The Built Environment and Public Health: From Theory to Practice

John Kurko
Gordon Holden
Griffith University, Queensland, Australia

A public health crisis is looming. The recent ‘Australian Health Survey’ highlighted increasing overweight/obesity and alarmingly low rates of physical activity in the country’s population. It is projected that the problem will decimate the nation’s future capacity to pay for health-support as the population ages, unless the trend can be turned around. There is now widely accepted convergent research bridging the public health sector, environmental psychology, town planning, transport planning and urban design that concludes the importance of better urban design in facilitating public health outcomes. Beyond concerns for health, climate change impact and reliance on fossil fuels, more and more signals point to the lack of sustainability of our current lifestyles. Many remedies are being explored and central to most of them is that the built environment is the major contributor to sustainability problems and consequently must be where solutions are found. The value of urban design is constantly being challenged but as the evidence mounts good urban design matters, there is a need to communicate best practise. Contributing to this is the need for more case studies to demonstrate solutions that can be taken up and applied across communities. A case study is presented that shows how a country town has responded to the evidence and has developed practical policies underpinned by theory to guide the future design and upgrading of the built environment to help improve public health.

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INTRODUCTION

The projected increase in cost that derives from declining public health of the nation (ABS, 2012) together with an ageing population is on a crash course with the reduced capacity of the country to pay for needed support. This is largely due to future reduced tax income per capita because of a proportionally lower workforce participation rate and the burden of chronic disease, diseases that are largely avoidable. This paper argues that the dilemma can be mitigated through improvements in the performance of the built environment that encourages physical activity (PA) providing benefits to public health, this alone being a worthy objective.

It is widely understood that the lack of PA is one of the major risk factors for a range of diseases several of which are life threatening. It is also known that regular walking and cycling promote health by providing physical activity. The benefits extend beyond individual health with macroeconomic benefits as well as contributing to decreases in environmental factors related to noise and air pollution (Bauman et al. 2008, Shoup & Ewing 2010). Very significant health benefits accrue from as little as 30 minutes of walking or cycling when undertaken most days of the week (WHO, 1999). These benefits are available even if the activity is undertaken in short bouts of 10 minutes throughout the day (Australian Government, 1999.) Further, the Menzies Centre for Health Policy states “Urban living influences levels of: physical activity, food choices, safety, social connection and participation, and exposure to pollutants” (Capon, 2007).

At an individual level much is a stake for families. Physical inactivity attributes 20% of the Diabetes rate. However regular PA throughout life reduces the incidence and fatality rate from cardiovascular disease by up to 50% (Bauman A, et al. 2002) and as much as a 58% reduction in the rate of diabetes can be sited when weight loss of 5-7% is combined with 30 minutes of PA most days of the week (Tuomilehto J, et al. 2001). For those with existing heart disease, being regularly active can decrease the chance of dying from another heart attack by 25% (Hardman, 2009). With the cost of mental health management set to increase substantially in the next decade the links between mental health and PA are also well established, the risk of depression is inversely associated with PA (Cassidy K, et al. 2004). With regular participation in PA improving short and long term psychosocial wellbeing by reducing feelings of stress, anxiety and depression (Australian Institute of Health and Welfare 2006; Warburton DE, et al. 2006). PA is a powerful tonic in the reduction of chronic illnes, and ultimately alleviates the cost of health care and improves quality of life.

The power to improve and maintain good health through PA is well recognised and is overwhelmingly supported by scientific literature across demographics, genders and social groups (Gebel et al. 2005). Such is the power of the approach that the medical system has included the prescription of PA into the routine practice of general practitioners (GPs) in Australia. In 2006 the national Medical Benefits Scheme rewarded GPs to assess and prescribe PA to patients 45 years old and older. The approach focuses on the individual and is based on the trans-theoretical model of behaviour change. Established in clinical trials for smoking cessation it has been adopted to address physical

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inactivity, nutrition, and the management of alcohol in patients globally. The focus on physical inactivity is justified with the risk equivalent to that of smoking (Lee et al. 2012). The investment into behaviour change in the medical system is well justified yet the determinants of PA behaviours stems broadly beyond the health system.

