

Planning for organized sport in the fringe suburbs of Australian cities: A case study of Perth

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Abstract: Australia's major cities are experiencing, significant population growth, much of which is occurring in greenfield sites at the fringes of metropolitan areas. Many recent planning policies have focused on issues of social liveability and environmental concerns in these localities. A recent report by Curtin University (Middle, Tye and Middle, 2012) found that the implementation of three recent planning policies - Liveable Neighbourhoods, Bush Forever and Water Sensitive Urban Design - whilst providing some important environmental and social benefits, had the unintended effect of significantly reducing the number of active playing fields being provided in new suburbs. This paper reports on stage one of follow-up research focusing on the key question 'does this significantly reduced supply of active playing fields in new suburbs matter?' This stage is a comprehensive literature review on the values of active open space, the importance of organised sport that active open space facilitates and the benefits of being physically active. The conclusion of this stage of the research is that communities that do not have access to active playing fields are more likely to miss out on the specific social and economic benefits attributable to such spaces and, in particular, to the activities that they support. The local government in the outer metropolitan areas of Perth are significantly worse off than the middle and inner suburbs with regard to the three key factors of supply of active open space, demand for active open space and socio-economic vulnerability. These findings have significant implications for planners and policy makers in planning for new suburbs.

Introduction

Public open spaces in urban areas (also called urban parks, open green spaces) cater for a range of uses including conservation, active sport and passive recreation, and provide a range of benefits for urban populations. Bedimo-Rung and Cohen (2005) argue that there are three benefits of active open space useage:

- Individual physical health benefits through increased fitness;
- Social benefits through increased social interactions; and
- Economic value, including property values of surrounding residences.

There has been recent interest in the health benefits of open spaces, especially active playing fields and passive recreation areas, from health professionals in developed countries concerned about increasing obesity levels and reduced cardiovascular health (Bedimo-Rung 2005, Ward Thompson 2011). It is the active public open spaces that are of interest to this research. Playing fields designed to accommodate active community-based organised sport have traditionally been one of the prime uses of public open space. Community-based organised sport plays an important role in increasing population-wide levels of physical activity, which makes it a valuable tool in tackling the growing problem of obesity, particularly in sedentary youth (Eime, Payne, and Harvey 2009). In addition community based organized sport provides an environment not offered by other forms of physical activity that can increase social connectedness, personal life satisfaction and self esteem (Eime, Payne, and Harvey 2009)

Australia's major cities are experiencing, significant population growth, much of which is occurring in greenfield sites at the fringes of metropolitan areas. Perth is no exception with the most recent strategic planning document for Perth – Directions 2031 - predicting that its population will increase by over half a million people to 2.2 million by 2031 and is likely to double by the mid 21st century (WAPC 2010). This growth predicted may well be conservative, with the latest population projections published this year suggesting the metropolitan region could reach 2.2 million people by 2024, (Mulholland and Piscicelli 2012).

The key aim of Directions 2031 is to produce a "world class liveable city: green, vibrant, more compact and accessible with a unique sense of place" (WAPC 2010, 2). Notwithstanding this desire for a more compact city, over half of the planned new residences will be in new housing estates in the outer metropolitan areas on 'greenfield' sites. Provision of infrastructure is a key concern for these suburbs, and traditionally the main focus has been on the hard infrastructure, notably, roads, power and water. For

Perth to become a more liveable city, planning for infrastructure needs to go beyond a focus on the hard and to examine the quantity and quality of softer infrastructure provision, including open space.

Open space has a range of values and uses including providing the opportunity to play organized sport. In the middle of the 20th century, organized sport was the primary use of local open space in Perth. The Stephenson Hepburn Plan released in 1955 provided a metropolitan wide planning framework (Stephenson & Hepburn, 1955). In relation to local open space, it prescribed that 10% of subdividable land be given up for open space, of which 85% be provided as space for active (sporting) recreation (Stephenson & Hepburn, 1955). This emphasis on organized sport was in line with broader park planning trends in Western nations, where sports participation was used as a means to ensure that populations had the necessary physical fitness and mental discipline to defend their country if required (Walker & Duffield, 1983). It also reflected the importance of sporting success in Australia at the time, with the release of the Stephenson-Hepburn Plan a year before the 1956 Olympic Games in Melbourne and shortly before the 1962 Empire Games in Perth.

