countries (Grier, 2006; Howell, 2012; Pemberton and Worboys 2013), policies requiring dogs to be leashed whenever off the owner's property have become commonplace since the 1970s (Borthwick, 2009; Walsh, 2011). Leashing can help to ensure the safety of these dogs, and may also help to safeguard other non-human animals in the vicinity as

well as people from threatening behavior and infectious diseases (Westgarth *et al.*, 2010). And when it comes to physical health and emotional well-being of people, leashing and the expectation of constant supervision are highly relevant to dog-walking and to sharing public spaces where other people's dogs are present (Cutt *et al.*, 2007; Toohey and Rock, 2011; Christian *et al.*, 2013). Nevertheless, designated off-leash areas are also important for animal welfare, and local governments' provision, design and management of off-leash areas can bolster physical activity among dog-owners (Cutt *et al.*, 2008a; Lee *et al.*, 2009; McCormack *et al.*, 2011).

Future research could delve deeper into how caring for pet dogs influences physical activity for owners and other people. Future research could also consider the extent to which meeting a pet's emotional and physical needs may contribute positively to a sense of self-efficacy (Bandura, 2004). For example, self-efficacy has been positively associated with dog-walking among dog-owners (Richards *et al.*, 2013). The potential for pet care to foster well-being via self-efficacy might apply to pets other than dogs, including cats and birds (Mahalski *et al.*, 1988; Anderson, 2003; Rock and Babinec 2010), among others (e.g. gerbils, rats, hamsters, fish, snakes, turtles).

### Procure pets ethically

Competing claims to the same pet are relevant to health promotion because they arise from a disruption to human–animal bonds, which have been associated positively with human health (Beck and Meyers, 1986; Beck and Katcher, 2003; McNicholas *et al.*, 2005). Furthermore, such claims carry the potential to fuel conflict and mistrust. For example, if 'their dog' is spotted in a park with new owners, and the former owners learn that 'their dog' was rehomed through the local government, they could plausibly feel anger towards the new owners as well as the local government.

Local policies on pets could mitigate the potential for different people to claim the same pet animal as their own, while also increasing the likelihood of reuniting lost pets with their rightful owners. For example, when local governments commit to sheltering impounded animals in high-quality facilities, citizens may be more likely to turn in lost pets found on their property or in public places, as opposed to keeping such a pet for themselves or giving the pet to someone



within their own social network. Citizens may also be encouraged to turn in lost pets when local governments commit to sheltering these animals for a period of time prior to putting them up for adoption. In addition, as discussed in more detail below, local policies to encourage pet licensing and identification can assist with ensuring that lost pets are returned to owners while also enabling unclaimed pets to be adopted in timely fashion (Coleman *et al.*, 2010). Conversely, high rates of euthanasia and low rates of rehoming may discourage citizens from turning over lost pets to local authorities (Coleman *et al.*, 2010). These issues have yet to be researched in-depth.

The concern with ethical procurement of pets also encompasses the conditions under which animals are bred and raised for sale, as in ‘puppy mills’. ‘Puppy mills’ and other instances of pet maltreatment could obstruct health promotion, in several ways. In particular, maltreated animals may develop health and behavioral problems that could strain human–animal bonds (McMillan *et al.*, 2011). Furthermore, the maltreatment of pets has been linked to cruelty and abuse directed toward people, including women and children (Volant *et al.*, 2008). Policies on pets can be worded and resourced so that private homes and businesses can be inspected for maltreatment (Smith, 2012). First-hand observation, questionnaires and qualitative interviews could yield insights relevant to public awareness and case coordination on ‘puppy mills’, pet-related nuisances and pet-related threats as points of entry for health promotion. Research along these lines has not been conducted anywhere in the world, to the best of our knowledge.

### **Providing pets with veterinary services**

Sterilization is the veterinary service that receives the most emphasis in many local governments’ policies on pets (Coleman *et al.*, 2010; Scarlett and Johnston, 2012). As an incentive for owners to have their pets sterilized, local governments increasingly charge less to license sterilized pets than for intact pets (Coleman *et al.*, 2010). Formal assessment of the extent to which linking licensing fees to sterilization status influences owners’ decisions, nuisance complaints or threatening behavior by pets has not been conducted, to the best of our knowledge (Coleman *et al.*, 2010).

As discussed further under ‘Licensing and Identifying Pets’, the revenue generated through

licencing of pets can be used to fund a variety of community services relevant to people, pets and other animals. These services include veterinary care. For example, local governments can subsidize sterilization operations for low-income owners. Formal assessments of such programs have reported mixed results on impounding and euthanasia rates (Scarlett and Johnston, 2012), yet have not yet considered the views and experiences of low-income owners.