There is general agreement that health sector intervention alone will be an inadequate response to inactivity. Many factors influencing PA are not within the purview of the health sector, but relate to other fields, including urban design and planning (ALGA et al. 2009). This realisation of the important role that urban design and planning can play in encouraging PA is evidenced by the plethora of recent resources produced to guide built environment professionals in this area, all of which recognise the interrelatedness of many issues that call for a collaborative, interdisciplinary approaches (see for example CSIRO, 2008, ALGA et al, 2009, UNSW 2011, Heart Foundation 2004 and 2009). As Michael Sorkin has suggested that the “human body is the central measure or urbanity” (Wines, 2000 p211) then the observable manifestation of a healthy urban environment would be walking. Measuring levels of PA in Australia is undertaken by many jurisdictions and agencies in an un-coordinated fashion and not necessarily consistently. The Australian Bureau of Statistics (ABS) includes a description of factors that begin to describe the multi factorial nature of walking. The ABS describes leisure related PA segregating it into socio-demographic or environmental issues. Denoting an important delineation of activity related to socio-cultural, environmental taxonomies and purpose: recreation, and that of purposeful PA or activity for transport.

Walking for recreation and transport provides more than two-thirds of all health-enhancing PA in Australia (Heart Foundation of Australia, 2009). How we interact with the urban form is important, and evidence indicates there is a clear link between the health of people and their environments (Capon et al. 2007). In light of this, there is widespread agreement that there are benefits in modifying the built environment to support the health and wellbeing of the community (Heart Foundation, 2009). Key factors influencing walking rates vary by the type of walking. Walking for transport is influenced neighbourhoods that have connected street networks, good access to destinations and public transport, and higher residential densities. Where recreationalist are influenced by neighbourhood aesthetics and access to facilities, parks and beaches (Heart Foundation, 2009). Additionally individual factors have been identified that inhibit or encourage walking such as the level of comfort, financial circumstance and knowledge of healthy behaviours.

There is substantial research underpinning theories from the public health sector that concludes the importance of the link with the built environment in facilitating activity levels resulting in better public health (Nelson et al, 2008). The reality of the current situation is levels of PA in Australia are low. Only 38% of the population actually achieves the recommended amount of PA each week (ABS, 2011). PA in daily life has been systematically removed over the past few decades leading to a rapid rise in non-communicable disease in the developed and developing world (Booth, 2000). Few adults walk or cycle as a mode of transport, and less than 1 per cent cycle, 3.7% walked and 10.4% used public transport to get to work (ABS Census, 2007). The decline in the number of children who walk or cycle to school is well documented (Telford et al 2005, Morris, 2001) and this is often cited as a major factor contributing to childhood obesity which is on the rise.

It is clear that there are important ways that urban designers can contribute to the development of environments that promote various aspects of active living. For this to be realised there must be increased collaboration that draws on knowledge across urban design, planning, transport planning, public health and environmental psychology disciplines. This calls for multidisciplinary, multi sector partnerships to undertake comprehensive interventions aimed at improving PA through the built environment (Giles-Corti et al 2005). Local Government has a range of built environment responsibilities and through leadership can play a crucial role in increasing PA by creating enabling environments and opportunities for activity that are tailored to local community needs (Edwards and Tsouros, 2006).

Generally across Australia the link between public health and the built environment has been inadequately addressed (Matysek, 2011). However Bellingen Shire on the mid North coast of NSW is one local government that has engaged with improving active living opportunities through new initiatives and through modifications to existing urban form (North Coast Area Health Service, Heart Foundation and Bellingen Shire Council, 2011). Bellingen’s ‘Healthy Planning’ initiative will be discussed further following a contextual and theoretical discussion.