In the latter decades of the 20th century, the recreational preferences of communities began to shift away from formal active recreation towards less formal activities and passive recreation. In particular, the value green open spaces was increasingly recognized for their ability to provide a range of subtle psychological and stress relieving benefits that came with contact with nature and refuge from urban environments (Kaplan and Kaplan 1989; Ulrich 1991). These trends were followed in Perth. A summary of the shifting historical objectives of public open space by Grose in 2009 found that new types of unstructured recreation began to emerge as early as the 1970's (Grose 2009). Concurrent with these social shifts, increased ecological understanding of cities brought a new focus on the environmental role of parks and open spaces (Cranz and Boland 2004; Thompson 2002). This role is particularly important in Perth, where urban sprawl was and is spreading into ecologically-sensitive areas such as high quality bushland and low lying wetlands.

Three recent Western Australian (WA) planning policies, namely Liveable Neighbourhoods (WAPC 2000b), Bush Forever (WAPC 2000a) and Water Sensitive Urban Design (WAPC 2008) have brought public open space planning more into line with these shifts, through their focus on the nature and quality of open space.

Liveable Neighbourhoods was informed by the New Urbanism movement in the late 1980s and early 1990s which saw traditional suburban design as being responsible for a range of social, economic and environmental problems, as well as being "monotonous, bland and tasteless" (Forsyth and Crew 2009, 416). New Urbanism seeks to enhance the public realm, with a focus on squares, streets, open spaces and public buildings (Grant 2006). Talen (1999, 1364), argues that the essence of New Urban design is the facilitation of a sense of community and that the design and location of Public Open Space is critical to this because it can provide "a venue for chance encounters, which serves to strengthen community bonds". Suburbs designed in the New Urban style typically incorporate parks of varying sizes located throughout the suburb in order to maximize the number of residents with good access to a park. It was also designed to address concerns over the walkability of neighbourhoods planned under the Stephenson-Hepburn guidelines, which were perceived to favour car use over active mobility (Giles Corti 2006). The net result of the Liveable Neighbourhoods initiative was, therefore, that large public open spaces able to support organised sport were replaced by smaller public open spaces that favoured passive recreation and more linear open spaces that came together to form connected green networks to encourage neighbourhood walking and cycling.

Bush Forever (WAPC 2000a) is a WA Government-endorsed policy that seeks to protect and reserve significant areas of urban bushland. The implementation of this policy has seen an increased use of suburban open space for conservation purposes, and has placed restrictions on the use of this space for other uses. This initiative complemented the Liveable Neighbourhoods strategy, which also had the aim of better incorporating key environmental areas into local open space networks.

Water Sensitive Urban Design relates to best-practice treatment of urban storm-water. Prior to the 1990s, water management in urban areas was seen primarily as an engineering issue (Hedgcock 2010), where the emphasis was on efficient treatment of storm-water with direct discharge into watercourses, wetlands and the ocean. Water Sensitive Urban Design requires that storm-water is treated on-site rather than

through direct discharge to other water bodies. This inevitably requires that public open space be set aside to allow for this treatment.

Together, these three policies have had a generally positive effect on public open space provision, ensuring that local parks have evolved from being often fragmented mono-functional grassed spaces towards green space systems providing a wider range of recreational opportunities whilst supporting key ecological functions. However, as confirmed by a report by Curtin University (Middle, Tye, and Middle 2012), the implementation of these three policies also had the unintended effect of significantly reducing the number of active playing fields being provided in the newer outer **suburbs** of Perth, which are the suburbs on greenfield sites on the edge of the existing footprint of Perth (to the north, south and east). The report found that whilst the amount of local open space being provided remained about the same, increased proportions of this open space was being used for the purposes of biodiversity conservation and water management rather than for active recreation purposes such as sporting playing fields. The report also highlighted the trend to the provision of many smaller parks in preference to fewer larger ones meant that the remaining open space available for active use were less likely to be of a suitable size and quality to accommodate organized **sport**.

