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Road safety benefits of placemaking activities in South Australia

SJ Raftery, G Ponte & JE Woolley

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AUTHORS

SJ Raftery, G Ponte and JE Woolley

PERFORMING ORGANISATION

Centre for Automotive Safety Research
The University of Adelaide
South Australia 5005
AUSTRALIA

SPONSORED BY

Department for Infrastructure and Transport
GPO Box 1533
Adelaide SA 5001
AUSTRALIA

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ABSTRACT

Placemaking is an urban design practice that provides a focus on place attributes for more inclusive use by 'people' rather than motor vehicles and where the central focus is 'place' (for people) rather than 'movement' (of traffic). Placemaking activities include simple interventions such as artworks on roads, as well as larger scale projects such as the creation of shared spaces and re-design of road space that supports asset renewal or economic development. The use of placemaking as a tool or catalyst for improving road safety is appealing, and psychologically managing driver behaviour through manipulation of environmental features has great value when those manipulations create a more people-friendly environment. While the mechanisms through which placemaking activities positively impact road safety are not fully understood, it is highly likely that the benefits are mainly realised through reductions of vehicle volumes and vehicle speeds. Additionally, placemaking that is more disruptive and/or reclaims larger portions of public space (i.e., roads) for people rather than traffic will result in increased road safety benefits.

KEYWORDS

Placemaking, road safety, movement, place, link, urban design

Summary

Placemaking is an urban design philosophy centred on attracting and encouraging people to visit or spend more time in places and engaging with the space, other people, and businesses or attractions. Placemaking activities include simple interventions such as artworks on roads, as well as larger scale projects such as the creation of shared spaces and re-design of road space. Placemaking is becoming more common in road asset renewal or road re-design and one of the potential benefits is improved road safety. The evidence suggests that a safety effect is largely the result of reductions in vehicle speeds and/or reductions in the volumes of motor vehicles due to restricted access or diverting traffic away from the area. There is also evidence that placemaking that increases pedestrian activity and density leads to a reduction in vehicle speeds. However, this effect appears to diminish when pedestrian density lowers.

Aside from the finding that projects that reduce or restrict motorised traffic have a safety benefit, it is difficult to specify the effects of individual placemaking elements. This is because projects that can be classified as 'placemaking' vary markedly, and many of them are unique.

Some evaluations of placemaking activities have employed simple methodologies that have only produced anecdotal results because sample sizes were too small (too few crashes to make comparisons) or it was not possible to control for factors such as general changes in speed across the road network. It's important to conduct randomised controlled evaluations to identify any valid, statistically significant changes.

In South Australia placemaking has been implemented using murals for a subtle traffic calming effect or as part of infrastructure renewal projects or large projects that support economic development. The consideration of vulnerable road users such as pedestrians and cyclists as a central focus allows the design of a "safe system" from project inception.

The use of placemaking as a tool or catalyst for improving road safety is appealing, and psychologically managing driver behaviour through manipulation of environmental features has great value when those manipulations create a more people-friendly environment. While the mechanisms through which placemaking activities positively impact road safety are not fully understood, it is highly likely that the benefits are predominantly realised through reductions of vehicle volumes and vehicle speeds. Additionally, placemaking that is more disruptive and/or reclaims larger portions of public space (i.e., roads) for people rather than traffic will result in increased road safety benefits.

The information contained in this report was current as of December 2020.

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1 Introduction

Over the past century, roads and streets have been designed primarily for motorised vehicular traffic with the focus being movement of people and goods. This philosophy has generally been applied to the full hierarchy of road types from low volume local roads to high volume arterials and motorways. As a result, the nature of the transport network makes encouragement of active transport modes such as walking and cycling difficult and complex to safely manage. The typical engineering response to make streets safe and amenable for pedestrian activity is through traffic calming, such as isolated raised platforms/plateaus, speed humps, chicanes, road narrowing or combinations of treatments that target an entire local area. Additionally, lowering of speed limits can also result in more appropriate traffic movements as well as displacing traffic from local residential streets to roads more suited to higher volumes and higher travel speeds.

These traffic management measures may be effective from an engineering point of view to lower speeds and lower traffic volumes but acknowledging that road space has value and should be shared by people, whether on foot or on a bike, is critical for improving liveability and amenity, while in some locations this can also benefit economic activity.

Increasingly, public spaces are being designed or re-designed as places that are more people-oriented. The term *placemaking* refers to an urban design philosophy centred on attracting and encouraging people to visit or spend more time in places and engaging with the space, other people, and businesses or attractions. Placemaking encompasses a range of activities. At one end of the scale, placemaking can involve small measures, such as a painted road mural, where the community actively engages in conceptualisation, design and in the painting of a road surface. This can be done either to reclaim space or present this space as a marking of community territory. At the other end of the scale, large-scale placemaking activities consider people at the forefront of the design of the roadway and physically reclaim whole (or substantial parts of) roads for the sole purposes of people-oriented activities.

Modifying road design to be more people-centric might be expected to yield a benefit to road safety through reduced potential conflicts between people and vehicles, reductions in vehicle speeds and traffic volumes, and a reduced number of road crashes. It is important that objective evidence is collected to identify such benefits where they exist.

The aim of this project is to seek some understanding as to how placemaking activities can benefit road safety, drawing on examples and evidence from overseas. The report discusses and gives examples of local placemaking, motivations for the placemaking and the results of evaluations. A commentary on the knowledge gaps regarding the evaluation of placemaking activities is also presented.

The information contained in this report was current as of December 2020.

2 Literature review

Placemaking is an urban design philosophy centred on the notion that public spaces should be designed to be more people-oriented and encourage people to spend time at the place, engaging with the space and other people. The term placemaking has been applied to a variety of activities including artworks painted on the road; the complete or partial redesign of streets (including footpath widening and beautification activities, etc.); shared spaces; and complete reclamation of road space primarily for use by pedestrians, with motor vehicle access either restricted or forbidden. Further, there are often substantial differences between placemaking projects, even of the same type, as different approaches may be used or different elements incorporated into the project. This makes drawing comparisons between placemaking projects difficult. Additionally, the requirements of true scientific experimentation (i.e., random allocation to treatment and control conditions) are often incompatible with public works. Studies examining the effects of placemaking tend to measure the effect of treatments as a whole rather than individual elements. As such, the available body of evidence in this field is difficult to assimilate as no two studies have examined the same thing and it is not possible to determine the effect of individual placemaking elements.

The literature review begins with a brief history of placemaking and the philosophy behind it, road function and classification with respect to the movement and place paradigm as well as tactical urbanism as an approach to influence urban design. Some research is then presented on the factors that influence safety outcomes of placemaking as well as literature that looks at methods to measure the value of place in the transport system. Examples of placemaking and methods to evaluate placemaking are then presented from the UK, New Zealand and the US.

2.1 History of placemaking

The origins of modern placemaking can be found in the advent of the Dutch *woonerf* (living yard) in the late 1960s (Lydon & Garcia, 2015). While traffic engineering has traditionally focussed on the design of roads to accommodate (primarily) the private motor vehicle, the *woonerf* is a residential street where the physical design is such that vehicles are slowed down and people are given priority. These arose from citizen concerns about safety, congestion, and pollution associated with the increasing dominance of motor vehicles. While the Dutch are widely considered advanced in their design of roads that accommodate vulnerable road users, other western jurisdictions, such as Australia, continued to design roads primarily as places for cars, with a focus on the efficient movement of vehicles, largely to the detriment of vulnerable users and the sense of place associated with some roads (e.g., main street shopping districts).