POPULATION GROWTH PROJECTIONS – GOVERNMENT SPENDING and BALANCES

The scale of this issue is immense and expanding. With Australia’s population projected to increase from about 22 million in 2012 to about 35 million by the mid 2050’s (Australian Government, 2010). The projections show a doubling of the proportion of people aged 65 years and over, to about 25% in 2056, when it is projected that there could be fewer than 1.5 working-age people for each person outside the 65+ age group, down from 2.1 today. In short, there will be less income per capita to pay for ever increasing expenditure per capita, with a cross-over point being reached about 2030, after which the nation will become increasingly in deficit. This is shown in the fiscal gap chart (blue bars) here shown as Table 1 (Australian Government ‘Australia to 2050’, 2010). Note that the brown bars (those that start in surplus in 2009-10) were the projections made in 2007, before the GFC.
The projected increased cost demands related to health and ageing (the first three sets of bars) to the year 2050 can be seen in Table 2, expressed as percentages of gross domestic product, compared with other categories, for which there is a projected decrease in spending. Health expenditure continues to expand, and is already the biggest category of government expenditure. Increased demands in the health system, higher technology/treatment costs and the pressure from chronic and preventable diseases will lead to expenditure that without action will overwhelm budgets and constrain services. The Queensland Government forecasted in 2011 that within thirty five years health spending will account for more than half of revenue collected because health expenditure has been growing at 9% pa compared with revenue growth of 6% pa – ensuring that the gap widens (Qld Govt, Dec 2011).

We can conclude from Tables 1 and 2 that Australia is heading toward a situation where expenditure demands on health will compromise other areas of national and state need. Clearly, if public health expenditure can be reduced then the gap between projected expenditure and revenue can close giving greater economic capacity and security for the nation. Physical inactivity contributes significantly to this burgeoning crisis, with research conducted in 2007 estimating that if more Australians were physically active for just 30 minutes a day the Australian health care system could save $1.5 billion in direct health care cost annually (Medibank Private, 2007). It is estimated that 17% of the total health care cost is due to treatment of 7 diseases (Coronary heart disease, Breast cancer, Colon cancer, Stroke, Depression, Type 2 diabetes, Falls) is attributable to physical inactivity. The key point however is that Australia should be seeking to assist the community in gaining a healthier profile for the well-being benefit of all citizens.
Government, May 1999) places Urban planners and designers in a unique position to create fundamental positive changes for communities and national agendas. Improving the performance of the built environment is arguably the most effective and sustainable way to benefit public health, with there also being potentially significant positive flow-on to the benefit of the economy and to the vibrancy of our urban areas.

VALUE OF URBAN DESIGN TO PUBLIC HEALTH

Links between urban design and public health are part of a complex set of relationships that are central to the challenge for urban design to demonstrate value. Assessing the value of urban design is complicated by there being many interrelated social (including health), economic and environmental benefits. Many, if not most, benefits accrue to the wider community rather than the developers of a project who may tend to emphasise short-run returns. The community favours a durable yet flexible outcomes that provides lasting utility. It falls then to local government to provide urban design guidelines and controls for private development, in alignment with public works, which together generate benefits to the community. One attribute alone will not necessarily deliver benefits; it is the combination of features and the extent to which they are made context-specific that counts (McIndoe, 2005, Ewing and Cervo 2010). An example of added value coming from a combination of attributes is demonstrated for Mixed Use and Connectivity. Mixed use and connectivity can deliver savings on land infrastructure and energy as well as being associated with lower crime rates and improved personal safety. Together the attributes produce health benefits by encouraging walking and cycling and in higher density they support public transport and economic vitality (McIndoe, 2005, Bauman and Bull, 2007), as shown in Table 3.

Table 3. Social, economic and environmental benefits deriving from Mixed Use & Connectivity (McIndoe, 2005).