Comment [RJ1]: One referee wanted you to define what you meant by outer suburbs. You need to do so (in a sentence or less) and this could be a good place to do so

Comment [RJ2]: Comment deleted and incorporated elsewhere

These findings by themselves tell only part of the story. While the Stephenson-Hepburn Plan was successful in securing sufficient *quantities* of local open space, particularly for the purposes of organized sport, it was less successful in providing *quality* open space that met the other requirements of public open space that were deemed to be necessary or at least desirable towards the end of the century. The parks that were produced under the Stephenson-Hepburn plan have been criticized as producing bland and unattractive open spaces (Grose 2009), which are prohibitive to a range of non-sporting forms of recreation (Corti, Donovan, and Holman 1996, Giles-Corti, Broomhall, and Knuiiman 2005). Unlike these other forms of recreation that can be integrated into and enhanced by ecological landscapes, organized sport requires a flat playing surface devoid of natural elements, where significant groundwater resources are needed to maintain the playing surfaces to a suitable standard. It could, therefore, be argued that the open space provisions in the Stephenson-Hepburn Plan resulted in an over-supply of playing fields at the expense of other forms of recreation and ecological space, and that some decrease in the amount of playing fields was necessary in order for these other uses to be accommodated. Yet, this does not alter the fact that providing adequate space for organized sport remains an important use of open space.

A key follow-up question that must be asked in relation to these findings is “does this reduced supply of active playing fields in the newer outer suburbs matter?” This question is of particular interest to those local governments currently facilitating growth on the fringe of the Perth Metropolitan Area. These outer metropolitan councils have formed an informal alliance to lobby State and Commonwealth Governments on a range of issues associated with their rapid growth. The City of Armadale, on behalf of this group, asked Curtin University to carry out a desktop study to document the potential socio-economic impacts of the reduced supply of active playing **fields**. This was primarily a review of the existing literature related to the issue, as well as reviewing some existing health data for various suburbs in Perth. This paper presents the outcomes of that study. Whilst this study focused on Perth, its findings are likely to be of interest to other Australian cities where comparable demographic/urban development pressures exist and policies similar to Perth’s Liveable Neighbourhoods, Bush Forever and Water Sensitive Urban Design have been implemented.

Comment [RJ3]: This is part of your methodology. It needs a little elaboration. What kinds of sources did you chase up? How did you go about it? Etc.

Part 1: The key findings of the 2012 study on the supply of sporting playing fields in the fringe suburbs of Perth

The 2012 report referred to above (Middle, Tye, and Middle 2012) was funded by the WA Department of Sport and Recreation and some of the affected local government areas because they shared a perception that the Liveable Neighbourhoods, Bush Forever and Water Sensitive Urban Design initiatives had led to a reduced supply of active playing fields in Perth. The aim of the research was to quantify the impact, if any, of these policies on the supply of sporting playing fields in these outer suburbs.

To reach this aim, the study employed a mapping technique from the field of Ecology that deals with the spatial patterns of urban landscapes. Here, landscapes are viewed as spatially discrete *patches* that exist over multiple scales within a broader continuous matrix (Pickett and Cadenasso 1995) In this approach, each individual piece of open space is seen as discrete from the surrounding built up urban matrix (i.e.

each individual park). Each piece of open space was mapped and its total area quantified. Next, the discrete landscape patches within each park were mapped and their areas quantified. Individual landscapes were mapped on the basis of whether they provided space for organized community sport (i.e. playing fields), fulfilled a significant role in biodiversity conservation (i.e. bushland and wetlands), or contributed to the aims of water sensitive urban design (i.e. sumps, swales, permanent stormwater areas). These stormwater areas were further classified as either permanent or seasonally dry areas. All other areas were grouped together as a remaining green matrix, which, for the purposes of this study, was classified as 'passive'. The cumulative areas of total open space and each individual landscape type were then calculated in an Excel workbook for the different suburbs. These totals were then scaled by the total residential area and the estimated/projected population to produce unique values that could be used to compare the patterns of open space provision for each suburb. Specifically, it allowed for any changes in the supply of sporting playing fields across these suburbs to be identified, and compared to changes in the supply of space for biodiversity conservation and water management.