In the early 21st century there was a recognition that arterial streets posed a unique problem for planners and traffic engineers due to the dual purpose of serving key transport routes but also having a number of urban *place* functions (Svensson et al., 2004). Traditional principles saw arterial roads designed more as roads to accommodate traffic movement much to the detriment of place functions of these streets. *Arterial streets for people* (Svensson et al., 2004) was developed as a guide for more people-oriented design for arterial streets, giving consideration to the overall transport and place needs of each space. This report gave rise to the *Movement and Place* paradigm.

While the core tenet of placemaking is the creation of spaces for people, there are some roads for which placemaking activities would not be appropriate. Movement and Place is the current road classification paradigm used to classify roads based on their function: roads can serve as a link, allowing the movement of traffic from one destination to another; they can also serve as a destination in their own right, a place where people desire to spend time and engage in social activities (Jones, Marshall, & Boujenko, 2008; see Figure 2.1). This also considers the social significance of destinations and the

nature of visitors to these areas; at one end of the spectrum lies nationally significant locations, which draw visitors from afar, while at the other end lies local streets, which are likely only to be visited primarily by people who live in the area. Linking road types with destination types yields a matrix of classification which can be used to determine a street's function on the movement-place spectrum. The movement function is primarily concerned with the efficient movement of traffic through the area while the place function is concerned with the area as a destination, the endpoint of the trip rather than a place through which to transit on the trip to some other destination. Some roads clearly have a movement function (e.g., highways and freeways) and are not suitable for placemaking, while shopping centres and local streets have a greater place function. Between the two lie a mix of road types with varying skews towards either movement over place or place over movement. A common Australian road is the high street shopping area which, due to shopping and other businesses, suggests a place function, while the street itself is usually a significant road with a movement function. Utilising the movement and place paradigm may facilitate the identification of locations suitable for placemaking activity *and*, with further work, may also be useful for identifying the types of placemaking activity that are appropriate for the road's function. Through their contributions to the development of the *Streets for People: Compendium for South Australian Practice* (Government of South Australia, 2012), Boujenko, Morris and Jones laid the foundations for placemaking in Australia.

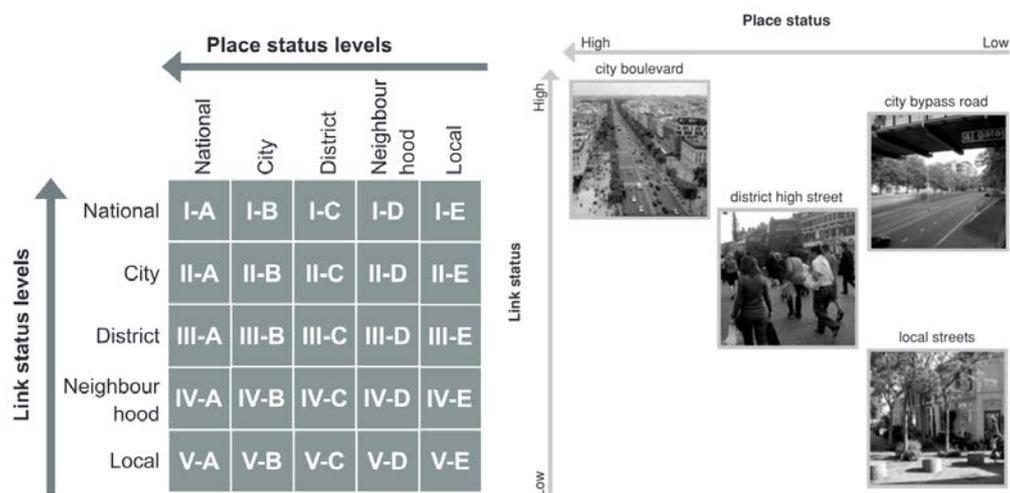


Figure 2.1
An example of a movement and place matrix (left) and the corresponding street types (adapted from Jones, Marshall, & Boujenko, 2008)

This paradigm shift from transport-oriented planning to a more people-oriented approach has led to the adoption of movement and place (or link and place) planning and network design in Australia and other jurisdictions around the world. There is recognition that urban planning, including the design and management of the road network, and the adoption of movement and place, and placemaking principles, has facilitated a shift away from planning for vehicles to planning for people in the recognition that the latter is an important aspect of creating vibrant and liveable cities. One of the more recent developments in Australia that facilitates the implementation of placemaking projects is the use of tactical urbanism to help bring designs and concepts into existence.

Tactical urbanism is a city, organisation, or citizen-led approach to urban design that utilises low-cost, short-term, scale-able interventions to demonstrate and trial changes to the urban environment intended to improve the experience of pedestrians and cyclists. The goal of tactical urbanism is to circumvent barriers to change associated with the traditional approach to urban design (i.e., focus on large-scale projects that are slow and expensive to complete), to bring about long-term changes that achieve the desired placemaking goals. The tactical use of short-term changes to the environment serves to provide

a real-time demonstration of how a space can be used and improved, and provides the flexibility to introduce changes as necessary. By adopting an iterative process of implementation and evaluation, the design is able to evolve through lessons learned from previous iterations, which ultimately yield a long-term design that meets the requirements of most stakeholders. Where placemaking is an urban design philosophy, tactical urbanism is a process through which placemaking can be achieved.

The National Association of City Transport Officials (NACTO) is an association of 81 North American cities and transit agencies created to facilitate the exchange of ideas and collaboratively address transport issues. NACTO seeks to develop cities as places for people with an emphasis on safety, accessibility, sustainability, and equity. NACTO have produced several street design guides that incorporate these principles (safety, sustainability, accessibility, equity), including designs that would be considered placemaking.

2.2 Factors that may influence the safety outcomes of placemaking activities

Some proponents of placemaking suggest safety is derived by building uncertainty (Engwicht, 2005). This uncertainty is then proposed to slow drivers down and cause them to drive with greater care. Increasing the number of pedestrians in the road space and the addition of other elements such as seating are said to increase uncertainty. Other novel elements in the environment, such as artworks on roads, may also raise uncertainty while highlighting the presence of a local community with some interest in and ownership of the road space and surrounding environments. Despite such hypotheses, there remains little understanding as to the actual mechanisms (e.g., uncertainty) through which placemaking can affect safety.

A more evidence-based approach is provided by the Austroads report Integrating safe system with movement and place for vulnerable road users (Corben, 2020). As the name suggests, this report outlines a range of engineering treatments that can be adopted to improve the safety of vulnerable road users based on road types classified by the Movement and Place matrix: city hubs, city streets, city places, activity boulevards, movement corridors and connectors, and local streets (see Figure 2.2). The treatments described and outlined by Corben are known to influence safety by moderating vehicle speed, exposure to vehicles, and the likelihood of collisions between vulnerable users and motorised transport. A summary of these treatments that are relevant to placemaking and their expected impact on safety are provided in Table 2.1 and Table 2.2.



Figure 2.2
Movement and place framework showing road and street groupings (from: Corben, 2020).