Table 4. Community cost deriving from traditional urban development ‘Business as Usual’.

The converse of conclusions drawn from the diagram in Table 3 are demonstrated in Table 4, which shows salient implications of maintaining the status-quo of low density, single use and poorly connected urban environments, established through the gardens cities framework, this being the predominant situation for the vast majority of Australian towns and cities.

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Following the cause and affect chain through from the design of neighbourhoods to community outcomes, shifts the ultimate cost of underperformance of the built environment onto both the individual citizen as well as State and Federal Governments in terms of health costs. There is sufficient evidence to conclude that modifications to the built environment are needed to support the health and well-being of the community and address the economic crisis (Heart Foundation, 2009). It is at the Local Government level where meaningful action must take place but this is not where the resources are available or where the cost burden sits. Unless State and National health/planning policy and funding priorities are changed to strengthen a preventative health approach there may be insufficient take-up at local government level to make a positive difference.

THEORETICAL UNDERPINNING LINKING BUILT ENVIRONMENT and PUBLIC HEALTH

Principles and guidelines for the planning and urban design of the built environment have included matters pertaining to public health for a long time but much of this has been based on positivist assertion rather than on empirically underpinned theory. Over the past decade considerable public health and environmental psychology research has pioneered much needed grounding. However there remains a continuing need for the strengthening of theory linking observed relationships with the environment and this is likely to be more relevant at community-wide levels rather than individual behaviour “modifications to the environment have the potential for much longer-lasting effects than individual level interventions because changes are assimilated into structures, systems, policies and socio-cultural norms” (Nelson et al, 2008, p. 112). Nelson et al conclude that the state of theoretical knowledge in the field is best understood under the two categories of: ‘measurement of the environment’; and, the ‘links between perception of the environment and behaviour’ both of which are discussed further.

The first key theory for measurement of the environment is that relating to ‘social ecology’. This involves the social, cultural and institutional contexts of people-environment relations, referring to elements largely outside of an individual’s control but modifiable by society (Nelson et al, 2008, p 112). This complexity has been studied through cross sectional and quasi-experimental studies. It suggests that multi policy responses are needed across a range of organisations and actors to create meaningful shifts in PA behaviour. It also reinforces that changes to the built environment in isolation tend not to correlate with increased walking and cycling (Ewing and Cervo 2010), nor small scale changes to built form (Krizek et al.) Importantly the theory acknowledges that there are differential impacts on the various demographics, socio economic groups and that will vary depending on the location (Carver et al. 2008, Frank et al 2010, Dahmann et al. 2010, Franzini et al. 2010, Bonhorm and Koth 2010, Michael et al. 2010).

There are several independent studies that indicate key environmental factors that influence people to be more active: accessibility of facilities; opportunities for activity; weather, safety, and aesthetics (Sallis et al. 2008; Humpel et al. 2003; Pikora et al. 2002). Important research from transport planning adds the dimensions of destinations, land use, connectivity and walkability (Saelens et al. 2003). This latter work has developed the NEWS tool (Neighbourhood Environment Walkability Scale) which has been tested in a range of situations with high reliability (Cerin et al. 2008; Adams et al. 2009; Rosenberg et al. 2009). Additionally economic incentives, education that is supported by policy is needed to amass the benefits that the built environment could afford, in terms of increased PA rates (Gebel et al. 2005, Rodriguez 2009).

Importantly engagement in PA is difficult to achieve in those that are not physically active currently pertinent to over half of the Australian public. It is suggested by the ecological theorists that biological and psychological models of behaviour will not provoke the change that is required (Brownson et al. 2005, Sallis and Ganz 2009, Poulilou and Elliot 2010). The social ecological model provides clues as to the complexity involved to achieve population level change.