It should be noted that the different forms of public open space provided in Perth is generally categorised by planning authorities as either *local open space* (LOS) or *regional open space* (ROS). Local Open Space serves the needs of the local population, and is vested in, and managed by, local government. This includes local parks, sporting fields, playgrounds, and 'pocket' parks, and is generally ceded back to the local authority free of cost by a developer at the time of subdivision. Regional Open Space generally serves the interests of a larger non-local population and is usually reserved, purchased and managed by the State Government. Perth is well supplied with Regional Open Space, with around 50,000 ha proposed for reservation or already set aside. Regional Open Space generally has two broad functions: protection of large areas of the natural environment (bushland, wetlands and areas of high landscape value), and, provision of large recreational areas – for example a small number of sites with multiple playing fields. However, the vast majority of active playing fields are located within Local Open Space. This study mapped *all* of the Local Open Space within 135 suburbs of Perth using the above methodology. It then mapped sporting playing fields *only* within the Regional Open Space of these suburbs.

Comment [RJ4]: If you did the whole of the metro area, just say within Metropolitan Perth. If you only did the outer suburbs, you need to say so and ideally refer to a map which shows this.

Using this approach, the recreational type/landscape proportions within the open spaces in the selected suburbs were mapped and quantified. Suburbs were categorised as either:

- Old-inner suburbs built prior to 1960s (29);
- Suburbs built between the 1960s and the 1990s under the Stephenson-Hepburn Plan (59);
- Suburbs developed post 1990s and planned under Liveable Neighbourhoods, Bush Forever and Water Sensitive Urban Design guidelines (35); and
- Suburbs developed post 1990s and planned under Liveable Neighbourhoods only i.e. Bush Forever and Water Sensitive Urban Design were not significant planning considerations. (12)

Comment [RJ5]: You need dates for these last two categories (e.g. LN 1990-2000 all three post 2000) and the order should be chronological

This study showed that, whilst the overall supply of Local Open Space had not decreased with the implementation of these three policies, the area of sporting playing fields had decreased by over 50% - see Figure 1, which shows that the overall percentage of the area of public open space – both Local and Regional – within the four categories of suburbs set aside for active playing fields.

Looking only at the Local Open Space data, it can be seen that the extra requirements for biodiversity conservation and water management under these policies has been a significant factor in the reduction in active sporting public open space. This is well illustrated in Figure 2.

Figure 1: Percentage of suburb dedicated to active (sporting) POS (LOS + ROS), by suburb type

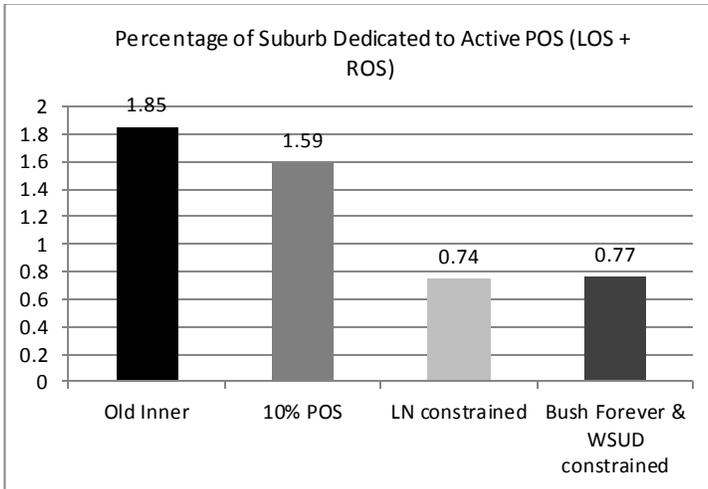
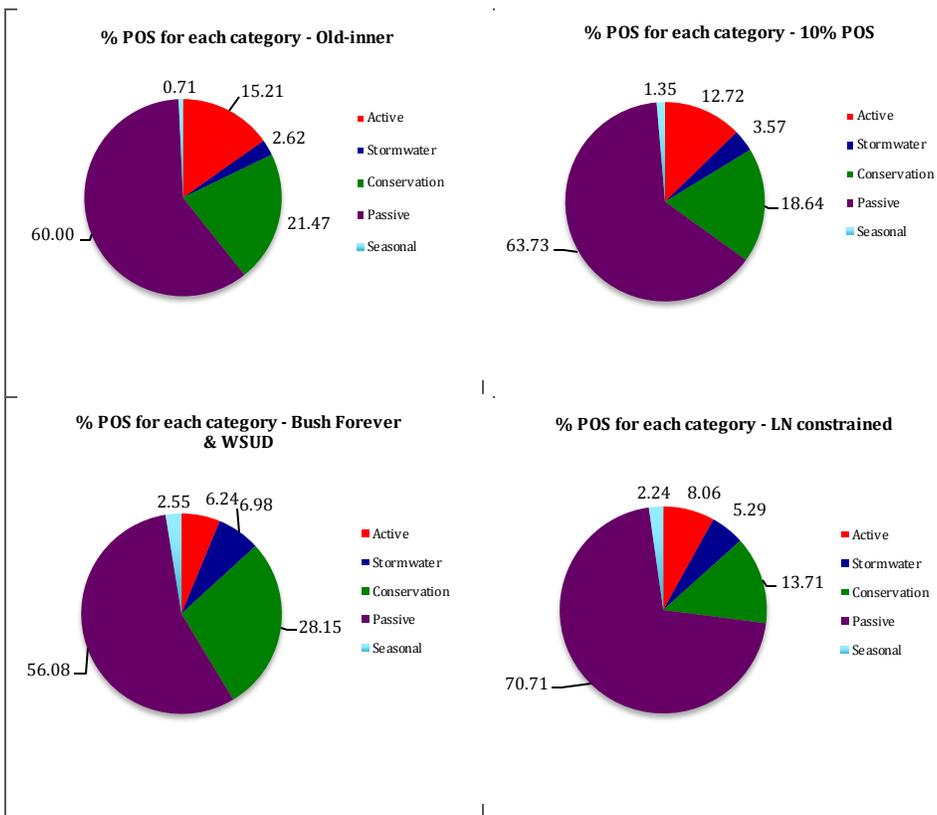