Pet adoptions can also be subsidized through licensing fees. Previous studies have found significant increases in physical activity following the acquisition of a dog (Serpell, 1991; Cutt *et al.*, 2008c), and measurable improvements in some other health-related indicators following the acquisition of either a dog or a cat (Serpell, 1991). These studies, however, did not report on the health status of the pets. Nevertheless, providing adopted pets with a veterinary bill-of-health prior to rehoming is relevant to health promotion because veterinary professionals can often identify problems that may lead to nuisances, pose threats, or interfere with human-animal bonds. Local policies can be worded and implemented so that pets receive a veterinary assessment prior to being adopted. Such policies merit further consideration and formal evaluation should take into account the impact on both pet animals and people.

### **Licensing and identifying pets**

Policies requiring dogs to be licensed within urban areas date to the mid-1800s (Grier, 2006; Pemberton and Worboys 2013), and some local governments require cats to be licensed, too (Coleman *et al.*, 2010; Rock, 2013). In addition, as a condition of licensure, pets must be micro-chipped or tattooed for the purposes of identification in some jurisdictions (Borthwick, 2009). Compliance with policies on pet licensing is variable (Coleman *et al.*, 2010), yet compliance as high as 90% for dogs has been reported (Rock, 2013). In cities with high rates of pet licensing, local governments gain access to substantial revenues, which can be used to finance community services (Coleman *et al.*, 2010; Rock, 2013). Examples include educational interventions with schoolchildren to prevent dog bites, sheltering lost pets until they can be reunited with their owners, rehoming unclaimed pets and subsidized sterilization of pets belonging to low-income owners (Coleman *et al.*, 2010; Rock, 2013).

Despite the long history of policies on pet licensing, resistance continues, in practice and on moral grounds. In fact, some academics and activists regard the very definition of non-human animals as property as a distortion of human–animal relations, properly conceived (Wadiwel, 2009; Francione and Garner, 2010). Whereas the legal and social status of pet animals is a complicated matter, our position is that legal ownership of pet animals can be defined and lived on a daily basis in ways that simultaneously protect animal welfare and promote human health (Rock and Degeling, 2013). Indeed, policies on pet licensing can be developed and encouraged in ways that are consistent with a strength-based perspective that recognizes and respects ‘caring for one’s self and others’ (WHO, 1986) as the basis for health promotion (Rock, 2013).

Through licensing, people establish a public claim to a particular animal. To the extent that such claims are respected in practice, local governments and fellow citizens are limited in what they can do to that animal. Local councils, for example, should not allow people’s pets to be adopted without first allowing time for reunification, and fellow citizens should not claim someone else’s pet as their own. Such policy measures are crucial for the sustenance of human–animal bonds and the mitigation of social conflict, and thus for associated health benefits, as well as for animal welfare. Furthermore, by tracing a pet animal back to a specific person, compliance with policies on pet licensing can assist in investigating pet-related threats and nuisances. Licensing may also be used to encourage desired behavior, such as providing pets with veterinary services, through financial incentives and related publicity (Coleman et al., 2010). Given the leverage that pet licensing provides on redressing threats and nuisances from pets, while also promoting well-being through animal-related community services, creative ways to encourage licensing merit consideration in both higher-income and lower-income settings. Use of revenue from pet licensing to fund animal-related community services may serve as an incentive for pet owners to purchase licenses, yet this approach has yet to be formally assessed in terms of health promotion.

## DISCUSSION

The notion of healthy cities is deeply rooted in the history of public health, yet became

reinvigorated in conjunction with the *Ottawa Charter for Health Promotion* (Hancock, 1993). In the contemporary conceptualization of healthy cities, public policy at the local level has been emphasized (Dooris and Heritage, 2011). Yet Rydin and colleagues (Rydin et al., 2012) assert that a coherent conceptual framework is lacking for assessing the health impact of local-level policies, and by way of a solution, they endorse ‘complexity thinking’ as ‘an approach that looks at the interconnected elements of a system and how that system has properties not readily apparent from the properties of the individual elements’ [(Rydin et al., 2012), p. 3]. In response, de Leeuw (de Leeuw, 2012) contends that Rydin and colleagues (Rydin et al., 2012) pay insufficient attention to critical theory and politics. We are sympathetic to this criticism, and would add that people’s complicated connections with non-human animals have been conspicuously absent from discussions about promoting healthy cities. Indeed, Rydin and colleagues (Rydin et al., 2012), p. 9] only mention non-human animals in relation to ‘disease vectors and pests’.