Engaging in PA requires the individual to commit to the behaviour, which is moderated by perceptions and manifests in behaviour itself. The second theory referred to as ‘theory of planned behaviour’ seeks to understand and predict relationships between attitudes and behaviour. This theory engages the question ‘is creating an activity-enhancing environment sufficient for individuals to become active? The theory best describes why positive behaviours are not acted upon. For example if a person perceives any one of the components of encouragement as negative then this helps predict why the planned behaviour does not translate into positive action (don’t bike-ride in the rain). Push pull forces enable and inhibit action, and can be considered through a matrix of the opportunity, ability and the motivation to undertake a certain action. As reported by Nelson et al. (2008, p. 114) research by Rhodes et al. (2006) concludes that “aesthetics and mixed use are likely to influence walking attitudes and potentially walking behaviour, by means of intention” Rhodes et al research results “imply that more and better quality green space and streetscape and a convenient mix of land uses may help in the transition of intentions into behaviour, and that individuals who live closer to retail destinations may end up walking more than originally intended”(p. 114).

Finally the trans-theoretical model of behaviour change places the individual at the centre of behaviour selection. Noting that an individual will respond differently to behavioural cues depending on what stage of change they are currently in. Ultimately matching information to the individuals location on a continuum improves the likely hood of change and the longevity of that engagement (Prochaska, and Velicer 1997). The theory has been used extensively in the medical field to better manage behaviours known to have adverse affects on health such as smoking and physical inactivity. This theory also normalises ‘failure’ to change, in that not all attempts at positive behaviour change are successful, nor are they always sustained. This theory places each individual on a continuum of change, with six stages: pre-contemplation, contemplation, preparation, action, maintenance, and termination and is mediated by factors such as self efficacy, decisional balance and temptation. Prochaska posited that as a general rule the
population that is not undertaking a particular desired behaviour, 40% are in pre-contemplation, 40% in contemplation, and 20% in preparation. Therefore the biggest gain can be found within 20% of the population.

Much of the research confirming or explaining the links between environment and individual/collective behaviour is relatively recent. Further research is needed to refine our understanding so that this can be transferred to practice. Recent reviews into the built environment conducted by the University of NSW identify a mix of environmental changes, social norms and socio/cultural environments influential in increasing physical activity, lending weight to socio ecological theory, this is supported by Gebel et al (2005). The factors and roles that enable PA behaviour is demonstrated in Figure 3. For positive change an integrated multidisciplinary approach is required (Transportation Research Board 2005, Giles-Corti 2005). There is no consensus to suggest the most appropriate theoretical model to best predict PA behaviour (Bible and Murtie, 2007), however in better understanding the built environment links with PA behaviours conceptual frameworks need to be expressed and then measured for certainty to develop.

![Figure 3 – Socio-Ecological Theory Attributes influencing PA behaviour](source: Transportation Research Board 2005, page 4.)

**PUBLIC PREFERENCES FOR HEALTHIER URBAN DEVELOPMENT**

Considering perceptions of the environment further, Australian residents have a latent demand for the preconditions that are required to become more active. The Heart Foundation funded telephone survey was conducted by Newspoll of 1,403 people aged 18+ in Sydney, Melbourne Brisbane, Adelaide and Perth in December 2010 and focused on elements of the built environment that respondents rated ‘extremely’ or ‘very’ important. Living within walking distance of public transport (69%), and living within easy walking distance of a range of local services (shops or cafes) (64%) are the stand-out highest priority elements. These were followed by every street having paved footpaths on both sides of the road (51%). Living within easy walking distance of a local park (46%) was also rated as ‘extremely’ or ‘very’ important, whereas 44% rated having a two-car garage and 39% having a large back yard with the same importance. It is pertinent in the context of the earlier discussion about Australia’s ageing population, that respondents over age 50 rated the above mentioned ‘extremely’ and ‘very’ important elements as more desirable than the younger age group.

The expressed needs of the Australian public align well with empirically tested attributes that are associated with active travel. The expressed need highlights the importance of those conditions that are out of the individuals control, the amenity that urban design can provide.