Figure 2: Percentage of each POS use type by suburb category (sporting space described as active)



Using the expertise of the steering group established to oversee the study and consideration of additional data on the demand and supply of active POS in a selected area in the South West of Perth, some guidelines were developed for what could be considered an adequate supply of sporting open space. The membership of the steering group were experts in recreation planning from local government and the group deliberated on the results of the study and reached consensus on a figure that represented an adequate supply of active POS. These can be used to provide guidelines as to what can be considered adequate active open space. It is not suggested that these proposed guidelines should be used as rigid criteria to determine the amount of POS and ROS that should be set-aside for active pursuits; rather, they provide a useful planning tool. The following guidelines were proposed:

- Suburbs setting aside around 1.4% of the suburb for playing fields would be likely to meet the local demand for sporting open space.
- For existing suburbs undergoing re-development with increased density, 6.5m² of playing fields per resident would be likely to meet the demand for sporting open space.

Based on these guidelines, the research went on to estimate the current notional shortfall of sporting open space in the Perth metropolitan area, and to predict what the shortfall would be by 2031 should there be no change to the three policy initiatives. The existing shortfall in the outer metropolitan suburbs of Perth is around 52 ha (this is the area if the playing surface only and does not include the surrounding grassed areas and the supporting infrastructure, including parking and club rooms). This is equal to 29 full sized AFL fields. By 2031, depending on the population projections used, this shortfall would grow to between 72 and 94 full sized AFL fields.

An additional finding of this research was that, as a consequence of the reduced supply of sporting open space in the new suburbs, there is an existing sporting open space 'spatial inequality' in Perth - i.e. there are sporting open space 'poor' and 'rich' suburbs.

Using Guidelines developed in the study, Figure 3 was created, which summarises the data with each suburb represented by a coloured dot:

- Blue – reasonably consistent with the Guideline (within 0.2% of the Guideline);
- Green – well above the 1.4% Guideline (1.6% or more); and
- Red – well below the Guideline (1.2% or less).

As illustrated in Figure 3, many of the new fringe suburbs are well below the Guideline for adequate active open space provision, while the majority of the suburbs with an adequate supply of active open space are in the old-inner or suburbs developed between 1960-1990. These new fringe suburbs can be considered the 'sporting open space poor' suburbs of Perth, wherein the residents have to travel long distances to have access to playing fields, both to play and to train for organised sport.