Table 2.1
Vulnerable user safety measures at intersections

At intersections									
Safe System treatment	Exposure	Likelihood	Severity	City Hubs	City Streets	City Places	Activity Streets & Boulevards	Movement Corridors & Connectors	Local Streets
Signalised intersections with 'Scramble' phasing (30 km/h speed limit)		✓	✓	✓	✓		✓		
Limit access by mode	✓	✓	✓	✓		✓			
Raised signalised intersections with 30 km/h ramps		✓	✓	✓	✓		✓		
Safety platforms (30 km/h or lower) on all approaches		✓	✓	✓	✓	✓			✓
Geo-fencing technology for trams, trucks and other large vehicles		✓	✓	✓	✓	✓	✓		
Signalised roundabout with exclusive turn phases for public transport, cyclists and pedestrians		✓	✓	✓			✓	✓	
Grade-separation of pedestrians and cyclists from vehicular traffic		✓		✓					
Roundabouts with 20/30 km/h wombat crossings		✓	✓		✓	✓	✓	✓	✓
Threshold platforms at intersections with side-streets		✓	✓	✓	✓	✓		✓	
Raised intersections with 30 km/h (or lower) platforms		✓	✓	✓	✓	✓	✓	✓	✓
Signalised 'tennis ball' intersections (30 km/h design)		✓	✓					✓	
All-way stop signs		✓	✓			✓		✓	✓
Restricted access intersection	✓	✓	✓			✓		✓	✓

Table 2.2
Vulnerable user safety measures for use mid-block

Between intersections									
Safe System treatment	Exposure	Likelihood	Severity	City Hubs	City Streets	City Places	Activity Streets & Boulevards	Movement Corridors & Connectors	Local Streets
30 km/h speed limits or lower		✓	✓	✓	✓	✓	✓		✓
Fully segregated pedestrian paths		✓		✓	✓	✓		✓	
Separated cycle facilities		✓		✓	✓	✓	✓	✓	
Car-free streets (potentially time-based)		✓		✓		✓	✓		
Pedestrian operated signals, Zebras or Wombats in 30 km/h (or lower) speed zones		✓	✓	✓	✓		✓		✓
Shared space (with raised textured pavements and 10 km/h speed limits)		✓	✓	✓	✓	✓	✓		✓
Relocation of public transport stops from centre of road to kerbside		✓	✓	✓					
Pedestrian malls	✓			✓		✓	✓		
Grade-separation of pedestrians and cyclists from vehicular traffic		✓		✓				✓	
Shared use by cyclists of traffic lanes (30 km/h)		✓	✓		✓				✓
Kerb blisters/road narrowing/pedestrian refuges	✓	✓			✓	✓			✓
General road narrowing (30 km/h setting)	✓				✓	✓			✓
Exposure reduction/redirection of through traffic/time-based restrictions on selected modes	✓				✓				✓
Medians		✓					✓		
Playground zones (30 km/h setting)		✓	✓			✓			✓
On-road cycle lanes (30 km/h setting)		✓	✓			✓			✓
On-road cycle lanes with physical separation		✓✓		✓	✓		✓	✓	✓
Wombat crossings (30 km/h)		✓	✓			✓			✓
Speed platforms (30 km/h)		✓	✓			✓			✓
Horizontal deflection (30 km/h setting)		✓	✓			✓			✓
Textured/coloured pavements (30 km/h setting)		✓	✓			✓			✓
Grade-separated roundabouts for pedestrians and cyclists, e.g., Hovenring, Eindhoven, Netherlands			✓					✓	

Another recent Austroads report (AP-R626-20; Fooks & Kennedy, 2020) sought to develop a means for measuring the value of place in the transport system. It examined the roles of different transport planners and urban planners in defining *place* within the transport network. Where traditionally the value of transport networks has been measured in terms of movement (i.e., travel time, etc.) there has been a gradual shift towards valuing streets as public spaces and for people to spend time rather than move on. The report explores the varying ways in which *place* is measured and valued. Traditional measures that focus on movement do not adequately address *place* so other methods are required. The report highlights variables associated with people, time, and activity to measure the value of place. Measures of safety, such as vehicle speeds and traffic volumes, are more traditional measures of transport value

(as opposed to place) and were not considered by the authors or others involved in workshops undertaken for the report to provide an accurate reflection of the value of place. Despite this, it should be acknowledged that elements of traffic, such as volumes, speed, pollution and noise can and do impact place value.

2.3 Review method

The purpose of this review was to examine the potential road safety benefits of placemaking activities within the road network. While placemaking has its origins in the Dutch woonerf and is very popular in European countries where city and village centres are often contained in a town square, this review focuses on the effects of placemaking in developed countries where road networks and their use are similar to those in Australia where city and town centres are located along high (or main) streets. Consistent with this approach, examples of placemaking are drawn primarily from the UK, USA, and New Zealand.

2.4 Placemaking examples from the UK

Examples of placemaking found in the UK include the Home Zone initiative, the re-development of Kensington High Street, Sheaf Square in Sheffield and New Road in Brighton. These were the only examples for which any form of evaluation was identified. While other placemaking activities were identified, information available for these only documented the types of activities undertaken and so were excluded from the review. This section therefore focuses on Home Zones and the three redevelopment locations.

2.4.1 Home Zones

The Home Zone initiative undertaken in the UK refers to residential streets that have been designed to be shared spaces (Biddulph, 2010). It was thought that the introduction of Home Zones would reduce the dominance and impact of motorised traffic on neighbourhoods, improve the aesthetic quality of streets, and make them safer for vulnerable users, creating more opportunity for children to play outside. Biddulph (2010) evaluated the Home Zone initiative drawing on reports available from 14 of the 75 Home Zones projects completed at the time. Reports generally consisted of surveys with residents regarding their thoughts and observations of Home Zones but some also provided information about vehicle speeds and crashes before and after the Home Zone was implemented. Biddulph (2010) noted substantial variability in the designs and costs adopted, ranging from a largely unchanged road with the introduction of isolated engineering treatments, to fully transformed streetscapes.

Analysis of vehicle speeds from eight projects found before speeds were below the 30 mph limit for urban areas, with five recording speeds below 20 mph. Following the Home Zone works, speeds were reduced across the eight projects with changes ranging from 1-5 mph. Biddulph (2010) notes that none of the projects where speeds were recorded achieved the desired design speed of 10 mph.

Analysis of crashes for 12 of the 14 projects demonstrated that many streets had very low numbers of crashes both before and after the projects were implemented. In the majority of cases crashes remained relatively unchanged but two sites saw reductions of around 2 crashes per year suggesting that Home Zone projects do not increase risk to vulnerable users (Biddulph, 2010).

2.4.2 Kensington High Street

A redesign of Kensington High Street in London was undertaken at the turn of the century, with work commencing in 2000 and finished in 2003. The goals of the redesign were to reduce street clutter through removal of signs and integrating traffic signals with light posts, and removing pedestrian guard

rails. Another aim was to improve pedestrian movement and links between both sides of the street. The impetus for the changes were to enhance the image of Kensington High Street as a premier shopping destination in London (Swinburne, n.d.).

Kerbs were aligned with the building line with all existing buildouts and lay-bys removed while footpath width was maintained or increased in some areas of high pedestrian activity. Bicycle parking was also installed in unused sections of the median strip. Figure 2.3 is an image of Kensington High Street after the redesign was completed.



Figure 2.3
The redesigned Kensington High Street (from: Sinnett et al., 2011).

The effect of the changes on safety were assessed by before (1998-2000) and after (Sept 2003 – August 2005) analysis of casualty crashes, with all London roads and the Royal Borough of Kensington and Chelsea used in an effort to control for broader trends and changes in road safety (Swinburne, n.d.). Swinburne (n.d.) noted that given the differences in the length of the before and after periods, and other potential confounders, it appeared that the changes had no adverse effect on safety and may have contributed to a slightly higher reduction (44%) than that observed in the Royal Borough of Kensington and Chelsea as a whole (35%). Further analysis found:

- Crashes due to pedestrians crossing where previously barriers would prevent this did occur, although there was an overall reduction in the number of crashes and overall crash severity.
- Vehicle speeds were reduced
- No casualties associated with the cycle parking installed on the median (e.g., to cyclists/pedestrians entering and leaving the parking, crossing the road)

2.4.3 Sheaf Square, Sheffield

In 2007 major works were undertaken in the city of Sheffield to improve pedestrian connections to the city centre from the train station. As part of the works a disused tower block was demolished and the area enhanced with sculptures, a fountain, and facilities to enhance comfort and encourage people to stay in the area (e.g., seating, lighting, etc.) (Sinnett et al., 2011). The improvements can be seen in

Figure 2.4. The resulting work resulted in increased pedestrian activity and substantial reductions in vehicle movements. No other information regarding safety was available.