In calling for more robust conceptualizations of complex socio-ecological systems in health promotion, we draw inspiration from critical theorists who acknowledge the participation of non-human animals, thereby unsettling the usual conflation of ‘social’ with ‘human’ (Rock et al., 2013). In this vein, and to take account of what they call the ‘politics of conviviality’, Hinchliffe and Whatmore (Hinchliffe and Whatmore, 2006) introduced the terminology of a ‘living city’. This terminology is meant to open up investigations of the ways in which ‘cities are inhabited with and against the grain of expert designs’, the extent to which human and non-human inhabitants are heterogeneous, and questions about ‘civic associations and attachments forged in and through more-than-human relations’ [(Hinchliffe and Whatmore, 2006), p. 124]. Whereas Hinchliffe and Whatmore [(Hinchliffe and Whatmore, 2006), p. 131] mention dog-walking, in the course of emphasizing that wildlife and plants are vital for urbanized ways of life, we foreground the perennial presence of pets.

Policies on pets reflect sociocultural norms. Thus, analysts must always ask whose values and aspirations are most reflected in written policies. At a minimum, local governments should share information and consult with citizens on proposed policy changes (Dooris and Heritage, 2011; Heritage and Dooris 2009). While the

wording of local governments' policies on pets is indicative of norms, the capacity of local governments to formulate and enforce pet-related policies will vary. Direct control by local governments over non-human animals is administratively costly and cumbersome, and is often viewed as undesirable by citizens and especially by advocates for animal welfare (Coleman *et al.*, 2010). Indirect control over pet animals via their owners is increasingly common (Borthwick, 2009). Furthermore, pet owners' duties can be interpreted as extending beyond their pets, to encompass consideration for other people, other people's pets, wildlife and shared ecosystems (Rock and Degeling, 2013). Yet people without pets of their own can also become implicated in implementing local governments' policies on pets, for example, by reporting incidents involving aggression and by directing dog-walkers to clean up after pets (Rock, 2013).

Policies on pets and, more generally, the extent of governments' capacity and authority when it comes to non-human animals have global relevance (Wadiwel, 2009; Zinsstag *et al.*, 2011; Smith, 2012; Srinivasan, 2013). Challenges are inherent to assessing the health impact of policies and programs that help to shape settings, and one consequence is that whole-system assessments are rather rare in health promotion (Dooris, 2006). Describing, never mind evaluating, a whole system in action poses methodological difficulties, not least when grappling with 'living cities' as complex socio-ecological systems (Hinchliffe and Whatmore, 2006). The conceptual framework that we have proposed is admittedly based on limited information and may continue to evolve, yet we already feel confident in providing some direction for policy-makers. At present, interventions in lower-income settings tend to emphasize population control of pet species, mainly through culling and sterilization (Morters *et al.*, 2013). Vaccinations are also prescribed, notably against rabies (Morters *et al.*, 2013). Meanwhile, in higher-income countries, a multitude of unattended pets are impounded every year, many unclaimed animals are euthanized, and policy responses continue to emphasize sterilization for the purposes of population control (Coleman *et al.*, 2010; Scarlett and Johnston, 2012; Srinivasan, 2013). Across divergent settings and contexts, therefore, a key concern in policies on pets is the balancing of civil liberties (such as respecting people's choices when it comes to pets) and the collective good

(such as ensuring that neither people nor non-human animals are unduly inconvenienced or harmed by other people's choices when it comes to pets). Whereas questions concerning harm prevention and mitigation are classic concerns in public policy and in public health (Coggon, 2012), these questions may take different forms when respectfully acknowledging the presence of non-human animals in constituting people's values and the collective good (Rock and Degeling, 2013).

As a non-obvious response to these issues, licensing fees are pivotal to the conceptual framework that we propose. Licensing of pets stems from recognition that these animals can legitimately live with people in urbanized societies, as a matter of personal choice. At the same time, pet licenses offer fellow citizens with a mechanism for intervening into the behavior of both owners and pets, by providing local governments with a way of tracing a particular pet to a particular owner when lodging formal complaints. Meanwhile, in the aggregate, licensing fees add up to substantial amounts of money that can be reinvested in animal-related community services, for the sake of both human and non-human lives.

We acknowledge that caring for oneself and others represents an ideal, as much in the *Ottawa Charter* as in our conceptual framework. Therefore, researchers and practitioners cannot assume that people who adhere to policies on pets do so out of consideration for others, or that people who do not comply are necessarily inconsiderate. Yet as caring for fellow human beings, for non-human beings, for entire ecosystems and for oneself become entwined in urban life, we contend that healthy cities are being created and sustained.

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analysis and the writing process; C.A. worked closely with M.R. to outline the structure of the manuscript, and she provided written and verbal feedback to M.R.; C.D. provided written and verbal comments to M.R. and G.M.; A.M. and G.M. also provided written and verbal comments to M.R., and their verbal feedback was summarized in writing by C.A.; In addition, G.M. designed the diagram shown in Figure 1, he drafted the abstract, and he planned the writing and submission process with M.R.

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