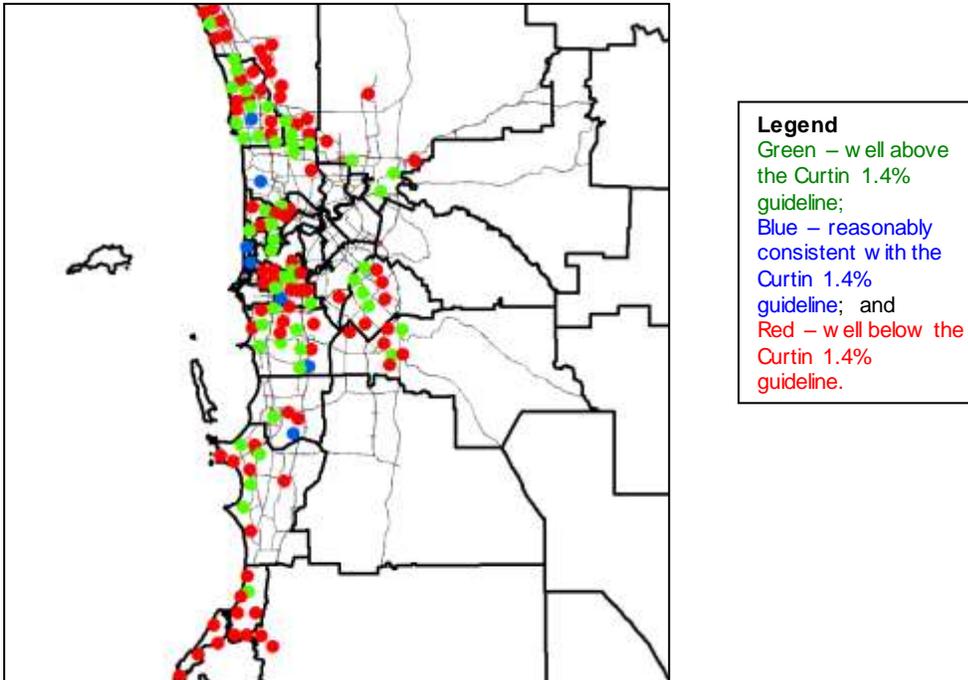
These results were the catalyst for the desktop study, which is reported on below.

Comment [RJ6]: You need to say how you arrived at these guidelines. Are they imputed from the SH era results?

Comment [RJ7]: You need to use specific numbers here. Is it (say) below 1%, 1-2 % and above 2%??

Comment [RJ8]: Comment deleted. Issue covered elsewhere

Figure 3: Sporting open space by suburb compared to the sporting open space guidelines



Part 2: Literature review of the unintended socio-economic consequences of a reduced supply of active open spaces in the Perth outer metropolitan suburbs

Overview

As noted above, the groups of local governments an formed informal alliance called the Perth Outer Metropolitan Growth Councils, and they commissioned a desktop study into the likely consequences of new suburbs having fewer sporting playing fields (Tye et al. 2012). The report concluded that active playing field provide both direct and indirect benefits. A key purpose of playing fields is that they facilitate physical activity, and there are many socio-economic benefits for the individual and the community from participation in organized community sport. By exposing participants to green environments, playing fields, as part of open space provide a range of other indirect benefits to health and well-being. The report also concluded that the suburbs on the fringe of Perth suffer a range of disadvantages, and that being 'sporting open space poor' adds further to this overall disadvantage.

The socio-economic importance of physical activity and sport

Participation in organised sport has the potential to provide a range of socio-economic benefits. There is now considerable evidence of the health benefits of physical activity (Asztalos et al. 2012, Bauman 2004, Chappell and Funk 2010), including greater health-related quality of life, enhancing the experience of well-being and positive physical self-perception. The economic benefits of physical activity by reducing the risk of chronic diseases like obesity, type 2 diabetes and cancers including lung, colon and breast cancers, are also considerable (WHO 2010, Physical Activity Guidelines Advisory Committee 2008, Wareham, van Sluijs, and Ekelund 2005).

The converse finding is that it is estimated that over 16,000 Australians die prematurely each year as a result of physical inactivity (Medibank Private 2008). The cost of physical inactivity has been estimated to be around \$14 billion in Australia (Access Economics 2008). The subsequent productivity loss was estimated by Access Economics to be 1.8 working days per employee per year.

While not all of these benefits are specific to organized sport, it is one of the most effective types of physical activity for providing these benefits for young people. One Australian study (Olds, 2009) found that organized sport made up over half of all moderate to vigorous physical activity for 9-16 year olds. Additionally, children who participate in organised community or school based sports are more likely to be active and to participate in physical activity as adults (Hardy et al. 2008, Jacka et al. 2011). Thus, participation in organized sport can also have indirect socioeconomic benefits later in life.

