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Neighbourhood socioeconomic and transport disadvantage: The potential to reduce social inequities in health through transport

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ABSTRACT

Globally, concerns about population growth, urbanisation, traffic congestion, climate change and rising chronic disease are prompting policy-makers and governments to prioritise policies that support local walking and increase access to public transport. These are of particular relevance for those more likely to experience transport disadvantage, such as those in socioeconomically disadvantaged areas, where transport disadvantage tends to be higher. The aim of this study was to examine associations between neighbourhood socioeconomic disadvantage and transport-related spatial measures, identified through a review of transport-related policies. It included 2460 neighbourhoods in Brisbane, Australia as defined by the 2011 Australian national census boundaries. Neighbourhood socioeconomic disadvantage was measured using a census-derived composite index. Policy-relevant spatial measures included: street connectivity, cul-de-sac length, street block length, traffic volume, public transport stops and public transport frequency. Data were analysed using binary and multinomial logistic regression. More disadvantaged neighbourhoods had significantly greater odds of being highly connected, and with cul-de-sac and street block lengths, and public transport stop access and frequencies at levels recommended by Australian urban and transport policies, although they also had higher traffic volumes. Compared with more advantaged neighbourhoods, there was no evidence that disadvantaged neighbourhoods in Brisbane experience transport disadvantage. Although these neighbourhoods have higher levels of traffic, they are more likely to comprise urban and transport design features and levels of public transport access recommended by Australian urban and transport policies. The distribution of transport-related infrastructure in Brisbane has potential to reduce health inequities; and could potentially be enhanced further by reducing exposure to traffic.

1. Introduction

Transport access is a social determinant of health, offering the means to reach essential services, facilities, and activities including employment, medical care, education, shops and social networks, all of which affect quality of life (Spinney et al., 2009). To this end, 'transport disadvantage' has been defined as the inability to travel when and where one needs to without difficulty (Denmark, 1998).

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Lack of mobility and accessibility to public transport have been shown to be positively associated with socioeconomic disadvantage and social exclusion (Lucas, 2012). Links between transport disadvantage and neighbourhood deprivation have been demonstrated both in the UK (Lucas et al., 2009) and in Australia (Currie et al., 2009; Currie et al., 2010; Dodson et al., 2010; Stanley et al., 2010).

Residents of disadvantaged neighbourhoods have been shown to exhibit poorer health behaviours and outcomes, even after adjusting for their individual-level socioeconomic position (Rachele et al., 2016; Rachele et al., 2015; Rachele and Turrell, 2016; Turrell et al., 2010; Turrell et al., 2012; Brennan and Turrell, 2012; Loh et al., 2016). The need to address such inequalities has been acknowledged internationally (Marmot et al., 2008). Using active and public transport, in lieu of driving is one mechanism for reducing health inequities. First, increases in transport-related physical activity can reduce levels of overweight and obesity (Webb et al., 2012). A systematic review of 30 health impact modelling studies, which quantify benefits from walking or cycling due to increases in physical activity, as well as resulting risks from exposure to air pollution or crashes, demonstrated that health benefits from active travel consistently outweigh risks (Mueller et al., 2015). Even public transport users undertake more incidental physical activity compared with car users, because they walk between origins, transit stops and their destinations (Mees and Groenhart, 2012). Second, health inequities can be reduced through decreases in material deprivation via no longer needing to own and operate one or more motor vehicles because no other transport options are available ('forced car ownership') (Gleeson and Randolph, 2002).

Transport and urban design policy can promote healthy and safe behaviours equitably, by prioritising active and public transport (Marmot et al., 2008). For example, transport disadvantage could be ameliorated by investing in walking and public transport infrastructure around socioeconomically disadvantaged neighbourhoods. Addressing transport disadvantage at a policy level will not only assist individuals to access essential services such as employment, education, and recreation, it will also create a healthier, more equitable society, in line with the Australian Government's principles of social inclusion (Rosier and McDonald, 2011). The equitable distribution of transport infrastructure in socioeconomically advantaged and disadvantaged neighbourhoods could therefore help reduce health and social inequities. Government policy shapes the physical makeup of communities and the distribution of services to those most in need. It could therefore play a key role in creating neighbourhoods that support active travel, and enhance equitable access.

The local built environment has the potential to reduce health inequities by providing more equitable access to transport infrastructure; hence, the relationship between neighbourhood-level socioeconomic disadvantage and transport infrastructure is important. This study examined associations between neighbourhood socioeconomic disadvantage and land use and transport measures of urban design features, using the City of Brisbane as a case study. Brisbane has a medium density urban environment, with a population of 1.2 million in 2015 (Australian Bureau of Statistics, 2005), managed by the a single council (Sinnewe et al., 2015). This study builds on our previous work examining policy-derived spatial transport measures, using data obtained from Brisbane City Council (Rachele et al.,). In order to maximise the policy-relevance of this study's findings, the spatial measures used were sourced from state-level government spatial transport policies across selected Australian states. Creating spatial measures that are derived from policy are useful for monitoring the success (or otherwise) of current policy, and inform the development of future neighbourhood land use and transport policies that would help to deliver more walkable, liveable environments that promote active travel (Greenwood, 2008; Badland et al., 2015; Badland et al., 2017). This approach differs from most research to date, which derives spatial built environment measures from the literature (Turrell et al., 2013) or environmental audits (Cerin et al., 2013).

2. Methods

2.1. Identification of spatial measures

To enable development of policy-relevant measures, in 2014, we identified current state-level transport policies in all Australian states participating in the Natonal Liveability Study (i.e.,the Australian Capital Territory (ACT), New South Wales (NSW) Queensland (QLD), Victoria (VIC), and Western Australia (WA)). We sought state policies because, in Australia, each state develops their own transport policies, and these may differ across different jurisdictions. The research team reviewed the policies and excluded those for which spatial measures were unable to be developed. The final list of spatial transport measures (Table 1) was reviewed for completeness by the National Liveability Study's Advisory Group, which consisted of state and federal policy-makers, practitioners, and non-government organisations. Five policy-relevant spatial transport measures relevant to neighbourhood design were identified for inclusion (street connectivity (from NSW), cul-de-sac length (WA and NSW), street block length (VIC) and traffic volume (NSW); and four policy-relevant measures related to public transport access (public transport stops (VIC, WA and NSW) and public transport frequency (NSW))).

Table 1
Broad policy areas and number of policies identified for inclusion.

Broad area	All relevant policies identified	Spatial policies identified
Neighbourhood design	17	5
Public transport	22	4
Cycling	10	0
Footpaths	10	0
Speed/parking	14	0
Aesthetics	5	0
Total	**78**	**9**