Figure 2.4
Sheaf Square (from: Sinnett et al., 2011).

2.4.4 New Road, Brighton

New Road was a busy commercial street that was redesigned into a shared space, including a level surface (i.e., no raised footpaths or kerbing) and the removal of signs and road markings (See Figure 2.5). This enabled people friendly activities such as outside dining in an area that otherwise would have been a road. Before and after comparison showed a 162% increase in pedestrian activity, a 93% reduction in traffic volume and a reduction in crashes from three in 2004-2007 to zero since the project was completed in 2007 (Sinnett et al., 2011).



Figure 2.5
New Road before and after it was converted to shared space (from: Sinnett et al., 2011)

2.4.5 A cautionary tale

In 2017 an incident in shared space on London's exhibition road saw a vehicle hit a number of pedestrians outside of the Natural History Museum. Initially it was thought to be a terrorist incident but later recognised as traffic collision due to bad driving (BBC, 2017). Exhibition road shared space included elements such as on-street dining. Such incidents serve as a cautionary tale that while shared spaces can be safe, when there is a break down in the system, particularly where there is no separation between vulnerable users and motor vehicles, the results can be catastrophic.

2.5 Examples from NZ

Two studies were identified examining the effect of placemaking in New Zealand. Each of these studies examined three streets in the Auckland city centre that were transformed into shared spaces. Shared spaces are low speed roads intended for use by pedestrians and vehicles (including bicycles) without obvious physical separation (Karndacharuk et al., 2016). An example of the before and after transformation of the streets can be seen in Figure 2.6. Elements of the design include street paving that is level, removal of bollards and signs, no obvious line markings or car parking, and the inclusion of

features for pedestrians (e.g., seating). Investigation of the transformation involved intercept interviews with pedestrians within one of the transformed spaces (n=360) and control group participants recruited from a comparable street (n=40). A second aspect of the study sought opinions from professionals with expertise in transport or urban planning (n=15) primarily regarding the implementation of the shared space elements. Although not assessing safety in direct terms (e.g., number of crashes or injuries) this study examined perceptions of safety from all involved. Across all sites safety was ranked as the most important aspect of design, with participants rating placemaking or economic objectives among the least important. Interestingly, participants perceived the control street to be the most safe, although this was likely due to the characteristics of this street: a one-way street with speed humps to slow vehicles (and perhaps the street wasn't directly comparable).

Experts noted that the re-design appeared to meet all requirements regarding pedestrian amenity and were considered to produce low speed environments but observations showed that, while vehicle speeds were lower during peak pedestrian times, there was a slight increase during non-peak times. It was also noted that during periods of high pedestrian activity pedestrians were more likely to utilise the whole space and during low pedestrian periods vehicles were more likely to take over, with pedestrians moving to the side. Despite an overall perception of the re-designed streets as safe, some experts considered that incidents were inevitable.

In a separate study, Karndacharuk et al. (2014) investigated the interactions between vehicles and pedestrians in the Elliott street shared space (image (a) in Figure 2.6) using video surveillance. They also measured vehicle counts, vehicle speeds, and undertook an analysis of crashes before (2010) and after (2011-2012) the redesign. They found that during periods of high pedestrian activity (8am-6pm) vehicle speeds were lower after the shared space was implemented but that speeds were found to be similar to pre-change speeds during the evenings when pedestrian activity was low. The number of vehicles using the street was also lower than the before period. Video analysis of pedestrian-vehicle interactions demonstrated that, whereas vehicles were observed to dominate the street previously, following the re-design pedestrians had reclaimed the space with most interactions observed with either the pedestrian given priority or equal priority with vehicles. Analysis of crashes revealed very few crashes in the before and after periods with only two non-injury crashes reported (one in the before and one in the after period). Authors identified several safety concerns arising from parked vehicles in the shared space zone, vehicles travelling in the wrong direction down the one-way street, and an increase in vehicle speeds during the evenings when pedestrian activity was lower.



(a)



(b)



(c)

Figure 2.6
Before (left) and after (right) shared space transformations of (a) Elliott Street, (b) Lorne Street, and (c) Fort street in Auckland, New Zealand (Karnadacharuk et al., 2016, p. 122).

2.6 Example from the US

In 2009 the New York City Department of Transport (DOT) commenced a pilot project to address the problems associated with Broadway, a road that runs diagonally through Manhattan, causing a number of issues for safety and traffic flow (see Figure 2.7). Broadway created complex intersections that contributed to congestion and higher crash rates compared to other Manhattan intersections. Removal

of Broadway from these intersections was intended to address mobility and safety issues with the added benefit of creating a destination suitable to Broadway's reputation (DOT, 2010). The project sought to redirect traffic away from Broadway at Times Square and Herald Square through changes to road geometry, shortening pedestrian crossings, changes to parking regulations, and the creation of pedestrian plazas (DOT, 2010).

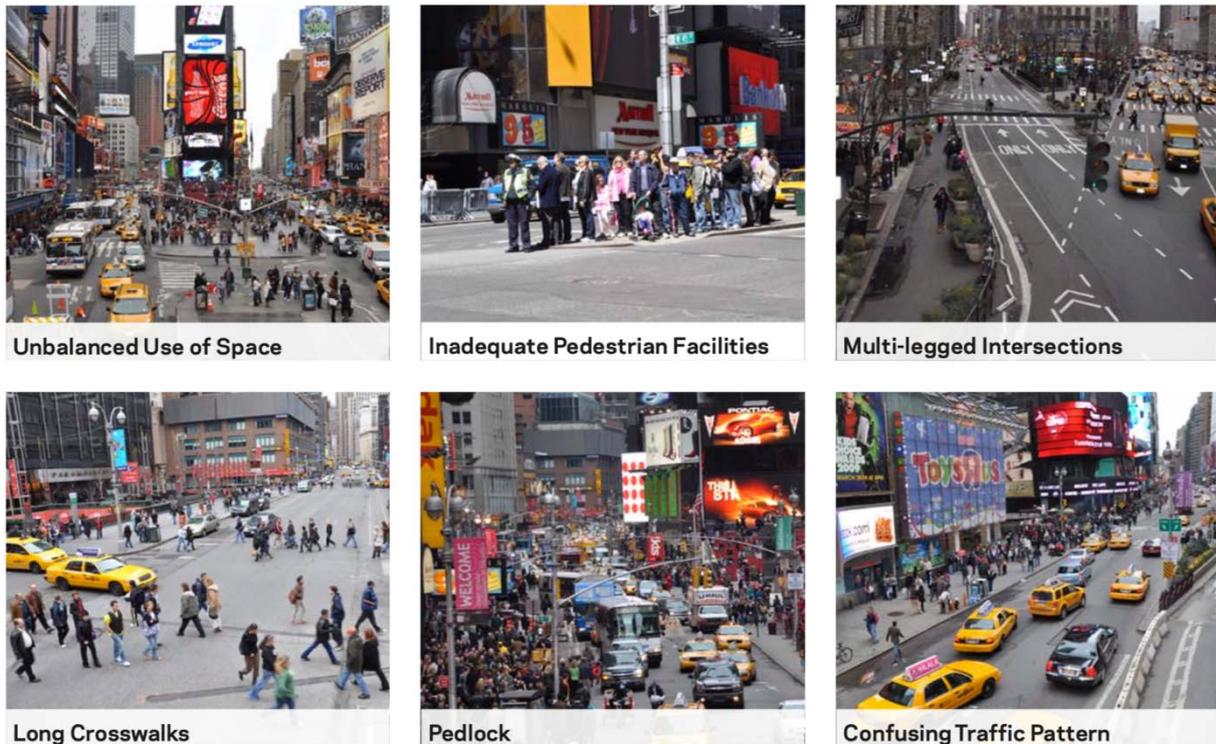


Figure 2.7

Issues arising from the alignment of Broadway prior to the Green Light for Midtown pilot project (source: DOT, 2010).