**CASE STUDY BELLINGEN**

Bellingen Shire is located on the mid north coast of New South Wales, part of a densely populated strip of land on the Eastern seaboard of Australia, pinched between the Great Dividing Range and the ocean. This coastal strip faces many pressures as existing towns and cities spread to accommodate an increasing population. The 2006 State of the Environment report (Beeton et al 2006) predicts that, if trends continue, 42.3 per cent of the Nowra to Noosa coastline will be urbanised by the year 2050, resulting in increased pressures on built and natural infrastructure. While Bellingen may not yet be feeling these looming population pressures directly, the Shire Council is, like many Councils in this part of the country, faced with increasing demands on its ageing infrastructure and assets combined with limited financial income from development with which to fund improvements. The area faces complex social challenges resulting from an ageing population combined with newer residents arriving as part of the ‘sea-change’ phenomenon. In these ways Bellingen is typical of many regional areas of the country.

The Shire has a small population base (12,416 at 2006 Census) and low population density (7.7 persons per km$^2$) well below densities that best support active living of 75 dwellings a hectare (Gilles-Corti etal. 2012), or the 30 people per hectare required for viable public transport and walkability (Eckersley, Dixon and Douglas, 2001). Residential development within the established town centres is generally restricted to infill within existing residential precincts. With new development not expected to occur at high rates, opportunities to fund public works from developer contributions are and will continue to be limited.
Through research commissioned by the Heart Foundation the collaboration was assessed and core outcomes of the collaboration were identified. These are discussed in the following account of the case study.

Collaborative planning for health in Bellingen, New South Wales

In 2008, staff from the North Coast Area Health Service (NCAHS), and planners from Bellingen Shire Council attended a healthy planning workshop run by the Premier’s Council for Active Living (PCAL) in Coffs Harbour. The workshop brought together staff from health services and local councils to discuss a wide range of issues of mutual interest under the conceptual framework of ‘healthy planning’. At the Coffs Harbour workshop, connections were made between NCAHS and Bellingen Council staff and the Heart Foundation (HF), who discovered through facilitated discussion that they had many goals in common in relation to healthy planning.

For Council planners, the timing of the workshop coincided with a broad review of planning controls being undertaken as part of the NSW Government planning reforms, so it was an opportune time to consider how to incorporate healthy planning principles as part of this review. Facilitated by the HF, which also engaged a consultant planner to assist with the process, the organisations began to work together to explore how some of the healthy planning ideas might be able to be incorporated into Council’s various plans and policies for the local area. This continued through 2008 and 2009, leading to long term commitments by the local agencies involved.

The healthy planning collaboration has resulted in a number of outcomes (discussed in more detail below). Council and NCAHS staff continue to work together and provide mutual support for their respective organisations’ healthy planning initiatives. Tangible outputs of the collaboration such as new provisions in Council plans result, while other outcomes have been less tangible, such as the ongoing relationship between the two local organisations, educational packages for new residents and the increased understanding about the kinds of opportunities that might be available in the future.

Some of the significant changes to planning documents, policies and processes that have resulted from this collaboration are as follows:

Bellingen Local Environmental Plan (LEP)

During the period of the collaboration, Council was developing a new Local Environmental Plan, and had hoped to insert specific clauses that would strengthen the statutory basis for healthy planning activities in the Shire. However opportunities to insert locally developed provisions into the LEP are generally limited by a need to meet state Department of Planning ‘standard instrument’ requirements, and use the state Department’s model clauses. One model clause used specifies that Development Control Plans for urban release areas must provide for ‘an overall transport movement hierarchy showing the major circulation routes and connections to achieve a simple and safe movement system for private vehicles, public transport, pedestrians and cyclists’, and also for ‘a network of passive and active recreational areas’. The LEP also makes neighbourhood shops permissible within residential areas (to encourage people to walk to a local shop rather than driving to the town centre). Council sees these provisions as providing broad support for a healthy planning approach to be specified at the Development Control Plan (DCP) level.