Considerable mental health benefits also ensue from participation in physical activity and sport. Physically active individuals consistently report higher levels of subjective wellbeing (DoH 2004, Kegler et al. 2012). Physical activity also promotes resilience to the stresses of modern living by reducing the symptoms of depression, anxiety and panic disorders (Adams, Moore, and Dye 2007, Street, James, and Cutt 2007). Research also shows that adolescents who are active participants in sports also tend to experience less anxiety, are less depressed and have fewer psycho-physiological symptoms (Carter et al. 2012, Asztalos et al. 2009).

Participation in organised sport has been shown to have benefits beyond these positive health outcomes described above. Physical activity can also act to increase social cohesion and sense of belonging within a community (Craddock et al. 2009, Kim and Kaplan 2004). In this way, it helps build the social capital of a community. Sport may be one of the most effective forms of physical activity for providing this function. One recent Australian study found that, due to its social nature, sport has the ability to contribute to the wellbeing and quality of life of its participants to a greater degree than other forms of physical activity (Eime, Payne, and Harvey 2009).

Sport plays a significant role in creating happier and safer communities by helping to integrate its most vulnerable members; it has the ability not just to bring like-minded people together but also to do so in an environment that encourages their development as citizens. The challenges unique to organised sports offer children the opportunity to acquire new skills, interact with others, meet challenges, develop team skills, and potentially improve their self-esteem and self-confidence (Hardy et al. 2010, Heitzler et al. 2006). Sports competition also presents its participants with opportunities for moral decision-making in pressure situations, and the development of values intrinsic to specific sports (Parry 2012). Through its ability to create better citizens, it has been found that children engaging in sport and recreation are more likely to perform better educationally, whilst being diverted away from crime and anti-social behaviours (Sport Business Partners 2007).

In summary, sport as a form of physical activity has a range of important direct social benefits related to both physical and mental health, provides economic benefits to the community as a whole through better health outcomes, contributes to a stronger sense of community, and creates better citizens.

The socio-economic importance of playing fields as green open space

Whilst the provision of active playing fields is critical in facilitating sport and physical activity and the benefits that ensue, they also have an intrinsic value beyond this formal role. Research suggests that there is a positive relationship between access to green space or natural environments and the general health of a community (Maas et al. 2006, Ward Thompson et al. 2012). Access to public green space plays an important role in perceptions of neighbourhood quality, satisfaction and safety (Evans et al. 2012, Ryan 2005). Furthermore, the frequency of childhood visits to green spaces is strongly related to the likelihood of visiting such spaces as an adult (Ward Thompson, Aspinall, and Montarzino 2008). Increasingly, participation in organized sport may be one of the few reasons that young people visit a green space, and thus receive the indirect benefits that are associated with these environments. Thus, while these changes to the way open space has been provided in Perth have not reduced the amount of green space in these suburbs, it may mean that one of the main pathways for exposing young people to these spaces and fostering positive behaviour is being removed.

Demographic snapshot of the Outer Metropolitan Councils of Perth

A range of data for Perth were analysed to assess whether the outer suburbs of Perth are significantly different from the rest of Perth in demographic terms. The key differences that emerged were:

- With the exception of one Local Government (City of Mandurah) the average household size is greater (2.7-3.0 in the outer metropolitan area compared to 2.6 for the whole of Perth);
- With the exception of one Local Government (Shire of Serpentine-Jarrahdale) the proportion of one parent families with children is higher (around 16% compared to 14.5% for the whole of Perth);
- Median household income in most of the outer suburbs is much less than the Perth average;
- With the exception of one Local Government (City of Cockburn) the percentage of people attending a tertiary institution is significantly less than that for the whole of Perth (6.7-10.9% compared to 13.9% for the whole of Perth);
- With the exception of one Local Government (City of Cockburn) unemployment rates are higher (4.5 -8.2% compared to 3.7% for the whole of Perth);
- Overall, the percentage of Disengaged Youth 15 to 24 years is higher (8.1 – 55.5% compared to 7.2% for the whole of Perth); and
- With the exception of one Local Government (City of Mandurah) home ownership rates are lower (19.0 – 27.6% compared to 29.5% for the whole of Perth).