Evaluation of the project included measurements of mobility and safety comparing relevant data before and after the project was implemented. The various measures of mobility demonstrated improvements in vehicle flows and travel times. Pedestrian volumes in Times and Herald Squares increased by 11% and 6% respectively. Changes to Times Square also improved pedestrian travel flows. In terms of safety, injuries to motorists and passengers decreased by 63% and injuries to pedestrians decreased by 35%.

2.7 Observations

This review identified a limited number of evaluations of what might be considered placemaking activities in jurisdictions that are considered comparable to Australia. There are a number of other reports that describe placemaking activities and evaluate these in terms of people's perceptions of favourability and economic gains, most of which indicate substantial benefits are derived from such activity. As the placemaking activities undertaken in the projects described above involve a number of changes it is not possible to comment on the impact of individual elements on safety although it is likely that safety is largely derived through either the exclusion of motor vehicles (by restricted access or displacing traffic away from shared zones) or lowering of vehicle speeds. With the exception of the Broadway project undertaken in New York and Kensington High Street, the majority of projects discussed placemaking activities in areas with already low crash rates making it difficult to quantify the impact on safety.

3 Placemaking in South Australia

Four metropolitan councils (and one rural council) were approached for discussions relating to placemaking activities undertaken within their council areas, and whether any of these activities had been evaluated for their effectiveness in terms of road safety. While there are likely to be many more councils actively involved in placemaking, three of the councils were chosen on the basis that there were known placemaking activities in their council areas and CASR had an accessible contact within that council. Consequent interviews were held with representatives from those three councils: Adelaide City Council, the City of Charles Sturt, and Prospect Council. The general consensus was that placemaking is still an emerging 'concept' that has trickled down to local government in the last five years. Placemaking teams have been created within local government but their budgets have been limited to low cost and small scale projects, such as road murals, greening, and lighting.

The roles of people involved in placemaking, particularly for larger projects, were wide and varied and included:

- traffic and transport engineers/managers
- transport planning engineers/managers,
- urban designers,
- managers of infrastructure and assets, and
- economic development managers.

In some councils, placemaking teams exist but project scale and budgets to date have been small. Placemaking teams are expected to have more influence on re-imagining public space in larger infrastructure projects in the future. The commentary below includes summaries of discussions, correspondence and opinions expressed by various SA council representatives who contributed to this project. It is acknowledged that there are many councils within South Australia that are likely to be undertaking placemaking or have undertaken placemaking projects and, as such, the following is just a snap-shot of what was captured as part of this project.

3.1 Road Murals

While the application of road murals may not seem to be a long term, large investment placemaking activity, it does fit within the design philosophy of placemaking, particularly in the manner in which it is undertaken. Road space is temporarily reclaimed for the activity of painting, and people within the community are brought together at a place to undertake the mural, interacting with each other and local businesses. In Figure 3.1, Jetty Road in Grange, SA was closed for the day by the local council, while members of the community claimed the road space to assist with the mural painting and other organised activities. The motivation for this project was to bring the local residents and stakeholders together for the day's activity and to provide a mural that would give a sense of community around the local business area and influence traffic behaviour to be mindful of the road environment and ongoing high pedestrian activity.



Figure 3.1
Road Mural being painted by the community in Jetty Street, Grange (April 2017).

In terms of road safety, road murals have been installed to attempt to lower vehicle speeds without big investment in local area traffic management infrastructure. However, the DPTI Code of Technical Requirements indicates that installation of road murals can be used to create more people friendly and safer streets, or for street beautification purposes, but not as a traffic calming device (Tonkin Consulting, 2018).

Road murals have been used in a number of areas around South Australia, with varying effectiveness, based on the limited evaluations that have been undertaken. One of the more significant road murals with a substantial evaluation was undertaken in Roopena Street, Ingle Farm.

Road murals were installed in Roopena Street in June 2015 as part of the Living Neighbourhoods Project (led by the then Department for Planning, Transport and Infrastructure; DPTI). The aim was to trial a new community approach for creating a safer, healthier and more vibrant neighbourhood, and to making a positive impact through the slowing of traffic (Tonkin Consulting, 2018). The five murals were developed with the assistance of the local community. Figure 3.2 shows one of the murals being painted by members of the community.

A before-after traffic speed evaluation was conducted at three sites, two in the vicinity of a mural (location 1 and location 2) and one outside the mural area (location 3), with results indicating that at location 1, 85th percentile speed of traffic decreased by 2.6 km/h (47.2 km/h to 44.6km/h) and the percentage of vehicles travelling above the default 50 km/h speed limit decreased from 6.7% to 3.5%. At location 2, the 85th percentile speed of traffic decreased by 1.4 km/h (52.2 km/h to 50.8 km/h) and the percentage of vehicles travelling above the default 50 km/h speed limit decreased from 24.8% to 18.1%. At location 3, the two traffic metrics assessed did not change; 85th percentile speed remained at 41.4 km/h and percentage of speeding vehicles remained at 0.7% (this location was near a roundabout so was likely to have the least effect).

A survey was also undertaken with 21 of 35 property occupiers responding. With regards to safety, one occupier reported they felt it was a distraction to motorists, five reported they believed the murals had a traffic slowing effect, eleven found it difficult to assess any difference on traffic and five felt there was no noticeable effect.



Figure 3.2
Community painting at one of the murals in Roopena Street, Ingle Farm

A formal additional evaluation undertaken three years after installation found that 85th percentile speed at location 1 was 47.1 km/h and the percentage of speeding vehicles was 6.2%. At location 2, 85th percentile speed was 50.4 km/h and the percentage of speeding vehicles was 16.6%. At location 3, 85th percentile speed of traffic increased by 0.2km/h and the number of speeding vehicles again did not change. In summary, it was reported that “the road murals do reduce vehicle speeds using a psychological effect to modify driver behaviour, to a level typical of the lower impact type of physical traffic calming measures.” (Tonkin Consulting, 2018).

A DPTI “Resident’s Win” project involving placement of road murals near Kilkenny Primary School in West Croydon also yielded positive results (see Figure 3.3 for mural). Traffic survey data collected near the road murals before (September 2017) and after installation (February 2018), revealed a 10% reduction in the 85th percentile speed (42.8 km/h to 38.4 km/h) and a 6% reduction in traffic volume. A nearby control site had a 2% reduction in 85th percentile speed (52.1 km/h to 51 km/h) and a 6% increase in traffic volume, for the same traffic survey dates (these differences are not statistically significant).



Figure 3.3
One of two road murals near Kilkenny Primary School.

In other cases, measurements taken after the installation of road murals have found higher 85th percentile speeds. Methodological issues, such as short term follow-up periods, single before and after counts, and individual treatment sites (as opposed to large randomised trials) make it difficult to detect any meaningful changes.

3.2 Place over movement re-allocation

Crawford Lane, Hindmarsh is used by businesses for access and deliveries, as well as sporting fans walking to Hindmarsh soccer stadium and was due for asset renewal. Murals and lighting (and seating) were installed as part of a project delivered by the City of Charles Sturt placemaking team and formed a component of the scheduled resurfacing with asset renewal. This project demonstrates how a small road can be activated and made highly attractive, potentially safer and feature more effectively as a place rather than purely for traffic movement.