Community facilities and open space contributions plan

Under this plan, approximately 80 per cent of the adopted rate will be allocated to the construction of a network of shared off-road pathways (suitable for walking, cycling and for less mobile residents using electric scooters). This decision to focus on improving the local off-road path network was taken following an assessment of existing community infrastructure, and likely future demand from the local community. The Shire was already well served with built community facilities (such as community halls, libraries and neighbourhood and senior citizens’ centres) and public open space (parks, informal recreation areas and sporting facilities). However much of the open space was not well used – at least partly because it was not well connected or easily accessible.

This assessment is reflected in Council’s Community facilities and open space developer contribution plan, which provides a clear rationale for the emphasis on funding shared pathways:

As the Shire’s population continues to age future demand is likely to be focused on the provision of services and facilities that support improved access and mobility. [ ] The increased use of personal mobility scooters and need to assist the less able in the community to lead independent lives through the provision of dual use share ways, highlights the importance of developing and constructing an all weather off street path network (p. 21).

Pedestrian Access and Mobility Plan (PAMP)

The healthy planning approach provided an opportunity to revisit the existing PAMP. The importance of achieving connectivity has led to Council focusing on addressing ‘missing links’ within the overall network, and prioritising those provisions in the PAMP that can improve the accessibility and legibility of the pedestrian network as a whole.

Local Roads and Traffic Infrastructure Developer Contribution Plan

This plan levies contributions from developers for ‘on-road’ infrastructure improvements (including footpaths). Council included a number of items in the project schedule that will help improve the local road network for pedestrians,
cyclists and public transport users. These include on-road cycle ways and pavement upgrades complimenting the community facilities and open space contributions, and will be guided by the (PAMP).

Bellingen Shire Development Control Plan 2010 provisions (Bellingen Shire Council, 2010).

The central mechanism for Bellingen Shire to implement healthy design is within the Development Control Plan. This provides design criteria for new development to improve connectivity, and create an environment that encourages walking and cycling. Utilising evidenced based guidelines provided planners within council a framework for implementation. The Heart Foundation’s publication, Healthy by Design: a planner’s guide to environments for active living (2004), was used to identify provisions, which include:

- Returning to a grid-style pattern for layout of new streets and restricting use of cul-de-sacs, producing legible street layouts and improving connectivity (Clause 3.7.5(a) & (b) – Subdivision pattern & connectivity).
- Placing eyes on the street, with lots to face public open space, improving passive surveillance and safety for pedestrians and park users (Clause 3.7.5(c) – Subdivision pattern & connectivity). Including subdivision design (Clause 3.7.3 Lot orientation and frontages) and dwelling design (Clause 1.6.5 & Clause 2.6.8 - Urban Design) that results in dwellings addressing and overlooking the street frontage.
- 1.2 meter wide footpaths/shared pathways on both sides of the street, a sufficient width and quality to allow safe and comfortable passage for people in wheelchairs, people with prams, learner cyclists and people walking comfortably side by side (Clause 3.7.6 – Infrastructure requirements: Footpaths and/or shared footpaths & cycleways).
- Removing car-parking requirements for minor commercial developments in CBD areas (Clause 5.6.1 Parking requirements within designated CBD areas of Urunga, Bellingen and Dorrigo) to reduce the focus on vehicles in these areas and provide an alternative mechanism to levy for pedestrian friendly improvements.

The final point creates the opportunity to levy commercial developments, not for parking but for alternative facilities that support healthy planning goals. Council is planning to use the Public Domain Contributions Plan to levy commercial developments for the provision of public facilities that promote useability and accessibility of CBD areas for pedestrians and cyclists. This provides funding for seating, drinking fountains, bicycle racks, street trees and shade structures. In this way, developer contributions can help to create a more pedestrian-friendly public domain, and support broader healthy planning goals.