Comment [RJ9]: Somewhere you need to identify what you mean by the outer suburbs

Comment [RJ10]: Put some numbers in here. 'Most' and 'much' don't cut it

In summary, the outer Metropolitan Growth Councils of Perth can be described as relatively disadvantaged on a number of indicators when compared to the rest of the metropolitan area. These areas have a younger age profile, have higher household size, and have larger proportions of one-parent families and couple families with children. In terms of income, these Councils have lower median household incomes and higher unemployment rates.

Discussion and conclusion

The data presented above make it clear that the outer Metropolitan Growth Councils of Perth are relatively disadvantaged on a number of indicators when compared to the rest of the metropolitan area. In addition to this socio-economic disadvantage, the research presented here also shows that the fringe suburbs of these Councils are also sporting open space poor. As a result, it is likely that there will be fewer opportunities for residents to participate in organised sport and other physical activities, meaning that they are likely to be less active, have poorer resultant physical and mental health and that the social cohesion of the communities may well be reduced.

All of these possible outcomes have not been reviewed in this study. As an initial test, however, the data on obesity for Perth was examined using information from the WA Health and Wellbeing Surveillance System (WAHWSS).

Table 1 summarises the average body weight data from WAHWSS. The table groups Councils into those in the outer Perth metropolitan areas that have significant growth, and Councils in established areas that have limited growth. An 'H' is allocated where a Council has a higher than WA average in any criteria. 'L' represents a lower than WA average. For illustrative purposes, to ascertain an overall body weight score for a given local authority a numerical score from -2 (high obese) to +2 (low obese) is allocated.

As can be seen, the populations in outer metropolitan growth Councils are already, on average, more overweight than those in the more established suburbs. Whilst a 'cause and effect' relationship is not being inferred, it could be argued that the populations in these outer suburbs are likely (using weight as an indicator) to be at greater risk of health problems. Having access to fewer sporting open spaces may be a direct contributor to poorer overall health outcomes compared to other areas, indirectly it may also impact on the general wellbeing of a population through reduced opportunities for accessing the associated social and economic benefits.

Table 1: Average adult body weights for Perth, by local government area (Source: WA Health and Wellbeing Surveillance System)

Body weight	Local Government																				
	Outer LGs with significant growth								Established LGs												
	Armada	Cockburn	Gosnells	Kwinana	Mandurah	Rockingham	Swan	Wanneroo	Bayswater	Belmont	Cambridge	Canning	Fremantle	Melville	South Perth	Victoria Park	Vincent	Joondalup	Stirling	Kalamunda	Mundaring
Normal weight	--	--	-	-	L	L	-	-	-	-	H	H	H	H	-	-	-	-	-	-	-
Overweight	--	H	-	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Obese	H	-	H	H	H	H	-	-	-	-	L	L	L	L	-	L	L	L	-	-	
Body weight score	-2	-1	-2	-1	-3	-3	0	0	0	0	2	2	2	2	1	0	1	1	1	0	0

In short, the supply of sporting playing fields in these outer Perth suburbs has been significantly reduced by changes in the open space planning guidelines even though the demographic makeup of these communities make them most reliant on the socioeconomic benefits provided by participation in organized sport within green open spaces. Thus, it can be concluded that the significant reduction in the amount of sporting playing fields within the public open spaces in these suburbs does indeed matter.

Comment [RJ11]: A conclusion that refers to the national relevance of these results would make the referees happier

Whilst the conclusions drawn here are specific to Perth, it is possible that other Australian Cities are facing the same similar shortages of playing fields in the new suburbs on the urban fronts on edge of the existing urban footprints. The three Perth planning policies referred to here – Liveable Neighbourhoods, Bush Forever and Water Sensitive Urban Design – have their parallels in other Australian cities. Urban design as emerged as a discipline in Australia based on some of the key ideas of the New Urbanism movement, and Sydney, Adelaide, Brisbane and Melbourne all have urban design guidelines (Kozlowski and Huston 2008). As Cuthbert (2008, 264) notes “The concept of urban space is at the heart of urban design.” Most Australian Cities have developed specific water management policies aimed at better management of urban water: for example, Melbourne has a urban water policy that is based on “integrated water cycle management...” (Corbett 2012, 221). The Commonwealth Government through strategic assessments under the EPBC Act has made conservation of key habitats in Australia’s major cities a significant planning issue (a strategic assessments of the future growth of Melbourne has been completed and one for Perth is underway).

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