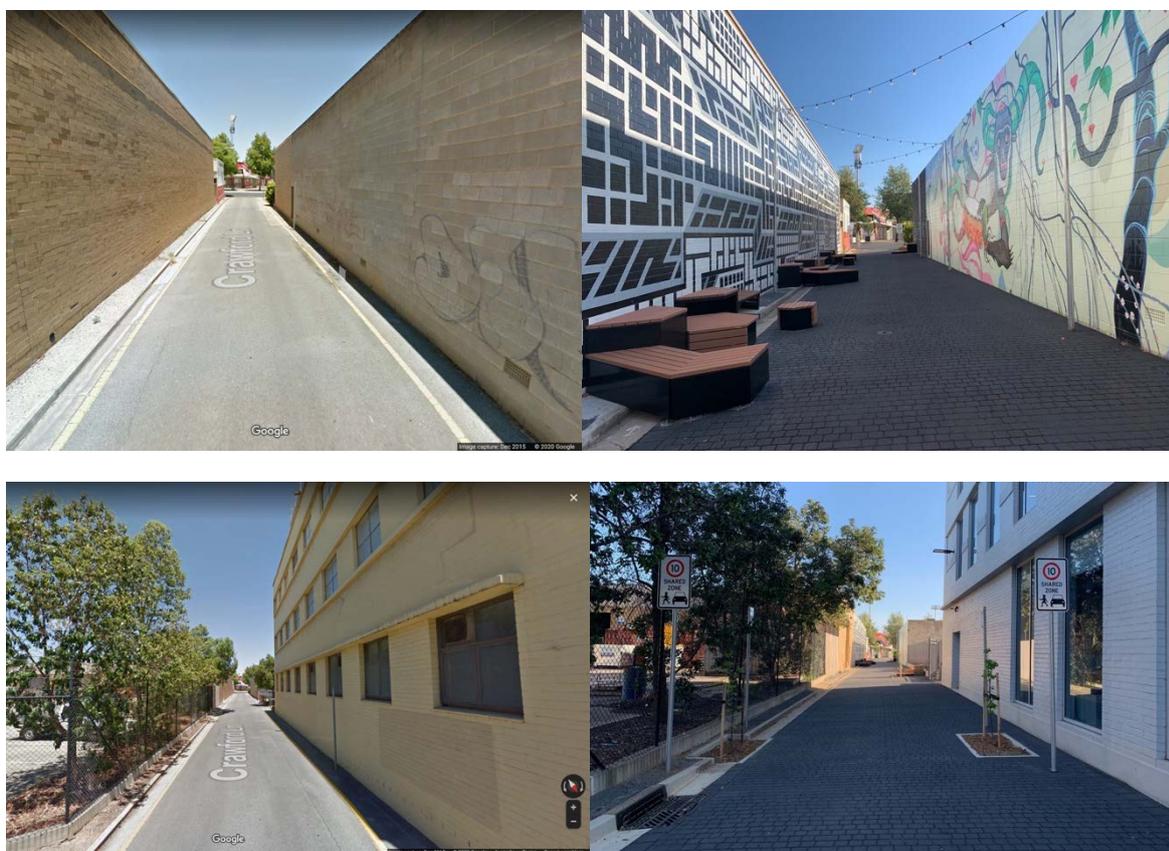


Figure 3.4
Before and after placemaking in Crawford Lane, Hindmarsh.

3.3 Placemaking through economic development

Lower scale treatments like the road murals discussed in Section 3.1 and other smaller budget initiatives, such as lighting projects, events, artwork, and outdoor dining spaces, are generally undertaken by 'placemaking teams' within Councils. More substantial 'placemaking' projects are usually associated with larger infrastructure projects.

Some placemaking projects are driven by asset renewal and economic development. For example, the City of Charles Sturt Military Road/Main Street (Henley Beach) Project coincided with the renewal of assets of one road (Military Road), while the other road (Main Street) still has a 'serviceable life', whereby that renewal is driven by economic uplift and public space enhancement. This placemaking project is being delivered by the Engineering and Assets team, who have the project management experience to deliver this scope of project (personal correspondence, Chris Bentick, City of Charles Sturt, City of Charles Sturt, 2019). This project (which is still to be delivered) has recently been awarded 2020 AILA SA Landscape Architecture Award for Urban Design; the project incorporates improvement of amenity and greening (for increased shade) for people using the area, as well as designing "streets for people walking, cycling or strolling", a project very much resulting in "streets for people" (ALIA, 2020). See Figure 3.5 for an artist's depiction of the streetscape design.



Figure 3.5
Streetscape view of part of Military Road and Main Street Precinct upgrade. (Sourced from ALIA, 2020)

There are also larger scale placemaking projects that have been co-funded by local and state government. These often coincide with asset renewal or projects that aim to promote 'economic development' where State Government funding can be acquired in addition to local Government funding, for projects which would deliver improved amenity and economic development outcomes. An example of this is the Prospect Road – Village Heart redevelopment which was partly funded through the South Australian Planning and Development Fund through the "Places for People Grant Program", local Government investment and road asset renewal (Government of South Australia, 2019; City of Prospect, 2017).

This project involved the widening of footpaths, narrowing of the road (allowing shorter pedestrian crossing distances), addition of pedestrian activated traffic lights (controlled pedestrian crossing facilities) and a speed limit reduction to 40 km/h in the redevelopment area on an arterial road. These are very much safety by regulation 'features' of the redevelopment. Additionally, increased pedestrian activity may increase safety by demonstrating the area to be more focussed on 'place' rather than 'movement', and increasing perception of safety by increased pedestrian activity in the area. New landscaping and public artwork were also installed, and the 'vibrancy' and attractiveness of the area was improved (Jensen PLUS, 2019a). The upgrades resulted in property developer confidence and encouraged investment in the area, with construction of new buildings, including cinemas, restaurants, bars and cafes as well as the re-development of older buildings. The council economic development team worked with local businesses to establish good relationships and peer to peer networks, so that

the area continues to be a sustainable, high trade and low vacancy area (Prospect Road currently has the lowest vacancy rate of any high street anywhere in metropolitan area).

The project also attracts the local community to the local amenities, encouraging walking and cycling as a preference, providing the free and fast internet “gigabit city”, as well as attracting visitors from outside the local area to visit. The future aspirations for this road are to lower the traffic speed ‘by design’ rather than by regulation, to get car drivers to respect vulnerable road users and crossing movements by better space sharing.

Figure 3.6 shows a major part of Placemaking on Prospect Road and Rose Street, Prospect. Car parks were removed and replaced with outdoor dining and greening (Rose Street), bollards were installed to protect outdoor diners, and green bicycle lanes were painted at the intersection to acknowledge cycling space and improve cyclist safety. While road safety aspects were incorporated into the Prospect village heart project, no traffic safety evaluations have been undertaken to date.

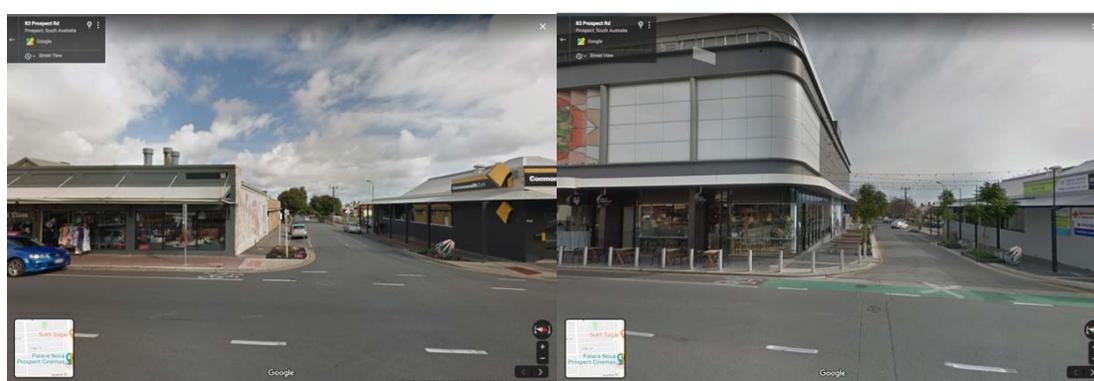


Figure 3.6

Part of the Prospect village heart project.