The strategic policy and legislative approach by council is supported by complimentary project based activities that include the development of community gardens in areas of underutilised open space and providing healthy living information for land purchasers as a part of the coveyancing process. Many organisational and partnership benefits have accrued in the collaboration. The importance of organisational change, methods of practice and capacities shouldn't be underestimated, issues such as:

- innovation, creative, and interdisciplinary thinking.
- contextualising healthy planning principles to a locality.
- Increases in communication between council departments.
- Internal Council-community collaborations.
- Leveraging and consolidating existing initiatives and relationships.
- Creates knowledge and encourages evidence-based approaches.

Conclusion

An escalating urban crisis threatens the very nature of our cities. This crisis is not so apparent or visceral as that of the cholera outbreak of the 1840s in London, or the insidious "miasma" that caused so much disease in the garbage riddled streets of the overcrowded industrialised cities of the late 19th century. Yet what looms is potentially crippling with health costs set to consume state and federal government budgets. Grounded approaches to modifying urban environments has been largely neglected and potentially provides an important lens in translating effort into results, and importantly measuring outcomes. The current research calls for multidisciplinary, multi sector partnerships to undertake multi pronged interventions aimed at improving PA through the built environment (Giles-Corti 2005). This case study describes such a collaborative, interdisciplinary approach to healthy planning and has investigated how standard local government planning processes and policies could be adapted to incorporate the principles of healthy planning, how a regional council with modest prospects of growth can fund appropriate changes to the urban form and ultimately how health outcomes can be improved.

This inter-sectoral collaboration has begun to integrate approaches from planning and health disciplines, and to apply this combined thinking to a specific Local Government Area. It has resulted in the addition of specific provisions to a number of Council’s planning instruments as well as generating ideas for future initiatives, forging positive interdisciplinary working relationships and introducing new ways of thinking to both Council and Area Health Service staff. For Council the project has provided a means of support for progressing innovative planning ideas, as well as adding legitimacy to these strategies through Health Department endorsement and the provision of an evidence base. This approach has great potential to assist Council to deliver on its Management Plan goals of community wellbeing, sustainable growth and enhanced quality of life. For Health Service staff, the relationship with Council provides a new way of achieving practical changes to the built environment that have the potential to deliver positive public health outcomes.

What is illuminated through the case study is the importance of three pillars of effective translation of theory into practice, the context, content and method. Bellingen has been able to take the evidence and contextualise the approach to ensure that actions correlate closely to the community desires and the sphere of influence that the council operates within, extend its capacity to engage in healthy urban environments through multidisciplinary...
collaboration. The demand for these types of changes relate more broadly to the Australian public, with residents in Australia’s major capital cities expressing a desire to be able to walk to the bus stop rather than a large back yard, (Heart Foundation, 2009). This could be an indication that the type of housing development that is largely being provided is not meeting the needs of the market. This should appeal to the development industry and policy makers alike, as it indicates a demand for healthier developments.

There is no consensus to suggest the most appropriate theoretical model that best predicts PA behaviour (Bible and Murtie, 2008), however in better understanding the built environment links with PA behaviours conceptual frameworks need to be expressed and then measured for certainty to develop. Bellingen has placed efforts in socio-ecological, and theories of planned behaviour. The challenge for Bellingen is to monitor these changes, with tools such as the Neighbourhood Environment Walkability Scale. This would complement the comprehensive approach that has already been taken.

While in many ways it is easy for this collaboration, and ultimately the success of this approach will be measured at the individual level, with lifestyle behaviours such as walking, cycling rates, sustainable changes will require ongoing commitment over a longer timeframe. The positive outcomes achieved to date suggest that the approach may be worthy of consideration in other areas and if replicated at a national scale could afford significant savings for state and federal governments mitigating the looming crisis in health and planning.

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