3.4 Other examples of large-scale placemaking projects

3.4.1 Bowden

The redevelopment of Bowden saw cooperation between Renewal SA, the City of Charles Sturt and property developers to redesign the surrounding streets with a focus of place over movement and including a more shared space feel than previously existed. The reconstruction of Sixth Street, Bowden (between Gibson Street and Park Terrace; see Figure 3.7) and several other streets in the redevelopment involved removal of kerbed footpaths, road surface treatments to include both paving and asphalt and centre-lined greening and kerbing to incorporate a degree of traffic calming without the use of vertical deflecting raised plateaus or horizontally deflecting chicanes. The project was intended to enhance the place function of the street but, anecdotally, was also found to have been effective at reducing vehicle speeds and volumes (7-day and 5-day vehicle counts reduced by about 30% and 36% respectively, while 85th percentile speeds reduced by almost 20% between July 2008 and May 2014; personal correspondence, Chris Bentick, 2019). This placemaking project was also part of a larger project to reclaim industrial land into transit-oriented housing, so it is important to note that the traffic type and traffic volumes were likely to be influenced even in the absence of deliberate placemaking.



Figure 3.7
Sixth Street, Bowden in 2009 (left) and in 2016 (right)

3.4.2 Goodwood Road Streetscape Upgrade, Goodwood.

The Goodwood Road Streetscape upgrade was “a design project to revitalise the footpaths and public spaces, incorporating strong public art and thermoplastic art on some local streets, new public seating spaces in side streets away from traffic, paving treatments and raised continuous footpaths” (City of Unley, 2016). Figure 3.8 shows the placemaking where Rosa Street intersects Goodwood Road. Power lines have been undergrounded (as part of a different project), footpaths have been paved and widened in areas, kerbs made less pronounced, and ramps removed with the lowered kerbing. Outdoor seating has been introduced for dining and bollards provided for protection, car parking removed, and thermoplastic artwork installed. The overall road design potentially lowers traffic speed by visually presenting a shared space environment. The regulatory Stop signs and lines have also been removed. Similar road environment design principles have also been applied to Florence Street, Lily Street and Gilbert Street.



Figure 3.8
Before and after depictions of Rosa Street incorporating footpath widening and thermoplastic road artwork.

3.4.3 Sixth Street, Murray Bridge.

Sixth Street, Murray Bridge was redesigned using 'shared' street principles including the reduction or removal of kerbs, slowing cars by narrowing and paving the roadway, and making the street pedestrian friendly (Jensen PLUS, 2019b). The streetscape upgrade was "designed to be an attractive, comfortable public place, somewhere to linger, not hurry through" (Jensen PLUS, 2019b). An example of part of the Sixth Street upgrade is shown in Figure 3.9. Generally, there is a consistent approach to this type of placemaking: removal of raised kerbing, narrowing of road sections, removal of car parking spaces, and the introduction of some paving to create a more shared space environment where pedestrians should feel safer. In the below example, this street section has been converted to one-way, potentially reducing pedestrian exposure to motorised traffic. It's interesting to note that, although some parallel parking has been removed, it was replaced with angled parking. While parallel parking increases the risk of "dooring" conflicts between cars and cyclists, angled parking decreases visibility of vulnerable road users for motorists reversing and leaving parking spaces. Research suggests that parallel parking is safer than angled parking (Oregon Department of Transportation, 2001), although in a clearly presented shared space environment that may differ. It is important to evaluate changes in order to better understand the safety implications of any placemaking activities.

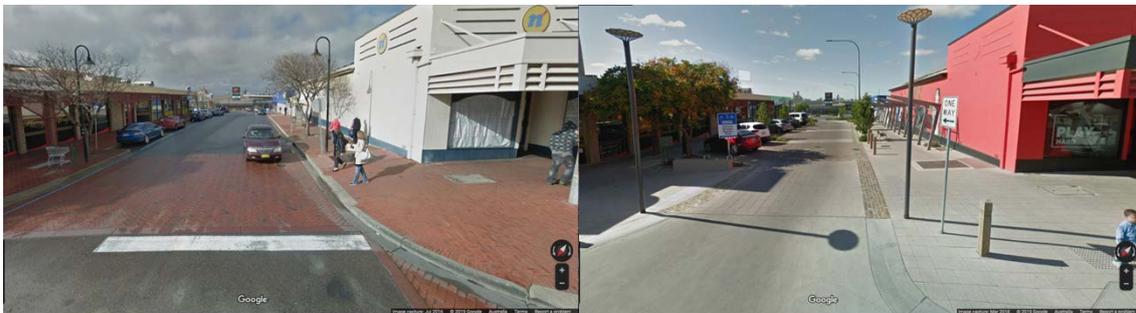


Figure 3.9
Sixth Street, Murray Bridge, before upgrade (left) and after upgrade (right)

Frome Street Bike way

The Frome Street bike way was undertaken by the City of Adelaide. Frome Road was re-designed to remove trafficable/parking space and allocate a physically separated space to cyclists. The arrangement retained two traffic lanes in each direction during morning and afternoon peak periods. Outside of peak periods, parking is permitted in the kerbside lanes in both directions. Preliminary crash analysis found that midblock bicycle crashes were eliminated following installation of the Bikeway, and there was a reduction in bicycle crashes compared to a similar parallel route (Pulteney Street, Adelaide) that large volumes of cyclists also use. Figure 3.10 shows the before after comparisons on Frome Road near Pirie Street, Adelaide, SA.



Figure 3.10

Frome Street bike way before and after the removal of road space and addition of separated bicycle infrastructure.

Hindley Street

The road upgrade on Hindley Street is a good example of placemaking by reclaiming space for pedestrian use (Figure 3.11). Footpaths were widened, car parking spaces were removed, and landscaping and greening undertaken to provide an attractive space, particularly for students and staff around the city west campus of the University of South Australia. The pedestrian activated crossing was removed and wombat crossings installed, and the speed limit in critical high pedestrian traffic areas was reduced to 30 km/h. The Hindley Street redesign incorporates good shared road principles, and somewhat dilutes the movement priority of motorised traffic by giving pedestrians more road space, and priority, even though the priority is still directed to the wombat crossing points.



Figure 3.11

Before and after photographs of Hindley Street, near George Street, Adelaide

City of Unley Parklets

Parklets were initiated throughout the City of Unley as a temporary pop-up modular and moveable structure which incorporates structural safety, seating and tables, and is a public space encouraging people “to spend more time on the street and in front of local businesses” (City of Unley 2019). The parklets consume two car parks, reclaiming the road as a public shared space, and give a different perspective on how road space can be used and how traffic needs to negotiate road space.



Figure 3.12
Examples of Parklets in Unley (Photograph from City of Unley, 2019)

4 Evaluation of placemaking projects

Generally, evaluations of placemaking projects have been minimal in terms of both scope and number of evaluations. The purpose of placemaking generally does not involve road safety as the main impetus for the project but is more a transformation of road space to “place”. Measures of vehicle speeds and traffic volumes are traditional indicators of how an intervention has influenced transport movement (as opposed to place) and are not considered to be an accurate reflection of the value of place. However, some efforts have been made in regard to evaluation, mainly consisting of short duration traffic surveys examining vehicle speeds and traffic volumes before and after the projects. There has been very little focus on evaluating the increase in ‘people’ in the area as counts for pedestrian and cyclists have not been generally conducted in South Australia, these assessments have been considered overseas, however.

Evaluations have demonstrated a traffic calming effect but a more robust scientific approach is required to evaluate any interventions properly. The simple case-control traffic study (one case and one control) adopted for some projects may be better than other methods but lacks the scientific rigour necessary to adequately measure the effect of individual placemaking activities.

A more suitable design for evaluation would require the selection of a number of sites with the potential to benefit from a ‘placemaking’ intervention, and then randomly selecting half of the sites for treatment and retaining the others as control sites; a minimum of 10 case and 10 control sites would be required. Traffic surveys (including bicycle and pedestrian surveys) before and after the placemaking interventions could then be compared between all sites with the intervention, between all sites without an intervention and between the case and control sites. Differences between case and control sites could then be attributed to the placemaking activities. Continued monitoring of the sites over a long period would give an indication as to whether changes brought about by placemaking are short-lived or have an enduring effect or a meta-analysis conducted for locations across the state or the nation. This research methodology would require careful planning and coordination with local government, state government and relevant stakeholders and hence cannot always be applied to real-world scenarios easily.

In the absence of being able to undertake an ideal research methodology, a simplified evaluation is better than no evaluation at all. With increased location specific data collection there is the opportunity for aggregating the individual results across multiple locations and hence providing a more adequate representation of any placemaking effect.

It is acknowledged that evaluations of placemaking and infrastructure projects are often neglected due to a need to deliver a large volume of projects. The busy capital and operating project workloads of councils often mean that, upon completion, project teams often move onto subsequent projects to ensure delivery prior to the financial year end. The importance of evaluations to ensure the projects achieve expected and desired outcomes is also recognised (Personal Correspondence, Chris Bentick, City of Charles Sturt). It is important, then, that any evaluation is built into a placemaking project. Projects should have clear outcomes and expectations declared from the onset and methods and measures to determine whether these have been met should be incorporated within the project scope.

City of Charles Sturt met with Placescore (a Placemaking consultancy) who suggested determining community priorities and the quality of their experiences. They also suggested evaluating economic benefits by measuring spending, while the attractiveness of a place to people can be measured a number of ways, including numbers of visits, average time spent at locations, and social media excitement. It was acknowledged that appropriate objective data collection remains difficult.

5 Discussion

Placemaking is an approach to urban design centred on the notion of creating public spaces for better utilisation by people and has the potential to provide road safety benefits. A review of international literature and a survey of South Australian councils, primarily from metropolitan areas, revealed substantial variation in the types of placemaking activities undertaken, including simple measures such as artworks on roads, and larger scale projects including the creation of shared spaces and re-designed intersections. Safety of these designs was largely measured using standard traffic variables, including vehicle speeds, traffic volumes, and crash numbers. The limited evidence appears to suggest that placemaking influences safety chiefly through reductions in vehicle speeds and/or reductions in the volumes of motor vehicles due to restricted access or diverting traffic from the area. There was also evidence that increased pedestrian density also lowered vehicle speeds, although speeds were found to increase at times when pedestrian density is lower. However, interactions between drivers of vehicles and other road users are complex and other factors may influence safety too.

Due to the manner in which placemaking is undertaken, projects tend to incorporate a number of elements and, among the examples considered in this report, no two projects were the same. This makes it difficult to identify the unique impact of individual placemaking elements on safety, although it would appear that larger scale projects that ultimately reduce or restrict traffic have the greatest benefit. It should be noted, however, that such activities as observed in this report were mostly undertaken in areas with already high pedestrian activity and already very low crash numbers; the characteristics of these environments may have contributed to the selection of these sites for placemaking. It was also noted that some evaluations of placemaking activities employed flawed methodologies that failed to control for factors such as general changes in speed across the road network. The adoption of randomised controlled evaluations would be of great benefit in the future.

At present, placemaking in South Australia is primarily undertaken as part of larger infrastructure renewal projects or large projects that support economic development strategies. Any road safety benefits that are achieved by these projects are likely to be the result of giving greater consideration to vulnerable users such as pedestrians and cyclists. The concept of “safety by design” is very important as it shows the importance of designing a “safe system” from the onset. However, the road safety benefits of such larger projects that fall within the design philosophy of placemaking generally have not been evaluated, most likely as the projects were primarily related to asset renewal or economic development, so measures of success of those projects relate to the fundamental project brief and not necessarily road safety.

The notion of placemaking as a tool for road safety appears plausible. The concept of psychologically managing driver behaviour through manipulating the environment would have great value where such manipulations also make the environment more people-friendly. Placemaking activities have the potential to be employed as road safety measures, primarily if used to lower speeds and reduce or remove motorised traffic from the area. While reductions in vehicle speeds of as little as 1km/h would have benefit (e.g., Doecke et al. 2011), significantly reducing speeds in line with safe systems to 20-30 km/h (Fildes et al., 2005; Tingvall & Haworth, 1999) would be necessary in locations where vulnerable users are expected to mix with motor vehicles. Further, it is likely that placemaking that is more intrusive and/or reclaims larger portions of public space (i.e., roads) will yield greater benefits.

It is important to note that, as the mechanisms through which placemaking activities impact safety are not fully understood, it would be risky to assume that any given activity would be sufficient to improve safety unless it will significantly reduce vehicle speeds. As demonstrated in the example of Exhibition Road, London, in designs where vehicles share space with vulnerable road users, there will always be an element of risk, and so it is important to build safety into the design in additional ways. These include

measures that can prevent high vehicle speeds from being possible (such as traffic calming devices) and pedestrian protection structures such as bollards.

As a philosophy, placemaking values people over vehicles and this philosophy is compromised when vehicles are included in designs. While early proponents of placemaking and psychological speed management such as Engwicht (2005) suggest that the creation of uncertainty by altering the environment can improve safety, in reality the types of activities he describes have not been scientifically tested. From the examples described above, particularly those from overseas, the most successful designs appear to be those that significantly limit the amount of interaction between vulnerable and motorised road users. Knowledge of the effects of different engineering treatments on speed, exposure, and likelihood of crashes also provide a more robust insight into the benefits that may be derived from placemaking that adopt these approaches (e.g., shared zones).

6 Conclusions

It appears likely that placemaking can provide road safety benefits based on limited scientific evidence, much anecdotal evidence, and strong theoretical arguments. Placemaking activities undertaken internationally (and to some extent locally) demonstrate the potential to provide safer environments. While the mechanisms are not fully understood, current evidence suggests safety is largely derived from reductions in vehicle speeds and traffic volumes. In Australia, placemaking is chiefly undertaken for economic reasons (i.e., to attract people to places of business) with road safety only a secondary benefit of this. Those undertaking placemaking primarily as a measure to improve safety of vulnerable users should endeavour to reduce speeds and motorised traffic as much as possible, noting that, where users are expected to occupy the same space, crashes are inevitable, and it is the safety of vulnerable users that is compromised in such cases. Placemaking activity has the potential to improve the value and use of public space and if implemented appropriately may also benefit road safety.

There are still large gaps in knowledge in relation to mechanisms that make interactions safer but it is assumed that a reduction in traffic volume (exposure) and traffic speed are likely contributors. This, however, grossly simplifies the complex nature of interactions between drivers and other road users.

Placemaking should be supported by road safety strategies and the opportunity to improve safety when asset renewal activities or urban renewal are undertaken. Open and improved coordination of State and Local Government renewal or maintenance activities could further increase the likelihood of realising the potential safety benefits derived from placemaking.

More evaluations are required to clarify the elements of placemaking that maximise road safety outcomes. Such knowledge would assist the business case for pursuing the activity on a more widespread basis. At present it appears that road safety is not accounted for when determining benefits and therefore is generally assumed as a by-product of the activity.

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